UNDERGRADUATE **2016**

Faculty of Engineering and the Built Environment

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UNIVERSITY
OF
JOHANNESBURG

UNIVERSITY OF JOHANNESBURG

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

RULES AND REGULATIONS
2016

UNDERGRADUATE PROGRAMMES

www.uj.ac.za

IMPORTANT NOTICE

Compare the information contained in the printed version of the
Rules and Regulations with the electronic version on the UJ website.
The electronic copy is regularly updated.
The University reserves the right to supplement, delete or change any part of a regulation without prior notice.

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GENERAL INFORMATION AND CONTACT DETAILS

Executive Dean **Prof Saurabh Sinha**
BEng (Univ of Pretoria), MEng (Univ of Pretoria), PhD(Eng)(Univ of Pretoria), SMIEEE, FSAIEE, Pr Eng

Secretaries of the Executive Dean:
Auckland Park Campus
Ms Daizeline Layte
011 559 2114

Doornfontein Campus
Mr Paballo Nkhumane
011 559 6165

Vice Deans

Postgraduate and Research **Prof Charles Mbohwa**
BScEng (Univ of Zimbabwe), MSc (Univ of Nottingham), PhD (Tokyo Metro. Inst of Tech), PrEng (Zimbabwe)

Teaching & Learning and Operations **Prof Morgan Dundu**
BScEng (Princeton), PhD (Univ of Pennsylvania)

Secretary to the Vice Deans:
Ms Reginah Mogola
011 559 6934

Heads of School

Civil Engineering and the Built Environment **Prof Stephen Ekolu**
PhD (Univ of Toronto)
Secretary:
Ms Nathalie Engelbrecht
011 559 3511

Electrical and Electronic Engineering **Prof Johan Meyer**
D Ing (RAU)
Secretary:
Ms Lara Botha
011 559 4396

Mechanical and Industrial Engineering **Prof Andre Nel**
D Ing (RAU)
Secretary:
Ms Charmaine Groenewald
011 559 3760

Mining, Metallurgy and Chemical Engineering **Prof Antoine Mulaba**
PhD (Univ of Leuven)
Secretary:
Ms Satsakani Mushwana
011 559 6635

Postgraduate School of Engineering Management
Prof Jan-Harm Pretorius
DEng (Electrical and Electronic Engineering)
Administrative Assistant:
Ms Gina Rautenbach
011 559 3824

Head of Faculty Administration **Ms Elize Maas**

Assistant to the Head of Faculty Administration
Ms Anuschka Vermeulen
011 559 2119

Senior Faculty Officer – Doornfontein Campus
Ms Pearl Naidoo
011 559 6311

Senior Faculty Officer – Doornfontein Campus
Mr Bongani Nkosi
011 559 6761

Senior Faculty Officer – Auckland Park Campus
Ms Thoko Mathibela
011 559 2115

Senior Faculty Officer - Post Graduate Administration
Ms Dudu Kanyi
011 559 2109

Faculty Finance
Mr. Andre van den Berg
011 559 2108

POSTAL ADDRESSES:

Faculty of Engineering and the Built Environment
University of Johannesburg
PO Box 524
AUCKLAND PARK 2006

Faculty of Engineering and the Built Environment
University of Johannesburg
PO Box 17911
DOORNFONTEIN 2028

Academic Departments

SCHOOL OF CIVIL ENGINEERING AND THE BUILT ENVIRONMENT

Civil Engineering Science – Auckland Park Campus
Head of Department: Prof Felix Okonta
Departmental Secretary: Ms Lerato Mahlangu
Tel: 011 559 2342

Civil Engineering Technology – Doornfontein Campus
Head of Department: Mr Thomas Chabalala
Departmental Secretary : Ms Kedibone Maganadisa
Telephone: 011 559 6415

Construction Management and Quantity Surveying – Doornfontein Campus
Head of Department: Mr Nazeem Ansary
Departmental Secretary: Ms Corlia Jordaan
Telephone: 011 559 6051

Town and Regional Planning – Doornfontein Campus
Head of Department: Mr George Onatu
Departmental Secretary: Ms Sithembile Thusi
Telephone: 011 559 6428

SCHOOL OF ELECTRICAL ENGINEERING

Department of Electrical and Electronic Engineering Science – Auckland Park Campus
Head of Department: Prof Yanxia Sun
Departmental Secretary: Vacant
Telephone: 011 559 2147

Department of Electrical Engineering Technology – Doornfontein Campus
Head of Department: Prof Babu Paul
Departmental Secretary: Ms Melanie van der Voorden-Bester
Telephone: 011 559 6106

SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING

Department of Mechanical Engineering Science – Auckland Park Campus
Head of Department: Prof Esther Akinlabi
Departmental Secretary: Ms Elma Taylor
Telephone: 011 559 2386

Department of Mechanical and Industrial Engineering Technology – Doornfontein Campus
Head of Department: Mr Samuel Gqibani
Departmental Secretary: Ms Lindelwa Bolilitye
Telephone: 011 559 6163

Department of Quality and Operations Management – Doornfontein Campus
Head of Department: Dr Pule Kholopane
Departmental Secretary: Ms Moloko Ramaboea
Telephone: 011 559 1206

SCHOOL OF MINING, METALLURGY AND CHEMICAL ENGINEERING

Department of Chemical Engineering Technology – Doornfontein Campus
Head of Department: Mr Mohammed Belaid
Departmental Secretary: Ms Showneez Snyders
Telephone: 011 559 6276

Department of Metallurgy - Doornfontein Campus
Head of Department: Dr Didier Nyembwe
Departmental Secretary: Ms Lincky Lesufi
Telephone: 011 559 6169

Department of Mining and Mine Surveying Engineering - Doornfontein Campus
Head of Department: Dr Hennie Grobler
Departmental Secretary: Ms Alta De Wet
Telephone: 011 559 6186

POST GRADUATE SCHOOL OF ENGINEERING MANAGEMENT

Head of School: Prof Jan-Harm Pretorius
Administrative Assistant: Ms Gina Rautenbach
Telephone: 011 559 3824

FACULTY-SPECIFIC REGULATIONS

EB1 ACADEMIC REGULATIONS

The Faculty Regulations should be read in conjunction with the *Academic Regulations* of the University of Johannesburg, which contains:

Admission requirements
Registration regulations
Credit and promotion requirements
Exemption and recognition of prior learning (RPL) requirements
Prerequisite and compulsory modules
Duration of programme
Teaching, learning and assessment,
Regulations for examinations and tests
Academic regulations applicable to Master's and Doctoral Degrees
The regulations for the particular programme as provided in this publication.

EB2 DIPLOMA AND DEGREE PROGRAMMES OFFERED

All BIng programmes are offered on the Auckland Park Campus (APK) and NDip and BTech programmes on the Doornfontein Campus (DFC) and Bunting Campus (APB).

Programme		**Minimum study period**	**Campus**
Diploma Programmes	Dip	3 Years full-time	DFC
National Diploma including *extended diploma programmes	NDip	3 years full-time	DFC
**Baccalaureus Technologiae	BTech	1 year full-time	DFC
Baccalaureus Ingeneriae	BIng	4 years full-time	APK

* Add one year to the minimum study period for the extended degrees and diplomas.
** The following Baccalaureus Technologiae programme(s) are also offered on a part-time basis: BTech: Civil (Structural).

EB3 APPLICATION FOR ADMISSION TO STUDY AT THE UNIVERSITY

Prospective students must apply for admission to programmes not later than the determined closing dates as published on the UJ webpage. An annually determined application fee may be payable. Admission is subject to selection in accordance with programme-specific admission requirements determined by the Faculty Board, as well as minimum requirements set for transfer students, approved by Senate.
Admission is also subject to:

a) the University's Enrolment Management Plan approved by the Department of Education , the Senate and the Faculty Board.
b) quota determination of elective modules as approved.
c) professional regulatory requirements where programmes are regulated by external regulatory boards/council.
d) requirements related to the student equity profile.
e) senate-approved selection, placement of admission tests.

EB3.1 Compliance with the minimum programme admission requirements

EB3.1.1 Admissions before 2008

M-score points are awarded for the six best symbols (taking faculty-and programme-specific requirements into account) in the SC/Grade 12 according to the scale below.
A maximum of six subjects will be used to calculate the M-score with a maximum M-score of 30.

SYMBOLS		A	B	C	D	E
POINTS	HIGHER GRADE	5	4	3	2	1
	STANDARD GRADE	4	3	2	1	0

EB3.1.1.1 Admission to NDip programmes

National Diplomas	Mathematics		Physical Science		English		Other Languages
	HG	SG	HG	SG	1st	2nd	
Extended Building Science	E	E	D	D	E		
Building	D	B	D	B	D	C	
Extended Civil Engineering	D	C	D	C	D	C	
Civil Engineering	C	A	C	A			2, pass
Chemical Engineering	C	A	C	A	Pass	Pass	
Computer Systems	C	B	C	B	C	B	
Extended Electrical Engineering	E	D	E	D	E	D	
Electrical Engineering	C	B	D	C	C	B	
Extended Mechanical Engineering	C	C	C	C	D	C	
Mechanical Engineering	C	B	C	B	Pass	Pass	
Extraction Metallurgy	C	A	C	A	C	B	
Extended Industrial Engineering	C	C	C	C	D		
Industrial Engineering	C	B	C	B	Pass	Pass	
Extended Engineering Metallurgy	D	C	D	C	D	C	
Engineering Metallurgy	C	A	C	A	C	B	
Extended Man Services	E	D	E	D	D	C	
Engineering Man Services	E	D	E	D	D	C	

Mineral Surveying	D	B	D	B	D	B	
Mining Engineering	C	A	C	A	D	B	
Town and Regional Planning	D	C	D	C	D	C	

It should be noted that although specific minimum entry requirements have been determined for Grade 12, the outcome of selection tests and/or a personal interview will also play a major role in the selection process.

EB3.1.1.2 Admission to the BIng degree programmes

Baccalaureus Ingeneriae	Mathematics	Physical Sciences	English or Afrikaans	M-score rating	University Exemption
	HG	HG	HG		
Electrical and Electronic Engineering	C	C	C	17	Full
Mechanical Engineering	C	C	C	17	Full
Civil Engineering	C	C	C	17	Full
Electrical and Electronic Engineering with IT	B	B	B	20	Full

EB3.1.2 National senior certificate admission requirements (from 2009)

The University of Johannesburg and the Faculty of Engineering and the Built Environment reserve the right to change the admission requirements for the Faculty of Engineering and the Built Environment. A limited number of students are admitted to certain fields of study. In addition to the general minimum admission requirements above, programme-specific requirements may apply.

EB3.1.2.1 ADMISSION SCORE TABLE

	NATIONAL					INTERNATIONAL					
APS	NSC	SC HG (M-SCORE)	SC SG (M-SCORE)	IEB	HIGCSE/ NSSC (HL)	HIGCSE/ NSSC (HL)	IGCSE/ NSSC (OL)	AS LEVELS	A LEVELS	IB (HL)	IB (SL)
10									A	7	
9									B	6	
8					1				C	5	
7	7 (80-100%)	A		7	2	1		A	D	4	7
6	6 (70-79%)	B	A	6	3	2		B	E	3	6

5	5 (60-69%)	C	B	5	4	3	A	C		2	5
4	4 (50-59%)	D	C	4		4	B	D		1	4
3	3 (40-49%)	E	D	3			C	E			3
2	2 (30-39%)	F	E	2			D/E				2
1	1 (0-29%)	G	F	1			F/G				1

The APS and GES are based on the achievement rating of each subject as indicated above and are the sum of the achievement ratings of the seven school subjects, keeping in mind that the performance rating achieved for Life Orientation must be divided by two.
Prospective students currently in Grade 12 will be considered for admission to study at the University based on a Grade Eleven Score (GES) that is calculated in the same way as the APS using the final achievement ratings of the Grade 11 subjects. Any student who has been admitted on the
Grade 11 results will have to satisfy the minimum admission requirements in Grade 12 for registration for the relevant qualification as laid down by the University.
The minimum GES and APS required for admission to each qualification are determined by the relevant Faculty Board, approved by Senate and contained in the relevant Faculty Rules and Regulations.

EB3.1.2.2 BING DEGREE PROGRAMMES

- **BIng Electrical and Electronic Engineering/Mechanical Engineering/Civil Engineering**

Minimum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
32	A minimum rating of **5** (60-69%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **5** (60-69%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **5** (60-69%) in Physical Sciences	A minimum rating of **5** (60-69%)	A minimum rating of **5** (60-69%)

- **BIng Electrical and Electronic Engineering with IT**

Minimum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
34	A minimum rating of **6** (70-79%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **3** (40-49%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **6** (70-79%) for Mathematics	Minimum rating of **5** (60-69%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **6** (70-79%) in Physical Sciences	A minimum rating of **5** (60-69%)	A minimum rating of **5** (60-69%)

EB3.1.2.3 NATIONAL DIPLOMA PROGRAMMES

- **Building**

Minimum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
26	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in anther recognised language (Home Language or First Additional Language)	Minimum rating of **4** (50-59%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS,the rating for Life Orientation must be divided by 2*)	A minimum rating of **4** (50-59%) in Physical Sciences	A minimum rating of **4** (50-59%)	A minimum rating of **4** (50-59%)

- **Civil Engineering Technology**

Minimum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
28	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in anther recognised language (Home Language or First Additional Language)	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS,the rating for Life Orientation must be divided by 2*)	A minimum rating of **5** (60-69%) in Physical Sciences	A minimum rating of **4** (50-59%)	A minimum rating of **4** (50-59%)

- **Chemical Engineering Technology**

Minimum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
28	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in anther recognised language (Home Language or First Additional Language)	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS,the rating for Life Orientation must be divided by 2*)	A minimum rating of **5** (60-69%) in Physical Sciences	A minimum rating of **4** (50-59%)	A minimum rating of **4** (50-59%)

- **Computer Systems**

	Group A				Group B	
	Languages	**Mathematics**	**Life**		**Subject 2**	**Subject 3**

Mini-mum APS	Must comply with NSC minimum requirements			**Orientation**	**Subject 1 (Physical Science)**		
	Language of Teaching and Learning	Other recognised language					
28	A minimum rating of 5 (60-69%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **3** (40-49%) in anther recognised language (Home Language or First Additional Language)	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS,the rating for Life Orientation must be divided by 2*)	A minimum rating of **5** (60-69%) in Physical Sciences	A minimum rating of **3** (40-49%)	A minimum rating of 3 (40-49%)

- **Electrical Engineering Technology**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
28	A minimum rating of **5** (60-69%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of 3 (40-49%) in anther recognised language (Home Language or First Additional Language)	Minimum rating of 5 (60-69%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS,the rating for Life Orientation must be divided by 2*)	A minimum rating of 5 (50-59%) in Physical Sciences	A minimum rating of 3 (50-59%)	A minimum rating of 3 (40-49%)

- **Engineering Metallurgy/Extraction Metallurgy**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
27	A minimum rating of **5** (60-69%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **5** (60-69%) in Physical Sciences	A minimum rating of **3** (40-49%)	A minimum rating of **3** (40-49%)

- **Mechanical Engineering Technology/Industrial Engineering Technology**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
28	A minimum rating of **5** (60-69%) in either	A minimum rating of **4** (50-59%) in anther	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **4** (50-59%).	A minimum rating of **5** (60-69%)	A minimum rating of **4** (50-59%)	A minimum rating of **3** (40-49%)

	Afrikaans or English (Home Language, or First Additional Language)	recognised language (Home Language or First Additional Language)		(*In the calculation of the APS,the rating for Life Orientation must be divided by 2*)	in Physical Sciences		

- **Minerals Surveying**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
22	A minimum rating of **4** (50-59%) in either English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **4** (50-59%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **4** (50-59%) in Physical Sciences	A minimum rating of **2** (30-39%)	A minimum rating of **2** (30-39%)

- **Mining Engineering**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
25	A minimum rating of **4** (50-59%) in either English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **5** (60-69%) in Physical Sciences	A minimum rating of **3** (40-49%)	A minimum rating of **2** (30-39%)

- **Town and Regional Planning**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
26	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **4** (50-59%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **4** (50-59%) in Physical Sciences	A minimum rating of **2** (30-39%)	A minimum rating of **2** (30-39%)

EB.3.1.2.4 DIPLOMA PROGRAMMES

- **Management Services / Operations Management**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics or Mathematical Literacy**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
22	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **2** (30-39%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **3** (40-49%) for Mathematics **or** minimum rating of **5** (50-59%) for Mathematical Literacy	Minimum rating of **3** (40-49%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **3** (40-49%)	A minimum rating of **3** (40-49%)	A minimum rating of **3** (40-49%)

EB3.1.2.4 EXTENDED NATIONAL DIPLOMA PROGRAMMES

- **Building**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
24	A minimum rating of **3** (40-49%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **3** (40-49%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **4** (50-59%) in Physical Sciences	A minimum rating of **4** (50-59%)	A minimum rating of **4** (50-59%)

- **Civil Engineering**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
26	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in anther recognised language (Home Language or First Additional Language)	Minimum rating of **4** (50-59%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS rating for Life Orientation must be divided by 2*)	A minimum rating of **4** (50-59%)in Physical Sciences	A minimum rating of **4** (50-59%)	A minimum rating of **4** (50-59%)

- **Electrical Engineering**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
20	A minimum rating of **3** (40-49%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **3** (40-49%) in anther recognised language (Home Language or First Additional Language)	Minimum rating of **3** (40-49%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **3** (40-49%) in Physical Sciences	A minimum rating of **3** (40-49%)	A minimum rating of **3** (40-49%)

- **Industrial Engineering/Mechanical Engineering**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
26	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **5** (60-69%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **5** (60-69%) in Physical Sciences	A minimum rating of **3** (40-49%)	A minimum rating of **3** (40-49%)

- **Engineering Metallurgy**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics**	**Life Orientation**	**Subject 1 (Physical Science)**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
22	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **4** (50-59%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **4** (50-59%) for Mathematics	Minimum rating of **4** (50-59%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **4** (50-59%) in Physical Sciences	A minimum rating of **2** (30-39%)	A minimum rating of **2** (30-39%)

EB.3.1.6 EXTENDED DIPLOMA PROGRAMMES

- **Management Services/Operations Management**

Mini-mum APS	Group A				Group B		
	Languages Must comply with NSC minimum requirements		**Mathematics or Mathematical Literacy**	**Life Orientation**	**Subject 1**	**Subject 2**	**Subject 3**
	Language of Teaching and Learning	Other recognised language					
22	A minimum rating of **4** (50-59%) in either Afrikaans or English (Home Language, or First Additional Language)	A minimum rating of **2** (30-39%) in another recognised language (Home Language or First Additional Language)	Minimum rating of **3** (40-49%) for Mathematics **or** minimum rating of **5** (50-59%) for Mathematical Literacy	Minimum rating of **3** (40-49%). (*In the calculation of the APS, the rating for Life Orientation must be divided by 2*)	A minimum rating of **3** (40-49%)	A minimum rating of **3** (40-49%)	A minimum rating of **3** (40-49%)

EB3.1.3 National certificate (vocational) NCV admission requirements

The University of Johannesburg and the Faculty of Engineering and the Built Environment reserve the right to change the admission requirements for the Faculty of Engineering and the Built Environment. A limited number of students are admitted to certain fields of study. In addition to the general minimum admission requirements above, programme-specific requirements may apply.

Admission Point Score		
Rating Code	**Rating**	**Percentage**
5	Outstanding	80-100
4	Highly competent	70-79
3	Competent	50-69
2	Not yet competent	40-49
1	Not achieved	0-39

National Certificate (Vocational) (NCV) Guidelines

Subject to institutional admission requirements, the minimum admission requirement to a Bachelor's degree programme is a National Certificate (Vocational) Level 4 issued by Council for General and Further Education and Training. The minimum legislative requirements for admission to a Bachelor's degree include the achievement of:

- Three (3) fundamental subjects between 60 - 69% (3)
  (Including English as the language of learning and teaching at UJ)
- Three (3) vocational subjects from the designated list between 70 - 79% (4)

For admission to a **National diploma** the applicant must have:

- A NCV (level 4) issued by the Council for General and Further Education and Training
- Achieved 70-79 (APS 4) for all 5 subjects – fundamental and vocational categories (minimum APS of 25)
- Passed English as Primary or First Additional Language with a minimum score of 4
- Passed Mathematics and Physical Sciences as Fundamental Components with a minimum score of 4
- Passed Mathematics, Physical Sciences and Life Sciences as Fundamental Components with a minimum score of 4

EB3.2 ADMISSION OF INTERNATIONAL APPLICANTS

3.2.1 Admission of non-South African resident students is subject to the conditions, as set out in the Immigration Act 13 of 2002.

3.2.2 The success of an international application depends on both the confirmation of academic acceptance and the obtaining of the necessary statutory documentation and state approval.

3.2.3 All international prospective students are required to submit proof of English language proficiency which may consist of:

a) The results of the internationally recognized IELTS test (score of six for undergraduate studies and a score of seven for postgraduate studies), or English passed at school leaving level.

Or

3.2.3 English passed at school-leaving level.

Or

3.2.4 the results of the UJ English Language Programme (UJELP) module completion test.

EB3.3 ENROLMENT MANAGEMENT PROCESS

3.3.1 FEBE Enrolment Management Process will be based on *accepting the best applicants for each programme to fill the number of places available* (rather than accepting applicants on a first-come-first-served basis meeting the minimum published admission requirements). The implication of this is that applicants will be *ranked* according to criteria described in point 3.3.3 below, and may be placed on a *waiting list* before a final decision is made as to whether they will or will not be offered a place in a programme.

3.3.2 Applicants will be selected by the respective departments to which they have applied. Those applicants who are selected for their first choice of programme will be offered a place in that particular programme. Applicants who are not selected for their first choice of programme may be offered a place in one of their lower preferences, or in any other programme for which the applicant may be considered suitable.

3.3.3 Admission will be based on final Grade 11 scores, provisional (or final) APS scores and scores in key subjects as well as other department-specific criteria, and may be supplemented (as set out in 3.3.6 below) by approved selection/placement tests (e.g. NBT), with each Head of Department being responsible for selection/placement of any student in his/her department. International applicants will be assessed on an equivalent scoring system. Note that this is *provisional* admission, subject to final APS scores being above the minimum published admission requirements for the particular programme.

3.3.4 In line with the Enrolment Management Plan, each Head of Department will determine the maximum intake of new applicants that the department can accommodate, based on infrastructure, staffing and other resources, as well as expected throughput (Expected throughput will determine the number of applicants who are likely to repeat any particular module, and who may therefore reduce the number of places available for new applicants

3.3.5 applicants applying to FEBE will be placed into one of three categories: (a) *excellent applicants* (above a certain cut-off of score/criteria as set out in point 3.3.3 above), who will be given admission without further testing; (b) *mid-range applicants*, who do not meet the cut-off for admission without further testing, but do meet the minimum published admission requirements, who will be waitlisted and may be required to write further selection/placement tests before a decision is taken on their acceptance and/or placement; and (c) *weaker applicants*, who do not meet the minimum published admission requirements, or who on the basis of their final Grade 11 scores, provisional (or final) APS scores and scores in key subjects will clearly not meet the requirements for acceptance, who may be rejected outright.

3.3.6 The cut-off scores for final Grade 11 scores, provisional (or final) APS scores and scores in key subjects for admission without further testing (see 3.3.6(a) above) will be determined internally by each Head of Department. These cut-off scores are likely to be adjusted from year to year, and are also likely to be *adjusted as time progresses during the admissions process of a particular year, depending on the number and quality of applications received for a particular programme*. Each department may also allow a percentage of places (approximately 10%) open for excellent last minute walk-in applicants. Although the automatic acceptance scores are not fixed, *the guiding principle is that each Head of Department will seek to fill the number of places available in each programme with the best applicants applying, and endeavour to place applicants on those programmes for which they have a reasonable chance of success in obtaining the qualification within the allowed time period*.

3.3.7 This acceptance process will be applicable to first year applicants as well as transfer applicants in higher years within UJ and from other universities.

3.3.8 While applicants may not be required to write further tests *for admission/selection and placement purposes*, individual departments may continue to use supplementary tests (e.g. NBT) and/or internal departmental tests *for the purposes of profiling/diagnosis of student strengths and weaknesses.*

EB4 WORK INTEGRATED LEARNING

4.1 Work Integrated Learning is a phase during which instruction and relevant practical experience, relating specifically to the selected programme, are integrated.

4.2 Students are requested to submit their Work Integrated Learning report according to Faculty submission dates. *First-term Work Integrated Learning Reports should be submitted during the second week of July. Second-term Work Integrated Learning Reports should be submitted at the latest, during the second week in January of the following year.*

4.3 While the University of Johannesburg undertakes to assist students in obtaining suitable Work Integrated Learning placements at approved companies, the onus remains on the student to secure such placement. A Work Integrated Learning agreement creates a separate contract between the employer and the student.

4.4 Students are personally responsible for obtaining structured Work Integrated Learning with an approved provider. (The Faculty will provide an information service for training opportunities, but will not be responsible for finding Work Integrated Learning opportunities for students). Work Integrated Learning guidelines are available from the Departments concerned. At the completion of each level of Work Integrated Learning, students must submit documentary evidence of having completed their Work Integrated Learning, as specified.

4.5 Students must register (and pay the prescribed registration fees) with the University of Johannesburg (UJ) for Work Integrated Learning in the semester during which they will complete Work Integrated Learning at the workplace. Under no circumstances will backdated registration be allowed. Deadlines will be determined by the Faculty.

4.6 A statement of competency, based on industry and Faculty assessment of students' performance in the workplace, must be obtained for each programme level associated with Work Integrated Learning.

4.7 Applications for recognition of prior work experience instead of Work Integrated Learning must be completed at the time of applying to study for the National Diploma.

4.8 The University supports students to obtain relevant SL or WIL placement opportunities.

EB5 ASSESSMENT OF PRIOR LEARNING (RPL)

5.1 Assessment for RPL is governed by the University's Policy on RPL in terms of the following principles:

(a) Current competence is more important than learning history. Relevant learning is valued, irrespective of where, when or how it occurred.
(b) Applicants have to demonstrate competence (proven learning).
(c) The standards by which students are assessed for prior learning are determined by the relevant Faculty Board, approved by Senate and contained in the relevant faculty rules and regulations.
(d) Each assessment of prior learning is individual based.
(e) RPL assessment is conducted by the lecturer responsible for that particular module or programme, or by the RPL Committee of the faculty if RPL affects the whole programme.
(f) A variety of assessment methods are used, including a formal summative assessment opportunity similar to the summative assessment opportunity that is required of students in the particular module or programme.

EB6 PROMOTION REQUIREMENTS

EB6.1 General Promotion requirements

6.1.1 Students will only be permitted to register for the higher module level if they have passed the prerequisite modules. Faculty regulations EB22 and EB23 provide the list of modules taught, together with the required prerequisite modules for the Engineering Technology and Engineering Science programmes respectively.

6.1.2 No student may attend lectures or any contact sessions in a module, receive study material or supervision, or have access to any electronic study material or sources, or be assessed in a module if he/she is not a registered student at the UJ for the relevant module for the academic semester/year concerned.

6.1.3 No assessment result is official if a student was not registered for a module in the specific academic year.

6.1.4 Students who have failed a module twice will not be allowed to continue their studies in the same module at the University, except with permission of the Executive Dean on recommendation of the relevant Head of Department after consultation with the Lecturer, or on recommendation of the Faculty's Examination and/or assessment Committee (Academic Regulation 6.6).

6.1.5 Student who have not been promoted to the following year of study for any two years of study will not be permitted to continue with that programme and will academically be excluded except with the special permission of the Executive Dean. The Executive Dean may stipulate conditions for students to continue with their studies.

6.1.6 Students who are registered for a three- of four-year programme and fail to complete the programme within a further period of two years will be allowed to continue with the programme only if granted special permission by the Executive Dean on recommendation of the relevant Head of Department or the faculty's Examination or Assessment committee.

6.1.7 Unsatisfactory attendance of lectures or (where applicable) participation in an electronic learning environment, tutorials and practicals is taken into consideration when decisions are made regarding the academic exclusion of students.

6.1.8 Students who have temporarily discontinued their studies and who have passed a module whose content has in the meantime undergone substantial changes may be refused admission to a module for which this module is a pre-requisite.

6.1.9 To be admitted to any module in the second, third or fourth academic year of study, and progress to the following year of study, students must have passed at least 60 % of the modules in the previous year of study.

EB6.2 Promotion requirements pertaining to Extended Programmes

6.2.1 Students in the extended programme will be permitted to continue their studies into the second year of study on condition that if a first-year module was failed, the module failed, is not a prerequisite for entry to any course in the second year.

6.2.2 Students who fail more than one module in the first year of the extended programme will only be permitted to register in the Faculty of Engineering for a second time, with permission of the Executive Dean.

6.2.3 The extended modules will have a mid-year test (during scheduled examination timetable), whereupon continuation will be determined according to the possibilty of a pass at the end of the year. The assessment at the end of the module (November examination) will be an integrated assessment of all the outcomes.

6.2.4 Mainstream Engineering students will be accommodated into the extended programme if progress in their degree course is unsatisfactory, on condition that there is still a possibility of graduating in the minimum required period plus one year (M+1).

6.2.5 Additional promotion requirements pertaining to Extended Diploma Programmes:

- Students in the extended diploma programme will not be permitted to continue their studies if a fully foundational first-year module (FFRP111; FWPN111; FPOM111; FSPC11A; FSPC11B) was failed.
- Students who fail a foundational provision module in the first year of the extended programme will only be permitted to register in the Faculty of Engineering for a second time, with permission of the Executive Dean.

- Students will only be permitted to register for the higher module level if they have passed the foundational provision modules.

EB6.3 Promotion requirements pertaining to undergraduate programmes

6.3.1 A student is admitted to the second year of study after he/she has successfully completed at least 60% of the prescribed number of modules of the first year of study.

6.3.2 A student is admitted to the third year of study after all modules of the first year of study and at least 60% of the prescribed number of modules of the second year of study, have been passed.

6.3.3 A student proceeds to the fourth year of study in respect of the BIng degree programmes after all modules of the second year of study and at least 60% of the prescribed number of modules of the third year of study, have been passed.

6.3.4 A student is permitted to register for engineering modules of a specific year of study only if he/she is promoted to that specific year of study.

6.3.5 A student who wishes to present only his/her Project Investigation and Design in respect of the BIng degree programmes for completion of his/her studies may complete these modules by means of full-time study within one semester.

6.3.6 The duration of Project Investigation will be two semesters, with the exception of the degree programmes in Civil Engineering where the duration is one semester. Project Investigation and Civil Design must be commenced so that the student, upon completion thereof, also completes his/her studies for the BIng degree.

6.3.8 A student who, during any semester, fails all modules registered for, may be excluded from the Faculty.

6.3.9 A student may be excluded if they do not:

- Successfully complete all modules in the first year of study within two years,
- Successfully complete all modules in the second year of study within three years,
- Successfully complete all modules in the third year of study within five years,
- Successfully complete all modules in the fourth year of study within six years.

6.3.10 A student may be excluded at the end of the first semester if their results will prevent sufficient progress toward their degree in the second semester.

6.3.11 A student who is deemed by the Faculty to be making insufficient academic progress may be placed on warning (see EB7.2, E1/E2), and may be excluded if any module in the following semester is not successfully completed.

EB7 ASSESSMENT

When a summative assessment opportunity is used as a last (comprehensive) assessment opportunity, a minimum mark of 40% is required.

7.1 SPECIAL SUMMATIVE ASSESSMENT AND SUPPLEMENTARY SUMMATIVE ASSESSMENT OPPORTUNITIES

7.1.1 Special assessment opportunities are considered by the faculty in which the programme/qualification resides, for students for who, in the event of illness, for compassionate reasons, on religious grounds or similar legitimate reasons, were prevented from attending a summative assessment opportunity. Students may be granted a special summative assessment opportunity if they apply for it within seven calendar days after the original date of the relevant summative assessment opportunity. The Executive Dean or the Vice Dean, in consultation with the relevant Head of Department, considers all applications and decides whether or not to grant the special summative assessment opportunity.

7.1.2 The Assessment Committee or a senior administrative officer of a faculty in which the module resides may grant a student a supplementary last summative assessment opportunity if

(a) the student failed a module but obtained a final mark of at least 45%;

or

(b) the student failed a module but obtained a final period/semester/year mark of at least 60%;

or

7.1.3 The Assessment Committee or a senior administrative officer of a faculty in which the module qualification resides may grant a student a supplementary last summative assessment opportunity if
(i) the student is a final year student, and
(ii) the module concerned is a first semester module, and
(iii) the module concerned is a pre-requisite for an exit level a module in the second semester of the particular programme, and
(iv) the student obtained a final mark of at least 40% in the module concerned.

7.1.4 The Assessment Committee or a senior administrative officer of a faculty in which the qualification resides may grant a student a supplementary last summative assessment opportunity if the student requires not more than the equivalent of two semester modules or one year module for the completion of the relevant qualification, provided that the student
(a) was registered for the relevant module in the current academic year; and
(b) was admitted to, and participated in the last assessment opportunity in the relevant module; and
(c) has complied with all the experiential or practical requirements prescribed for the qualification (where applicable) excluding Work Integrated modules; and
(d) was not granted a supplementary last assessment opportunity in the relevant module during the current academic year.
(e) fulfilled the requirements of 80% attendance in all lectures, tutorials and practicals.

The Executive Dean of the faculty in which the qualification resides may, in exceptional circumstances and in consultation with the Executive Dean of the faculty in which the particular modules reside, waive one or more of the conditions specified in (a) (c) to (e).

7.1.5 Supplementary assessment results are, subject to AR 10.5.11, combined with the module mark for calculation of the final mark.

7.1.6 Supplementary assessments for continuous assessment modules are scheduled as part of the assessment plan for a particular module. The following applies:
(a) A minimum of 45% final mark (FM) in the predetermined assessment is required to gain access to a supplementary assessment.
(b) Supplementary assessments are limited to a minimum of one scheduled assessment per semester module, or two scheduled assessments per year module, or according to each faculty's internal assessment policy.
(c) A maximum of no more than a pass mark is awarded for the supplementary assessment.

7.1.7 Special summative assessment and supplementary assessment opportunities reflect the same degree of difficulty and cover the same scope as the original summative assessment opportunity.

7.1.8 Students are personally responsible for ascertaining whether they qualify for a special assessment or a supplementary assessment opportunity and for acquainting themselves with the details of the timetable and the venue.

7.1.9 Students' entitlement to a special or supplementary summative assessment opportunity lapses if they fail to use the opportunity.

7.1.10 Students may not be granted another supplementary summative assessment opportunity if they have used and failed a previous one except if the Executive Dean of the faculty in which the qualification resides has waived requirement
(d) of AR 10.5.4 above.

7.1.11 The final mark for a supplementary summative assessment opportunity is capped at 50%.

7.1.12 No capping of a final mark is applicable in the case of a special summative assessment opportunity.

EB7.2 Result Codes

After completion of the last summative assessment session of the semester, students will receive a global result code regarding their overall performance for the year/semester. The following table explains the result codes given to students after the last summative assessment (exams).

RESULT		BUSINESS RULES	PROMOTION TO NEXT YEAR
CODE	**DESCRIPTION**		
E1	PROCEED: PASS ALL COURSES NOV	Warning: At the end of the first semester the student is allowed to proceed in the second semester with his/her studies for that specific qualification on condition that all modules must be passed at the end of that semester to prevent exclusion on academic grounds.	N/A
E2	PROCEED: PASS ALL COURSES JUNE	Warning: At the end of the second semester the student is allowed to proceed in the next academic year with his/her studies for that specific qualification on condition that all modules must be passed at the end of the first semester of that year to prevent exclusion on academic grounds.	NO
EE	REFER TO FACULTY POLICY ABOVE	Warning: The student must take note of the applicable faculty policy that is placed at the top of the result letter.	NO
F4	FAILED ALL SUBJECTS	Student failed all modules and is excluded from the Faculty (see Academic Regulation 6.13).	NO
F7 *	RE-ADMISSION PROGRAMME REFUSED	The student is excluded on academic grounds and may not proceed with his/her studies in that specific programme (see Academic Regulation 6.8).	NO
IT	EXPERIENTIAL LEARNING INCOMPLETE	No information on the result of the required experiential learning (work- or service-based learning - previously called in-service training) has as yet been received	N/A
L3	FAILED MODULE TWICE (QUAL).	Warning: A module has been failed twice and should not be registered for again in future. In terms of Academic Regulation 6.6 the Executive Dean may grant the student another opportunity to register for and pass the module but no further concessions will be considered.	NO
P4	PROMOTED	The student may reregister the next year for the same qualification and may register for modules of the following curriculum year (see Academic Regulation 6.7)	YES
P5	MAY CONTINUE STUDIES	The student may reregister the next year for the same qualification but may not register for any modules of the following curriculum year (see Academic Regulation 6.7).	NO
P6	DEGREE/DIPL/CERT COND SSA EXAM	The student will complete his/her qualification if he/she passes all modules he/she has been admitted to the SSA examination.	NO
P7	OBTAINED DEGREE/DIPLOMA/ CERT	The student has complied with all requirements for the completion of the applicable qualification (see Academic Regulation 10.6.1).	NO
P8	DEGREE/DIPL/CERT PASSED WITH DISTINCTION	The student has complied with all requirements for the completion of the applicable qualification cum laude passed with distinction see Academic Regulation 10.6.2).	NO
PH	POTENTIAL GRADUANDUS/A	The student will complete his/her qualification if he/she passes all modules he/she has been registered for in this academic year.	NO
SV	APPOINTMENT WITH HOD	The student is requested to contact the HOD urgently to clarify certain aspects of the student's future registration. This is normally the case where certain decisions have to be made before the student will be allowed to register online.	NO
UT	ADMISSION DOCUMENT OUTSTANDING	Admission documents are still not yet been submitted and re-registration will not be allowed unless these documents are submitted satisfactorily.	NO

These regulations refer to students who are rated as E1/E2 or F7

*An **E1** rating is applied by the Faculty Office at the end of the FIRST semester and requires that all the modules for which the student is registered in the SECOND semester have to be passed.*

*An **E2** rating is applied by the Faculty Office at the end of the SECOND semester and requires that all the modules for which the student is registered in the FIRST semester of the following year have to be passed*

*An **E1/E2** rating is applied when:*

a) *fewer than 60% of the modules for which the student was registered in a given semester have been passed, **AND***
b) *the student is able to continue with at least 50% of the modules prescribed for the relevant qualification.*

The continued registration of such a student is conditional and permission to continue in the faculty must be obtained from the Faculty Office.

*A student is rated **F7** when his/her success rate is extremely poor. It will be applied to a student who:*

a) *has already had one or more previous E1/E2 ratings, OR*
b) *has failed all the modules in a semester, OR*
c) *cannot continue to the next semester, irrespective of whether in the same or the following year of study.*

Students with an F7 rating will not be permitted to continue with their studies in the faculty.

EB7.3 Appeals against academic exclusion (F7)

(a) Students may lodge an appeal against their academic exclusion (i.e. receiving an F7 global result code) at the specific faculty on the campus where the student is registered. Faculty-specific arrangements will be made and dates publicised by the Faculty concerned

(b) Applicants who want to appeal must follow the prescribed administrative procedure by submitting their motivation and supporting documents as well as other substantiating documents to the relevant dean's office according to faculty guidelines and procedures and in accordance with UJ policies.

(c) The Faculty Appeals Committee will consider the appeals and may refuse or allow readmission.

(d) The students will be notified in writing of the outcome of the appeal.

(e) The decision of the Faculty Appeals Committee is final.

(f) Students who transfer to another faculty retain their academic

EB8 OBTAINING A QUALIFICATION

8.1. A qualification is awarded or conferred with distinction if the requirements below are met:

8.1.1 Duration:

(i) Students must complete an undergraduate programme in the minimum period of study specified for the programme, unless the Executive Dean has approved a longer period of study for legitimate reasons.

(ii) Students must complete an honours qualification within one year if registered full-time and within two years if registered part-time.

(iii) Students must complete a master's qualification within three years.

8.1.2 Average final mark for the qualification:

(i) Students must achieve a weighted and/or proportional calculated average final mark for an undergraduate qualification of at least 75% as determined by the Faculty Board, approved by Senate and contained in the Faculty Rules and Regulations.

(ii) Students must achieve an average final mark for an honours qualification of at least 75% calculated by weighting the final marks for all the modules comprising the qualification in accordance with the credit values allocated to the modules.

(iii) Students for a master's qualification by dissertation must achieve a final mark of at least 75% for the dissertation.

(iv) Students for a master's qualification by coursework must achieve an average final mark for the qualification of at least 75% calculated by weighting the average final marks for all the coursework modules and the final mark for the minor dissertation in accordance with the credit values allocated to all the coursework modules and the minor dissertation respectively (for example, if the credit value of the minor dissertation represents 40% of the total credit value of the qualification, the average final mark for the qualification will be weighted in

the proportion of 40 for the minor dissertation and 60 for all the coursework modules).

(v) Decimal marks may be rounded upwards or downwards in accordance with the decision taken by the Faculty Assessment Committee concerned.

8.1.3 A student must never have failed a module as a first attempt in the relevant programme.

8.1.4 A student must have obtained a minimum mark of 65% in every prescribed module of NQF 7 and, in the case of a master's qualification by coursework, in the minor dissertation as well.

8.1.5 Students for an honours qualification must have been registered for the full curriculum as prescribed for each academic year on a full-time or part-time basis, as the case may be.

8.1.6 Students for a master's qualification must have been registered for the full curriculum as prescribed for each academic year on a full-time or part-time basis, as the case may be.

8.1.7 If students are transferred from another Higher Education Institution in the same programme qualification to at the UJ the same requirements as stated shall apply subject to the necessary changes having been made.

8.1.8 If students change programmes within the UJ only the modules related to the new programme will be taken into consideration in calculating whether the qualification is obtained with distinction.

EB9.1 Professional Engineer

9.1.1 The Baccalaureus Ingeneriae (BIng) degree programmes in Electrical and Electronic, Electrical and Electronic with Information Technology as endorsement, Mechanical as endorsement and Civil Engineering, offered at the University of Johannesburg are accredited by the Engineering Council of South Africa (ECSA) and allow BIng graduates to register as "Candidate Engineer."

9.1.2 In terms of the Professional Engineer's Act of South Africa (Act 46 of 2000), it is compulsory that a three-year period of practical training and experience under the guidance of a professional engineer be completed after graduation. Following this, a student qualifies for registration as a Professional Engineer. This period may be reduced by up to one year in recognition of successful postgraduate degree studies. It is of utmost importance that every student should register as a "Candidate Engineer" immediately after graduation.

EB9.2 Professional Engineering Technologist

The Baccalaureus Technologiae (BTech) degree programmes in Engineering Technology offered at the University of Johannesburg are accredited by ECSA, enabling BTech graduates to register as professional technologists at ECSA.

EB9.3 Professional Engineering Technician

The National Diploma programmes in Engineering offered at the University of Johannesburg are accredited by ECSA, enabling NDip diplomats to register as professional technicians at ECSA.

EB9.4 Built Environment

Graduates in Town and Regional Planning may apply for registration as a technician or planner with the SACPLAN.

EB10 RECOGNITION OF DIPLOMAS AND DEGREES

10.1 The programmes offered by the Faculty of Engineering and the Built Environment at the University of Johannesburg are recognised for membership by South African and foreign professional associations.

10.2 Foreign universities recognise these diplomas and degrees for admission to postgraduate studies. Additional admission requirements may apply.

EB11 REGISTRATION REQUIREMENTS

***For specific Faculty Admission requirements, see Regulation EB3*.**

11.1 Documents to be submitted upon registration

At registration, prospective students who register for the first time at the University must may be required to submit, together with their registration documents, certified copies of the documents specified below.

11.2 First-year students

(a) Identity document or permanent residence permit where applicable.

(b) Senior Certificate or National Senior Certificate or equivalent qualification and statement of symbols. Only when specifically requested by faculties.

11.3 Transfer students from other higher education institutions including honours, masters and doctoral students

(a) Identity document or permanent residence permit where applicable.

(b) Senior Certificate or National Senior Certificate or equivalent qualification and statement of symbols only when specifically requested by faculties.

(c) Original Certified copies of academic record from the previous higher education institution(s).

(d) Original c Certified copies of certificate of conduct if not included on the academic record.

(e) Additional faculty programme requirements determined by the relevant Faculty Boards.

11.4 Students who cancel their registration are not entitled to reimbursement of the registration fee and remain liable for the tuition fees in accordance with the Student Fees Policy.

11.5 Students are not allowed to register outside the prescribed and approved registration periods unless the Management Executive Committee formally extends the registration period. Students who register late are liable for the payment of a late registration fee in accordance with the Student Fees Policy and decisions taken by the Management Executive Committee in this regard.

EB12 EXEMPTION AND RECOGNITION REQUIREMENTS

12.1 A Head of Department may, in consultation with the Executive Dean or in accordance with a list of exemptions approved by the Executive Dean, grant exemption from and award a credit for a module to students on the grounds that they have passed a relevant module at the University or at another accredited Higher Education Institution.

12.2 Exemption from and awarding of credit for modules, as stipulated in EB12.1, may not be granted for more than half the number of modules required in an undergraduate programme in which exemption and recognition are requested. At least half the number of semester modules, including the exit level modules where appropriate, should be passed at the University for the University to award the diploma or confer the degree. The Executive Dean concerned, in consultation with the Registrar, may give permission to the student (for legitimate reasons) to complete such exit level module(s) at another HEI in South Africa, or abroad in accordance with the academic record concerned. For

the purposes of this sub-regulation, a year module counts as two semester modules, and one term module counts as half a semester module.

12.3 Only in exceptional circumstances may the Executive Dean grant exemption from an exit level or semester core module that has been passed at another institution or in another programme.

12.4 Exemption from or credit for a module may only be granted for one further programme in addition to the programme in which the module was originally completed

EB13 PROGRAMME AND MODULE CHANGES

13.1 After the official registration period and within the appointed time, students may change their registration, only with the permission of the Executive Dean of the Faculty.

13.2 Application for programme changes must be made on the prescribed form. These changes are subject to adherence to closing dates.

13.3 Cancellation of studies:

13.3.1 Students cancel their studies in a particular programme or module by official notification thereof before the date determined by the University. This notification is submitted to the relevant faculty officer.

13.3.2 Students who fail to notify the University officially before the prescribed dates will forfeit any claim to the reimbursement of money.

13.3.3 Cancellation of studies in a semester module(s) or a year module(s) within the 21-day period before the beginning of the assessment opportunity will be regarded as absence from the assessment opportunity. Cancellation of studies in a continuous evaluation year module within the 42-day period before the beginning of the assessment opportunities will be regarded as absence from the assessment opportunity.

EB14 EXTENSION OF STUDY PERIOD

A student who is registered for a three or four-year programme and fails to complete the programme within a further period of two years will only be allowed to continue if granted special permission by the Executive Dean on recommendation of the relevant Head of Department.

EB15 FEES PAYABLE

In respect of fees payable, refer to the Brochure: **Student Fees.**
If not in possession of this brochure and information needs to be obtained urgently, STUDENT FINANCES: 011 559 3777 can be contacted.

EB16 PLAGIARISM

16.1 **"Plagiarism"** means passing off ideas however expressed, including in the form of phrases, words, images, artefacts, sounds, or other intellectual or artistic outputs, as one's own when they are not one's own; *or* such passing off, as an original contribution, of ideas that are one's own but have been expressed on a previous occasion for assessment by any academic institution or in any published form, without acknowledgement of the previous expression. Plagiarism is understood as one of several related forms of academic dishonesty, all of which are addressed in the Student Disciplinary Code.

"Reportable plagiarism" means *Plagiarism* that:

(a) Vitiates the attempt fairly and meaningfully to assess and, where relevant, assign a mark, grade, or other outcome to the work in question; *and*

(b) Is such that an educational response (which may include capping or prescribing a mark) is inappropriate and that a formal academic response or a disciplinary response is appropriate, given the plagiarism history of the student, and all the other relevant circumstances of the case; *or*

(c) In the case of work that is not submitted for assessment (for example work submitted by a student to a supervisor or lecturer for comment), is deemed by the individual academic staff member in question to be reportable, having regard to the nature of the offence, the plagiarism history of the student, the

possibility or probability of repeat offence, and all the other circumstances of the case.

ENGINEERING TECHNOLOGY PROGRAMMES

EB17 NATIONAL DIPLOMAS (NDIP)

Applicants for the National Diploma programme must have a background in science and mathematics, and are selected on academic merit as well as potential. Programmes are presented on a full-time, part-time or flexible-learning basis. One of the three years (normally the second) leading to the National Diploma may be spent in the workplace.

Award of diploma
A National Diploma in the relevant field of study will be awarded to candidates after successful completion of all theoretical and experiential learning requirements.

EB17.1 NDIP: BUILDING NDB001

17.1.1 Purpose of the programme
This is a broad-based qualification intended to prepare diplomats for supervisory and middle management level employment in the construction industry and for technical and support level in the quantity surveying profession. Students who have obtained this qualification will be competent to support supervisors, managers and quantity surveyors.

17.1.2 Outcomes
Exit level outcomes:
1. Supervision of building projects;
2. Procurement, administration and management of building projects; and
3. Preparation of contract documentation and administration of building contracts.

17.1.3 Admission Requirements and Selection Criteria
a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) For NTC4: Mathematics D, Physical Sciences D.
d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.1.4 Experiential learning
Experiential learning must be undertaken at an approved construction company, quantity surveyor's office, government or local authority department, or other employer, as approved by a Departmental Committee upon submission of a written request and letter of appointment from the employer.
Credit for experiential learning is obtained on approval of a written report and logbook.

17.1.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
CONM11	Construction Management 1		
CONT111	Construction Technology 1		
PHY1YKP	Construction Applied Building Science (Practical)		
PHY1YKT	Applied Building Science (Theory)		
QSB111	Quantity Surveying 1		
SSG111	Site Surveying 1		
BGC111	Communication Studies 1	CAB111	Computer Applications 1

MAT1YB	Mathematics 1	CCM11-1	Construction Materials

Second year

First semester		Second semester	
ACM2A10	Applied Construction Micro-Economics	EL3540	Building Practice
CONT221	Construction Technology 2		
STA1ZIT	Statistics 1		
CMS11-1	Construction Methods 1		
QSB221	Quantity Surveying 2		

Third year

First semester		Second semester	
CEGA211	Soil Mechanics 2A	CEGB211	Engineering Geology 2B
CONA331	Construction Accounting 3		
CONM331	Construction Management 3		
CONT331	Construction Technology 3		
PRAE331	Price Analysis & Estimating 3		
QSG331	Quantity Surveying 3		
SAC3000	Structures 3		
		ACM2B10	Applied Construction Macro-Economics

EB17.2 NDIP: ENGINEERING: CIVIL 309-3

17.2.1 Purpose of the programme

A student who has obtained this qualification will be competent to apply theoretical knowledge, practical experience and skills in Civil Engineering as a civil engineering technician, who forms part of the engineering team, by applying proven techniques to engineering activity, within standards and codes under remote supervision, and under close supervision if operating outside standards and codes.

17.2.2 Outcomes

Exit level outcomes:
The qualifying student must have:

1. the ability to plan Civil Engineering systems, in accordance with the relevant codes of practice under remote supervision, and under close supervision if operating outside standards and codes.
2. the ability to design Civil Engineering systems, in accordance with the relevant codes of practice, under remote supervision, and under close supervision if operating outside standards and codes.
3. the ability to prepare and administer the documentation for Civil Engineering systems, in accordance with the relevant codes of practice under remote supervision, and under close supervision if operating outside standards and codes.
4. the ability to build and maintain Civil Engineering systems under supervision.

17.2.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) N4 Certificate with a minimum pass of 70% in Mathematics and Engineering Science, and a pass in two languages.
d) N5 Certificate, with a minimum of 60% in Mathematics and Engineering Science.
e) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.2.4 Experiential learning
Refer to Faculty Regulation E4.

17.2.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
CSAAC31	Communication Skills 1A	CSABC31	Communication Skills 1B
CCM11-1	Construction Materials 1	CEM1111	Management : Civil 1
CSUA111	Surveying 1A Theory	CISA211	Surveying : Civil 2A Theory
CSUB111	Surveying 1B Practice	CISB211	Surveying : Civil 2B Practice
EIRA111	Computer Skills 1A	EIRB111	Computer Skills 1B
CAM1111	Applied Mechanics 1	CMS11-1	Construction Methods 1
CDR1111	Drawing 1	FCDR2211	Drawing 2
WWEC121	Mathematics 1	WWEA22C	Mathematics 2A
		STA1BCI	Statistics 2B
		IST2111	Theory of Structures 2
Second year			
First semester		Second semester	
AIS2111	Structural Analysis 2	AIS3211	Structural Analysis 3
CET2111	Transportation Engineering 2	CET3211	Transportation Engineering 3
CEW2A11	Hydraulics 2A	CEW3A21	Water and Sewage Reticulation 3A
CEW2B11	Water and Wastewater Treatment 2B	CEW3B21	Hydrology 3B
CEGA211	Soil Mechanics 2A	CEG3211	Geotechnical Engineering 3
CEGB211	Engineering Geology 2B	DIS3111	Documentation 3
RCM31-1	Reinforced Concrete & Masonry Design 3	TSS31-1	Structural Steel & Timber Design 3
CEM2211	Management : Civil 2		
Third year			
First semester		Second semester	
EL30911	Civil Engineering Practice 1	EL30922	Civil Engineering Practice 2

EB17.3 NDIP: ENGINEERING: CHEMICAL 308-3

17.3.1 Purpose of the programme
This qualification is intended for process or chemical engineering technicians working in process-related industries. Students who have obtained this qualification have the competence to apply existing process technology to chemical engineering problems in chemical processes and plant operations.

17.3.2 Outcomes
Exit level outcomes:
The qualifying student will have the ability to:
1. Identify, evaluate, formulate and solve process-related technical and operational problems.
2. Design process equipment, in order to modify existing sections of the plant.
3. Plan and implement the production of required products.
4. Plan and implement projects, using project management tools and skills.
5. Communicate effectively, both orally and in writing, with a variety of audiences, using appropriate language structure, style and graphical support.

6. Implement knowledge of the Safety, Health and Environmental (SHE) impact of chemical processing activities, by identifying the impact and measures used to control these impacts.
7. Use IT in the application of engineering methods, skills and tools.

17.3.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Certificate (until 2008) and the National Senior Certificate (from 2009).
c) N3 Certificate, with a minimum pass of 60% in Mathematics and Physical Science, and a pass in two languages.
d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.3.4 Experiential learning

A specific period of experiential learning will not be recognized if student is registered for three or more modules concurrently.

17.3.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
CET1AC1	Chemistry 1 (Theory)	CET1BCE	Chemical Practical 2
CET1AC2	Chemistry 1 (Practical)	PHY1BCP	Engineering Physics 2 (Practical)
CSAA131	Communication Studies 1A	PHY1BCT	Engineering Physics 2 (Theory)
EIR1111	Computer Skills 1	WAR2111	Chemical Engineering Technology 2
MATE0A1	Engineering Mathematics 0A1	WTA1131	Drawing: Chemical Engineering 1
PHY1ABP	Physics 1 (Practical)	CET1BP1	Physical Chemistry
PHY1ABT	Physics 1 (Theory)	CET1BO1	Organic Chemistry
WPD2111	Chemical Process Industries 2		

Second year

First semester		Second semester	
ACPA321	Chemical Plant 3A	ACPB321	Chemical Plant 3B
CMTA321	Chemical Engineering Technology 3A	CMTB321	Chemical Engineering Technology 3B
CIT3111	Thermodynamics: Chemical Engineering 3	ACT3111	Thermodynamics: Applied 3
BIMA131	Management Skills 1A	BIMB131	Management Skills 1B
MAT2AE2	Engineering Mathematics 2	CPD3111	Chemical Process Design: Principles 3
STA1ZCE	Statistics 2B	ICP3111	Process Control 3
CSAB131	Communication Studies 1B		

Third year

First semester		Second semester	
EL30811	Chemical Engineering Practice 1	EL30822	Chemical Engineering Practice 2

EB17.4 NDIP: ENGINEERING: COMPUTER SYSTEMS NDC001

17.4.1 Purpose of the programme

A student who has completed this qualification will be competent in providing professional, technical and developmental support in the computer industry.

17.4.2 Outcomes

Exit level outcomes:
The qualifying student will have the ability to:

1 Communicate, develop, maintain and implement software systems.
2 Develop, implement and maintain hardware systems in the computing environment.
3 Implement and maintain network hardware and operating systems.
4 Describe and implement the theoretical principles supporting the computing environment.

17.4.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) N3 Certificate, with a minimum pass of 60% in Mathematics, Physical Science, Industrial Electronics and Electrotechnology, and a pass in two languages.
d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.4.4 Experiential learning

As broad a field as possible must be incorporated.
All students will be required to complete a basic 6-month course, Experiential Learning I, which will include the following tasks:

- Orientation
- Basic Hand Skills
- Computer Components
- Network Administration
- General Administration
- Safety and First Aid
- Measuring Instruments
- Circuit Diagrams
- Application Programming
- Report Writing

The remaining six months should be spent on more advanced tasks orientated towards a particular sub-discipline.

17.4.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
EDS121	Digital Systems 1	EDS231	Digital Systems 2
EEL1111	Electronics 1	EEL2211	Electronics 2
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
PH1AEEP	Physics 1A (Practical)	PH1BEEP	Physics 1B (Practical)
PH1AEET	Physics 1A (Theory)	PH1BEET	Physics 1B (Theory)
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
AE11221	Electrical Engineering 1	EIP1111	Projects 1
EIR1111	Computer Skills 1	CPS111	Programming 1
		CSY211	Systems Analysis 2
Second year			
First semester		Second semester	
CNS211	Network Systems 2	CNS311	Network Systems 3
CPS211	Programming 2	CPS311	Programming 3
BPO311	Software Engineering 3	BOS311	Operating Systems 3

CLD311	Logic Design 3	CMP311	Microprocessors 3
EDS341	Digital Systems 3	DBP311	Database Principles 3
MAT3AW3	Engineering Mathematics 3	EMA3111	Measurements 3

Third year

First semester		Second semester	
EL2781	Experiential Learning 1	EL2782	Experiential Learning 2
EDP3111	Design Project 3		

EB17.5 NDIP: ENGINEERING: ELECTRICAL NDE001
Option: Electronic Engineering

17.5.1 Purpose of the programme
A qualifying student will be competent to apply technical knowledge, engineering principles and problem-solving techniques in the field of Electrical Engineering by operating within the relevant standards and codes in collaboration with other members of the engineering team.
The qualified student will be able to register with the Engineering Council of South Africa (ECSA) as a Technician-in-Training in the field of Electrical Engineering.

17.5.2 Outcomes
Exit level Outcomes:
The qualifying student will be able to:
1. Practice Electrical Engineering activities and applications at the level expected of a Professional Technician (Engineering).
2 Manage Electrical Engineering activities and applications at the level expected of a Professional Technician (Engineering).

17.5.3 Admission Requirements and Selection Criteria
a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) N3 Certificate, with a minimum pass of 60% in Mathematics, Physical Science, Industrial Electronics and Electrotechnology, and a pass in two languages.
d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.5.4 Experiential learning
As broad a field as possible must be incorporated.
All students will be required to complete a basic six-month course, Experiential Learning I, which will include the following tasks:

- Orientation
- Basic Hand Skills
- Electrical/Electronic Components
- Power Sources
- General Administration
- Safety and First Aid
- Measuring Instruments
- Circuit Diagrams
- Programmable Devices
- Report Writing

The remaining six months should be spent on more advanced tasks orientated towards a particular sub-discipline, Experiential Learning II (Light Current) or Experiential Learning II (Power Engineering).

17.5.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
AE11221	Electrical Engineering 1	AEI2211	Electrical Engineering 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
EDS121	Digital Systems 1	EDS231	Digital Systems 2
EEL1111	Electronics 1	EEL2211	Electronics 2
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
PH1AEEP	Physics 1 (Practical)	PH1BEEP	Physics 1B (Practical)
PH1AEET	Physics 1 (Theory)	PH1BEET	Physics 1B (Theory)
EIR1111	Computer Skills 1	EIP1111	Projects 1
Second year			
First semester		Second semester	
ASY211	Control Systems 2	ASY331	Control Systems 3
AEC2221	Electronic Communication 2	CNS211	Network Systems 2
EDS341	Digital Systems 3	EDP3111	Design Projects 3
EEL341	Electronics 3	EMA3111	Measurements 3
MAT3AW3	Engineering Mathematics 3	EER3111	Radio Engineering 3
CPS111	Programming 1	EEP3211	Power Electronics 3
ELM2221	Electrical Machines 2		
Third year			
First semester		Second semester	
EL38011	Electrical Engineering Practice 1	EL380LC	Electrical Engineering Practice 2

EB17.6 NDIP: ENGINEERING: ELECTRICAL NDP001
Option: Power Engineering

17.6.1 Purpose of the programme

A qualifying student will be competent to apply technical knowledge, engineering principles and problem-solving techniques in the field of Electrical Engineering by operating within the relevant standards and codes, in collaboration with other members of the engineering team.
The qualified student will be able to register with the Engineering Council of South Africa (ECSA) as a Technician-in-Training in the field of Electrical Engineering.

17.6.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Practice Electrical Engineering activities and applications at the level expected of a Professional Technician (Engineering).
2 Manage Electrical Engineering activities and applications at the level expected of a Professional Technician (Engineering).

17.6.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) N3 Certificate, with a minimum pass of 60% in Mathematics, Physical Science, Industrial Electronics and Electrotechnology, and a pass in two languages.

d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.6.4 Experiential learning

As broad a field as possible must be incorporated.
All students will be required to complete a basic six-month course, Experiential Learning I, which will include the following tasks:

- Orientation
- Basic Hand Skills
- Electrical/Electronic Componel
- Power Sources
- General Administration
- Safety and First Aid
- Measuring Instruments
- Circuit Diagrams
- Programmable Devices
- Report Writing

The remaining six months should be spent on more advanced tasks orientated towards a particular sub-discipline, Experiential Learning 2 (Light Current) or Experiential Learning 2 (Power Engineering).

17.6.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
AE11221	Electrical Engineering 1	AEI2211	Electrical Engineering 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
EDS121	Digital Systems 1	EDS231	Digital Systems 2
EEL1111	Electronics 1	EEL2211	Electronics 2
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
PH1AEEP	Physics 1A (Practical)	PH1BEEP	Physics 1B (Practical)
PH1AEET	Physics 1A (Theory)	PH1BEET	Physics 1B (Theory)
EIR1111	Computer Skills 1	EIP1111	Projects 1
Second year			
First semester		Second semester	
AEI3311	Electrical Engineering 3	ASY331	Control Systems 3
AEP3221	Electrical Protection 3	EDP3111	Design Project 3
ASY211	Control Systems 2	EEP3211	Power Electronics 3
ELM2221	Electrical Machines 2	ELD3221	Electrical Distribution 3
MAT3AW3	Engineering Mathematics 3	ELM3221	Electrical Machines 3
CPS111	Programming 1	CNS211	Network Systems 2
EDS341	Digital Systems 3		
Third year			
First semester		Second semester	
EL38011	Electrical Engineering Practice 1	EL380HC	Electronic Engineering Practice 2

EB17.7 NDIP: ENGINEERING: ELECTRICAL NDT001
Option: Instrumentation Technology

17.7.1 Purpose of the programme
A qualifying student will be competent to apply technical knowledge, engineering principles and problem-solving techniques in the field of Electrical Engineering by operating within the relevant standards and codes in collaboration with other members of the engineering team.
The qualified student will be able to register with the Engineering Council of South Africa (ECSA) as a Technician-in-Training in the field of Electrical Engineering.

17.7.2 Outcomes
Exit level outcomes:
The qualifying student will be able to:
1. Practice Electrical Engineering activities and applications at the level expected of a Professional Technician (Engineering).
2 Manage Electrical Engineering activities and applications at the level expected of a Professional Technician (Engineering).

17.7.3 Admission Requirements and Selection Criteria
a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) N3 Certificate, with a minimum pass of 60% in Mathematics, Physical Science, Industrial Electronics and Electrotechnology, and a pass in two languages.
d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.7.4 Experiential learning
As broad a field as possible must be incorporated.
All students will be required to complete a basic six-month course, Experiential Learning I, which will include the following tasks:

- Orientation
- Basic Hand Skills
- Electrical/Electronic Components
- Power Sources
- General Administration
- Safety and First Aid
- Measuring Instruments
- Circuit Diagrams
- Programmable Devices
- Report Writing

The remaining six months should be spent on more advanced tasks orientated towards a particular sub-discipline, Experiential Learning 2 (Light Current) or Experiential Learning 2 (Power Engineering).

17.7.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
AE11221	Electrical Engineering 1	AEI2211	Electrical Engineering 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
EDS121	Digital Systems 1	EDS231	Digital Systems 2
EEL1111	Electronics 1	EEL2211	Electronics 2
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
PH1AEEP	Physics 1A (Practical)	PH1BEEP	Physics 1B (Practical)
PH1AEET	Physics 1A (Theory)	PH1BEET	Physics 1B (Theory)
EIR1111	Computer Skills 1	PRI 1111	Process Instrumentation 1

Second year

First semester		Second semester	
ASY211	Control Systems 2	ASY331	Control Systems 3
PRI221	Process Instrumentation 2	PRI3221	Process Instrumentation 3
EDS341	Digital Systems 3	EDP3111	Design Projects 3
EEL341	Electronics 3	EEP3211	Power Electronics 3
MAT3AW3	Engineering Mathematics 3	CNS211	Network Systems 2
CPS111	Programming 1		
ELM2221	Electrical Machines 2		

Third year

First semester		Second semester	
EL38011	Electrical Engineering Practice 1	EL380HC	Electronic Engineering Practice 2

EB17.8 NDIP: EXTRACTION METALLURGY 403-1

17.8.1 Purpose of the programme

At this level, a qualifying student will be competent in basic metallurgical process operation and problem-solving, thus contributing to the needs of the metallurgical industry and mining community. The qualified student will be able to register with ECSA as a Technician.

17.8.2 Outcomes

Exit level outcomes:
The qualifying student will have the ability to:

1. Apply metallurgical principles to plants and processes and operate relevant metallurgical laboratory and plant equipment.
2. Collect and process data, and evaluate information on different plant parameters.
3. Show responsibility towards safety and health and the environment.
4. Implement communication skills to write reports and make oral presentations, supported by effective non-verbal information.
5. Apply technical and administrative principles to metallurgical plants and processes.
6. Demonstrate the ability to perform under pressure, using own initiative.

17.8.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) Recommended subject: Technical Drawing.
d) N3 Certificate, with a pass of at least 60% in Mathematics and Physical Science, and a pass in two languages.
e) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.8.4 Experiential learning

Refer to Faculty Regulation E4.

17.8.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
MAT1AW1	Engineering Mathematics 1	MAT2AE2	Engineering Mathematics 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B

CET1AMP	Metallurgical Chemistry 1 (Practical)	CET1AM2	Metallurgical Chemistry 2
CET1AMT	Metallurgical Chemistry 1 (Theory)	MTP21-1	Metallurgical Plant 2
MET111	Metallurgy 1	PMY11-1	Physical Metallurgy 1
PHY1ABP	Physics 1 (Practical)	PRE21-1	Practical Metallurgy 2: Extraction Metallurgy
PHY1ABT	Physics 1 (Theory)	MPR 2A20	Mineral Processing 2
EDM1111	Mechanical Engineering Drawing 1	MPR 2B20	Mineral Processing 2
EIRX111	Computer Skills 1	STA1ZCE	Statistics 2B

Second year

First semester		Second semester	
GEO1111	Geology 1	MCUA311	Coal Processing and Usage 3 (Theory)
MAY21-2	Analytical Techniques 2	MCUB311	Coal Processing and Usage 3 (Practical)
MPE21-1	Process Engineering 2	MGG21-2	Metallurgical Geology 2
STA2BEM	Process Statistics 2	MHD3111	Hydrometallurgy 3
THM21-2	Metallurgical Thermodynamics	MNM31-1	Numerical Methods 1
MPR32-1	Mineral Processing 3	MYP3111	Pyrometallurgy 3
		MLM21-1	Metallurgical Management 2

Third year

First semester		Second semester	
EL40311	Experiential Learning 1	EL40312	Experiential Learning 2

EB17.9 NDIP: ENGINEERING: INDUSTRIAL 321-3

17.9.1 Purpose of the programme

Graduates who have obtained this qualification will be competent in applying operations management techniques and strategies, resulting in effectiveness and productivity in industry. The qualified student will be able to register with ECSA.

17.9.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Execute operations management techniques in Industry.
2. Apply management and leadership principles in Industry.
3. Apply cost control.
4. Apply relevant principles and procedures to perform financial analyses.

17.9.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) Recommended subject: Technical Drawing.
d) N3 Certificate, with a minimum pass of 60% in Mathematics and Physical Science, and a pass in two languages.
e) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.9.4 Experiential learning

Refer to Faculty Regulation E4.

17.9.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
IMV1111	Mechanical Manufacturing Engineering 1	IMV2211	Mechanical Manufacturing Engineering 2
ELT1111	Electrotechnology 1	TIV121	Engineering Work Study 1
EIRI111	Computer Skills 1	STA1ZIT	Statistics 1
CHM1111	Mechanics 1	BEP121	Production Engineering: Industrial 1
EDM1111	Mechanical Engineering Drawing 1	**Elective (one of the following modules)**	
		CAD1111	Computer-Aided Draughting 1
		EIS2111	Software Design 2
Second year			
First semester		Second semester	
TIV231	Engineering Work Study 2	TIV351	Engineering Work Study 3
BEP231	Production Engineering: Industrial 2	BAU3111	Automation 3
BCO2111	Costing 2	BBB341	Industrial Accounting 3
BVR2111	Manufacturing Relations 2	BIL3111	Industrial Leadership 3
BQA2111	Quality Assurance 2	BOA321	Operational Research 3
BFM2111	Facility Layout and Materials Handling 2	**Elective (one of the following modules):**	
		IMV321	Mechanical Manufacturing Engineering 3
		MAT3AW3	Engineering Mathematics 3
		EIS3111	Software Design 3
Third year			
First semester		Second semester	
EL32121	Industrial Engineering Practice 1	EL32123	Industrial Engineering Practice 2

EB17.10 NDIP: ENGINEERING: MECHANICAL 293-3

17.10.1 Purpose of the programme

Students who have obtained this qualification will be able to, independently, as well as under supervision, integrate analytical and practical engineering techniques and engineering knowledge to solve well defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

17.10.2 Outcomes

Exit level outcomes:

The qualifying student will be able to:

1. Apply mechanical engineering principles to diagnose and solve engineering problems.
2. Demonstrate mechanical engineering knowledge and skills in one or more specialized areas.
3. Engage in mechanical engineering design work, individually, and as part of a team.
4. Communicate effectively in a technological environment.

5. Apply management principles in an engineering environment.

17.10.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) N4 Certificate, with a minimum pass of 60% in both Mathematics and Physical Science, and a pass in English and one other language.
d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.10.4 Experiential learning

Students will not obtain credit for Work Integrated Learning done on a part-time basis, while registered for full-time study.
Students may not register concurrently for Work Integrated Leaning and attendance of lectures during the normal working day without permission of the Head of the Department.

17.10.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
CHM1111	Mechanics 1	CAD1111	Computer-Aided Draughting 1
EDM1111	Mechanical Engineering Drawing 1	EMM2111	Mechanics of Machines 2
EIRME111	Computer and Programming Skills 1	IMF2111	Fluid Mechanics 2
ELT1111	Electrotechnology 1	IMT2111	Thermodynamics 2
IMV1111	Mechanical Manufacturing Engineering 1	SOM2111	Strength of Materials 2
Second year			
First semester		Second semester	
EMM313	Mechanics of Machines 3	ASM301	Applied Strength of Materials 3
IMF313	Fluid Mechanics 3	MHM301	Hydraulic Machines 3
IMO2111	Mechanical Engineering Design 2	MHT302	Theory of Machines 3
IMT313	Thermodynamics 3	SMP301	Steam Plant 3
SOM312	Strength of Materials 3	MAT3AW3	Engineering Mathematics 3
ELT2211	Electrotechnology 2	**Elective (one of the following modules):**	
		BIM121	Management Skills 1
		ELT312	Electrotechnology 3
		IMO312	Mechanical Engineering Design 3
		IMV2211	Mechanical Manufacturing Engineering 2
Third year			
First semester		Second semester	
EL29321	Mechanical Engineering Practice 1	EL29331	Mechanical Engineering Practice 2

EB17.11 NDIP: ENGINEERING: METALLURGY 402-1

17.11.1 Purpose of the programme

At this level, a qualifying student will be competent in basic metallurgical process operation, product development and problem-solving, thus contributing to the needs of the metallurgical industry and mining community. The qualified student will be able to register with ECSA as a Technician.

17.11.2 Outcomes

Exit level outcomes:
The qualifying student will be competent to:

1. Operate specific metallurgical equipment, and control metallurgical processes and products within stipulated specifications.
2. Communicate effectively by means of reports, presentations, specifications, drawings and standards.

17.11.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) Recommended subject: Technical Drawing.
d) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.11.4 Experiential learning

Refer to Faculty Regulation EB4.

17.11.5 Curriculum

First year

CODE	MODULE	CODE	MODULE
First semester		Second semester	
MAT1AW1	Engineering Mathematics 1	MAT2AE2	Engineering Mathematics 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
CET1AMP	Metallurgical Chemistry 1 (Practical)	CET1AM2	Metallurgical Chemistry 2
CET1AMT	Metallurgical Chemistry 1 (Theory)	PMY11-1	Physical Metallurgy 1
MET111	Metallurgy 1	PRM21-1	Practical Metallurgy 2: Physical Metallurgy
PHY1ABP	Physics 1 (Practical)	TEX2111	Extraction Metallurgy 2
PHY1ABT	Physics 1 (Theory)	TST2111	Strength of Materials 2
EDM1111	Mechanical Engineering Drawing 1	STA1ZCE	Statistics 2B
EIR1111	Computer Skills 1		

Second year

First semester		Second semester	
PMY22-2	Physical Metallurgy 2	PMY33-3	Physical Metallurgy 3
MTM3111	Materials Testing: Metallurgy 3	BIM121	Management Skills 1
PRS21-1	Production of Iron and Steel 2	HMR21-1	Heat and Mass Transfer 2
THM21-2	Metallurgical Thermodynamics 2	TMP31-1	Mechanical Metallurgy 3
TKU21-2	Quality Control 2	**Electives (two of the following modules)**	
Elective (one of the following modules)		FTY302	Foundry Technology 3

FTY21-1	Foundry Technology 2	PRS302	Production of Iron and Steel 3
TMI21-1	Mechanical Deformation Technology 2	TKR31-1	Corrosion 3

Third year

First semester		Second semester	
EL40211	Metallurgical Engineering Practice 1	EL40212	Metallurgical Engineering Practice 2

EB17.12 NDIP: MINERAL SURVEYING 440-1

17.12.1 Purpose of the programme

The qualification will be awarded to a learner who has provided evidence to the satisfaction of the assessors that the stated competence, as detailed in the specified outcomes, has been achieved, either through education and training in a recognised provider`s learning programme, or through expertise that complies with the stated specified outcomes

17.12.2 Outcomes

Exit level outcomes:
The qualified student should have the ability and knowledge to effectively:

1. Conduct the normal mine survey work of a mine, with the associated calculations and subsequent plotting and drawings on plans that may be required.
2. Conduct and control the sampling required for mineral evaluation purposes.
3. Monitor the flow of ore, in order to detect any mineral/ore losses by means of calculating suitable ore flow control factors.
4. Communicate with others to form part of the production team of a mine.
5. Solve mathematical problems relating to mine surveying.
6. Present data in a statistical format for reporting purposes.
7. Write and present reports.
8. Conduct elementary mineral reserve evaluations.
9. Solve statistical problems relating to distributions of mineral values.

17.12.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) Recommended subject: Technical Drawing.
d) N3 or N4 Certificate, with a pass of at least 60% in Engineering Mathematics and Engineering Science, and a pass in two languages.
e) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.12.4 Experiential learning

The total experiential time for this qualification is 1.5 years.

17.12.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
BQT1112	Quantitative Techniques 1	CAD1111	Computer-Aided Draughting 1
CSA121	Communication Skills 1	EDM1111	Mechanical Engineering Drawing 1
EIRM111	Computer Skills 1	ENM31-1	Environmental Management 1
MOT1111	Mineral Exploitation 1	MAS11-1	Accounting Skills 1
MWT1111	Science: Mining 1	MSY1111	Mineral Survey 1

Second year

First semester		Second semester	
EL440-1	Experiential Learning 1	EL440-2	Experiential Learning 2

Third year

First semester		Second semester	
MGN21-1	Engineering Management 2	MGN32-1	Engineering Management 3
GLG3AMM	Mining Geology 2	MSG3121	Structural Geology 3
MNM31-1	Numerical Methods 1	MSS21-1	Statistics: Mining 2
MSY2111	Mineral Survey 2	MSY3111	Mineral Survey 3
MVN1111	Mineral Valuation 1	MVN2111	Mineral Valuation 2

EB17.13 NDIP: MINING ENGINEERING 339-1

17.13.1 Purpose of the programme

The qualified learner would be technically competent in the effective and safe process and manpower management of all mining production activities at first level management and supervision levels at mines.

17.13.2 Outcomes

The qualified learner should have the technical and management capability to effectively run all types of mining production operations at junior and mid management level.

17.13.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) Students who have passed suitable access programmes may be exempted from the minimum requirements.
d) Preference will be given to applicants who have a pre-committed practical training opportunity from a reputable mining company.

The Department reserves the right to select students for this programme. Students are advised to ensure a 100% health record, as required for employment and experiential learning at mines.

PLEASE NOTE: Although APS requirements are low. Any potential applicant should be advised when querying the feasibility of entering the programme that they should ideally have been exposed to a mine visit underground before making the decision and most importantly are physically strong enough (mass in excess of 40Kg) and that they are in good health with acceptable senses such as hearing and vision. Applicants will have to pass a medical assessment to gain employment in the industry. Applicants should ideally have the backing of a mining company.

17.13.4 Experiential learning

A formal report must be submitted for the evaluation of experiential learning.

17.13.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
BQT1112	Quantitative Techniques 1	CAD1111	Computer-Aided Draughting 1
CSA121	Communication Skills 1	EDM1111	Mechanical Engineering Drawing 1
EIRM111	Computer Skills 1	ENM31-1	Environmental Management 1
MOT1111	Mineral Exploitation 1	MAS11-1	Accounting Skills 1

MWT1111	Science: Mining 1	MWS1111	Engineering Work Study 1

Second year

First semester		Second semester	
EL33911	Experiential Learning 1	EL33912	Experiential Learning 2

Third year

First semester		Second semester	
MGN21-1	Engineering Management 2	MGN32-1	Engineering Management 3
MIN21-1	Mining 2	MIN32-1	Mining 3
MEG2111	Mine Engineering 2	MEG3211	Mine Engineering 3
MSV2111	Mine Survey & Valuation 2	MSV3211	Mine Survey and Valuation 3
GLG3AMM	Mining Geology 2	MWG3211	Geology: Mining 3
MBF21-1	Mineral Beneficiation 2	MTL3211	Mining Technical Services 3

EB17.14 NDIP: TOWN AND REGIONAL PLANNING 387-1

17.14.1 Purpose of the programme

This qualification is intended for planning technicians working in government and non-governmental sectors. Students would, in a team, be able to perform in both spatial and non-spatial planning fields, using appropriate technology, in order to critically respond to the challenges in the built environment. Learners may apply for registration as a Technical Planner with SACPLAN, after having met specific SACPLAN requirements.

17.14.2 Outcomes

Exit level outcomes:
The qualifying student should be able to:

1. Research and plan, within the built and natural environment, to assist in facilitating land use planning, control and development.
2. Apply appropriate technology in the process of planning land use and development.
3. Apply communication skills in retrieving and disseminating information.
4. Apply interpretive skills in town planning-related matters.

17.14.3 Admission Requirements and Selection Criteria

a) A National Senior Certificate **or** an equivalent qualification of an equivalent standard.
b) Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).
c) Recommended subjects: Geography or Drawing.
d) N3 Certificate, with a minimum pass of 60% in Mathematics and English.
e) Students who have passed suitable access programmes may be exempted from the minimum requirements.

17.14.4 Experiential learning

Refer to Regulation E.4.
Project Work (P1) and Planning Practice (P2) must be completed in an environment related to Town and Regional Planning.

17.14.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
CDR1112	Drawing for Planners 1	CES1111	Civil Engineering for Planners 1
GSS1111	Geography for Planners 1	ASS1111	Survey and Analysis 1

PSSA111	History and Principles of Planning 1	DPS211	Planning Design 2
SSS1111	Surveying 1	EIRT111	Computer Skills 1
		PSSB111	Theory of Planning 1

Second year

First semester		Second semester	
DPSA321	Planning Design 3A	ART331	Computer Applications 3
DPTA311	Economics for Planners 3	DPSB321	Planning Design 3B
LPT111	Legal Principles 1	DPTB311	Housing Development 3
STA1ZIT	Statistics 1	LPS211	Legal Procedures 2

Third year

First and second semester	
EL38712	Planning Practice 2
EL3871A	Project Work A
EL3871B	Project Work B
EL3872C	Project Work C
EL3872D	Project Work D

EB17.15 DIP: MANAGEMENT SERVICES D6MASQ

17.15.1 Purpose of the programme

The aim of the qualification is to develop the student's applied and cognitive competencies in the acquisition, interpretation, understanding and application of management information and decision support. The student should be able to analyse and explain company and environmental data, information and systems in the context of a company and its business environment, and to assess and interpret the external impact of decisions. The student should also be able to reflect on his/her managerial decisions and applications to assess the effect thereof in the holistic context of specialised management functions in industry, in order to contextualise their learning to their business environment, and to appreciate improvements and interventions they can affect in their working environments.

17.15.2 Outcomes

Exit level outcomes:

The qualifying student should be able to:

a) Demonstrate detailed understanding and acquired knowledge to apply different manufacturing, operations and services to an organization in a way that improves organization development and effectiveness. This can involve design, installation, commissioning and implementation of control systems, improvement systems and strategies and new ideas useful in addressing "specific needs" required for operations process/system to function optimally

b) Understand and apply strategic management services and strategies required to organize, plan, lead and control a system and operational processes to function optimally

c) Analyse, prepare and apply the dynamics of systems management and design in order to maximize organizational performance, development, efficiency and effectiveness

d) Apply Management Services techniques in order to make sound decisions required for assisting in the efficient and effective running of an organization.

e) Apply different management services practices principals, methods, techniques and ideas in order to improve overall organizational planning, operational, tactical and strategic implementation and performance

f) Illustrate by means of submitting a project based on a research methodology illustrating knowledge, application and implementation of management services techniques, ideas, principles, theories and strategies in order to optimize operational processes and the use of resources.

17.15.3 Admission Requirements and Selection Criteria

Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).

17.15.4 Experiential learning

Refer to Regulation EB.4.

17.15.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
BMA01A1	Business Management 1A	BMA01B1	Business Management 1B
CAE01A1	Costing and Estimating 1A	CAE01B1	Costing and Estimating 1B
OPM1A11	Operations Management 1A	OPM11B1	Operations Management 1B
ORE11A1	Organisational Effectiveness 1A	ORE11B1	Organisational Effectiveness 1B
STAQTA1	Quantitative Techniques 1A	STAQTB1	Quantitative Techniques 1B

Second year

First semester		Second semester	
BMA02A2	Business Management 2A	BMA02B2	Business Management 2B
EUC01A1	End-User Computing 1A	EUC01B1	End-User Computing 1B
OPT22A2	Operations Management Techniques 2A	OPT22B2	Operations Management Techniques 2B
ORE22A2	Organisational Effectiveness 2A	ORE22B2	Organisational Effectiveness 2B
QAS22A2	Quality Assurance 2A	QAS22B2	Quality Assurance 2B

Third year

First semester		Second semester	
BMA03A3	Business Management 3A	BMA03B3	Business Management 3B
ORE33A3	Organisational Effectiveness 3A	ORE33B3	Organisational Effectiveness 3B
SAD01A1	Systems Analysis and Design 1A	SAD01B1	Systems Analysis and Design 1B
MAN3YR3	Management Services	MAN3YR3	Management Services

EB17.16 DIP: OPERATIONS MANAGEMENT D6OPMQ

17.16.1 Purpose of the programme

To develop the student's applied and cognitive competencies in the acquisition, interpretation, understanding and application of management information and decision support.

The student should be able to:

- manage operational resources within the operations management field,
- demonstrate detailed understanding of the different supply chain objectives needed in different operational circumstances
- reflect on managerial decisions and applications to assess the effect thereof in the holistic context of specialized operational management functions in industry, in order to contextualize their learning to their business environment, and to appreciate improvements and interventions they can affect in their working environments.

17.16.2 Outcomes

Exit level outcomes:

The qualifying student should be able to:

a) Conduct and display knowledge and application of the role and scope of the operations managers function in the context of the production of goods and services in either profit oriented or not-for-profit endeavors.
b) Recognize, understand and use different quantitative and qualitative techniques tools and models applicable in operations management in contemporary manufacturing / service organizations to optimize operation processes
c) Conduct and display knowledge and application of project and supply chain management principles, quality and productivity improvement.
d) Apply a logical and analytical approach in problem solving and prepare a managerial report that will ensure resource and process optimization based on the findings.
e) Understand the role of quality and quality improvements in the life of an organization which include implementation of quality systems and use of quality tools to make informed decisions.
f) Understand and display basic information technology, human relations skills, and financial principles in order to plan and control operational systems.
g) Illustrate by means of submitting a report based on a direct practical industrial experience simulation illustrating knowledge and application of operations management in various manufacturing and service industries.

17.16.3 Admission Requirements and Selection Criteria

Refer to Faculty Regulation EB3 for the minimum admission requirements for the Senior Certificate (until 2008) and the National Senior Certificate (from 2009).

17.16.4 Experiential learning

Refer to Regulation EB4.

17.16.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
OPM11A1	Operations Management 1A	OPM11B1	Operations Management 1B
ORE11A1	Organisational Effectiveness 1A	ORE11B1	Organisational Effectiveness 1B
STAQTA1	Quantitative Techniques A	STAQTB1	Quantitative Techniques B
WPD11A1	Workplace Dynamics 1A	WPD11B1	Workplace Dynamics 1B
Second year			
First semester		Second semester	
OPM22A2	Operations Management 2A	OPM22B2	Operations Management 2B
OPT22A2	Operations Management Techniques 2A	OPT22B2	Operations Management Techniques 2B
ORE22A2	Organisational Effectiveness 2A	ORE22B2	Organisational Effectiveness 2B
QAS22A2	Quality Assurance 2A	QAS22B2	Quality Assurance 2B
Third year			
First semester		Second semester	
EUC01A1	End-User Computing 1A	EUC01B1	End-User Computing 1B
FPO0AA1	Financial Principles in Operation 1A	FPO0BB1	Financial Principles in Operation 1B
OPM33A3	Operations Management 3A	OPM33B3	Operations Management 3B

OPT33A3	Operations Management Techniques 3A	OPT33B3	Operations Management Techniques 3B
OPP3YR3	Operations Management Practice 3	OPP3YR3	Operations Management Practice 3

EB18 NDIP EXTENDED PROGRAMMES

EB18.1 EXTENDED PROGRAMME NDIP: BUILDING NDE354

18.1.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First and second semester	
FABS1PA	Mathematics 1
FCONM1A	Construction Management 1A
FCOT11A	Construction Technology 1A
FFRP111	Fundamental Research Practice
FQSG11A	Quantity Surveying 1A
FWPN111	Workplace Preparation

Second year

First semester		Second semester	
FCOT11B	Construction Technology 1B	FCOT11B	Construction Technology 1B
FCONM1B	Construction Management 1B	FCONM1B	Construction Management 1B
FQSG11B	Quantity Surveying 1B	FQSG11B	Quantity Surveying 1B
BGC111	Communication Studies 1	CCM11-1	Construction Materials
PHY1YKP	Construction Applied Building Science (Practical)	PHY1YKP	Construction Applied Building Science (Practical)
PHY1YKT	Applied Building Science Theory	PHY1YKT	Applied Building Science Theory
SSG111	Site Surveying 1	SSG111	Site Surveying 1

Third year

First semester		Second semester	
ACM2A10	Applied Construction Micro-Economics	EL3540	Building Practice
CONT221	Construction Technology 2		
STA1ZIT	Statistics 1		
CMS11-1	Construction Methods 1		
QSB221	Quantity Surveying 2		

Fourth year (Entrance into the Fourth year of the programme are completed first and second year)

First semester		Second semester	
CONA331	Construction Accounting 3	CONA331	Construction Accounting 3
CONM331	Construction Management 3	CONM331	Construction Management 3
CONT331	Construction Technology 3	CONT331	Construction Technology 3
PRAE331	Price Analysis & Estimating 3	PRAE331	Price Analysis & Estimating 3
QSG331	Quantity Surveying 3	QSG331	Quantity Surveying 3
SAC3000	Structures 3	SAC3000	Structures 3
CEGA211	Soil Mechanics 2A	CEGB211	Engineering Geology 2B
		ACM2B10	Applied Construction Macro-Economics

EB18.2 EXTENDED PROGRAMME NDE321
NDIP: ENGINEERING: INDUSTRIAL

18.2.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First and second semester	
FFRP111	Fundamental Research Practice (Engineering) Extended
FWPN111	Workplace Preparation
CHM111T	Mechanics 1 (Theory) Extended
CHM111P	Mechanics 1 (Practical) Extended
FEDM111	Mechanical Engineering Drawing 1 Extended
FPOM111	Mathematics 1 Foundation
FSPC11A	Foundation Chemistry Extended
FSPC11B	Foundation Physics Extended
FEIR111	Computer Skills 1
FCAB111	Computer Application 1

Second year

First semester		Second semester	
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
IMV1111	Mechanical Manufacturing Engineering 1	IMV2211	Mechanical Manufacturing Engineering 2
ELT1111	Electrotechnology 1	BEP121	Production Engineering: Industrial 1
		TIV121	Engineering Work Study 1
		STA1ZIT	Statistics 1
		Elective1 (one of the following modules):	
		CAD1111	Computer-Aided Draughting 1
		EIS2111	Software Design 2

Third year

First semester		Second semester	
TIV231	Engineering Work Study 2	TIV351	Engineering Work Study 3
BEP231	Production Engineering: Industrial 2	BAU3111	Automation 3
BCO2111	Costing 2	BBB341	Industrial Accounting 3
BVR2111	Manufacturing Relations 2	BIL3111	Industrial Leadership 3
BQA2111	Quality Assurance 2	BOA321	Operational Research 3
BFM2111	Facility Layout and Materials Handling 2		
		Elective (one of the following modules):	
		IMV321	Mechanical Manufacturing Engineering 3
		MAT3AW3	Engineering Mathematics 3
		EIS3111	Software Design 3

Fourth year

First semester	Second semester

EL32121	Industrial Engineering Practice 1	EL32123	Industrial Engineering Practice 2

EB18.3 EXTENDED PROGRAMME NDE293
NDIP: ENGINEERING: MECHANICAL

18.3.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First and second semester	
FFRP111	Fundamental Research Practice (Engineering) Extended
FWPN111	Workplace Preparation (Engineering) Extended
CHM111T	Mechanics 1 (Theory) Extended
CHM111P	Mechanics 1 (Practical) Extended
FEDM111	Mechanical Engineering Drawing 1 Extended
FPOM111	Mathematics 1 Foundation Extended
FSPC11A	Foundation Chemistry Extended
FSPC11B	Foundation Physics Extended
FEIRME1	Computer and Programming Skills 1

Second year

First semester		Second semester	
IMV1111	Mechanical Manufacturing Engineering 1	SOM2111	Strength of Materials 2
ELT1111	Electrotechnology 1	CAD1111	Computer-Aided Draughting 1
CSAA131	Communication Studies 1A	CSAB131	Communication Studies 1B
MAT1AW1	Engineering Mathematics 1	EMM2111	Mechanics of Machines 2
		IMF2111	Fluid Mechanics 2
		IMT2111	Thermodynamics 2
		MAT2AW2	Engineering Mathematics 2

Third year

First semester		Second semester	
EMM313	Mechanics of Machines 3	ASM301	Applied Strength of Materials 3
IMF313	Fluid Mechanics 3	MHM301	Hydraulic Machines 3
IMO2111	Mechanical Engineering Design 2	MHT302	Theory of Machines 3
IMT313	Thermodynamics 3	SMP301	Steam Plant 3
SOM312	Strength of Materials 3	MAT3AW3	Engineering Mathematics 3
ELT2211	Electrotechnology 2	**Elective (one of the following modules):**	
		BIM121	Management Skills 1
		ELT312	Electrotechnology 3
		IMO312	Mechanical Engineering Design 3
		IMV2211	Mechanical Manufacturing Engineering 2

Fourth year

First semester		Second semester	
EL29321	Mechanical Engineering Practice 1	EL29331	Mechanical Engineering Practice 2

EB18.4 EXTENDED PROGRAMME NDE402
NDIP: ENGINEERING: METALLURGY

18.4.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester
FFRP111	Fundamental Research Practice	
FWPN111	Workplace Preparation (Engineering) Extended	
FWWE112	Engineering Mathematics 1	
FEDM111	Mechanical Engineering Drawing 1 Extended	
FWCMA14	Metallurgical Chemistry 1 (Practical) Extended	
FWCMB14	Metallurgical Chemistry 1 (Theory) Extended	
FEIR1111	Computer Skills 1	

Second year

First semester		Second semester	
FWFJA14	Physics 1 (Theory) Extended	FWFJA14	Physics 1 (Theory) Extended
FWFJB14	Physics 1 (Practical) Extended	FWFJB14	Physics 1 (Practical) Extended
MET111	Metallurgy 1	PMY11-1	Physical Metallurgy 1
CSAA131	Communication Studies 1A	PRM21-1	Practical Metallurgy 2: Physical Metallurgy
CET1AM2	Metallurgical Chemistry 2	TEX2111	Extraction Metallurgy 2
MAT2AE2	Engineering Mathematics 2	TST2111	Strength of Materials 2
		CSAB131	Communication Studies 1B
		STA1ZCE	Statistics 2B

Third year

First semester		Second semester	
TKU21-2	Quality Control 2	PMY33-3	Physical Metallurgy 3
THM21-2	Metallurgical Thermodynamics 2	HMR21-1	Heat and Mass Transfer 2
PMY22-2	Physical Metallurgy 2	TMP31-1	Mechanical Metallurgy 3
PRS21-1	Production of Iron and Steel 2	BIM121	Management Skills 1
MTM3111	Materials Testing: Metallurgy 3	**Electives (two of the following modules):**	
Elective (one of the following modules):		FTY302	Foundry Technology 3
FTY21-1	Foundry Technology 2	PRS302	Production of Iron and Steel 3
TMI21-1	Mechanical Deformation Technology 2	TKR31-1	Corrosion 3

Fourth year

First semester		Second semester	
EL40211	Metallurgical Engineering Practice 1	EL40212	Metallurgical Engineering Practice 2

EB18.5 EXTENDED PROGRAMME D6MAEQ
DIP: MANAGEMENT SERVICES

18.5.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
FRP10Y1	Fundamental Research Practice		
WPP1YR1	Workplace Preparation		
FBM10Y1	Fundamentals of Business Mathematics		
BME0YA1	Business Management 1A		
ORE1AY1	Organisational Effectiveness 1A		
EUC01A1	End-User Computing 1A		

Second year

First semester		Second semester	
CAE01A1	Costing And Estimating 1A	CAE01B1	Costing And Estimating 1B
OPM11A1	Operations Management 1A	OPM11B1	Operations Management 1B
STAQTA1	Quantitative Techniques 1A	STAQTB1	Quantitative Techniques 1B
BME0YB1	Business Management 1B	BME0YB1	Business Management 1B
ORE1BY1	Organisational Effectiveness 1B	ORE1BY1	Organisational Effectiveness 1B

Third year

First semester		Second semester	
BMA02A2	Business Management 2A	BMA02B2	Business Management 2B
OPT22A2	Operations Management Techniques 2A	EUC01B1	End-User Computing B
ORE22A2	Organisational Effectiveness 2A	OPT22B2	Operations Management Techniques 2B
QAS22A2	Quality Assurance 2A	ORE22B2	Organisational Effectiveness 2B
		QAS22B2	Quality Assurance 2B

Fourth year

First semester		Second semester	
BMA03A3	Business Management 3A	BMA03B3	Business Management 3B
ORE33A3	Organisational Effectiveness 3A	ORE33B3	Organisational Effectiveness 3B
SAD01A1	Systems Analysis and Design 1A	SAD01B1	Systems Analysis and Design 1B
MAN3YR3	Management Services	MAN3YR3	Management Services

EB18.6 EXTENDED PROGRAMME NDEE11
NDIP: ELECTRICAL ENGINEERING

18.6.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First and second semester	
FFRP111	Fundamental Research Practice
FWPN111	Workplace Preparation
FPOM111	Foundation Maths
FSPC11B	Foundation Physics

FSPC11A	Foundation Chemistry
FEIR111	Computer Skills 1
FELT111	Foundation Electrotechnology

Second year

First semester		Second semester	
AE11221	Electrical Engineering 1	AEI2211	Electrical Engineering 2
CSAA131	English: Communication Studies 1A	CSAB131	English: Communication Studies 1B
EDS121	Digital Systems 1	EDS231	Digital Systems 2
EEL1111	Electronics 1	EEL2211	Electronics 2
MAT1AW1	Engineering Mathematics 1	MAT2AW2	Engineering Mathematics 2
PH1AEEP	Physics 1A (Practical)	PH1BEEP	Physics 1B (Practical)
PH1AEET	Physics 1A (Theory)	PH1BEET	Physics 1B (Theory)
		PRI 1111	Process Instrumentation 1

Third year

First semester		Second semester	
ASY211	Control Systems 2	ASY331	Control Systems 3
PRI221	Process Instrumentation 2	PRI3221	Process Instrumentation 3
EDS341	Digital Systems 3	EDP3111	Design Projects 3
EEL341	Electronics 3	EEP3211	Power Electronics 3
MAT3AW3	Engineering Mathematics 3	CNS211	Network Systems 2
CPS111	Programming 1		
ELM2221	Electrical Machines 2		

Fourth year

First semester		Second semester	
EL38011	Electrical Engineering Practice 1	EL380HC	Electrical Engineering Practice 2

EB18.7 EXTENDED PROGRAMME NDIP: CIVIL ENGINEERING NDCE01

18.7.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First and second semester	
FFRP111	Fundamental Research Practice
FWPN111	Workplace Preparation
FPOM111	Foundation Math
FSPC11B	Foundation Physics
FCAM111	Applied Mechanics 1 and Lab

First semester		Second semester	
FCDR111	Drawing 1	FCDR211	Drawing 2
FEIRA11	Computer Skills 1A	FEIRB11	Computer Skills 1B

Second year

First semester	Second semester

CSAAC31	English: Communication Skills 1A	CSABC31	English: Communication Skills 1B
CCM11-1	Construction Materials 1	CEM1111	Management : Civil 1
CSUA111	Surveying 1A Theory	CISA211	Surveying : Civil 2A Theory
CSUB111	Surveying 1B Practice	CISB211	Surveying : Civil 2B Practice
		CMS11-1	Construction Methods 1
WWEC121	Mathematics 1	WWEA22C	Mathematics 2A
		STA1BCI	Statistics 2B
FIST211	Theory of Structures 2	FIST211	Theory of Structures 2

Third year

First semester		Second semester	
AIS2111	Structural Analysis 2	AIS3211	Structural Analysis 3
CET2111	Transportation Engineering 2	CET3211	Transportation Engineering 3
CEW2A11	Hydraulics 2A	CEW3A21	Water and Sewage Reticulation 3A
CEW2B11	Water and Wastewater Treatment 2B	CEW3B21	Hydrology 3B
CEGA211	Soil Mechanics 2A	CEG3211	Geotechnical Engineering 3
CEGB211	Engineering Geology 2B	DIS3111	Documentation 3
RCM31-1	Reinforced Concrete & Masonry Design 3	TSS31-1	Structural Steel &Timber Design 3
CEM2211	Management : Civil 2		

Fourth year

First semester		Second semester	
EL30911	Civil Engineering Practice 1	EL30922	Civil Engineering Practice 2

EB18.8 EXTENDED PROGRAMME DIP: OPERATIONS MANAGEMENT D6OPEQ

18.8.1 Curriculum

CODE	MODULE	CODE	MODULE

First year

First and second semester	
FRPE0Y1	Fundamental Research Practice (ENG) EXT
WPP10Y1	Workplace Preparation (ENG) EXT
FBM10Y1	Fundamental Business Mathematics
BPJ1AY1	Operations Management 1A
ORE1AY1	Organisational Effectiveness 1A
EUC01A1	End-User Computing 1A

Second year

First semester		Second semester	
STAQTA1	Quantitative Techniques A	STAQTB1	Quantitative Techniques B
BPJ1BY1	Operations Management 1B	BPJ1BY1	Operations Management 1B
ORE1BY1	Organisational Effectiveness 1B	ORE1BY1	Organisational Effectiveness 1B
WPD11A1	Work Place Dynamics 1A	WPD11B1	Work Place Dynamics 1B

		EUC01B1	End-User Computing 1B

Third year

First semester		Second semester	
QAS22A2	Quality Assurance 2A	QAS22B2	Quality Assurance 2B
OPM22A2	Operations Management 2A	OPM22B2	Operations Management 2B
OPT22A2	Operations Management Techniques 2A	OPT22B2	Operations Management Techniques 2B
ORE22A2	Organisational Effectiveness 2A	ORE22B2	Organisational Effectiveness 2B

Fourth year

First semester		Second semester	
FPO0AA1	Financial Principles in Operation 1A	FPO0BB1	Financial Principles in Operation 1B
OPM33A3	Operations Management 3A	OPM33B3	Operations Management 3B
OPT33A3	Operations Management Techniques 3A	OPT33B3	Operations Management Techniques 3B
OPP3YR3	Operations Management Practice 3	OPP3YR3	Operations Management Practice 3

EB19 BACCALAUREUS TECHNOLOGIAE (BTECH)

After successful completion of the National Diploma, candidates may, subject to the applicable programme regulations, register for the Bachelor's Degree in Technology (Baccalaureus Technologiae – BTech). The BTech requires a minimum of one year's further study.
A BTech Degree in the relevant field of study will be conferred on candidates after successful completion of all theoretical requirements.

EB19.1 BTECH: ENGINEERING: CIVIL 603-1

19.1.1 Purpose of the programme
A student who has obtained this qualification will be competent to apply theoretical knowledge, practical experience and skills gained in a specialized area of civil engineering at the level of a Professional Engineering Technologist by interpreting, managing and applying current technology to complex specialist engineering activity within codes, or by adapting standards and codes, under minimal supervision.

19.1.2 Outcomes
Exit level outcomes:
The qualifying student will be able to:
1. Plan complex specialized Civil Engineering activity, in accordance with the relevant codes of practice in their field of specialization.
2. Design Civil Engineering systems, in accordance with the relevant codes of practice in their field of specialization.
3. Prepare and administer the documentation for specialized Civil Engineering systems, in accordance with the relevant codes of practice, under supervision.
4. Build and maintain Civil Engineering systems, in accordance with the relevant codes of practice in their field of specialization.

19.1.3 Admission Requirements and Selection Criteria
An ECSA accredited National Diploma: Engineering: Civil, **or** an equivalent qualification of an equivalent standard.
Also refer to Faculty Regulation EB3.

19.1.4 Conferment of the degree
The Baccalaureus Technologiae: Engineering: Civil will be conferred on students who have completed a total of eight modules listed in the prescribed curriculum successfully.

19.1.5 Fields of specialization
A student may only register for a Baccalaureus Technologiae: Engineering: Civil in one specialist field. Only once the degree in a specialist field is completed can the student be considered for admission to a second specialist field, subject to the following conditions:
1. Credit may only be granted for a maximum of 50% of the prescribed modules for the second degree programme. The Executive Dean may grant exemption from an exit-level module that has been passed in another programme at this or another institution. (Refer to UJ Academic Regulation 7.3)
2. Exemption from or recognition of a module may only be granted for one further programme in addition to the programme in which the module was originally completed. (Refer to UJ Academic Regulation 7.4)

PLEASE NOTE:
- Modules marked with * are offered in the first semester of 2016.
- Modules marked with ** are offered in the second semester of 2016.
- Modules with no marking will not be offered in 2016.
- Students generally enroll for two modules per semester.

19.1.5.1 Curriculum specialising in Transport Engineering – 603-1A

CODE	MODULE
First and second semester	
Seven compulsory core modules:	
PVT411	Pavement Technology 4
TBJ421	**Concrete Technology 4
TGN411	*Geometric Design 4
TPP411	Transportation Planning 4
TVK411	**Traffic Engineering 4
CFE411	Foundation Engineering 4
Choose one of:	
CMC411	*Contract Management: Civil 4
CPM411	**Project Management 4
Elective modules – select **one** of the following**:**	
AIS411	Structural Analysis 4
BEB411	**Principles of Management Economics 3
CMC411	*Contract Management: Civil 4
CPM411	**Project Management 4
CRD411	Reticulation Design and Management 4
HRM411	*Human Resources Management: Civil 4
IRN211	Industrial Relations and Negotiations 4
TGM411	*Reinforced Concrete Design 4
THB411	**Hydrology 4
THD411	Hydraulics 4
TSI441	Theory of Structures 4
TSR411	Structural Steel Design 4
WTT411	*Water Treatment Technology 4
WWT411	*Waste Water Treatment Technology 4

19.1.5.2 Curriculum specialising in Water Engineering – 603-1B

Please note: The student must pass module THD411 (Hydraulics 4) prior to admission to module CRD411 (Reticulation Design and Management 4)

CODE	MODULE
First and second semester	
Seven compulsory core modules:	
CRD411	Reticulation Design and Management 4
THB411	**Hydraulics 4
WTT411	*Water Treatment Technology 4
WWT411	*Waste Water Treatment Technology 4
TBJ421	**Concrete Technology 4
THB411	**Hydrology 4
Choose one of:	
CMC411	*Contract Management: Civil 4
CPM411	**Project Management 4

Elective modules – select **one** of the following**:**	
AIS411	Structural Analysis 4
BEB411	**Principles of Management Economics 3
CFE411	Foundation Engineering 4
CMC411	*Contract Management: Civil 4
CPM411	**Project Management 4
HRM411	*Human Resources Management: Civil 4
IRN211	Industrial Relations and Negotiations 4
PVT411	Pavement Technology 4
TGM411	*Reinforced Concrete Design 4
TGN411	*Geometric Design 4
TPP411	Transportation Planning 4
TSI441	**Theory of Structures 4
TSR411	Structural Steel Design 4
TVK411	**Traffic Engineering 4

19.1.5.3 Curriculum specialising in Structural Engineering – 603-1C

CODE	**MODULE**
First and second semester	
Seven compulsory core modules:	
TGM411	*Reinforced Concrete Design 4
AIS411	Structural Analysis 4
CFE411	Foundation Engineering 4
TSI441	**Theory of Structures 4
TSR411	Structural Steel Design 4
TBJ421	**Concrete Technology 4
Choose one of:	
CMC411	*Contract Management: Civil 4
CPM411	**Project Management 4
Elective modules – select **one** of the following**:**	
BEB411	**Principles of Management Economics 3
CMC411	*Contract Management: Civil 4
CPM411	**Project Management 4
CRD411	Reticulation Design and Management 4
HRM411	*Human Resources Management: Civil 4
IRN211	Industrial Relations and Negotiations 4
PVT411	Pavement Technology 4
TGN411	*Geometric Design 4
THB411	**Hydrology 4
THD411	Hydraulics 4
TPP411	Transportation Planning 4
TVK411	*Traffic Engineering 4
WTT411	*Water Treatment Technology 4
WWT411	*Waste Water Treatment Technology 4

19.1.5.4 Curriculum specialising in Construction Management – 603-1E

CODE	MODULE
First and second semester	
Six compulsory core modules:	
BEB411	*Principles of management Economics 3
CMC411	*Contract Management: Civil 4
CPM411	**Project Management 4
HRM411	*Human Resources Management: Civil 4
IRN211	**Industrial Relations and Negotiations 4
TBJ421	**Concrete Technology 4
Elective modules – select **two** of the following**:**	
AIS411	Structural Analysis 4
CFE411	Foundation Engineering 4
CRD411	Reticulation Design and Management 4
PVT411	Pavement Technology 4
TGM411	Reinforced Concrete Design 4
TGN411	Geometric Design 4
THB411	Hydrology 4
THD411	Hydraulics 4
TPP411	Transportation Planning 4
TSI441	**Theory of Structures 4
TSR411	Structural Steel Design 4
TVK411	**Traffic Engineering 4
WTT411	*Water Treatment Technology 4
WWT411	*Waste Water Treatment Technology 4

EB19.2 BTECH: ENGINEERING: CHEMICAL 600-1

19.2.1 Purpose of the programme

This qualification is intended for Process or Chemical Engineering Technicians working in process-related industries. Students who have obtained this qualification should have the competence to apply existing process technology to chemical engineering-related problems and

process design, and will illustrate competence, thus contributing to the needs of the chemical industry.

19.2.2 Outcomes

Exit level outcomes:
The qualifying learner will have the ability to:

1. Identify, assess, formulate and solve process-related technical and operational problems creatively and innovatively.
2. Design process equipment, in order to modify existing sections of the plant or for new additions.
3. Plan and implement the production of required chemical products.
4. Plan and implement projects, using project management tools and skills.
5. Communicate effectively, both orally and in writing, with a variety of audiences, using appropriate language structure, style and graphical support.
6. Demonstrate knowledge of the Safety, Health and Environmental (SHE) impact of chemical processing activities, by identifying the impact and measures used to control such impacts.
7. Use IT in the application of engineering methods, skills and tools.

19.2.3 Admission Requirements and Selection Criteria

A National Diploma: Engineering: Chemical, **or** an equivalent qualification of an equivalent standard.
Students are selected on academic merit.
Also refer to Faculty Regulation EB3.

19.2.4 Conferment of the degree

The Baccalaureus Technologiae: Engineering: Chemical will be conferred on students who have completed all the prescribed modules successfully.

19.2.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
CPDA411	Chemical Process Design 4A - Equipment Design	CPDB411	Chemical Process Design 4B - Plant Design
MAT1AE3	Mathematics: Chemical Engineering 3	ICP411	Process Control 4
PCE411	Project: Chemical Engineering 4	PCE411	Project: Chemical Engineering 4
WARA432	Chemical Engineering Technology 4A - Fluid Flow	PCI411	Production Engineering: Chemical Industry 4
WARB432	Chemical Engineering Technology 4B - Unit Operations	WER411	Reactor Technology 4
WARC432	Chemical Engineering Technology 4C - Heat/Mass Transfer		

EB19.3 BTECH: CONSTRUCTION MANAGEMENT 607-1

19.3.1 Purpose of the programme

This qualification is intended for students specializing in the field of construction management. Students who have obtained this qualification will be competent to perform services relevant to contract planning management and property development independently.

19.3.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Provide financial management skills and create awareness of entrepreneurship.
2. Advise on investment in property.
3. Provide an integrated approach to the planning and management of contracts.

19.3.3 Admission Requirements and Selection Criteria

A post 2007 UJ National Diploma: Building leading to the BTech Construction Management, with the minimum entry requirements of a 60% aggregate for The National Diploma: Building, at first attempt and who have scored 60% for the subject Construction Management 3 at Diploma level.
Students who do not meet the set requirements may be considered after at least two years' post-Diploma experience in the Construction (Building/Civil Contracting or Construction Consulting) industry.
Students who have not met the academic requirements stated above, and who have a UJ National Diploma: Building **but who are employed** and have achieved a minimum of 55% for all the major subjects, Construction Management, Construction Technology, Quantity Surveying and Price Analysis and Estimating, *may* be considered with an accompanying letter of strong recommendation from their respective employers.

Non Post 2007 UJ National Diploma: Building and non-UJ applicants may be accepted if they satisfy the requirements set by the Head of Department. These are obtainable from the Head of Department on request

19.3.4 Conferment of the degree

The Baccalaureus Technologiae: Construction Management will be conferred on students who have completed all the prescribed modules successfully.

19.3.5 Curriculum

CODE	MODULE
First and second semester	
BEN41-1	Building Entrepreneurship 4
CLP41-1	Construction Law and Procedures 4
CMO43-1	Construction Management 4
CON41-1	Construction Economics 4
CRM41-1	Research Methodology 4
OHB41-1	Maintenance Management 4

EB19.4 BTECH: ENGINEERING: ELECTRICAL 604-1

90.4.1 Purpose of the programme

A qualifying student will be competent to design, implement and control production, testing, planning, construction, commissioning and maintenance in the field of Electrical Engineering by applying technical knowledge, engineering principles, innovative design, problem-solving techniques and managerial skills. He/she will be capable of exercising independent technological judgment and responsible decision-making by taking the relevant financial, economic, commercial, social, environmental and statutory factors into account.
The qualified student will be able to register with the Engineering Council of South Africa (ECSA) as a Professional Technologist in the field of Electrical Engineering.

19.4.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Practice Electrical Engineering activities and applications at the level expected of a Professional Technologist (Engineering).
2. Manage Electrical Engineering activities and applications at the level expected of a Professional Technician (Engineering).

19.4.3 Admission Requirements and Selection Criteria

A National Diploma: Engineering: Electrical, including a pass in Mathematics III, **or** an equivalent qualification of an equivalent standard.
Selection is based on academic merit and a personal interview.
Also refer to Faculty Regulation EB3.

19.4.4 Conferment of the degree

The Baccalaureus Technologiae: Engineering: Electrical will be conferred on students who have completed a total of eight modules listed in the prescribed curriculum successfully.

19.4.5 Curriculum

CODE	MODULE
First and second semester	
Core modules – the following modules are compulsory:	
MAT1AW4	Engineering Mathematics 4
TBN4000	Industrial Project 4
Elective modules – select six of the following:	
AEPA411	Electrical Protection 4
AEPB411	Protection Technology 4
ASY411	Control Systems 4
DSP411	Digital Signal Processing 4
ECN411	Computer Networks 4
EEP411	Power Electronics 4
EER411	Radio Engineering 4
EPS411	Power Systems 4
ESC411	Satellite Communications 4
MCS411	Microcontroller Systems 4
MDS411	Micro Systems Design 4
OPE411	Opto-Electronics 4
TEF441	Electrical Machines 4
TIF441	Engineering Management 4

EB19.5 BTECH: EXTRACTION METALLURGY 614-1

19.5.1 Purpose of the programme

At this level, a qualifying student will be competent in process design and development and be able to demonstrate technical management competence, thus contributing to the needs of the metallurgical and mining industry. The qualified student will be able to register with ECSA as a Professional Technologist.

19.5.2 Outcomes

Exit level outcomes:
The qualifying student should have the competence to:

1. Initiate and optimise a range of requirements in metallurgical processes.
2. Communicate effectively by means of reports, presentations, drawings and standards.
3. Manage finance/budget material, manpower, equipment and technology within the metallurgical field.

19.5.3 Admission Requirements and Selection Criteria

A National Diploma leading to the BTech: Extraction Metallurgy, with the minimum entry requirement of a 60% aggregate for S4 Extraction Metallurgy, at first attempt.
Students who do not meet the requirements may be considered after at least two years' post-Diploma experience in industry, with an accompanying letter of strong recommendation from their Plant Managers.
Also refer to Faculty Regulation EB3.

19.5.4 Conferment of the degree

The Baccalaureus Technologiae: Extraction Metallurgy will be conferred on students who have completed all the prescribed modules successfully.

19.5.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
MAT1AE3	Mathematics: Chemical Engineering 3	MIL41-1	Industrial Minerals 4
MGG32-2	Metallurgical Geology 3	MPE32-1	Process Control 4
MNF41-2	Non-Ferrous Extraction Metallurgy 4	MTP4112	Metallurgical Project 4
MPE42-1	Metallurgical Project Management 4		
MPI11-1	Process Economics 1		
MTP4111	Metallurgical Project 4		
MFM 41-1	Ferrous Metallurgy 4		

EB19.6 BTECH: ENGINEERING: INDUSTRIAL 601-1

19.6.1 Purpose of the programme

Graduates who have obtained this qualification will be competent in the leading of programmes regarding productivity improvement, integrated manufacturing systems, operating information systems, and project and logistics management. The graduates will be able to register with ECSA.

19.6.2 Outcomes

Exit level outcomes:
Qualifying students will be able to:

1. Apply operations management techniques in industry.
2. Provide integrated logistics support in industry.
3. Establish, manage and maintain a small business.
4. Conceptually design integrated manufacturing systems in industry.
5. Apply research methodology in the manufacturing and service industry.

19.6.3 Admission Requirements and Selection Criteria

A National Diploma: Engineering: Industrial, **or** a National Higher Diploma: Industrial Engineering, **or** an equivalent Industrial Engineering qualification of an equivalent standard.
Mathematics II is a prerequisite subject. Applicants who do not meet this requirement must register for and pass Mathematics II during the first semester after registration.
The number of student enrolments will be limited. Applicants must have obtained an average of 60% at S4 level.
Also refer to Faculty Regulation EB3.

19.6.4 Conferment of the degree

The Baccalaureus Technologiae: Engineering: Industrial will be conferred on students who have completed a total of **eight** modules listed in the prescribed curriculum successfully.

19.6.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
IPE411	Project Engineering 4	IIS411	Information Systems 4
IPT411	Production Technology 4	ILE411	Logistics Engineering 4
BQA411	Quality Assurance 4	IPR411	Project Research 4
EIE411	Entrepreneurship 4	TSH421	Systems Dynamics 4

EB19.7 BTECH: ENGINEERING: MECHANICAL 602-1

19.7.1 Purpose of the programme

Students who have obtained this qualification will be able to integrate mechanical engineering principles independently, apply these to determine appropriate ways of approaching activities, and establish and use criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry, and successful students will be able to register with ECSA as Professional Technologists.

19.7.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Apply mechanical engineering principles to diagnose and solve engineering problems.
2. Apply management principles in an engineering environment.
3. Demonstrate knowledge of mechanical engineering in one or more specialized fields.
4. Communicate effectively in a technological environment.
5. Engage in mechanical engineering design work, individually, and as part of a team.

19.7.3 Admission Requirements and Selection Criteria

A National Diploma: Engineering: Mechanical, **or** an equivalent **Mechanical Engineering** qualification**.** Also refer to Faculty Regulation EB3.

a) Mathematics 3 is a prerequisite subject**.**
b) Applied Strength of Materials is required to enrol for Strength of Materials 4 and Stress Analysis 4.
c) Hydraulic Machines 3 is required to enrol for Fluid Mechanics 4 and Turbo Machines 4.
d) Theory of Machines 3 is required to enrol for Mechanics of Machines 4.
e) Steam Plant 3 is required to enrol for Thermodynamics 4 and Refrigeration & Air Conditioning 4.
f) Mechanical Engineering Design 3 is required to enrol for Engineering Design Project 4.

19.7.4 Conferment of the degree

The Baccalaureus Technologiae: Engineering: Mechanical will be conferred on students who have completed a total of eight modules listed in the prescribed curriculum successfully.

19.7.5 Curriculum

CODE	MODULE	MODULE	CODE

Core modules – choose at least 6 of the following modules (of which a minimum of 2 pairs must be selected)

First semester			Second semester	
TSH441	Strength of Materials 4	and	Stress Analysis 4	ESA411
TFE441	Fluid Mechanics 4	and	Turbo Machines 4	TUM411
TMB441	Mechanics of Machines 4	and	Automatic Control 4	TOG431
IMT411	Thermodynamics 4	and	Refrigeration and Air Conditioning 4	RAC411
DES411	Engineering Design Project 4 (this module has a credit rating of 2)			

Elective modules - choose not more than 2 of the following modules

First semester		Second semester	
BQA411	Quality Assurance 4	Information Systems 4	IIS411
EIE411	Entrepreneurship 4	Logistics Engineering 4	ILE411
IPT411	Production Technology 4	Project Research 4	IPR411
IPE411	Project Engineering 4	Systems Dynamics 4	TSH421

EB19.8 BTECH: ENGINEERING: METALLURGY 613-1

19.8.1 Purpose of the programme

At this level, a qualifying student will be competent in metallurgical process and product design, process and product development, and be able to demonstrate technical management competence, thus contributing to the needs of the metallurgical industry and mining community. The qualified student will be able to register with ECSA as a Professional Technologist.

19.8.2 Outcomes

Exit level outcomes:
The qualifying student should be competent to:

1. Initiate and optimise a range of requirements in metallurgical processes, products and specifications.
2. Communicate effectively by means of reports, presentations, specifications, drawings and standards.
3. Manage finances/budgets, material, manpower, equipment and technology within the metallurgical field.

19.8.3 Admission Requirements and Selection Criteria

A National Diploma leading to the BTech: Engineering: Metallurgy, with the minimum entry requirement to be determined by programme staff, in conjunction with Regulation G4.1.1, **or** an equivalent qualification at an equivalent standard.
A student must pass a minimum 60% at S4 level first time, or 2 years of industrial experience with motivation.
A student may be required to complete prerequisite modules at National Diploma level, as determined by the HOD before admission to BTech.
Also refer to Faculty Regulation EB3.

19.8.4 Conferment of the degree

The Baccalaureus Technologiae: Engineering: Metallurgy will be conferred on students who have completed a total of four modules listed in the prescribed curriculum successfully.

19.8.5 Curriculum

PLEASE NOTE that a student must pass modules PMY43-2 (Physical Metallurgy 4) and TMP42-2 (Mechanical Metallurgy 4) prior to admission to module MPJ41-1 (Project Metallurgy).

CODE	MODULE	CODE	MODULE
First semester		Second semester	
Core modules - all modules are compulsory			
PMY43-2	Physical Metallurgy 4	MPJ41-1	Project Metallurgy 4
TMP42-2	Mechanical Metallurgy 4		
Elective modules – select one of the following modules:			
		PRS42-2	Production of Iron and Steel 4
		THM32-1	Metallurgical Thermodynamics 3
		FTY42-2	Foundry Technology 4

EB19.9 BTECH: MINERAL RESOURCE MANAGEMENT 728-1

19.9.1 Purpose of the programme

The qualified learner would:

- Be competent in the effective and safe management of the surveying required to be done on a mine and the mineral reserve evaluation required for a mine.
- Contribute to satisfy the need for suitably competent mine surveyors and mineral resource managers at middle and senior management in the mineral industry.
- Be able to register with PLATO to register as a professional Mine Surveyor in training

19.9.2 Outcomes

Exit level outcomes:
The qualifying student should be competent to:

1. Conduct and manage all the survey work that may be required on a mine.
2. Minimise mineral losses by establishing a suitable ore flow control system with the necessary sampling and calculation of ore flow control factors.
3. Manage the resources required for the normal running of a survey department on a mine.
4. Conduct and manage the evaluation of the mineral reserve of an operating mine.

19.9.3 Admission Requirements and Selection Criteria

A National Diploma: Minerals Surveying, in conjunction with Regulation E.86.2, **or** an equivalent qualification of an equivalent standard.
Also refer to Faculty Regulation EB3.

19.9.4 Conferment of the degree

The Baccalaureus Technologiae: Mineral Resource Management will be conferred on students who have completed all the prescribed modules successfully.

19.9.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
ACS41-1	Applied Computer Skills 4	GEOP411	Geostatistics Projects 4
GEOS411	Geostatistics 4	MES41-1	Mining Economics 4
MIN21-1	Mining 2	MTL3211	Mining Technical Services 3
MSL41-1	Mineral Survey Legislation 4	PDS41-1	Precise Deformation Surveys 4

EB19.10 BTECH: MINING ENGINEERING 619-1

19.10.1 Purpose of the programme

A qualified student will be technically competent in the effective and safe management of all types of mining production activities for middle and senior production and technical management.

19.10.2 Outcomes

Exit level outcomes:
A qualified student should have the:

1. Technical engineering ability to manage any type of mining production operations at middle and senior management level effectively.
2. Ability to contribute meaningfully to high-level decisions in the areas of rock mechanics and ventilation.

19.10.3 Admission Requirements and Selection Criteria

A National Diploma leading to the BTech: Mining Engineering, with the minimum entry requirement to be determined by the Head of Department, **or** an equivalent qualification of an equivalent standard.
Also refer to Faculty Regulation EB3.
The Department reserves the right to select students for entry to this programme.

PLEASE NOTE: Although APS requirements are low. Any potential applicant should be advised when querying the feasibility of entering the programme that they should ideally have been exposed to a mine visit underground before making the decision and most importantly are physically strong enough (mass in excess of 40Kg) and that they are in good health with acceptable senses such as hearing and vision. Applicants will have to pass a medical assessment to gain employment in the industry. Applicants should ideally have the backing of a mining company.

19.10.4 Conferment of the degree

The Baccalaureus Technologiae: Mining Engineering will be conferred on students who have completed all the prescribed modules successfully.

19.10.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
MGNA411	Engineering Management 4A	MGNB411	Engineering Management 4B
MINA411	Mining 4A	MINB411	Mining 4B
MLG42-1	Mining Legislation 4	MPT42-1	Mining Project 4
MTLA411	Mining Technical Services 4A	MTLB411	Mining Technical Services 4B

EB19.11 BTECH: QUANTITY SURVEYING 608-1

19.11.1 Purpose of the programme

This qualification is intended for students specializing in the field of quantity surveying, in the construction and property industries and the quantity surveying profession. Students who have obtained this qualification will be competent to perform services relevant to contract procurement, financial and cost management and property development independently.

19.11.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Provide financial management skills and create awareness of entrepreneurship.
2. Advise on investment in property.
3. Prepare tender and contract documentation and administer building contracts.

19.11.3 Admission Requirements and Selection Criteria

A post 2007 UJ National Diploma: Building leading to the BTech Quantity Surveying, with the minimum entry requirements of a 60% aggregate for The National Diploma: Building, at first attempt and who have scored 60% for the subject Quantity Surveying 3 at Diploma level.
Students who do not meet the set requirements may be considered after at least two years' post-Diploma experience in the Construction (Building/Civil Contracting or Construction Consulting) industry.
Students who have not met the academic requirements stated above, and who have a UJ National Diploma: Building **but who are employed** and have achieved a minimum of 55% for all the major subjects, Construction Management, Construction Technology, Quantity Surveying and Price Analysis and Estimating, *may* be considered with an accompanying letter of strong recommendation from their respective employers.

Non Post 2007 UJ National Diploma: Building and non-UJ applicants may be accepted if they satisfy the requirements set by the Head of Department. These are obtainable from the Head of Department on request

19.11.4 Conferment of the degree

The Baccalaureus Technologiae: Quantity Surveying will be conferred on students who have completed all the prescribed modules successfully.

19.11.5 Curriculum

CODE	MODULE	CODE	MODULE
First and second semester			
BEN41-1	Building Entrepreneurship 4		
BQS44-1	Quantity Surveying 4		
CLP41-1	Construction Law and Procedures 4		
CMO43-1	Construction Management 4		
CON41-1	Construction Economics 4		
CRM41-1	Research Methodology 4		

EB19.12 BTECH: TOWN AND REGIONAL PLANNING 760-3

19.12.1 Purpose of the programme

This qualification is intended for students specializing in the field of urban and regional development planning, working in government and non-governmental sectors. Students who have achieved this qualification will be able to, independently, and in a team, plan in both spatial and non-spatial fields, using appropriate technology, in order to critically respond to the challenges in the natural and built environment. Students will be able to apply for registration as a Professional Planner with SACPLAN, after having met specific SACPLAN requirements.

19.12.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Research a plan, within the built and natural environment, assist in facilitating land use planning, control and development professionally.
2. Apply appropriate technology, in the process of planning land use and development.
3. Apply communication skills in retrieving and disseminating information.
4. Apply interpretive skills in town planning-related matters.
5. Assist in optimizing the use of resources within the built and natural environment.

19.12.3 Admission Requirements and Selection Criteria

A National Diploma: Town and Regional Planning, **or** an equivalent qualification of an equivalent standard.
At the discretion of the Head of Department, applicants may be required to register for and pass bridging subjects before admission to the BTech: Town and Regional Planning.
Students are selected on academic merit. The criteria may be amended at the discretion of the Head of the Department if it is considered that applicants have acquired suitable approved practical experience to augment their academic record.
Also refer to Faculty Regulation EB3.

19.12.4 Conferment of the degree

The Baccalaureus Technologiae: Town and Regional Planning will be conferred on students who have completed all the prescribed modules successfully.

19.12.5 Curriculum

CODE	MODULE	CODE	MODULE
First and second semester			
COMS431	Community Studies 4		
CRP431	City and Regional Planning 4		
ENS431	Environmental Studies 4		
GIS431	Geographic Information Systems 4		
PDES431	Planning Design 4		
TPM431	Management for Planners 4		
TRP406	Research Project 4: Town & Regional Planning		

EB19.13 BTECH: MANAGEMENT SERVICES BT1407

19.13.1 Purpose of the programme

The aim of the qualification is to develop the student's applied and cognitive competencies in the acquisition, interpretation, understanding and applications of management information and decision support. The student should be able to analyse and explain company and environmental data, information and systems in the context of a company and its business environment, and to assess and interpret the external impact of decisions. The student should also be able to reflect on her/his managerial decisions and applications to assess the effect thereof in the holistic context of specialized management services. Students should have experience in the management

functions in industry, in order to contextualize their learning to their business environment, and to appreciate improvements and interventions they can affect in their working environments.

19.13.2 Outcomes
Exit level outcomes:
The qualifying student will be able to:

1. Demonstrate detailed understanding and acquired knowledge to apply different manufacturing, operations and services to an organization in a way that improves organization development and effectiveness. This can involve design, installation, commissioning and implementation of control systems, improvement systems and strategies and new ideas useful in addressing “specific needs” required for operations process/system to function optimally.
2. Understand and apply strategic management services and strategies required to organize, plan, lead and control a system and operational processes to function optimally.
3. Analyse, prepare and apply the dynamics of systems management and design in order to maximize organizational performance, development, efficiency and effectiveness.
4. Apply management services techniques in order to make sound decisions required for assisting in the efficient and effective running of an organization.
5. Apply different managements services practices, principles, methods, techniques and ideas in order to improve overall organizational planning, operational, tactical and strategic implementation and performance.
6. Illustrate by means of submitting a project based on a research methodology illustrating knowledge, application and implementation of management services techniques, ideas, principles, theories and strategies in order to optimize operational processes and the use of resources.

19.13.3 Admission Requirements and Selection Criteria
An applicant must hold a National Diploma: Management Services or an equivalent qualification at NQF Level 6 as determined by a Status Committee.
Also refer to Faculty Regulation EB3.

19.13.4 Conferment of the degree
The Baccalaureus Technologiae: Management Services will be conferred on students who have completed all the prescribed modules successfully.

19.13.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
BPJ44A4	Operations Management 4A	BPJ44B4	Operations Management 4B
OEF44A4	Organisational Effectiveness 4A	OEF44B4	Organisational Effectiveness 4B
		BEB41-1	Management Economics 3
QPI44-1	Quality Planning & Implementation 4	STM44-4	Strategic Management 4
RMD41-1	Research Methodology	RMD41-2	Project 4

EB19.14 BTECH: OPERATIONS MANAGEMENT BT1403

19.14.1 Purpose of the programme
The aim of the qualification is to develop the student’s applied and cognitive competencies in the acquisition, interpretation, understanding and applications of operations management. The student should be able to analyse and explain operations management decisions in the context of an operations unit or company, and to assess and interpret the external impact of decisions. The student should also be able to reflect on her/his managerial decisions and applications to assess the effect thereof in the holistic context of operations management. Students must have experience in production, operations, engineering management or quality, in order to contextualize their learning to their business environment, and to appreciate improvements and interventions they can affect in their working environments.

19.14.2 Outcomes

Exit level outcomes:

The qualifying student will be able to:

1. Demonstrate detailed understanding and acquired the necessary knowledge to apply different manufacturing/service and control systems operations management strategies used in today's world and at the same time recognize "specific needs" required for operations process/system to function optimally.
2. Understand and apply strategic operations management strategies required to organize, plan, lead and control a system and operational processes to function optimal.
3. Analyse, prepare and apply the dynamics of: Strategic Process Design and Quality improvements of processes and the implementation of quality systems.
4. Apply operations management techniques in order to make sound qualitative and qualitative decision required for assisting in the efficient running of an organization.
5. Apply financial principles in order to plan and control operational finance.
6. Illustrate by means of submitting a project based on a research methodology illustrating knowledge, application and implementation of operations management strategies in order to optimize operational processes and resources.

19.14.3 Admission Requirements and Selection Criteria

An applicant must hold a National Diploma in Operations Management or an equivalent qualification at NQF Level 6 as determined by a Status Committee.

Also refer to Faculty Regulation EB3.

19.14.4 Conferment of the degree

The Baccalaureus Technologiae: Operations Management will be conferred on students who have completed all the prescribed modules successfully.

19.14.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
BFA44A4	Financial Planning and Control 3A	BFA44B4	Financial Planning and Control3B
BPJ44A4	Operations Management 4A	BPJ44B4	Operations Management 4B
BPI44A4	Operations Management Techniques 4A	BPI44B4	Operations Management Techniques 4B
QPI44-1	Quality Planning & Implementation 4	RMD41-2	Project 4
RMD41-1	Research Methodology		

EB19.15 BTECH QUALITY 456-2

19.15.1 Purpose of the programme

The aim of the qualification is to develop the student's applied and cognitive competencies in the acquisition, interpretation, understanding and applications of quality management principles. The student should be able to analyse and explain quality assurance decisions in the context of a QA unit, a company, as well as the regulatory environment, and to assess and interpret the external impact of decisions. The student should also be able to reflect on her/his QA decisions and applications to assess the effect thereof in the holistic context of quality assurance and improvement. Students must have experience in the QA function, in order to contextualize their

learning to their business environment, and to appreciate improvements and interventions they can affect in their working environments

9.15.2 Outcomes

Exit level outcomes:
The qualifying student will be able to:

1. Demonstrate detailed understanding and acquired the necessary knowledge to apply different quality management systems used in today's world.
2. Understand and apply strategic quality control, which is required to maintain a quality management system and continual improvement of quality in the organization.
3. Analyse, prepare and apply the statistical quality techniques associated with industries and the implementation of quality systems.
4. Identify and solve quality related issues through case studies and practical's.
5. Apply quality auditing techniques to enable the learner to become a certified auditor.

19.15.3 Admission Requirements and Selection Criteria

An applicant must hold a National Diploma in Operations Management, or a National Diploma: Industrial Engineering or a National Diploma: Management Services or an equivalent qualification at NQF Level 6 as determined by a Status Committee.
Also refer to Faculty Regulation EB3.

19.15.4 Conferment of the degree

The Baccalaureus Technologiae: Quality will be conferred on students who have completed all the prescribed modules successfully.

19.15.5 Curriculum

CODE	MODULE	CODE	MODULE
First semester		Second semester	
QMY44-1	Quality Management Systems 3	CQI44-2	Continual Quality Improvement 4
STA3AQT	Statistical Quality Techniques 3	STA4BQT	Quality Techniques 4
QPI44-1	Quality Planning And Implementation 4	RMD41-2	Project 4
RMD41-1	Research Methodology	QAT44-2	Quality Auditing Techniques 4

ENGINEERING SCIENCE PROGRAMMES

EB20 BACCALAREUS INGENERIAE

EB20.1 ELECTRICAL AND ELECTRONIC ENGINEERING BIN015

As from January 2014, no new applications for the BIN014 programme would be allowed, the curriculum as set out below would be valid for pipeline students only. Please refer new applications to the BIN015 programme, Regulation EB20.1(*bis*).

20.1.1 Purpose of the programme

The purpose of the qualification is to develop an engineering intellectual who can identify, assess and formulate the engineering needs of the society at large, and research and solve the identified engineering problems creatively and innovatively, by applying scientific, mathematical, engineering, economic and other relevant principles and methods. The qualification prepares students for an engineering science, design and project-based career through fundamental understanding, use and appropriate application of engineering methods, skills, tools and information technology. The qualification also provides a platform for lifelong learning.

20.1.2 Outcomes

The student should be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering problems creatively and innovatively by applying knowledge of mathematics, basic science and engineering sciences from first principles.
2. Plan and manage small engineering projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering practice.
3. Work effectively, individually and with others, as a member of a team, group, organisation, and community or in multi-disciplinary environments.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence and exercise judgment based on knowledge and expertise.
5. Plan and conduct appropriate levels of investigation, research and/or experiments by applying relevant theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering audiences and the community at large, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in engineering practice, and show an understanding and a willingness to accept responsibility for the impact of engineering activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits.
9. Employ various learning strategies and skills to master module outcomes required for preparing him/herself to engage in continuous learning, to keep abreast of knowledge and skills required in the inter-disciplinary field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering activities.
12. Explore, where applicable, education and career opportunities.
13. Organise and develop entrepreneurial opportunities through engineering problem-solving, design, technical research and managerial skills.

20.1.3 Admission Requirements and Selection Criteria

Refer to Faculty Regulation E.3 for the minimum admission requirements for this programme.
Students are selected on academic merit and a personal interview, if deemed necessary.
The number of student enrolments will be limited.

20.1.4 Promotion Requirements

Refer to Faculty Regulations EB4 and EB5, stipulating the promotion requirements for Engineering Sciences programmes and the requirements for awarding a passed with distinction BIng degree.

20.1.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
APM1A10	Applied Mathematics 1A10	APM1B10	Applied Mathematics 1B10
IIN1A11	Introduction to Engineering Design 1A11	PJC1B21	Project Communication 1B21
MATE0A1	Engineering Mathematics 0A1	MATE0B1	Engineering Mathematics 0B1
PHY1A01	Physics 1A01	PHY1B01	Physics 1B01
CEM1A10	Chemistry 1A10	ETN1B21	Electrotechnics 1B21
EEM1A11	Electrical Engineering Methods 1A11		
Second year			
First semester		Second semester	
APM2A10	Applied Mathematics 2A10	APM2B10	Applied Mathematics 2B10
ETN2A11	Electrotechnics 2A11	ETN2B21	Electrotechnics 2B21
MAT0AA2	Engineering Mathematics 0AA2	MAT0AB2	Engineering Mathematics 0AB2
MAT0CA2	Engineering Mathematics 0CA2	MAT0CB2	Engineering Mathematics 0CB2
PHY2A01	Physics 2A01	IEP2B21	Engineering Economics and Practice 2B21
MOD2A11	Modelling 2A11	MTK2B21	Science of Materials 2B21
EPJ2A11	Electrical Projects 2A11	TRD2B21	Thermodynamics 2B21
Third year			
First semester		Second semester	
AMD3A11	Advanced Modelling 3A11	BHS3B01	Control Systems 3B01
EMN3A11	Electromagnetics 3A11	EKA3B21	Electronics 3B21
KRL3A01	Power Systems 3A01	EEP3B21	Electrical Engineering Practice 3B21
STE3A01	Statistics for Engineers 3A01	PJB3B21	Project Management 3B21
SST3A11	Signals and Systems 3A11	RKE3B01	Computer Systems 3B01
CPS3A01	Complementary Studies 3A01	SIG3B01	Signal Processing 3B01
CPS3A02	Complementary Studies 3A02	TEL3B01	Telecommunications 3B01
SIO3A11	Systems Engineering and Design 3A11	SIO3B21	Systems Engineering and Design 3B21
Fourth year			
First semester		Second semester	
BHS4A11	Control Systems 4A11	EMN4B01	Electromagnetics 4B01
RKE4A11	Computer Systems 4A11	EMA4B02	Electrical Machines 4B02
HSE4A01	High Speed Electronics 4A01	KRL4B21	Power Systems 4B21
PWE4A01	Power Electronics 4A01	OTS4B21	Optical Systems 4B21
EEP4A11	Electrical Engineering Practical 4A11	RTI4B21	Legal Applications in the Engineering Practice 4B21
PJE4A11	Project Investigation 4A11 (Electrical and Electronic)	PJE4B21	Project Investigation 4B21 (Electrical and Electronic)

SIG4A01	Signal Processing 4A01		
TEL4A01	Telecommunications 4A01		

EB20.2 MECHANICAL ENGINEERING BIN017

20.2.1 Purpose of the programme

The purpose of the qualification is to develop an engineering intellectual who can identify, assess and formulate the engineering needs of the society at large, and research and solve the identified engineering problems creatively and innovatively, by applying scientific, mathematical, engineering, economic and other relevant principles and methods. The qualification prepares students for an engineering science, design and project-based career through fundamental understanding, use and appropriate application of engineering methods, skills, tools and information technology. The qualification also provides a platform for lifelong learning.

20.2.2 Outcomes

The student should be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering problems creatively and innovatively by applying mathematics, basic science and engineering sciences from first principles.
2. Plan and manage small engineering projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation, community or in multi-disciplinary environments.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgment based on knowledge and expertise.
5. Plan and conduct limited investigations, research and experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering audiences and the community at large, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in engineering practice, and show an understanding and a willingness to accept responsibility for the impact of engineering activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess, where applicable, their social, legal, health, safety and environmental impact and benefits.
9. Employ various learning strategies and skills to master module outcomes required in fundamental Mathematics, engineering sciences, engineering design research and aspects of management, thereby preparing him/herself to engage in lifelong learning, to keep abreast of knowledge and skills required in the engineering field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically.
11. Demonstrate cultural and aesthetic sensitivity across a range of social context in the execution of engineering activities.
12. Explore education and career opportunities.
13. Organise and develop entrepreneurial opportunities through engineering problem-solving, design, technical research and managerial skills.

20.2.3 Admission Requirements and Selection Criteria

Refer to Faculty Regulation EB3 for the minimum admission requirements for this programme.
Students are selected on academic merit and a personal interview, if deemed necessary.
The number of student enrolments will be limited.

20.2.4 Promotion Requirements

Refer to Faculty Regulations EB4 and EB5, stipulating the promotion requirements for Engineering Sciences programmes and the requirements for awarding a passed with distinction BIng degree.

20.2.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
APM1A10	Applied Mathematics 1A10	APM1B10	Applied Mathematics 1B10
GKM1A11	Graphical Communication 1A11	GKM1B21	Graphical Communication 1B21
IIN1A11	Introduction to Engineering Design 1A11	IIN1B21	Introduction to Engineering Design 1B21
MATE0A1	Engineering Mathematics 0A1	MATE0B1	Engineering Mathematics 0B1
PHY1A01	Physics 1A01	PHY1B01	Physics 1B01
CEM1A10	Chemistry 1A10	ETN1B21	Electrotechnics 1B21
Second year			
First semester		Second semester	
APM2A10	Applied Mathematics 2A10	APM2B10	Applied Mathematics 2B10
MAT0AA2	Engineering Mathematics 0AA2	MAT0AB2	Engineering Mathematics 0AB2
MAT0CA2	Engineering Mathematics 0CA2	MAT0CB2	Engineering Mathematics 0CB2
OWM2A11	Design 2A11 (Mechanical)	OWM2B21	Design 2B21 (Mechanical)
ETN2A11	Electrotechnics 2A11	MTK2B21	Science of Materials 2B21
STR2A11	Fluid Mechanics 2A11	SLR2B21	Strength of Materials 2B21
MOD2A11	Modelling 2A11	TRD2B21	Thermodynamics 2B21
Third year			
First semester		Second semester	
CPS3A01	Complementary Studies 3A01	INP3B21	Engineering Practice 3B21
CPS3A02	Complementary Studies 3A02	MKE3B21	Theory of Machines 3B21
OWM3A11	Design 3A11 (Mechanical)	OWM3B21	Design 3B21 (Mechanical)
STE3A01	Statistics for Engineers 3A01	VVE3B21	Manufacturing Methods 3B21
STR3A11	Fluid Dynamics 3A11	SLR3B21	Strength of Materials 3B21
MLA3000	Mechanical Engineering Laboratory 3000	MLA3000	Mechanical Engineering Laboratory 3000
TMS3A11	Thermofluids 3A11	COM3B21	Communication 3B21
MTK3A11	Science of Materials 3A11		
Fourth year			
First semester		Second semester	
OIP4000	Design and Engineering Practice 4000	OIP4000	Design and Engineering Practice 4000
PJM4000	Project Investigation 4000 (Mechanical)	PJM4000	Project Investigation 4000 (Mechanical)
WAO4A11	Heat Transfer 4A11	RTI4B21	Legal Applications in Engineering Practice 4B21
SLR4A11	Strength of Materials 4A11	EBP3B21	Management Principles and Practice 3B21
TRM4A11	Thermomachines 4A11	TML4B21	Thermal Systems 4B21
MVS4A11	Advanced Manufacturing Systems 4A11	TKN4B21	Control Systems 4B21 (Mechanical)

EB20.3 CIVIL ENGINEERING BIN016

20.3.1 Purpose of the programme

The purpose of the qualification is to develop an engineering intellectual who can identify, assess and formulate the engineering needs of the society at large, and research and solve the identified engineering problems creatively and innovatively, by applying scientific, mathematical, engineering, economic and other relevant principles and methods. The qualification prepares students for an engineering science, design and project-based career through fundamental understanding, use and appropriate application of engineering methods, skills, tools and information technology. The qualification also provides a platform for lifelong learning.

20.3.2 Outcomes

The student should be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering problems creatively and innovatively by applying knowledge of Mathematics, Basic Science and Engineering Sciences from first principles.
2. Plan and manage small engineering projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering practice.
3. Work effectively, individually or with others, as a member of a team, group, organisation, community or in multi-disciplinary environments.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgment based on knowledge and expertise.
5. Plan and conduct limited investigations, research and experiments commensurate with the level of competence by applying appropriate theories and methodologies, and perform data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering audiences and the community at large, using appropriate structure, style and graphical support.
7. Use and assess appropriate engineering methods, skills, tools and information technology effectively and critically in engineering practice, and show an understanding and a willingness to accept responsibility for the impact of engineering activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess, where applicable, their social, legal, health, safety and environmental impact and benefits.
9. Employ various learning strategies and skills to master module outcomes required in fundamental mathematics, engineering sciences, engineering design research and aspects of management, thereby preparing him/herself to engage in lifelong learning, to keep abreast of knowledge and skills required in the engineering field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically.
11. Demonstrate cultural and aesthetic sensitivity across a range of social contexts in the execution of engineering activities.
12. Explore education and career opportunities.
13. Organise and develop entrepreneurial opportunities through engineering problem-solving, design, technical research and managerial skills.

20.3.3 Admission Requirements and Selection Criteria

Refer to Faculty Regulation E.3 for the minimum admission requirements for this programme.
Students are selected on academic merit and a personal interview, if deemed necessary.
The number of student enrolments will be limited.

20.3.4 Promotion Requirements

Refer to Faculty Regulations EB4 and EB5, stipulating the promotion requirements for Engineering Sciences programmes and the requirements for awarding a passed with distinction BIng degree.

20.3.5 Curriculum

CODE	MODULE	CODE	MODULE
First year			
First semester		Second semester	
APM1A10	Applied Mathematics 1A10	APM1B10	Applied Mathematics 1B10
IIN1A11	Introduction to Engineering Design 1A11	DRG1B01	Draughting 1B01
MATE0A1	Engineering Mathematics 0A1	MATE0B1	Engineering Mathematics 0B1
PHY1A01	Physics 1A01	PHY1B01	Physics 1B01
CEM1A10	Chemistry 1A10	ETN1B21	Electrotechnics 1B21
		BTK2B21	Concrete Technology 2B21
Second year			
First semester		Second semester	
APM2A10	Applied Mathematics 2A10	APM2B10	Applied Mathematics 2B10
MAT0AA2	Engineering Mathematics 0AA2	MAT0AB2	Engineering Mathematics 0AB2
MAT0CA2	Engineering Mathematics 0CA2	MAT0CB2	Engineering Mathematics 0CB2
MGA2A11	Applied Mechanics 2A11	SMC2B21	Strength of Materials for Civil Engineers 2B21
GLG1A10	Geology 1A10	HTA3B02	Heritage Assessment3B02
STR2A11	Fluid Mechanics 2A11	ENV3B01	Environmental Management for Engineers 3B01
MOD2A11	Modelling 2A11	COM2B21	Communications 2B21
Third year			
First semester		Second semester	
GTG3A11	Geotechnical Engineering 3A11	GTG3B21	Geotechnical Engineering 3B21
SUS3A11	Structural Engineering 3A11	SUS3B21	Structural Engineering 3B21
HMG3A11	Hydraulic Engineering 3A11	HMG3B21	Hydraulic Engineering 3B21
STE3A01	Statistics for Engineers 3A01	VVI3B21	Transportation 3B21
CPS3A01	Complementary Studies 3A01	PJB3B21	Project Management 3B21
VVI3A11	Transportation Engineering 3A11	OPM3B21	Surveying 3B21
CPS3A02	Complementary Studies 3A02		
Fourth year			
First semester		Second semester	
GTG4A11	Geotechnical Engineering 4A11	OWS4B21	Civil Design 4B21
PJB4A11	Project Management 4A11	PJS4B21	Civil Project Investigation 4B21
SUS4A11	Structural Engineering 4A11	CPP4B21	Civil Professional Practice 4B21
SDI4A11	Urban Hydraulics 4A11	RTI4B21	Legal Applications in Engineering Practice 4B21
UDS4A11	Urban Development Studies 4A11		
SUS4A12	Structural Engineering 4A12		

EB20.4 ELECTRICAL AND ELECTRONIC ENGINEERING WITH INFORMATION TECHNOLOGY BIN018

20.4.1 Purpose of the programme

The purpose of the qualification is to develop an engineering intellectual who can identify, assess and formulate the engineering needs of the society at large, and research and solve the identified engineering problems creatively and innovatively, by applying scientific, mathematical, engineering, economic and other relevant principles and methods. The qualification prepares students for an engineering science, design and project-based career through fundamental understanding, use and appropriate application of engineering methods, skills, tools and information technology. The qualification also provides a platform for lifelong learning.

20.4.2 Outcomes

The student will be able to:

1. Identify, assess, formulate, interpret, analyse and solve engineering problems creatively and innovatively by applying knowledge of mathematics, basic science and engineering sciences from first principles.
2. Plan and manage small engineering projects, demonstrating fundamental knowledge, understanding and insight into the principles, methodologies and concepts that constitute socially responsible (to local and other communities) engineering practice.
3. Work effectively, individually and with others, as a member of a team, group, organisation, community or in multi-disciplinary environments.
4. Organise and manage him/herself and his/her activities responsibly, effectively, professionally and ethically, accept responsibility within his/her limits of competence, and exercise judgment based on knowledge and expertise.
5. Plan and conduct limited investigations, research and experiments by applying appropriate theories and methodologies, and perform appropriate data analysis and interpretation.
6. Communicate effectively, both orally and in writing, with engineering audiences and the community at large, using appropriate structure, style and graphical support.
7. Use and assess appropriate research methods, skills, tools and information technology effectively and critically in engineering practice, and show an understanding and a willingness to accept responsibility for the impact of engineering activities on society and the environment.
8. Perform procedural and non-procedural design and synthesis of components, systems, works, products or processes as a set of related systems and assess their social, legal, health, safety and environmental impact and benefits.
9. Employ various learning strategies and skills to master module outcomes required in fundamental mathematics, engineering sciences, engineering design research and aspects of management, thereby preparing him/herself to engage in lifelong learning, to keep abreast of knowledge and skills required in the engineering field.
10. Participate as a responsible citizen in the life of local, national and global communities by acting professionally and ethically.
11. Demonstrate, where applicable, cultural and aesthetic sensitivity across a range of social context in the execution of engineering activities.
12. Explore education and career opportunities.
13. Organise and develop entrepreneurial opportunities through engineering problem-solving, design, technical research and managerial skills.

20.4.3 Admission Requirements and Selection Criteria

Refer to Faculty Regulation EB3 for the minimum admission requirements for this programme.
Students are selected on academic merit and a personal interview, if deemed necessary.
The number of student enrolments will be limited.**20.4.4 Promotion Requirements** Refer to Faculty Regulations EB4 and EB5, stipulating the promotion requirements for Engineering Sciences programmes and the requirements for awarding a passed with distinction BIng degree.

20.4.5 Curriculum

CODE	MODULE	CODE	MODULE

First year

First semester		Second semester	
APM1A10	Applied Mathematics 1A10	APM1B10	Applied Mathematics 1B10
CSC1A10	Computer Science 1A10	CSC1B10	Computer Science 1B10
EEM1A11	Electrical Engineering Methods 1A11	ETN1B21	Electrotechnics 1B21
IIN1A11	Introduction to Engineering Design 1A11	PJC1B21	Project Communication 1B11
MATE0A1	Engineering Mathematics 0A1	MATE0B1	Engineering Mathematics 0B1
PHY1A01	Physics 1A01	PHY1B01	Physics 1B01

Second year

First semester		Second semester	
APM2A10	Applied Mathematics 2A10	APM2B10	Applied Mathematics 2B10
CSC2A10	Computer Science 2A10	CSC2B10	Computer Science 2B10
ETN2A11	Electrotechnics 2A11	ETN2B21	Electrotechnics 2B21
IFM2A10	Informatics 2A10	IFM2B10	Informatics 2B10
MAT0AA2	Engineering Mathematics 0AA2	MAT0AB2	Engineering Mathematics 0AB2
MAT0CA2	Engineering Mathematics 0CA2	MAT0CB 2	Engineering Mathematics 0CB2
PHY2A01	Physics 2A01	IEP2B21	Engineering Economics and Practice 2B21

Third year

First semester		Second semester	
KRL3A01	Power Systems 3A01	BHS3B01	Control Systems 3B01
STE3A01	Statistics for Engineers 3A01	EKA3B21	Electronics 3B21
SST3A11	Signals and Systems 3A11	RKE3B01	Computer Systems 3B01
IFM3A10	Informatics 3A10	IFM3B10	Informatics 3B10
CPS3A01	Complementary Studies 3A01	PJB3B21	Project Management 3B21
CPS3A02	Complementary Studies 3A02	SIO3B21	Systems Engineering and Design 3B21
SIO3A11	Systems Engineering and Design 3A11	SIG3B01	Signal Processing 3B01
		TEL3B01	Telecommunications 3B01
		EEP3B21	Electrical Engineering Practical 3B21

Fourth year

First semester		Second semester	
CSC3A10	Computer Science 3A10	CSC3B10	Computer Science 3B10
BHS4A11	Control Systems 4A11	KRL4B21	Power Systems 4B21
HSE4A01	High Speed Electronics 4A01	RTI4B21	Legal Applications in Engineering Practice 4B21
PJE4A11	Project Investigation 4A11 (Electrical and Electronic)	PJE4B21	Project Investigation 4B21 (Electrical and Electronic)
PWE4A01	Power Electronics 4A01		
SIG4A01	Signal Processing 4A01		
TEL4A01	Telecommunications 4A01		
EEP4A11	Electrical Engineering Practical 4A11		

EB21 MODULES: ENGINEERING TECHNOLOGY PROGRAMMES

EB21.1 ALPHABETICAL LIST WITH PREREQUISITES

NATIONAL DIPLOMA MODULES

NAME		CODE	PRE-REQUISITE
Accounting Skills 1	SM	MAS11-1	
Analytical Techniques 2	SM	MAY21-2	Prac Met 2: Extraction Metallurgy (PRE21-1) Metallurgical Chemistry 2 (CET1AM2)
Applied Building Science (Theory)	YM	PHY1YKT	
Applied Construction: Macro-Economics	SM	ACM2B10	Applied Construction: Micro-Economics (ACM2A10)
Applied Construction: Micro-Economics	SM	ACM2A10	Constr Management 1 (CONM111)
Applied Mechanics 1	SM	CAM1111	
Applied Strength of Materials 3	CM	ASM301	Strength of Mat 2 (SOM2111) Strength of Mat 3 (SOM312) – 40%
Automation 3	SM	BAU3111	
Building Practice	SM	EL3540	Full first year
Business Management 1A		BMA01A1	
Business Management 1B		BMA01B1	
Business Management 2A		BMA02A2	Business Management 1A (BMA01A1) Business Management 1B (BMA01B1)
Business Management 2B		BMA02B2	Business Management 1A (BMA01A1) Business Management 1B (BMA01B1)
Business Management 3A		BMA03A3	Business Management 2A (BMA02A2) Business Management 2B (BMA02B2)
Business Management 3B		BMA03B3	Business Management 2A (BMA02A2) Business Management 2B (BMA02B2)
Chemical Engineering Practice 1	SM	EL30811	
Chemical Engineering Practice 2	SM	EL30822	Chemical Engineering Practise 1 (EL30811)
Chemical Engineering Technology 2	SM	WAR2111	Chemistry 1 (Theory) (CET1AC1) Engineering Mathematics 1 (MAT1AW1)
Chemical Engineering Technology 3A	SM	CMTA321	Chemical Engineering Technology 2 (WAR2111)
Chemical Engineering Technology 3B	CM	CMTB321	Chemical Engineering Technology 3A (CMTA321) -40%

Chemical Plant 3A	SM	ACPA321	Chemical Process Industries 2 (WPD2111)
Chemical Plant 3B	CM	ACPB321	Chemical Plant 3A (ACPA321) – 40%
Chemical Practical 2	SM	CET1BCE	Chemistry 1 (Practical) (CET1AC2) Chemistry 1 Theory (CET1AC1) Student must be registered concurrently for the following modules: Organic Chemistry 2 (CET1BO1) Physical Chemistry 2 (CET1BP1)
Chemical Process Design: Principles 3	SM	CPD3111	Chemical Engineering Technology 3A (CMTA321)
Chemical Process Industries 2	SM	WPD2111	
Chemistry 1 (Practical)	SM	CET1AC2	
Chemistry 1 (Theory)	SM	CET1AC1	
		CET1AMT	
Civil Engineering for Planners 1	SM	CES1111	
Civil Engineering Practice 1	SM	EL30911	
Civil Engineering Practice 2	SM	EL30922	
Coal Processing and Usage 3 (Practical)	SM	MCUB311	Analytical Techn (MAY21-2)
Coal Processing and Usage 3 (Theory)	SM	MCUA311	Mineral Processing 3 (MPR32-1)
Communication Skills 1	SM	CSA121	
Communication Skills 1A	SM	CSAAC31	
Communication Skills 1B	SM	CSABC31	Comm Skills 1A (CSAAC31)
Communication Studies 1	SM	BGC111	
Communication Studies 1A	SM	CSAA131	
Communication Studies 1B	SM	CSAB131	Comm Studies 1A (CSAA131)
Computer Applications 3	SM	ART331	
Computer Skills 1		EIR1111, EIRX111	
Computer Skills 1	SM	EIRT111	
Computer Skills 1A	SM	EIRA111	
Computer Skills 1B	SM	EIRB111	Computer Skills 1A (EIRA111)
Computer-Aided Draughting 1	SM	CAD1111	Computer Skills 1 (EIRME11)
Concrete 3	YM	SAC331	Construction Methods 1 (CMS11-1)
			Construction Materials 1 (CCM11-1)
Construction Accounting 3	YM	CONA331	Constr Management 2 (CONM221)
			Applied Construction: Micro-Economics (ACM2A10)
Construction Applied Building Science (Practical)	YM	PHY1YKP	
Construction Management 1	YM	CONM111	
Construction Management 2	SM	CONM221	Constr Management 1 (CONM111)
Construction Management 3	YM	CONM331	Constr Management 2 (CONM221)

			Applied Construction: Micro-Economics (ACM2A10)
Construction Materials 1	SM	CCM11-1	
Construction Methods 1	SM	CMS11-1	
Construction Technology 1	YM	CONT111	
Construction Technology 2	SM	CONT221	Constr Technology 1 (CONT111)
Construction Technology 3	YM	CONT331	Constr Technology 2 (CONT221)
Control Systems 2	SM	ASY211	Eng Maths 2 (MAT2AW2)
Control Systems 3	CM	ASY331	Control Systems 2 (ASY211) – 40%
			Eng Maths 3 (MAT2AW3)
Corrosion 3	SM	TKR31-1	Phys Metallurgy 2 (PMY22-2)
Costing 2	SM	BCO2111	
Costing and Estimating 1A		CAE01A1	Refer to Faculty of Economic & Financial Sciences
Costing and Estimating 1B		CAE01B1	Refer to Faculty of Economic & Financial Sciences
Database Principles 3	SM	DBP311	Programming 2 (CPS211)
Design Project 3	SM	EDP3111	
Digital Systems 1	SM	EDS121	
Digital Systems 2	CM	EDS231	Digital Systems 1 (EDS121) – 40%
Digital Systems 3	SM	EDS341	Digital Systems 2 (EDS231)
Documentation 3	SM	DIS3111	Management: Civil 2 (CEM2211)
Drawing 1	SM	FCDR1111	
Drawing 2	SM	FCDR2211	Drawing 1 (FCDR1111)
Drawing for Planners 1	SM	CDR1112	
Drawing: Chemical Engineering 1	SM	WTA1131	
Economics for Planners 3	SM	DPTA311	
Electrical Distribution 3	SM	ELD3221	Electrical Eng 2 (AEI2211)
			Electrical Protection 3 (AEP3221)
Electrical Engineering 1	SM	AEI1221	
Electrical Engineering 2	CM	AEI2211	Electrical Eng 1 (AEI1211) – 40%
Electrical Engineering 3	SM	AEI3311	Electrical Eng 2 (AEI2211)
Electrical Engineering Practice 1	SM	EL38011	
Electrical Engineering Practice 2	SM	EL380HC	Electr Eng Prac 1 (EL38011)
Electrical Machines 2	SM	ELM2221	Electrical Eng 1 (AEI1221)
Electrical Machines 3	CM	ELM3221	Electr Machines 2 (ELM2221) – 40%
Electrical Protection 3	SM	AEP3221	Electrical Eng 2 (AEI2211)
Electronic Communication 2	SM	AEC2221	Electronics 2 (EEL2211)
Electronic Engineering Practice 2	SM	EL380LC	Electr Eng Prac 1 (EL38011)
Electronic Measurements 3	SM	EIM3111	
Electronics 1	SM	EEL1111	
Electronics 2	CM	EEL2211	Electronics 1 (EEL1111) – 40%

Electronics 3	SM	EEL341	Electronics 2 (EEL2211)
Electrotechnology 1	SM	ELT1111	
Electrotechnology 2	SM	ELT2211	Electrotechnology 1 (ELT1111)
Electrotechnology 3	CM	ELT312	Electrotechnology 2 (ELT2211) – 40%
End-User Computing 1A		EUC01A1	
End-User Computing 1B		EUC01B1	
Engineering Geology 2B	SM	CEGB211	Soil Mechanics 2A (CEGA211) for NDip: Building
Engineering Management 2	SM	MGN21-1	
Engineering Management 3	CM	MGN32-1	Engineering Management 2 (MGN21-1) – 40%
Engineering Mathematics 1	SM	MAT1AW1	
		MAT1YBU	
Engineering Mathematics 2	CM	MAT2AW2, MAT2AE2	Eng Maths 1 (MAT1AW1) – 40%
Engineering Mathematics 3	SM	MAT3AW3	Eng Maths 2 (MAT2AW2)
Engineering Physics 2 (Practical)	SM	PHY1BCP	Physics 1 Prac (PHY1ABP) Physics 1 (Theory) (PHY1ABT)
Engineering Physics 2 (Theory)	SM	PHY1BCT	Physics 1 Theory (PHY1ABT) Physics 1 (Practical) (PHY1ABP)
Engineering Work Study 1	SM	MWS1111 TIV121	
Engineering Work Study 2	SM	TIV231	Eng Work Study 1 (TIV121)
Engineering Work Study 3	SM	TIV351	Eng Work Study 2 (TIV231)
Environmental Management 1	SM	ENM31-1	
Experiential Learning 1	SM	EL33911, EL40311	
		EL440-1	
Experiential Learning 2	SM	EL33912, EL40312	
		EL440-2	
Experiential Learning 2	SM	EL2782	Experiential Learning 1 (EL2781)
Extraction Metallurgy 2	CM	TEX2111	Metallurgy 1 (MET111) – 40%
			Metallurgical Chemistry 1 (Theory) CET1AMT)
			Physics 1 (Theory) (PHY1ABT)
Facility Layout and Materials Handling 2	SM	BFM2111	Mechanical Engineering Drawing 1 (EDM1111)
			Eng Work Study 1 (TIV121)
			Production Engineering: Industrial 1 (BEP121)
Financial Principles in Operation 1A		FPO0AA1	Refer to Faculty of Economic & Financial Sciences.
Financial Principles in Operation 1B		FPO0BB1	Refer to Faculty of Economic & Financial Sciences.
Fluid Mechanics 2	SM	IMF2111	
Fluid Mechanics 3	SM	IMF313	Fluid Mechanics 2 (IMF2111)

Foundry Technology 2	SM	FTY21-1	Extractive Met 2 (TEX2111)
			Physical Met 1 (PMY11-1)
			Met Chem 2 (CET1AM2)
Foundry Technology 3	CM	FTY302	Foundry Tech 2 (FTY21-1) – 40%
Geography for Planners1	SM	GSS1111	
Geology 1	SM	GEO1111	Metallurgy 1 (MET111)
Geology: Mining 3	SM	MWG3211	
Geotechnical Engineering 3	SM	CEG3211	Soil Mechanics 2A (CEGA211)
Heat and Mass Transfer 2	SM	HMR21-1	Metallurgical Thermodynamics 2 (THM21-2)
History and Principles of Planning 1	SM	PSSA111	
Housing Development 3	SM	DPTB311	
Hydraulic Machines 3	CM	MHM301	Fluid Mechanics 2 (IMF2111)
			Fluid Mechanics 3 (IMF313) – 40%
Hydraulics 2A	SM	CEW2A11	Applied Mechanics 1 (CAM1111)
Hydrology 3B	SM	CEW3B21	
Hydrometallurgy 3	SM	MHD3111	Met Chem 2 (CET1AM2)
Industrial Accounting 3	SM	BBB341	Costing 2 (BCO2111)
Industrial Engineering Practice 1	SM	EL32121	
Industrial Engineering Practice 2	SM	EL32123	
Industrial Leadership 3	SM	BIL3111	
Introduction to Construction Law	YM	new code	
Laboratory Safety Induction	SM	LSI111	
Legal Principles 1	SM	LPT111	
Legal Procedures 2	SM	LPS211	
Logic Design 3	SM	CLD311	Digital Systems 2 (EDS231)
Management : Civil 1	SM	CEM1111	
Management : Civil 2	SM	CEM2211	Management: Civil 1 (CEM1111)
Manufacturing Relations 2	SM	BVR2111	
Management Skills 1	SM	BIM121	
Management Skills 1A	SM	BIMA131	
Management Skills 1B	SM	BIMB131	Management Skills 1A (BIMA131)
Manufacturing Relations 2	SM	BVR2111	
Materials Testing: Metallurgy 3	SM	MTM3111	Strength of Materials (TST2111)
			Physical Met 1 (PMY11-1)
Mathematics 1	SM	MAT1AW1	
Mathematics 2A	SM	WWEA22C	Mathematics 1 (WWEC121)
Mathematics 2A	SM	MAT2AE2	Eng Maths 1 (MAT1AW1)
Statistics 2B	SM	STA1ZCE	Eng Maths 1 (MAT1AW1)

Measurements 3	SM	EMA3111	
Mechanical Deformation Technology 2	SM	TMI21-1	
Mechanical Engineering Design 2	SM	IMO2111	Computer-Aided Draughting 1 (CAD1111)
			Mechanical Engineering Drawing 1 (EDM1111)
			Strength of Materials 2 (SOM2111)
Mechanical Engineering Design 3	SM	IMO312	Mech Eng Design 2 (IMO2111)
			Strength of Materials 3 (SOM312)
Mechanical Engineering Drawing 1	SM	EDM1111	
Mechanical Engineering Practice 1	SM	EL29321	
Mechanical Engineering Practice 2	SM	EL29331	
Mechanical Manufacturing Engineering 1	SM	IMV1111	
Mechanical Manufacturing Engineering 2	SM	IMV2211	Mech Man Eng 1 (IMV1111)
Mechanical Manufacturing Engineering 3	SM	IMV321	Mechanical Manufacturing Engineering 2 (IMV2211)
Mechanical Metallurgy 3	SM	TMP31-1	Physical Met 2 (PMY22-2)
			Materials Test 3 (MTM3111)
Mechanics 1	SM	CHM1111	
Mechanics of Machines 2	SM	EMM2111	
Mechanics of Machines 3	SM	EMM313	Mechanics 1 (CHM1111)
			Mechanics of Machines 2 (EMM2111)
Metallurgical Chemistry 1 (Practical)	SM	CET1AMP	
Metallurgical Chemistry 1 (Theory)	SM	CET1AMT	
Metallurgical Chemistry 2	SM	CET1AM2	Chem 1 (Theory) (CET1AMT)
			Chem 1 (Prac) (CET1AMP)
Metallurgical Engineering Practice 1	SM	EL40211	
Metallurgical Engineering Practice 2	SM	EL40212	Metallurgical Engineering Practice 1 (EL40211)
Metallurgical Geology 2	SM	MGG21-2	Geology 1 (GEO1111)
Metallurgical Management 2	SM	MLM21-1	
Metallurgical Plant 2	SM	MTP21-1	Physics 1 (Practical)(PHY1ABP)
			Physics 1 (Theory)(PHY1ABT)
Metallurgical Thermodynamics 2	SM	THM21-2	Metallurgical Chemistry 2 (CET1AM2)
Metallurgy 1	SM	MET111	
Microprocessors 3	SM	CMP311	Digital Systems 3 (EDS341)
Mine Engineering 2	SM	MEG2111	
Mine Engineering 3	CM	MEG3211	Mine Engineering 2 (MEG2111) – 40%
Mine Survey and Valuation 2	SM	MSV2111	
Mine Survey and Valuation 3	CM	MSV3211	Mine Survey and Valuation 2 (MSV2111) – 40%
Mineral Beneficiation 2	SM	MBF21-1	

Mineral Exploitation 1	SM	MOT1111	
Mineral Processing 2A	SM	MPR2A20	Metallurgy 1 (MET111)
Mineral Processing 2B	SM	MPR2B20	Metallurgy 1 (MET111)
Mineral Processing 3	SM	MPR32-1	Mineral Processing 2A20 (MPR2A20)
			Mineral Processing 2B20 (MPR2B20)
Mineral Survey 1	SM	MSY1111	Mineral Exploitation 1 (MOT1111)
Mineral Survey 2	SM	MSY2111	Mineral Survey 1 (MSY1111)
Mineral Survey 3	SM	MSY3111	Mineral Survey 2 (MSY2111)
Mineral Valuation 1	SM	MVN1111	
Mineral Valuation 2	SM	MVN2111	Mineral Val 1 (MVN1111)
Mining 2	SM	MIN21-1	
Mining 3	CM	MIN32-1	Mining 2 (MIN21-1) – 40%
Mining Geology 2	SM	GLG3AMM	
Mining Technical Services 3	SM	MTL3211	
Network Systems 2	SM	CNS211	Computer Skills 1 (EIR1111)
Network Systems 3	SM	CNS311	Network Systems 2 (CNS211)
Numerical Methods 1	SM	MNM31-1	Mathematics 2A (MAT2AE2)
			Statistics 2B (STA1ZCE)
Operating Systems 3	SM	BOS311	Programming 2 (CPS211)
Operational Research 3	SM	BOA321	
Operations Management 1A		OPM11A1	
Operations Management 1B		OPM11B1	
Operations Management 2A		OPM22A2	Operations Management 1A (OPM11A1)
			Operations Management 1B (OPM11B1)
Operations Management 2B		OPM22B2	Operations Management 1A (OPM11A1)
			Operations Management 1B (OPM11B1)
Operations Management 3A		OPM33A3	Operations Management 2A (OPM22A2)
			Operations Management 2B (OPM22B2)
Operations Management 3B		OPM33B3	Operations Management 2A (OPM22A2)
			Operations Management 2B (OPM22B2)
Operations Management Practice 3		OPP3YR3	Operations Management 2A (OPM22A2)
			Operations Management 2B (OPM22B2)
Operations Management Techniques 2A		OPT22A2	STAQTA1
			STAQTB1
Operations Management Techniques 2B		OPT22B2	STAQTA1
			STAQTB1

Operations Management Techniques 3A		OPT33A3	Operations Management Techniques 2A (OPT22A2)
			Operations Management Techniques 2B (OPT22B2)
Operations Management Techniques 3B		OPT33B3	Operations Management Techniques 2A (OPT22A2)
			Operations Management Techniques 2B (OPT22B2)
Opto-Electronics 4	YM	OPE411	
Organisational Effectiveness 1A		ORE11A1	
Organisational Effectiveness 1B		ORE11B1	
Organisational Effectiveness 2A		ORE22A2	Organisational Effectiveness 1A (ORE11A1)
			Organisational Effectiveness 1B (ORE11B1)
Organisational Effectiveness 2B		ORE22B2	Organisational Effectiveness 1A (ORE11A1)
			Organisational Effectiveness 1B (ORE11B1)
Organisational Effectiveness 3A		OEF33A3	Organisational Effectiveness 2A (ORE22A2)
			Organisational Effectiveness 2B (ORE22B2)
Organisational Effectiveness 3B		OEF33B3	Organisational Effectiveness 2A (ORE22A2)
			Organisational Effectiveness 2B (ORE22B2)
Organic Chemistry	SM	CET1B01	Chem 1 (Theory) (CET1AC1)
			Chem 1 (Practical) (CET1AC2)
Physical Chemistry	SM	CET1BP1	Chem 1 (Theory) (CET1AC1)
			Chem 1 (Practical) (CET1AC2)
Physical Metallurgy 1	SM	PMY11-1	Physics 1 (Practical) (PHY1ABP)
			Chemistry 1 (Theory) (CET1AMT)
			Metallurgy 1 (MET111)
			Mechanical Engineering Drawing 1 (EDM111)
			Physics 1 (Theory) (PHY1ABT)
Physical Metallurgy 2	SM	PMY22-2	Phys Metallurgy 1 (PMY11-1)
Physical Metallurgy 3	CM	PMY33-3	Phys Metallurgy 2 (PMY22-2) -40%
Physics 1 (Practical)	SM	PHY1ABP	
Physics 1 (Theory)	SM	PHY1ABT	
Planning Design 2	SM	DPS211	Drawing for planners 1 (CDR1112)
Planning Design 3A	SM	DPSA321	
Planning Design 3B	SM	DPSB321	Planning Design 3A (DPSA321)
Power Electronics 3	SM	EEP3211	Electronics 2 (EEL2211)
			Eng Maths 3 (MAT3AW3)
Practical Metallurgy 2: Extraction Metallurgy	SM	PRE21-1	Metallurgy 1 (MET111)
Practical Metallurgy 2: Physical Metallurgy	CM	PRM21-1	Metallurgy 1 (MET111)

Price Analysis and Estimating 3	YM	PRAE331	Quantity Surveying 2 (QSB221) Construction Technology 2 (CONT221)
Process Control 3	SM	ICP3111	Chemical Process Industries 2 (WPD2111) Chemical Plant 3A (ACPA321)
Process Engineering 2	SM	MPE21-1	
Process Instrumentation 1	SM	PRI1111	Electronics 1 (EEL1111)
Process Instrumentation 2	SM	PRI221	Process Instrumentation 1 (PRI1111)
Process Instrumentation 3	CM	PRI3221	Process Instrumentation 2 (PRI221) – 40%
Process Statistics 2	SM	STA2BEM	Statistics 2B (STA1ZCE)
Production Engineering: Industrial 1	SM	BEP121	
Production Engineering: Industrial 2	SM	BEP231	Production Engineering: Industrial 1 (BEP121)
Production of Iron and Steel 2	SM	PRS21-1	Extractive Met 2 (TEX2111) Met Chem 2 (CET1AM2)
Production of Iron and Steel 3	CM	PRS302	Production of Iron and Steel 2 (PRS21-1) – 40%
Programming 1	SM	CPS111	Computer Skills 1 (EIR1111)
Programming 2	SM	CPS211	Programming 1 (CPS111)
Programming 3	SM	CPS311	Programming 2 (CPS211)
Project Work A	SM	EL3871A	
Project Work B	SM	EL3871B	
Project Work C	SM	EL3871C	
Project Work D	SM	EL3871D	
Projects 1	SM	EIP1111	Computer Skills 1 (EIR1111)
Pyrometallurgy 3	SM	MYP3111	Metallurgical Thermodynamics 2 (THM21-2) Met Chem 2 (CET1AM2)
Quality Assurance 2	SM	BQA2111	
Quality Assurance 2A		QAS22A2	
Quality Assurance 2B		QAS22B2	
Quality Control 2	SM	TKU21-2	Eng Maths 2 (MAT2AW2)/Mathematics 2A (MAT2AE2/WWE1131)
Quantitative Techniques 1	SM	BQT1112	
Quantitative Techniques A		STAQTA1	Refer to Faculty of Science
Quantitative Techniques B		STAQTB1	Refer to Faculty of Science
Quantity Surveying 1	YM	QSB111	
Quantity Surveying 2	YM	QSB221	Quantity Survey 1 (QSB111) Construction Technology 1 (CONT111)
Quantity Surveying 3	YM	QSG331	Quantity Survey 2 (QSB221) Construction Technology 2 (CONT221)
Radio Engineering 3	CM	EER3111	Electronic Comm 2 (AEC2221) – 40%

Reinforced Concrete and Masonry Design 3	SM	RCM31-1	Theory of Struct 2 (IST2111)
Science: Mining 1	SM	MWT1111	
Site Surveying 1	YM	SSG111	
Software Design 2	SM	EIS2111	
Software Design 3	SM	EIS3111	
Software Engineering 3	SM	BPO311	Programming 1 (CPS111)
Soil Mechanics 2A	SM	CEGA211	Construction Materials 1 (CCM11-1) for NDip: Building
			Construction Methods 1 (CMS11-1) for NDip: Building
Statistics 1	SM	STA1ZIT	
Statistics 2B	SM	STA1BC1	
Statistics: Mining 2	SM	MSS21-1	
Steam Plant 3	CM	SMP301	Thermodynamics 2 (IMT2111)
			Thermodynamics 3 (IMT313) – 40%
Strength of Materials 2	SM	TST2111	Eng Maths 1 (MAT1AW1)
			Physics 1 (Practical) (PHY1ABP)
			Physics 1 (Theory) (PHY1ABT)
Strength of Materials 2	SM	SOM2111	
Strength of Materials 3	SM	SOM312	Strength of Mat 2 (SOM2111)
Structural Analysis 2	SM	AIS2111	Theory of Struct 2 (IST2111)
Structural Analysis 3	CM	AIS3211	Struct Analysis 2 (AIS2111) – 40%
Structural Geology 3	SM	MSG3121	
Structural Steel and Timber Design 3	SM	TSS31-1	Theory of Structures 2 (IST2111)
Structures 3	YM	SAC3000	Construction Tech 1 (CONT111) Construction Methods 1 (CMS 11-1) Construction Materials 1 (CCM11-1)
Survey and Analysis 1	SM	ASS1111	
Surveying : Civil 2A Theory	SM	CISA211	Surveying 1A Theory (CSUA111)
Surveying : Civil 2B Practice	SM	CISB211	Surveying 1B Practice (CSUB111)
Surveying 1	SM	SSS1111	
Surveying 1A Theory	SM	CSUA111	Civil 2A Theory (CISA211)
Surveying 1B Practice	SM	CSUB111	Civil 2B Practice (CISB211)
Systems Analysis 2	SM	CSY211	Computer Skills 1 (EIR1111)
Systems Analysis and Design 1A		SAD01A1	
Systems Analysis and Design 1B		SAD01B1	
Theory of Machines 3	CM	MHT302	Mech of Machine 1 (CHM1111)
			Mech of Machine 2 (EMM2111)
			Mech of Machine 3 (EMM313) – 40%
Theory of Planning 1	SM	PSSB111	History and Principles of Planning 1 (PSSA111)

Theory of Structures 2	SM	IST2111	Applied Mechanics (CAM1111)
Thermodynamics 2	SM	IMT2111	
Thermodynamics 3	SM	IMT313	Thermodynamics 2 (IMT2111)
Thermodynamics: Applied 3	SM	ACT3111	Mathematics 1 (MAT1AW1) Chemical Engineering Technology 2 (WAR2111) Physical Chemistry 2 (CET1BP1)
Thermodynamics: Chemical Engineering 3	SM	CIT3111	Phys Chemistry (CET1BP3)
			Eng Maths 1 (MAT1AW1)
Transportation Engineering 2	SM	CET2111	Surveying: Civil 2A Theory (CISA211)
Transportation Engineering 3	SM	CET3211	Transportation Eng 2 (CET2111)
Water and Wastewater Treatment 2B	SM	CEW2B11	
Water and Sewage Reticulation 3A	CM	CEW3A21	Hydraulics 2A (CEW2A11) – 40%
Workplace Dynamics 1A		WPD11A1	
Workplace Dynamics 1B		WPD11B1	

EB21.2 MODULE DESCRIPTIONS: NDIP PROGRAMMES

The outcomes and assessment criteria of each module are stated in the relevant learning guides.

MAS11-1	**ACCOUNTING SKILLS 1**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide knowledge required for effective and financially concerned mining activities for basic decisions in technical subjects related to mining
Content	The accounting world, Financial accounting, Management accounting, Introduction to taxation

MAY21-2	**ANALYTICAL TECHNIQUES 2**
Calculation Criteria	Final mark weighting = Portfolio(100%)
Purpose	On completion of the module learners will have developed the necessary practical skills required to work in an analytical chemical laboratory. Learners will develop the confidence and ability to carry out chemical analyses with acceptable accuracy using various analytical instruments and to appreciate the value of some analytical techniques. Learners will also gain an appreciation of the importance of laboratory safety standards
Content	The theoretical and practical aspects of assaying various types of ores by a selection of methods eg.: Gold and silver, Copper, Iron and Manganese dioxide

PHY1YKT	**APPLIED BUILDING SCIENCE (Theory)**
Purpose	The purpose of this module is to provide a factual knowledge of definitions, methods and principles in Physics, and a broad background knowledge of basic Physics to aid in the understanding and interpretation of future scientific and technological development and to acquire the following life skills such as identifying and solving problems, working in groups and communicating effectively as is needed for Applied Building Science
Content	Introduction to measurement/calculation, Optics, Mechanics, Hydrostatics, Heat, Photometry

ACM2B10	**APPLIED CONSTRUCTION: MACRO-ECONOMICS**
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Gain a factual knowledge of definitions, methods and principals of management which the learner may require in the study of the specific field chosen, Obtain broad background knowledge of management which will aid the understanding and interpretation of future technological development, Collect, analyse, organize and critically evaluate information
Content	What macroeconomics is all about, Major sectors, markets and flows in the mixed economy, Measuring the performance of the economy, Basic macroeconomic model, Keynesian model including government and the foreign sector, The monetary sector, Unemployment and the Phillips curve

ACM2A10	APPLIED CONSTRUCTION: MICRO-ECONOMICS
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	The learner will be able to master the following critical outcomes: Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Gain a factual knowledge of definitions, methods and principals of management which the learner may require in the study of the specific field chosen, Obtain broad background knowledge of management which will aid the understanding and interpretation of future technological development, Collect, analyse, organize and critically evaluate information
Content	Introduction to economics, The economic problem, Mechanisms of overcoming the scarcity problem, The economic system in South Africa, A mixed economy, Criteria for measuring performance, Economic growth, Unemployment, Inflation

CAM1111	APPLIED MECHANICS 1
Calculation Criteria	Final mark weighting = Portfolio(100%)
Purpose	Obtain fundamental knowledge, analytical and practical skills required to solve problems related to statically determinate force systems acting on particles and bodies in space. Apply methods based on graphical, algebraic and trigonometric solutions to define force systems and determine unknown properties.
Content	Statics of particles and rigid bodies under coplanar force systems which may or may not be in equilibrium. Centroids and centres of gravity. Static friction. Hydrostatics. Linear, curvilinear and relative motion of bodies. Laws of motion and work and energy.

ASM301	APPLIED STRENGTH OF MATERIALS 3
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse and solve strength of materials problems in the mechanics and technology fields.
Content	Slope and Deflection of Beams; Leaf Springs; Struts; Complex Stress and Complex Strain; Thick Cylinders; Elastic Constants and Volumetric Strain; Strain in Non-uniform Sections.

BAU3111	AUTOMATION 3
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse and solve automation problems in the field of manufacturing engineering and service industry.
Content	Manufacturing Operations; Manufacturing Models and Metrics; Automation and Control Technologies; Industrial Control Systems; Hardware Components for Automation and Process Control; Numerical Control; Industrial Robotics; Programmable Logic Controllers

EL3540	BUILDING PRACTICE
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)

Purpose	To enable the student to experience the work situation in the construction industry and allied professions and achieve proficiency in the work situation
Content	Administration, Contract documentation & surveying, Planning & resourcing, Progress meetings, Construction, Fabrication, Plant utilisation, Supervise works, Supervise works, Maintain infrastructure, Quantity surveying, Practical building experience, Interpersonal relations, Write & present reports, Training, Production control, Site investigations, Quality assurance, Health & safety, Surveying, Testing and monitoring, Computer skills

BMA01A1	**BUSINESS MANAGEMENT 1A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to introduce students to the main themes and concepts of Business Management. The lectures, discussions and prescribed reading are designed to enable you to understand and analyse these concepts in a practical and basic manner.
Content	

BMA01B1	**BUSINESS MANAGEMENT 1B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of the module is to introduce the learner to the field of General Management and develop a student who can clearly demonstrate a focused knowledge on the issues of the manager and the development of management theory as well as the task of management, namely planning, organising, leading and controlling.
Content	

BMA02A2	**BUSINESS MANAGEMENT 2A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to provide a well-rounded, broad education that equips students with the knowledge base, theory and methodology of operations management and applied competencies in the mastering, analysis, interpretation and application within this field as well as to provide a basis for further learning
Content	

BMA02B2	**BUSINESS MANAGEMENT 2B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to provide a well-rounded, broad education that equips students with the knowledge base, theory and methodology of financial management and public relations management and applied competencies in the mastering, analysis, interpretation and application within these fields as well as to provide a basis for further learning.
Content	

BMA03A3	BUSINESS MANAGEMENT 3A
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to prepare students to understand and apply the generic principles of business management and demonstrate a good understanding of relevant knowledge, skills and values required of management students in the context of a developing country.
Content	

BMA03B3	BUSINESS MANAGEMENT 3B
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to prepare students to understand and apply the generic principles of business management and demonstrate a good understanding of relevant knowledge, skills and values required of management students in the context of a developing country.
Content	

EL30811	CHEMICAL ENGINEERING PRACTICE 1
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	The primary purpose of this module is to introduce the student to the chemical process industry
Content	Safety Training, Plant Operations: Process monitoring: taking readings, comparing against standard operating conditions and entering log sheets, Exposure to Chemical analysis, Exposure to laboratory work e.g.: routine, titrations, specific gravity, viscosity, Tasks as required for good housekeeping, Flow diagrams op plants, Piping systems – symbols and specifications, Elementary mass balances, Elementary energy balances, Systems found in factory environment: Organization structures, Plant operating systems, Maintenance systems. Report Writing.

EL30822	CHEMICAL ENGINEERING PRACTICE 2
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	The primary purpose of this module is to introduce the student to the chemical process industry (See module outcomes and module assessment
Content	Module learning outcomes and Module assessment criteria are evaluated based on the following table: Plant operations and troubleshooting: Basic operating skills e.g: operating valves, starting motors, turbines, pumps, Handling of equipment specific to the operation. Determination of power requirements for pumps, mixers etc. Partaking in project work in order to understand the specific nature of projects e.g: design of piping system. Exposure to loss control, quality control and safety inspections. Advanced energy balances. Overall material and energy balance of plant. Schematic diagrams of unit operations. Analysis of design. Environmental assessment. Exposure to non-technical issues: Financial management, ROI calculations: Depreciation, Human resources, Industrial relations

WAR2111	CHEMICAL ENGINEERING TECHNOLOGY 2

Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The primary purpose of this module as an integral part of the National Diploma is to provide the students with an understanding of chemical engineering principles and techniques which will serve as a fundamental basis for the students' further development in chemical engineering.
Content	Chemical engineering principles with regard to units and dimensions. Methods of analysis and measurement associated with chemical engineering problems. Performing calculations using chemical equations and stoichiometry. Analyse material balance problems. Generate material balances for chemical engineering systems. Generate material balances for multiple subsystems. Generate material balances for recycle, bypass and purge systems. Do energy balances for chemical engineering systems. Do calculation of enthalpy changes. Solve combined material and energy balances for chemical engineering systems.

CMTA321	**CHEMICAL ENGINEERING TECHNOLOGY 3A**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Introduction of the learners to the modelling/design techniques used in chemical engineering technology
Content	Learners are made familiar with heat and mass balances, fluid flow (compressible and incompressible), and basic mechanisms in heat transfer.

CMTB321	**CHEMICAL ENGINEERING TECHNOLOGY 3B**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	As a would-be chemical engineer it will be necessary to understand the basic principles of engineering. This is the foundation of all engineering knowledge for your future
Content	Transfer Processes, Absorption, Evaporation, Drying, Humidification, Leaching, Distillation

ACPA321	**CHEMICAL PLANT 3A**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The primary purpose of this module as an integral part of the National Diploma is to provide the students with an understanding of chemical principles which will serve as a fundamental basis for the students' further in Chemical Engineering
Content	Corrosion: Define Corrosion, cost of corrosion, Wet and dry corrosion, Corrosion principles: Corrosion related equation, Electrochemical aspects of corrosion, Polarization vs. passivity. Materials; Metals and alloys, Non-metal. Water treatment; Industrial wastewater, Chemical effluent and domestic effluent, Main unit operations used in the water treatment, Design sequence for a water treatment plant for a specific industrial application. Mechanical separation ; Gravity settling, Centrifugal separation, Sieves and screens, Magnetic separation, Flotation, Electrostatic separators, Hydro cyclones, Thickeners, Filtration, Membrane, Sedimentation, Size reduction of solids, Mechanism of size reduction, Crushing equipment. Handling and Storage of solids and fluids ; Factors to consider for conveyor selection, Operation and application of belt, Screen, vibration, etc., Name the methods for storing

	solids in bulk, Types of weighing operation. Environment prevention: Air pollution, Soil pollution, Water pollution, Noise pollution

ACPB321	**CHEMICAL PLANT 3B**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Understanding industrial concept and equip student with design criteria.
Content	Pumps and Piping, Valves, Mixing, Combustion, Steam Plant, Cooling Towers

CET1BCE	**CHEMICAL PRACTICAL 2**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

CPD3111	**CHEMICAL PROCESS DESIGN : PRINCIPLES 3**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Identify The Design Process. Initiate And Execute Design Projects. Calculate And Estimate Operating And Capital Costs.Assess The Economics Of Engineering Design. Evaluate The Economics Of Alternate Projects And Provide Recommendations.
Content	Introduction to Design: Nature of Design, The Anatomy of Chemical Manufacturing Processes, Organisation of a Chemical Engineering Project, Project Documentation, Codes & Standards, Factors of Safety, Systems of Units, Degrees of Freedom and Design Variables, Design Optimisation. The Process of Synthesis and Analysis: Creative Aspects of Process Design, A Hierarchical Approach to Conceptual Design. Engineering Economics: Cost Information Required, Estimating Capital & Operating Costs, Total Capital Investment and Total Product Costs. Economic Decision Making: Time Value of Money, Project Economic Evaluation & Decision-making

WPD2111	**CHEMICAL PROCESS INDUSTRIES 2**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To expose students to Chemical industries processes.
Content	Petroleum Refining, Coal Industry, Heavy Chemical Industry, Iron & Steel Industry, The Cement Industry, Fuel Cells, Soap & Detergent Industry, Phosphorus Industry and cleaner production.

CET1AC2	**CHEMISTRY 1 (PRACTICAL)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

CET1AC1	**CHEMISTRY 1 (THEORY)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

CES1111	**CIVIL ENGINEERING FOR PLANNERS 1**

Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	*Acquaint* the student with the relevance of Civil Engineering to Town and Regional Planning. *Provide* the learner with an understanding of civil engineering factors and aspects
Content	The student is introduced to Civil engineering aspects and infrastructure factors that are relevant for town and regional planning, such as: Roads, Services – electrical; water supply; soil water removal; surface drainage, Geotechnical aspects that effect town and regional planning, Solid Waste Removal – Types of waste and methods of removal and disposal.

EL30911	**CIVIL ENGINEERING PRACTICE 1**
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	Empower the student with the necessary skills to perform basic Civil engineering operations in the working place
Content	Empower the student with the necessary skills to perform civil engineering operations in the working place; have an understanding of the civil engineering workplace as a whole and the role of each section/department

EL30922	**CIVIL ENGINEERING PRACTICE 2**
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	Empower the student with the necessary skills to perform advanced civil engineering operations in the working place; have an understanding of the civil engineering workplace as a whole and the role of each section/department. To be able manage civil engineering processes at junior engineer level.
Content	The organisational structure of the Company; Civil Engineering maintenance and/or manufacturing and/or development and/or construction, etc. procedures; Individual assignment projects should be used to complement team activities. Note: The learner must be allowed to exercise increasingly his/her own judgement and improve his/her decision-making ability.

MCUB311	**COAL PROCESSING AND USAGE 3 (PRACTICAL)**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	On completion of this module candidates will have developed the practical laboratory skills required to conduct the essential analytical, and physical tests on coal to characterize the different coals for industrial use and to interpret plant operating efficiencies from sampling results. This information will assist the candidates in recommending relevant changes to operating plant parameters to improve performance
Content	Introduction into the formation of coal, changes in rank and theoretical and practical aspects of the: Proximate Analysis, Ultimate analysis and Heat value determination. Physical testing of coal (eg. AFT, Roga Index, SwNo. Abrasive Index.etc.)

MCUA311	COAL PROCESSING AND USAGE 3 (THEORY)
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	On completion of this module the learners will have acquired the knowledge of the processes and specialized equipment used for the beneficiation of run of mine coal. Learners will be capable of maintaining product yields and product qualities required by consumers by recommending the necessary changes to the plant operating parameters to improve performance
Content	Coal formation, coal processing units , flow sheets, coal analysis, wash abilities of various coals and the effect on processing plants are discussed and covered in the module

CSA121	COMMUNICATION SKILLS 1
Refer to the Rules and Regulations of the Faculty of Humanities for more information on the module.	
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)

CSAAC31	COMMUNICATION SKILLS 1A
Refer to the Rules and Regulations of the Faculty of Humanities for more information on the module.	

CSABC31	COMMUNICATION SKILLS 1B
Refer to the Rules and Regulations of the Faculty of Humanities for more information on the module.	

BGC111	COMMUNICATION STUDIES 1
Refer to the Rules and Regulations of the Faculty of Humanities for more information on the module.	

CSAA131	COMMUNICATION STUDIES 1A
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Refer to the Rules and Regulations of the Faculty of Humanities for more information on the module.	

CSAB131	COMMUNICATION STUDIES 1B
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Refer to the Rules and Regulations of the Faculty of Humanities for more information on the module.	

CAD1111	COMPUTER AIDED DRAUGHTING 1
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for interpretation of mechanical drawing and preparation for use of CAD in mechanical engineering applications

Content	Core computer application in mechanical engineering drawing – standard package overview. Two dimensional drawing; Three dimensional drawing; Three dimensional models

ART331	**COMPUTER APPLICATIONS 3**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Introduction to the Computer Drafting environment as to help him/her in becoming computer drawing literate; to apply these skills optionally during assignments and in the day-to day work environment drawing concept plans as well as layouts accurately. This literacy is also essential as background to Geographic Information Systems, a Btech degree, forth year subject
Content	The students are briefed on the background and origin of drawing on computers. The relevancy of drawings to the Town Planning profession is explained. Looking at samples of what can be done with Cad. Accessing The Program, Setting Up The Environment, Creating And Opening Drawings, Drawing Tools, Editing Functions:, Setting And Changing Drawing View's, Inserting Pictures, Setting And Applying Formats To A Drawing, Setting And Adding Dimensions, Modifying Properties, Tools, Printing A Drawing.

EIRI111, EIRM111 EIRME111, EIRX111	**COMPUTER SKILLS 1**
Calculation Criteria	Final mark weighting = 100%
Purpose	To create documents for use in the engineering environment using the computer as a tool; To be able to use computer hardware for engineering applications; To have basic computer programming skills.
Content	Provide knowledge required for presentation and communication of information and data. The introduction to an Computer environment as to help him/her in becoming computer literate; to apply these skills optionally during assignments and in the day-to day work environment writing reports, compiling graphs and presenting information. Students have the opportunity to be lectured in Windows and Microsoft Office software currently utilized in the South African as well as International market. These are: Windows Environment, Ms-Dos, Microsoft Word, Microsoft Excel, Microsoft Powerpoint.

EIRT111	**COMPUTER SKILLS 1**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The introduction to an Computer environment as to help him/her in becoming computer literate; to apply these skills optionally during assignments and in the day-to day work environment writing reports, compiling graphs and presenting information. This literacy is also essential as background to Computer Applications III, a third year subject.
Content	Students have the opportunity to be lectured in Windows and Microsoft Office software currently utilized in the South African as well as International market. These are: Windows environment; MsDos; Microsoft Word; Microsoft Excel; Microsoft Powerpoint

EIRA111, EIR1111	**COMPUTER SKILLS 1A**

Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	To create documents for use in the engineering environment using the computer as a tool; To be able to use spreadsheets and database for engineering applications; To have basic computer programming skills.
Content	Concepts of information technology; Using the computer and managing the files; Word processing; Spreadsheets; Database; Presentation; Information and Communication; Programming using VBA.

EIRB111	**COMPUTER SKILLS 1B**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	To create documents for use in the engineering environment using the computer as a tool; To be able to use spreadsheets and database for engineering applications; To have basic computer programming skills.
Content	Concepts of information technology; Using the computer and managing the files; Word processing; Spreadsheets; Database; Presentation; Information and Communication; Programming using VBA.

SAC331	**CONCRETE 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To provide the learner with broad knowledge on the fundamentals of: Structural Detailing, Theory of Structures, Structural Design, Concrete Design, Concrete Use
Content	Concrete: Properties of Reinforced Concrete, The design of a concrete mix, Batching and mixing concrete, Ready-mix concrete, Handling and transporting concrete, Supervision of concrete pumping, Placing and compaction, Curing, Quality control of site produced concrete, Special techniques, Repairs to concrete, Statistics, Formwork. Structures: structural steel detailing, shear force and bending moment diagrams, beam selection using section modulus, calculation of moment of inertia of a section, beam design, beam deflections, analysis of trusses by joint resolution, introduction to reinforced concrete, reinforced concrete foundations, reinforced concrete columns, slabs and beams, bolted and welded connections, the design of tensile members of steel structures, the design of compression members of steel structures, reinforced concrete pad design, reinforced concrete column design, reinforced concrete slab and beam design

CONA331	**CONSTRUCTION ACCOUNTING 3**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	Make the routine recording, adjusting and closing entries required in the construction accounting process, Select a suitable accounting policy from alternative available, in context of a given set of circumstances, Understand the basics of financial management and apply this to a construction business
Content	The purpose of accounting, Records and first entries, Business transactions, Bank transactions, Transactions up to trial balance, Closing entries up to trial balance, Contract accounts, Sole owners and partnership accounts, Limited companies and close corporation accounts, Application of a construction accounting computer programmes. Understand the various corporate and financial goals in managing the firm, Learn about capital markets and their structure and roles, Develop insight into the interaction of firm decisions and

	capital markets, Understand the concept of corporate value, and the underlying factors that drive the value creation and management process, Understand the concept and the various types of risk, and how risk is measured and managed in a firm, Understand the methods by which securities are valued, and how security values change with changes in the business environment.

PHY1YKP	**CONSTRUCTION APPLIED BUILDING SCIENCE (PRACTICAL)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

CONM111	**CONSTRUCTION MANAGEMENT 1**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The purpose is to enable the student have insight in the operation of the construction industry, construction companies and the process of procuring work. Simple site administrative operations are also introduced. The other objective is to introduce the learner to the construction industry, the various processes and practice
Content	Organizations involved in the construction industry, Parties involved in the construction process, Construction companies and there organizational structures, Procurement of work, Introduction to site administration and cost control, Site meetings. Introduction to management processes and its functions, Management of Human Resources, Work Study, Contract Planning, Material, Plant and Sub-Contractor. Introduction to production management, Productivity, Production planning and development, Product standardization and grading, Theories of plant location, Factory building, Inspection, Inventory control

CONM221	**CONSTRUCTION MANAGEMENT 2**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Gain a factual knowledge of definitions, methods and principals of management which the learner may require in the study of the specific field chosen, Obtain broad background knowledge of management which will aid the understanding and interpretation of future technological development, Collect, analyse, organize and critically evaluate information
Content	Introduction to economics, The economic problem, Mechanisms of overcoming the scarcity problem, The economic system in South Africa, A mixed economy, Criteria for measuring performance, Economic growth, Unemployment, Inflation

CONM331	**CONSTRUCTION MANAGEMENT 3**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The learner will be able to master the following critical outcomes: Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Gain a factual knowledge of definitions, methods and principals of management which the learner may require in the study of the specific field chosen, Obtain broad background knowledge of management which will aid the understanding and

	interpretation of future technological development, Collect, analyse, organize and critically evaluate information
Content	Contract Management, Planning techniques/Programming techniques, Office, Site administration and Documentation, Financial reporting and control, Contract law and Applicable clauses in a Standard Contract, Quality Control. Labour relations and legislation, Skills development, Compensation for occupational injuries and diseases, Occupational health and safety, 2003 regulation, Industrial psychology, Personnel management, Public relations. Macro- Economics

CCM11-1	**CONSTRUCTION MATERIALS 1**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Obtain fundamental knowledge, analytical and practical skills required to identify the chemical and physical properties of materials used in the construction of civil engineering projects. Conduct field and laboratory tests on materials to determine engineering properties and design mix proportions. Analyse material for suitability in a structural component.
Content	Cement, aggregate, concrete mix design. Bitumen and asphalt. Soils, site investigation, sampling, road + foundation tests, introduction to pavement design. Steel, yield properties, welding, corrosion protection. Timber, sawing, types, structural grades and properties, treatment. Aluminium, polymers and other materials. Quarrying and crushing.

CMS11-1	**CONSTRUCTION METHODS 1**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To introduce the students to the technology of construction in the building and civil engineering sectors
Content	Civil Engineering Construction, Pipes, Valves, Road Works, Environmental Awareness, Materials codes and regulations, Dams, Reticulation, Storm water Drainage, Hydrology and Hydraulics, Culverts, Canals, Water Supply systems, Sewerage Systems, General Introduction to: Bridges, Tunnels, Railways, Harbours and Airports. Quarry's, Crushing

CONT111	**CONSTRUCTION TECHNOLOGY 1**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	To introduce the students to the technology of construction in the building and civil engineering sectors
Content	Civil Engineering Construction (Pipes, Valves, Road Works, Environmental Awareness, Materials codes and regulations, Dams, Reticulation, Storm water Drainage, Hydrology and Hydraulics, Culverts, Canals, Water Supply systems, Sewerage Systems. General Introduction to: Bridges, Tunnels, Railways, Harbours and Airports. Quarry's, Crushing
	Geometrical constructions, Building plans, Site establishment, The setting out of buildings, Wall construction, Brick bonds, Special foundations in buildings, Concrete, Mortar and plaster, Lintels and arches, Wall openings, Windows and glazing, Doors, Timber, Double-pitched roofs, Hipped, and mono-pitched roofs, Roof coverings, The water-proofing of roofs, Suspended wooden floors, Ceilings, Floor and wall finishes, Glass, and paints and painting, External Works (Boundary walls, Paving)

CONT221	CONSTRUCTION TECHNOLOGY 2
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The student will be able to master the following critical outcomes: Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Gain a factual knowledge of definitions, methods and principles of services in the construction industry which the student may require in the study of the specific field chosen, Obtain broad background knowledge of building services will aid the understanding and interpretation of future technological development, Collect, analyse, organize and critically evaluate information
Content	Electricity for Construction Students, Refrigeration and Air-conditioning for Construction Students, Plumbing and Drainage for Construction Students, Lifts for Construction Students:

CONT331	CONSTRUCTION TECHNOLOGY 3
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The learner will be able to master the following critical outcomes: Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively in drawing, verbally and in writing, Gain a factual knowledge of definitions, methods and principals of construction technology which the learner requires in the study of the specific field chosen, Obtain broad background knowledge of construction technology which will aid the understanding and interpretation of future technological development, Collect, analyse, organize and critically evaluate information
Content	Building: Concrete structures, Steel framed structures, Formwork, Brick cladding to concrete structures, Block work, Ceilings and drywall partitions, Ironmongery, Aluminium windows, Lightweight composite claddings, Specialized ceilings, Specialized wall coating, Application of the building regulations, Materials, Site investigation, Underground water, Sheet piling, Foundation piling, Heaving clay Geology: Introduction, Basic engineering geology Soil Mechanics: Soil and its Formation, Phase Relationships, Soil Classification, Standard Procedures and Symbols for Recording Soil Profiles, Soil Compaction, The California Bearing Ratio (CBR), Dynamic Cone Penetration Test

ASY211	CONTROL SYSTEMS 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge relating to Control systems, Allow the student to identify and solve problems
Content	Programmable Logic Controllers; Introduction to Control; Introduction to Block Diagram Algebra; Transfer Functions; Transient Responses of Systems; Frequency response and stability of systems; PID Applied control systems

ASY331	CONTROL SYSTEMS 3
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	Provide knowledge of basic concepts and terminology involved with control system technology.

Content	Reduction of multiple subsystems; Modelling in the frequency domain; Time responses; Steady State errors; Stability; Root locus techniques; Frequency response – Bode diagrams; Phase compensators; Frequency response – Nyquist (polar) plots; Frequency response – Nichols charts; Three term controllers (PID) and Introduction to State space.

TKR31-1	**CORROSION 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Build upon what was learnt in Metallurgy 11 introducing new concepts of corrosion and teaching more in depth and broader concepts of what was introduced previously.
Content	The basics (low level theory, why, how and how much does it cost safety, health, productivity, cost etc.), general aspects of control of corrosion, chemistry thereof and the conditions under which it occurs. Also what can influence its rate, how do we assess corrosion and the basics of methods to retard or arrest it. Also an introduction to the various fields of corrosion that can be studied further in more detail, i.e. coatings, inhibition, CP, passivation, AP, material selection,

BCO2111	**COSTING 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Identifying, measuring, analysing, and communicating financial information.
Content	Introduction to cost management, cost terms, classification and concepts, job order costing, process costing cost behaviour analysis and use, cost volume-profit relationship, variable costing tool for management, activity based costing, profit planning and budgeting, and standard costing

CAE01A1	**COSTING AND ESTIMATING 1A**
Refer to the Rules and Regulations of the Faculty of Economic and Financial Sciences for more information on the modules above.	

CAE01B1	**COSTING AND ESTIMATING 1B**
Refer to the Rules and Regulations of the Faculty of Economic and Financial Sciences for more information on the modules above.	

DBP311	**DATABASE PRINCIPLES 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Introductory course on how to develop database management systems
Content	Describe various structure, types of databases and data models, develop queries and E-R diagrams for a given enterprise description, design and administer relational database, develop and implement relational database.

EDP3111	**DESIGN PROJECT 3**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	The ability to after having considered various options choose and Create the plan for their own business.

	To introduce the students, in a hands-on way, to project planning so that they are able to: Identify, Propose, Plan and Carry out a level III (S3 or S4) engineering project.
Content	Determining relevant factual information, comparing viable alternatives, analysing complex scenarios, designing a business plan, and drawing conclusions as to its feasibility. Determining relevant factual information, comparing viable alternatives, analysing technical scenarios and information, and designing or improving a system or circuit in order to produce a project plan, and implement it. The output of the project plan will be, a working circuit, software, or an evaluation study or design at the appropriate level.

EDS121	**DIGITAL SYSTEMS 1**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Fundamental knowledge of Computer Technology (e.g. Binary Operating) and hardware
Content	Introduction to digital systems, Numbering systems, Codes, Switching algebra and minimisations, Logic functions

EDS231	**DIGITAL SYSTEMS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Knowledge on the Computer Technology (e.g. Binary Operating) and hardware
Content	Bistable multivibrator circuits, Pulse circuits, Sequential logic circuits, Shift registers, Combinational logic circuits, Logic families and technology, Minimisation of switching functions, Microprocessor hardware, Registers and memories, Multiplexing and displays

EDS341	**DIGITAL SYSTEMS 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge relating to Microcontrollers and Computers
Content	Introduction to microprocessors, Types of programs, Software development algorithm, Basic programming model of the PIC, Programming the PIC, Programming concepts, Hardware model of the PIC, Memory interfacing, Interrupt structures, Input/output interfacing, On-chip timer/counter, A/D AND D/A converters

DIS3111	**DOCUMENTATION 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To introduce students to the primary document types in a civil engineering project
Content	Introduce students to the primary document types in a civil engineering project.

FCDR1111, CDR1112	**DRAWING 1/ DRAWING FOR PLANNERS 1**

Calculation Criteria	CDR1111: Final mark weighting = Semester mark (100%) CDR112: Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	Provide competency and a broad foundation of knowledge to be used in civil engineering drawing applications
Content	Drawing office equipment, filing, storage, reproduction. Line Drawing and Lettering, Construction of basic geometrical forms. First and third angle orthographic projection, auxiliary and isometric projections. Intersections of flat and curved surfaces, developments. Drawing Types: Scale, measure, expressing scales on plans and maps, determination of scales, conversion of units of measure, metric system, conversion factors, co-ordinates, maps and surveys, aerial photography, drawings, measured and architectural drawings. Vectors and polygon of forces, non-concurrent force systems, Bow's notation. Topographic and map work:

FCDR2211	**DRAWING 2**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for reinforced concrete and structural steel detailing
Content	Create reinforced concrete and structural steel detailed schedules and to do the necessary drawings ready for the structural building industry

WTA1131	**DRAWING: CHEMICAL ENGINEERING 1**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Develop skill of drawing and perspective in the interpretation of mechanical drawing
Content	The module requires the learner to become competent with drawing techniques by drawing single mechanical components, assembly drawings as well as the use of chemical plant symbols and circuits. 1st and 3rd angle Orthographic Projection; Isometric Drawing; Sectional Drawings; Chemical Plant; Sectional Drawings; drawing Portfolio for final evaluation

DPTA311	**ECONOMICS FOR PLANNERS 3A**
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	The purpose of the module is to provide the student with an understanding of: Different economic systems and approaches/theories, Knowledge of the difference between macro versus micro economics and the factors of production: Planning implications of such theories in general and South Africa in particular, Classical School, Marxist School, Keynesian School, Marginaliist School, Institutionalist School, Mercantilists, Physiocrats, Basic Economic Problems and Factors of Production, Participants in the Economy and major economic sectors, Role of technology and technological innovation in production process, Capital as factor of production, Role of entrepreneurship, Market forces, Demand / Supply and price determination, National Income Accounting methods, GDP, GNP and challenges, Inflation and Unemployment, Different between Economic growth and Development, Approaches to Development relevant to planners
Content	Introduction to Economics. The History of Economics – Predominant Theories and Approaches, Outline of what modern Economics is, Implications and effects of Economics on Town and Regional Planning.

ELD3221	ELECTRICAL DISTRIBUTION 3
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To expose students to Electrical engineering applications, applying theory learned in previous & current subjects
Content	Generation; load curves; economics; tariffs; p.f. improvement; Overhead lines.

AEI1221	ELECTRICAL ENGINEERING 1
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide basic knowledge of electrical engineering
Content	Basic Electrical Units; Direct Current Circuits; Storage Cells

AEI2211	ELECTRICAL ENGINEERING 2
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge of electrical engineering
Content	AC Fundamentals, Poly-Phase Theory and Power Factor Correction, AC Theorems and Harmonics & Transformers

AEI3311	ELECTRICAL ENGINEERING 3
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The purpose of the module is to introduce the student to three phase theory, distributors and feeders, underground cables, illumination, and metering & control.
Content	The module covers advanced three-phase theory: Polyphase Systems, Power Measurement in Three-phase Systems, Symmetrical Components, Alternating and Direct Current Distribution, Electric Lighting (Illumination), Energy Efficiency and Demand-Side Management, Underground Cables, Tariffs

EL38011	ELECTRICAL ENGINEERING PRACTICE 1
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	The purpose of the module is to align the theoretical knowledge gained, with practical industry based applications relative to the level of the qualification.
Content	Orientation: Company Orientation: Safety and First Aid, Basic Hand Skills, Measuring Instruments, Electrical and Electronic Components, Circuit Diagrams, Power Sources, Programmable Devices, General Administration and Report Writing, Report Writing

ELM2221	ELECTRICAL MACHINES 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The purpose of the subject is to introduce the student into key elements of energy conversion that is used throughout the world, that is conversion of electric energy to magnetic energy and vice-versa, and also the conversion of

	electric energy to mechanical energy. These concepts are embodied into the electrical machines such as transformers and electric motors.
Content	This course covers some advanced themes in single phase transformers, three-phase transformers three phase induction motors (also used almost universally in industry), and single phase motors, used for small power, specialised functions. These machines are covered in detail to allow the student to understand their principal operation and also for the student to be able to analyse and judge their performance based on tests and calculations of various parameters governing these machines.

ELM3221	**ELECTRICAL MACHINES 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The purpose of the subject is to introduce the student into key elements of energy conversion that is used throughout the world, that is conversion of electric energy to magnetic energy and vice-versa, and also the conversion of electric energy to mechanical energy. These concepts are embodied into the electrical machines such as transformers and electric motors
Content	This course covers some advanced themes in single phase transformers, three-phase transformers three phase induction motors (also used almost universally in industry), and single phase motors, used for small power, specialised functions. These machines are covered in detail to allow the student to understand their principal operation and also for the student to be able to analyse and judge their performance based on tests and calculations of various parameters governing these machines.

AEP3221	**ELECTRICAL PROTECTION 3**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To expose students to Electrical engineering applications, applying theory learned in previous & current subjects.
Content	Introduction to protection, Symmetrical fault calculations and theory, Grading of I.D.M.T. relays, Protection and measurement transformers, Circuit Breaking and Fuses

AEC2221	**ELECTRONIC COMMUNICATION 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The objective of this module are to give the learner an insight into the theory and application of different elements which form the building blocks of the electronic communication discipline.
Content	Examine and explain various electronic circuits like attenuators and filter networks, Describe different means of non-destructive testing of components and circuits, Apply theory and mathematics in order to electrical engineering problems by means of applying fundamental theory, Work safely with electricity by applying safety precautions, Explain the functioning and construction of electronic circuits

EL380LC EL382LC EL380HC, EL380LC	**ELECTRONIC ENGINEERING PRACTICE 2**

Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	The purpose of the module is to align the theoretical knowledge gained, with practical industry based applications relative to the level of the qualification.
Content	Communication Systems, Industrial Electronics and Instrumentation, Design of Analogue and/or Digital Systems, Installation, Commissioning and Testing of new Analogue and/or Digital Systems, Fault Finding and Maintenance of Digital and/or Analogue Systems, Computer Aided Engineering and/or Computer Applications, Quality Control, Any other tasks in agreement with the University

EIM3111	**ELECTRONIC MEASUREMENTS 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To expose students to the use of Electronic instrumentation and applications, applying theory learned in previous & current subjects.
Content	Introduction to Measurements, Standard Meters and Multi-meters, Signal Sources, Oscilloscopes. Frequency Measurements, Power Supplies, Spectrum, Network-Analysers and Logic Analysers.

EEL1111	**ELECTRONICS 1**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	This module is limited to fundamental principles of Basic electronics.
Content	Design and analyse one-stage transistor amplifiers and non-regulated power supplies. Use instruments such as multimeter and oscilloscope to analyse various electronic signals. Explain operation of oscilloscope electronic protection and switching circuits.

EEL2211	**ELECTRONICS 2**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The objectives of this module are to give the learner an insight into the theory and application of different elements which form the building blocks of the electronic discipline.
Content	Power Supplies, Amplifier specifications and characteristics, Small signal BJT amplifier analysis, Field effect transistor (FET) small signal analysis, Power amplifiers, Oscillators, IC Technology, Laboratory work

EEL3311, EEL341	**ELECTRONICS 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The purpose of this course is: Design analyse, combine and assemble various electronic circuits like power supplies, amplifiers and filter networks, Investigate and evaluate different means of non destructive testing of components and circuits, Derive and prepare various solutions to electrical engineering problems by means of applying fundamental theory, Work safely with electricity by applying safety precautions, Examine and analyse the functioning and construction of electronic circuits, Select, distinguish and

	explain the function of the different types of electrical components, Technologic and scientific reasoning when applying rules of logic to solve problems, Collect and retrieve information from books, Internet and other data storage and retrieval facilities
Content	Differential Amplifiers (Balanced Pair), Operational Amplifiers, Amplifiers and feedback, High frequency Effects, Filter Networks, Phase Lock Loop, Transistor switches, Oscillator circuit applications, Feedback

ELT1111	**ELECTROTECHNOLOGY 1**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide basic knowledge of electrical engineering
Content	Basic Electrical Units; Direct Current Circuits; Storage Cells

ELT2211	**ELECTROTECHNOLOGY 2**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge of electrical engineering
Content	Basic Electrical Measurements; Alternating Current Circuits; Transformers; Distribution

ELT312	**ELECTROTECHNOLOGY 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide complex knowledge of electrical engineering
Content	Basic electronic components and circuits; Direct current motors; Alternating current machinery; Single-phase induction motors; Three-phase synchronous machines; Protection

EUC01A1	**END-USER COMPUTING 1A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to introduce the students to basic IT (information technology) terms, skills and the basic components of a computer. The students will be able to manipulate files and use word processing application to solve business problems and to use presentation software.
Content	Mouse Training; Basic Concepts of MSWord; Navigating in a Document; Additional Editing Techniques; Character and Paragraph Formatting; Bullets and Numbering; Tables; Controlling Page Appearance; Modifying Margins and Page Breaks; Tools and Printing; Applying a Style; Mail Merge; Basic Concepts of MS PowerPoint; Drawing Tools; Organisational Charts; Slide Master; Slide Show

EUC01B1	**END-USER COMPUTING 1B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%

Purpose	At the end of this module the students will be able to use spreadsheet applications and database application software to solve business problems. The students will also be able to search the internet and utilize e-mail.
Content	Excel Introduction; Correcting Data & Navigating; Modifying a Workbook; Formatting a Worksheet; Formatting a Worksheet (Borders and Shading); Formulas; Working with Functions; Creating a Simple Charts; Formatting a Chart; Overview of Access; Creating a Tables; Working with Tables; Using Select Queries; Creating and Using Forms; Creating and Using Reports

CEGB211	**ENGINEERING GEOLOGY 2B**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MGN21-1	**ENGINEERING MANAGEMENT 2**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide knowledge required for computer skills development and management activities in mining related areas and fit for basic management decisions
Content	The student is exposed to communication/management techniques. Communication: Revision of Tubbs communication model, Bruckmans communication model - common background, Self-image - psycho-cybernetics, Transactional analysis, Johari window, Motivation theory: Maslow: hierarchy of needs; McGregor: Theory X and Y; Herzberg: Motivation -Hygiene theory, Case histories - application of models, Report writing. COMPUTER APPLICATION: Development and use of standard packages in Mining related projects and problems

MGN32-1	**ENGINEERING MANAGEMENT 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide knowledge for the understanding of the human element in engineering and of risk management in engineering and in business
Content	Labour Relations In The Mineral Industry, Risk And Safety And Health Management, Mine Management: Principles And Functions, Leadership, Motivation Theories Applied To Mines: Manslow's Hierarchy Of Needs, Behaviour In The Mining Industry, Quality Circles, Management Grids, Personnel Management, Leadership Styles Used On The Mines, Training Technology Used On Mines, State And Public Involvement In The Mining Group System

MAT1AW1, MAT1YBU	**ENGINEERING MATHEMATICS 1**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MAT2AW2, MAT2AE2	**ENGINEERING MATHEMATICS 2**

Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MAT2AW3	**ENGINEERING MATHEMATICS 3**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

PHY1BCP	**ENGINEERING PHYSICS 2 (PRACTICAL)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

PHY1BCT	**ENGINEERING PHYSICS 2 (THEORY)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MWS1111, TIV121	**ENGINEERING WORK STUDY 1**
Calculation Criteria	MWS1111: Final mark weighting = Semester mark (100%) TIV121: Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The objectives of this course are to provide a concise introduction to the subject of Engineering Work Study I. The efficient organizing and management of large and complex production facilities is founded on systematic application of Method Study and Work Measurement techniques. This course provides basic concepts of work study practice.
Content	Introduction, Productivity and Work study, Method Study, Work Measurement, Working Conditions and The Work Environment

TIV231	**ENGINEERING WORK STUDY 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The purpose of this module is to give direction in the subject matter of Work Study. Work Study II expands on several of the method study and time measurement topics covered in Work Study I. Several new topics are covered such as Value Engineering and Incentive schemes. The module is about analysing a process, product or a work place environment and applying different techniques to improve it.
Content	Method Study techniques (Higher Level), Work Measurement, Design of Jigs, Ergonomics (Higher Level), Value Engineering, Achievement indices of production factors, Incentive systems, Work Study in the administrative function.

TIV351	**ENGINEERING WORK STUDY 3**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	The purpose of this module is to provide direction in the subject matter of Engineering Work study III. This module gives the learners a broad perspective on productivity, the measurement thereof and experience in

	setting up an Objective matrix. This module teaches the student about the 20 Keys and other productivity improvement methods and also provides the students with a background in change management.
Content	Productivity, Activity sampling, The 20 Keys, Change Management

ENM31-1	**ENVIRONMENTAL MANAGEMENT 1**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for base of future mining related subject areas and fit for basic decisions in technical subjects related to mining
Content	Environmental and ecological appreciation as it applies to Mining Industry and new projects

EL40311	**EXPERIENTIAL LEARNING 1**
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	To familiarise the student with a metallurgical plant environment, including operation of equipment and working shifts. To introduce the student to industrial safety and health and to environmental aspects. To expose the student to a specific process that is relevant to the field of Extraction Metallurgy. The purpose of the module is to align the theoretical knowledge gained with practical industry based applications relative to the level of the qualification.
Content	After completion the learner should have learnt to operate a plant section on shift applying the standard procedures with strict compliance to safety rules and systems.

EL2781, EL33911, EL40311, EL440-1	**EXPERIENTIAL LEARNING 1**
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	To familiarize the student with a metallurgical plant environment, including operation of equipment and working shifts. To introduce the student to industrial safety and health and to environmental aspects. To expose the student to a specific process that is relevant to the field of extraction metallurgy. The purpose of the module is to align the theoretical knowledge gained, with practical industry based applications relative to the level of the qualification.
Content	Plant induction (including health and safety and company rules). Integration into a shift team that works in a specific section of the plant. Possible transfer to another team that works in another section. Transfer of certain operational duties and responsibilities to the trainee student, which could include a supervisory position once he has acquired sufficient knowledge and skills (shift leader). At the end of the six-month period, the student has to compile a report that includes, typically, a process description of the plant where he worked and his personal experience in respect to technical aspects and human relations. Orientation: Company Orientation: Safety and First Aid, Basic Hand Skills, Measuring Instruments, Computer Components, Circuit Diagrams, Network Administration, Application Programming, General Administration and Report Writing, Report Writing.

EL40312	EXPERIENTIAL LEARNING 2
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	To introduce the student to conducting specific plant projects relevant to the field of Extraction Metallurgy. To familiarise the student with the various methods of technical investigations such as literature searches, sampling, data collection, statistical analysis etc. After completion a learner should be able to conduct a technical investigation in a metallurgical plant environment
Content	Assignment by company mentor of one or more plant technical projects, either to be carried out by the trainee student alone or as part of a team

EL2782, EL33912, EL440-2, EL40312	EXPERIENTIAL LEARNING 2
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	To introduce the student to conducting specific plant projects relevant to the field of extraction metallurgy. To familiarize the student with the various methods of technical investigations, such as literature searches, sampling, data collection, statistical analysis etc. To further deepen the ability of technical report writing
Content	Assignment by company mentor of one or more plant projects, either to be carried out by the trainee student alone or as part of a team. Preliminary work relevant to the project, such as literature searches or analysis of historical data. Conducting the experimental project work, such as measurement of physical parameters (flow rates, densities, pressures, temperatures etc.), collection of samples, physical and chemical analysis of samples (typically particle size determination, concentration of valuable components, etc.). Compilation and interpretation of results; establishing the context and relevance in respect to the process under consideration, often supported by a financial analysis. Reducing the entire project work to writing in form of a technical report. The purpose of the module is to align the theoretical knowledge gained, with the practical knowledge in the industry require obtaining the national diploma. Communication Systems: Design of Network systems, Installation, commissioning and testing of computer network systems, Fault finding and maintenance of computer network systems, Engineering application software, Quality control, Any other task in agreement with the University.

TEX2111	EXTRACTION METALLURGY 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	As a student in Metallurgical Engineering it is also necessary to have a reasonable knowledge of Extraction Metallurgy, including the technical terminology used by Extraction Metallurgists. In the industrial world these two fields of metallurgy often overlap.
Content	An introduction into the physical chemistry of the metallurgical processes (eg Chemical Equilibrium, Thermal Chemistry, Thermo Dynamics and the Ellingham Diagrams etc), Drying, Calcining, Roasting, sintering and agglomeration, Refractories. (Classification, Manufacture, properties and testing, and application of the various types of refractories) covered at an introductory level, the silica – alumina phase diagram, Refining: Basic principles of fire refining, Refining of lead, Cupellation, The Miller process. Fluxes and slags. Types of fluxes, Properties and classification of metallurgical slags, The Blast Furnace. Iron Ores - Classification, Evaluation,

	Composition of the Gangue and it effect on iron and steel. Coke - The By-Product Oven, Properties and functions of coke in the blast furnace. The Blast Furnace Charge - Chemical reactions – Auxiliary Equipment – and entry level Blast furnace charge calculations. Oxygen Steel Making Processes - chemical reactions – Functions of the slag cover. Hydrometallurgy. (Reagents, Leaching systems, Solid and Liquid ion exchange). Copper (Occurrence properties and uses of copper) Copper recovery from ores (Hydrometallurgical and Pyrometallurgical Processes), Calculations and Flow Diagrams. Aluminium (Occurrence, properties and uses of aluminium), Recovery of Al_2O_3 from bauxite and its Electrolytic Smelting to Metallic Aluminium.

BFM2111	**FACILITY LAY-OUT AND MATERIALS HANDLING 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The objectives of this course are to provide a concise introduction to the subject of Facilities Lay out Design and Materials Handling
Content	Introduction, Process Design, Flow Analysis Techniques, Activity Relationship Analysis, Auxiliary services space requirements, Materials Handling, Area/Space Allocation

FPO0AA1	**FINANCIAL PRINCIPLES IN OPERATION 1A**
Refer to the Rules and Regulations of the Faculty of Economic and Financial Sciences for more information.	

FPO0BB1	**FINANCIAL PRINCIPLES IN OPERATION 1B**
Refer to the Rules and Regulations of the Faculty of Economic and Financial Sciences for more information.	

IMF2111	**FLUID MECHANICS 2**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide basic knowledge to analyse and solve fluid mechanics problems in the mechanics and technology fields.
Content	Fluid Mechanics and Fluid Properties; Forces in Static Fluids; Static Pressure; Static Forces on Submerged Surfaces; Buoyancy and Stability of Floating bodies; Fluid dynamics. Continuity and Energy Equations; Application of Continuity and Energy Equations.

IMF313	**FLUID MECHANICS 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse and solve fluid mechanics problems in the mechanics and technology fields.
Content	Fluid Dynamics – the Momentum Equation ; Real Fluid Behavior; Pipe Flow; Unsteady Flow. Quasi-steady flow; Unsteady Flow; Pressure Transients; Unsteady Flow; Mass Oscillation.

FTY21-1	**FOUNDRY TECHNOLOGY 2**

Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To educate and form technicians suitable to work in the metals casting industry. This first module of foundry technology is intended to introduce the student to the basics of melting and moulding.
Content	The course introduces the student to the basics of Melting and Moulding: Melting of Cast Iron, Melting of Aluminium, Greensand Technology, Resin Bonded sand technology, Core Making, Introduction to Precision Casting

FTY302	**FOUNDRY TECHNOLOGY 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To educate & form technicians suitable to work in a foundry
Content	Introduction to casting design, Casting and Moulding methods, Selection of Casting Alloys, Liquid Metal & Gating of Casting, Casting simulation, Quality Assessment & Control, Casting Defects

GSS1111	**GEOGRAPHY FOR PLANNERS 1**
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	Acquaint the student with Maps, Scales, Plans, Aerial Photographs. Provide the student with an understanding of geographical phenomena such as Soil types, Weathering, Erosion and Hydrologic System, Climate and Land Forms. Introduce the student to population characteristics such as Composition, Population Pyramids, Migration. Acquaint the student with the Rural and Urban Environment: Origins, Types, Growth, Planning for improved environments, Challenges and Opportunities. Introduce the student to Economic Geography ; Economic activities in SA, Gauteng Province – a case study.
Content	SITE ANALYSIS: Interpreting Maps and Contours, PHYSICAL ENVIRONMENT: Soils; Hydrologic System; Environment and Climate, POPULATION: Population characteristics; Composition; Population Pyramids, RURAL ENVIRONMENT: The dynamic relationship between the rural and urban environment. Settlement Patterns; Agriculture; Problems, Challenges; Opportunities, URBAN ENVIRONMENT: The dynamics of the urban environment; Problems, Challenges; Opportunities; Origins; Locational Factors; Urban growth; Planning improved urban environments, ECONOMIC GEOGRAPHY: Economic development in South Africa and the Gauteng Province.

GEO1111	**GEOLOGY 1**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MWG3211	**GEOLOGY: MINING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for structural Geology of Mineral ore bodies

Content	REVISION OF PART A AND B GEOLOGY, STRUCTURAL GEOLOGY: Inherent structures of sediments, inclined strata, folds, fissures and faults, erosion structures, Geological maps: Scales, profile drawing, map symbols, strike, and dip form of outcrops, Solution of structural problems: Strike and dip, completion of outcrops, faults, stratigraphic thickness, borehole problems, unconformities and sub outcrops, folds, isopachs, isobaths. ENGINEERING GEOLOGY: Engineering Properties of Rocks and Soils: Rocks: Density, porosity, sorption, strength (compressive tensile, shear), Soils: Rock weathering and soil formation, soil profile; clay minerals in soils; soil properties: cohesion, density, porosity, sorption, plasticity and swelling, compaction, bulking; Soil types in South Africa: soil forms; soil series; master Horizons; diagnostic horizons. Ground water: Rocks as water bearers; Forces controlling water in rocks; the water table; movement of ground water; springs; wells and bore holes ; ground water in South Africa; pumping tests; drainage problems; sink holes and dolines; landslides. Siting of Works: Building foundations: spread footings, piers, piles, case studies; Dams: the reservoir area, the dam wall area, types of all, foundation rocks, case studies; Cuttings: rock, earth; Tunnels: geological structure; embankments; subsidence's due to mining. Rock in construction: Usage: dimension stone, crushed stone; desirable characteristics, quarrying; sand; concrete aggregate; roadway aggregates; Sources of stone: dimension stone, aggregates, Introduction to Rock mechanics:

CEG3211	**GEOTECHNICAL ENGINEERING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Successful completion of this module should equip the learner with the fundamentals, including theory, methods of analysis and laboratory tests, of the: Permeability of soils, Strength parameters of soils, Soil pressures against retaining structures, Stability of slopes, Stress distribution in soils, Bearing capacity of foundations, Settlement of foundations.
Content	Groundwater flow, Two dimensional flow, The behaviour of soil and the principle of effective stress, Seepage forces, Shear strength of soil and the mohr circle, Laboratory tests to measure the shear strength of soil**,** Lateral earth pressures and earth retaining structures, Retaining walls, The stability of slopes, Bearing capacity of foundations, Stress distribution in soils, Immediate (elastic) settlement, Consolidation settlement

HMR21-1	**HEAT AND MASS TRANSFER 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	For the student to learn and understand the modes of heat transfer, translate a practical situation into differential equations and to empower them to solve heat transfer related problems and situations so that the results will add value to the operations where they will work in their career. Similarly for Mass transfer
Content	Principles of Steady State Conduction, Fourier's law of conduction and Newton's law of cooling, Steady state conduction multiple dimensions, Unsteady (unstable) state conduction, Principles of Convection, Graetze Number & Examples, Radiation heat transfer, Basics of mass transfer

PSSA111	**HISTORY AND PRINCIPLES OF PLANNING 1**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)

Purpose	The purpose of this module is to introduce the concept of human settlements and evolution of planning systems. The course would acquaint students with the significance of human settlements, planning through the ages covering ancient phase, intermediate phase or medieval phase and modern phase or organizational phase. The students would be introduced to planning principles, planning elements and dimensions.
Content	History and Significance of Human Settlements, Definitions, Significance, Science of Human Settlements, Significance of Human Settlements, History of Civilizations : Periodic & Geographical Classification, Pre-Historic / Ancient / Early Records , Medieval Civilization/ Middle Ages, Classical Period, Renaissance, Industrial Revolution, Colonial Planning, Background, Town Planning Concepts / Characteristics, Modern City / Contemporary Planning Garden city, New Towns, 19th Century, Pre-Modernism, Settlements : South Africa / Africa, Background, Developing Cities, Developed Cities, Modern City Planning, Pre-Colonial Towns and Cities, Forms of Planning, Geometric, Adaptive, Utopian, Garden City, Suburbia, Introduction : Town Planning Concepts, Purpose, Scope, Objectives , Theories, Planning features, Dimensions of Planning, Principles, Planning Process, Plan Formulation, Planning System, Plan Preparation, Implementation Agencies, Planning Issues

DPTB311	**HOUSING DEVELOPMENT 3B**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	*Introduce* the student to policies and procedures with regard to public sector and private sector housing at national, provincial and local level in South Africa. Provide the learner with an understanding of housing aspects such as: Policies; Delivery; Affordability, Housing finance and housing standards, The physical and environmental implications and impacts of various types of housing. Convey and discuss the relevance of different housing types at varying densities to Town and Regional Planning policies, layout design and neighbourhood formation.
Content	Evolution of the housing policy in South Africa, policies and procedures with regard to public sector and private sector housing at national, provincial and local level in South Africa, relevant housing legislation, e.g. the Housing Act (1997), post-Apartheid democratic, inclusive policies, e.g. 'Breaking New Ground' (2005), Affordability and Delivery of RDP Houses, Statutory housing bodies, housing finance, subsidies and housing standards, Physical and environmental implications and impacts of various types of housing. An outline of the evolution of the housing policy in South Africa, introduced to policies and procedures with regard to public sector and private sector housing at national, provincial and local level in South Africa, made aware of relevant housing legislation, e.g. the Housing Act (1997), introduced to the seven strategies that inform the Housing White paper, 1994, introduced to post-Apartheid democratic, inclusive policies, e.g. 'Breaking New Ground' (2005), Housing as a component of IDP and Social Housing Policies, provided with an understanding of housing aspects such as: Affordability and Delivery of RDP Houses, Statutory housing bodies, housing finance, subsidies and housing standards, Physical and environmental implications and impacts of various types of housing.

MHM301	**HYDRAULIC MACHINES 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse and solve fluid mechanics problems in the mechanics and technology fields.

Content	Centrifugal Pumps; Water Turbines; Fans; Channel Flow; Financial Justification

CEW2A11	**HYDRAULICS 2A**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for solving basic hydraulic problems under supervision.
Content	Fluid properties, pressure in fluids, hydrostatic forces, buoyancy, fluid flow, canal flow

CEW3B21	**HYDROLOGY 3B**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Be familiar with basic hydrological principles as applicable in civil engineering
Content	Flood analysis, water resources analysis, water storage

MHD3111	**HYDROMETALLURGY 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	After completion of this module the learner should be able to supervise the efficient extraction and refining of metals from ores, making use of hydrometallurgical processes in a metallurgical plant
Content	Introduction to hydrometallurgy, Process route, Solution production, The chemistry of leaching, Kinetics of leaching, Leaching process variables, Leaching technology, Solid / Liquid separation, Solution purification and concentration, Ion Exchange / Solvent extraction, Recovery of metals from solution, Gold extraction and Platinum extraction

BBB341	**INDUSTRIAL ACCOUNTING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Collection, recording, analysing and extraction of financial information, and the summary of it in the form of a periodic profit and loss account, a balance sheet and a cash flow statement in accordance with legal, professional, and capital market requirements.
Content	Financial statements, financial planning and taxes, time value of money, bond valuations, share valuations, capital budgeting and project evaluation, risk, cost of capital, short term financing and credit management

EL32121	INDUSTRIAL ENGINEERING PRACTICE 1
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To apply the theoretical knowledge and techniques learnt in the first theoretical year of study in industrial practice.
Content	The industry / company / working environment and safety policy, the OHS Act, NOSA, Quality Management Systems (ISO 9001 and ISO 14001) and industry specific codes and regulations. Structure, behaviour, hierarchy of the company, its vision, mission, philosophy, manpower planning policy and procedures, labour relations and unions. The layout of the working environment. Operate and control machines and monitor processes. i.e. fitting, turning, pneumatics, hydraulics, basic electrical systems. Develop, evaluate, improve and implement methods, systems and / or production techniques of one process or part of a process (method study). Work measurement and the development / maintenance of production, maintenance, labour standards (time study). Analysis of workflow / layout / materials handling / transportation. Maintenance and systems support

EL32123	INDUSTRIAL ENGINEERING PRACTICE 2
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To apply the theoretical knowledge and techniques learnt in the first theoretical year of study in industrial practice.
Content	Key business functions e.g. marketing, financial, operations. Managerial cost and accounting procedures. Workplace project (individual or team-based) against criteria / specifications. Execute project management and planning in project completion (schedules, budgets, time management). Application areas for project work

BIL3111	INDUSTRIAL LEADERSHIP 3
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Getting people together to accomplish desired goals and objectives. Management comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal.
Content	Introduction to management, The evolution of management theory, managing in a changing environment, strategic planning, planning, creative problem solving and decision making, Organizing and delegation, managing change, managing diversity, leadership, individuals in the organization, groups and teams in the organization, motivation, communication and interpersonal relationships, controlling, and new challenges for management

LPT111	LEGAL PRINCIPLES 1
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	The purpose is thus to introduce the students to the basics principles of the Law of Property in order to empower the students with legal knowledge in their field of studies and to equip him/her for the course “Legal Procedures II”.
Content	Basic Understanding of the South African Legal System, Sources of Planning Law, Tools employed in Planning Law, Principles and purpose of planning law, Public participation, Removal or Amendment of Restrictive Conditions, General Principles contained in the Development Facilitation Act, Immovable

	Property and Ownership, Co-Ownership and Common Ownership, Servitudes, Mineral Right and Real Security, General Principles of Contract, Survey of land

LPS211	**LEGAL PROCEDURES 2**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The history of Planning Legislation in SA., Existing South African Land Use Management Systems, Current Town Planning Schemes, The importance of the Environmental Conservation Act in planning, Application procedures and requirements in respect of the following applications:, Township Establishment. Rezoning/Amendment Scheme, Removal of restrictive conditions of title, Consent Use, Subdivision/Consolidation, Division of Farm Land, Development Facilitation Act, The Assessment of Development Applications
Content	Introduction on the reasons for planning and the need for town planning controls, History of planning legislation in SA, Existing South African land use management systems, Which legislation is involved in town and regional planning, Town planning schemes, Generic/typical components of land use management applications, Typical requirements of good applications and memorandums, Environmental legislation, The compilation of different land use management applications, The purpose and principles of the development facilitation act as well as the process, Assessment of development applications. Spatial planning/forward planning, Gauteng planning and development act.

CLD311	**LOGIC DESIGN 3**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge relating to the design of logic circuitry using modern design tools. Provide knowledge on how to implement logic designs practically using modern methods.
Content	Altera Max+Plus II software, synchronous design techniques, PLD development board, LPM universal counters, PLD development board.

CEM1111	**MANAGEMENT: CIVIL 1**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To introduce students to the civil engineering aspects of engineering management.
Content	Introduce students to primary document types in a civil engineering project, site establishment requirements and general aspects of civil engineering management.

CEM2211	**MANAGEMENT: CIVIL 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To introduce students to planning and programming aspects of Civil Engineering Projects
Content	Planning techniques, Financial planning and budget control, Contract planning Programming of construction projects, scheduling of resources, site costing, budgeting, cash flow and budget control, Labour law, Estimating.

BVR2111	MANUFACTURING RELATIONS 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse and solve labour relations disputes under the Labour Relations Act.
Content	Constitution, Labour Relations Act, Origins of Labour Law, The Individual Employment Relationship, Discipline and Dismissal, Unfair Labour Practices and Employment Equity, Collective Labour Law, Industrial Action, Dispute Resolution

MAN3YR3	MANAGEMENT SERVICES
Calculation Criteria	
Purpose	The enable the candidate to ▪ function as an advisor to management and at supervisory levels and their staff within an organisation; ▪ independently plan an investigative project within the fields of the Management Services Body of Knowledge; ▪ execute projects including the determination of resources, dependencies and tasks and the development and evaluation of alternatives through research and application of current and new techniques relevant to the Management Services Function; and ▪ formally report the results of the investigative project along with relevant and practical recommendations.
Content	Management Services Practice is offered as part of the curriculum for the N Dip: Management Services. The subject must be seen as the practical component of the qualification. The subject consists of modules A and B. Module B is offered at a higher cognitive level than Module A and focuses on the development of research abilities

BIM121	MANAGEMENT SKILLS 1
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Refer to the Rules and Regulations of the Faculty of Management for more information on the module.	

BIMA131	MANAGEMENT SKILLS 1A
Refer to the Rules and Regulations of the Faculty of Management for more information on the module.	

BIMB131	MANAGEMENT SKILLS 1B
Refer to the Rules and Regulations of the Faculty of Management for more information on the module.	

BVR2111	MANUFACTURING RELATIONS 2
Refer to the Rules and Regulations of the Faculty of Management for more information on the module.	

MTM3111	MATERIALS TESTING: METALLURGY 3
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Students will be introduced to the fundamentals necessary to identify and understand materials at a basic level
Content	Students should know material types and their properties, basic knowledge of atomic structures and arrangement, use of phase diagrams, mechanical properties of materials, and applications of materials / alloys

WWEC121	MATHEMATICS 1
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

WWEA22C	MATHEMATICS 2A
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MAT2AE2	MATHEMATICS 2A
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

EMA3111	MEASUREMENTS 3
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	To expose students to the use of Electronic instrumentation and applications, applying theory learned in previous & current subjects.
Content	Introduction to Measurements, Standard Meters and Multi-meters, Signal Sources, Oscilloscopes. Frequency Measurements, Power Supplies, Spectrum, Network-Analysers and Logic Analysers.

TMI21-1	MECHANICAL DEFORMATION TECHNOLOGY 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To provide theoretical background in Mechanical Deformation Technology concepts at a basic level.
Content	The aim of the subject is to give the student basic knowledge and sufficient theoretical background in Mechanical Deformation Technology to better understand metallurgical concepts and processes. Learners must be able to understand the physical and mechanical properties of metals and alloys, the effect of composition and thermal treatment on the processing of metals and alloys. You are also expected to be able to perform calculations relating to the various processes.

IMO2111	MECHANICAL ENGINEERING DESIGN 2
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide basic knowledge to analyse and solve mechanical engineering technology and manufacturing problems.
Content	Design Process; Technical Drawing; Modes of Failure; Legal Aspects related to design; Engineering Materials; Limits and Fits; Shafts Design; Keys, Splines and Couplings; Rolling Element Bearings, Plain Bearings, and Hydrodynamic Bearings; Fasteners and Bolted Connections; Design Project.

IMO312	MECHANICAL ENGINEERING DESIGN 3
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide advanced knowledge to analyse and solve mechanical engineering technology and manufacturing problems.
Content	Advanced Design Process; Modes of Failure; Fatigue Design by analysing Variable Loads; Curved Beams; Spur, Helical, and Bevel Gears; Welding calculation; Design Project

EDM1111	MECHANICAL ENGINEERING DRAWING 1
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Develop skill of drawing and perspective in the interpretation of mechanical drawing
Content	1st and 3rd angle Orthographic Projection; Isometric Drawing; Sectional Drawings; Assembly drawings; Sectional Drawings of assemblies; drawing Portfolio for final evaluation

EL29321	MECHANICAL ENGINEERING PRACTICE 1
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	The purpose of experiential learning is to familiarize the learner with the most common and basic hand-tool and machine skills as well as mechanical components and assemblies. The learner will spend a semester in industry and participate in the strip/remove and assemble/mount processes expose him/her to the application, proportions and functions of components and assemblies as well as the level of skill required to perform the tasks. The degree of difficulty and responsibility must be increased as the learner achieves greater skill and proficiency.
Content	Basic Machine-Shop hand tools and machining skills. Goal orientated learning of the more common mechanical machine components

EL29331	MECHANICAL ENGINEERING PRACTICE 2
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	On completion of the programme the learner should have a practical knowledge of the next level of workshop and manufacturing skills, namely understanding of the company's organizational structure, plant layout, plant operation and competently participating in maintenance, manufacturing, development, construction etc. procedures; and drawing office activity. The

	learner is encouraged to pragmatically exercise his engineering judgment and decision making ability.
Content	The learner is to become a member of the engineering teams and so become familiar with: the organizational structure, plant layout and plant operation; participate in maintenance, manufacturing, development and construction processes and apply engineering knowledge in drawing office activities.

MLA3000	**MECHANICAL ENGINEERING LABORATORY MLA3000**
Calculation Criteria	A single semester test (25%), together with the five different practical marks (15% each x 5 = 75%) will count towards the final mark. There will be no written exam.
Purpose	To ensure that students have an appreciation, including both theoretical and practical application, of the methods and relevance of experimental techniques in mechanical engineering.
Content	Objectives of engineering/scientific measurements, experimental design, research methodology, accuracy, reliability, data correlation, presentation of results, meaning. Report writing and structure of technical reports and publications. Measurement Five laboratory practicals.

IMV1111	**MECHANICAL MANUFACTURING ENGINEERING 1**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide basic mechanical engineering manufacturing knowledge
Content	Health and safety concepts; Manufacture of metals; Metal treatment; Metal uses and application in industry; Hand tools use and applications; Screw threads terminology, advantages and applications; Locking devices; Work-holding and clamping of a work-piece in machines; Precision engineering measurement; Instruments and procedures for marking off; Powered hand tools use and applications.

IMV2211	**MECHANICAL MANUFACTURING ENGINEERING 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide basic mechanical engineering manufacturing knowledge.
Content	Limits and Fits; Measuring instruments and Precision measuring; Failure modes and mechanical testing of materials; Welding processes; Casting ,forging and rolling processes; Powder metallurgy processes; Metal pressing processes; Metal coating processes; Plastics

IMV321	**MECHANICAL MANUFACTURING ENGINEERING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Familiarize the student with the science, engineering and technology of manufacturing processes and manufacturing competitiveness.
Content	Fundamentals of machining, extrusion and drawing of metals, fundamentals of metal casting, metal casting design, material and economics and rolling of metals

TMP31-1	**MECHANICAL METALLURGY 3**

Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The purpose of this subject is to empower the student to identify and solve subject related problems thus to acquire the understanding of the fundamentals and then to display and use the knowledge gained to make accurate basic evaluations of fractures that occur and to identify failures of a mechanical nature that occur. This includes deformation of materials, (elastic and plastic) as well as the fracture processes encountered in engineering materials
Content	The following is covered in the course: Stress/strain relationship, Elastic and plastic deformation, Dislocation of crystals, dislocation theory, Strengthening mechanisms, Fractures and Fracture mechanics, Fatigue, creep and stress rupture, brittle fracture and impact testing failure analysis

CHM1111	**MECHANICS 1**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide basic knowledge to analyse and solve engineering problems in the static and dynamic solid mechanics fields.
Content	Resolution of forces; Moments of forces; Centres of gravity; Friction; Linear motion with uniform acceleration; Vertical motion under gravitational acceleration; Angular motion; Work done and power; Momentum and Newton's second law of motion; Conservation of energy; Centripetal acceleration.

EMM2111	**MECHANICS OF MACHINES 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide basic knowledge to analyse and solve engineering problems in the static and dynamic solid mechanics and technology fields.
Content	Moments of inertia; Belt drives; Band brakes and block brakes; Balancing; Spur gears; Epicyclic gear trains

EMM313	**MECHANICS OF MACHINES 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide basic knowledge to analyse and solve engineering problems in the static and dynamic solid mechanics and technology fields.
Content	Dynamics Of Kinematics' Chains: Velocity Diagrams, Acceleration Diagrams, Forces In Mechanisms, Analytical Approach. Vehicle Dynamics; Dynamics Of Hoists; Dynamics Of Clutches

CET1AMP	**METALLURGICAL CHEMISTRY 1 (PRACTICAL)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

CET1AMT	**METALLURGICAL CHEMISTRY 1 (THEORY)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

CET1AM2	METALLURGICAL CHEMISTRY 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

EL40211	METALLURGICAL ENGINEERING PRACTICE 1
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	To provide industrial and practical training
Content	Students in engineering metallurgical do experiential training to strengthen their knowledge and skills base, and are an essential part of their preparation for a career in metallurgical engineering.

EL40212	METALLURGICAL ENGINEERING PRACTICE 2
Calculation Criteria	Final mark weighting = Portfolio (100%)
Purpose	To provide industrial and practical training
Content	Students in engineering metallurgical do experiential training to strengthen their knowledge and skills base, and are an essential part of their preparation for a career in metallurgical engineering.

MGG21-2	METALLURGICAL GEOLOGY 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MLM21-1	METALLURGICAL MANAGEMENT 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	On completion of this module learners will have acquired knowledge of some management theories to enable them to analyse challenges and problems confronting managers and to suggest appropriate solutions to resolve them in the mining and metallurgical industry. Students will further gain knowledge of some minerals industry laws and regulations
Content	Management theories of motivation, communication, job enrichment , training , management styles human relations , disciplinary procedures, employment equity , legislation etc.

MTP21-1	METALLURGICAL PLANT 2
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To introduce learners to the industrial plant environment apart from the extraction process itself. Learners learn about the importance of structures, the mechanics of some machines, and some of the electrical engineering aspects of a metallurgical plant

Content	Vectors, forces in structural elements, material properties, conveyor belts operations, heat treatment and effect on properties, steam generation, refrigeration cycles, compressors, RCL circuits, ac and dc motors.

THM21-2	**METALLURGICAL THERMODYNAMICS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Successful completion of the module enables the student to interpret metallurgical processes in basic thermo-dynamic terms and calculate critical process parameters. The module also serves as a basis for subsequent modules in higher semesters where such thermodynamic principles are applied to more specific cases (Pyrometallurgy, Non-ferrous Extraction, Hydrometallurgy).
Content	Units, entropy, enthalpy, laws of thermodynamics, Gibbs Free energy, equilibrium,

MET111	**METALLURGY 1**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	After completion of this module the learner should become familiar with and understand the basic terminology, definitions, concepts and unit operations in the fields of mineral processing, geology and physical metallurgy. The learner will be able to describe and use these aspects in communications in the form of reports and test work
Content	Students should know material types and their properties, basic knowledge of atomic structures and arrangement, use of phase diagrams, mechanical properties of materials, and applications of materials / alloys.

CMP311	**MICROPROCESSORS 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	This course builds on the introductory knowledge of microcontrollers and microprocessors that you gained when doing the course Digital Systems 3. You will be required to integrate the knowledge that you have gained in other courses together with new knowledge gained in this course and to apply the integrated knowledge to produce practical outcomes as a demonstration of your newly acquired knowledge. The focus of the course is very practical, as opposed being a purely theoretical exercise.
Content	8086 microprocessors, EMU8086 software development tool, PC as a software development platform, access to the I/O devices. Flowcharts and program design. 8086/88 hardware specification, Pin-outs and pin functions, 8284 clock generator chip, Bus buffering and latching, Bus timing, Minimum mode and maximum mode, RAM and ROM, 8 bit memory interfacing, 8 bit discrete address decoding, 8 bit block address decoding, 16 bit memory interfacing, 16 bit discrete address decoding, 16 bit block address decoding, Basic I/O interface, 8255 programmable peripheral interface, 16C550 UART, 8086/88 Interrupt handling

MEG2111	MINE ENGINEERING 2
Calculation Criteria	Final mark weighting = 100%
Purpose	Provide knowledge required for decision making related to Machinery used on Mines and base for extension into further semester knowledge and skills
Content	Mechanotechnics, thermo dynamics, electrical applications and theory

MEG3211	MINE ENGINEERING 3
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for Engineering in the Mining Discipline – Electrical and Mechanical – Machinery maintenance, contracting and selection of Machinery. Well defined problems
Content	MECHANICS: Locomotives, Rail traction - track design and layouts, Dynamics, Beams – bending, Transport systems and design - road - tyres – safety, Hoists - factors of safety - attachments - exams controls, Chair lifts, Elevators, Legal requirements. MECHANICAL POWER TRANSMISSION: Hydraulics, hydraulic cylinders, hydro power, V belts, gearing, torque converter / fluid coupling. CONVEYORS: Design and components, Calculations. TREATMENT PLANT EQUIPMENT: crushers, mills, screens, stockpiles. THERMODYNAMICS: energy and power - esp. ventilation and fans. WATER HANDLING: pumping - water - mud - slurry - multi stage – storage, pump curves, fill systems - design and problems, sumps and settlers, pumping problems and solutions. STEAM APPLICATIONS: boilers

MSV2111	MINE SURVEY AND VALUATION 2
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for carrying out simple mine survey and valuation exercises and simple plan reading and viability decisions
Content	SURVEY: Emphasis to be on establishing concepts with understanding that the traditional survey methods e.g. layouts and checks etc. are not required. Horizontal, vertical and inclined planes, Units of measurement in surveying, Co-ordinate systems in South Africa: Direction of co-ordinate axes, Plotting of points and lines on maps. Join calculations. Survey instruments and their application (briefly). Availability and application of high tech instruments. Laser - distomat etc., Traversing - surface and underground, Solution of triangles (revision), Triangulation and resection (concepts and basic calcs only.), Levelling and gradient calculations. Areas and perimeters of plane figures: triangles, quadrilaterals, polygons, circles, ellipses; areas by co-ordinates (applicable formula and basic calcs. Areas bounded by irregular lines: Trapezoidal and Simpson's rules (simple concept examples); planimeters. Tape surveying and excavation measuring. Volumes and surface areas: pyramids, cones, cylinders. Tachometry (concept and applicable formula). Major and minor dips: determining major dip from minor dips and boreholes; concept of lines of intersections and calculations, graphical solution to 3 bore hole problems, simple fault problems - graphical solutions, dip - strike - minor dips – inclines. VALUATION: Sampling methods: basic principles and definitions, sampling methods, gold and platinum mines underground, coal, and other ore bodies, dumps. Averaging and weighting of sampling results, regular and irregular sampling intervals, weighting by length, area and mass, tonnage calculations, sampling reports.

MSV3211	MINE SURVEY AND VALUATION 3

Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide a strong knowledge base for design and control of excavations. Provide knowledge required for Mining Survey and ore body evaluation
Content	Sampling methods, Ore-flow tabulation for gold mines, Ore-flow tabulation for other mines, Pay limit calculations, Grade control, Forecasting and life of mine calculations, Washability, Borehole surveying, Introduction to Geostatistics. PLAN READING AND PLANS, CURVES DESIGN

MBF21-1	**MINERAL BENEFICIATION 2**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for decision making related to Mineral Beneficiation and processing
Content	Materials handling, Storage, transport, feeders, Preparation of ores, Sorting, crushing, milling, washing, Classification Screens, classifiers, cyclones, Liquid Solid Separation, Thickeners, filters, flocculation, Seperation Processes Gravity, floatation, magnetic, electro-static, heavy media, Hydro-Metallurgy Leaching, precipitation, Pyro-Metallurgy the iron "blast furnace", roasting, smelting, Flow Sheets ISOsymbols, Copper, platinum group metals, diamond, gold CIP and RIP , coal. Developments process control, process development, bacterial leach, heap leach, refining. Residue and Effluent Control Slurries, solids, back filling, water pollution, air pollution, and applicable legislation. Value analysis, sampling, metal accounting, steady state, profits effect of surge production, dilution factors, blending and stockpiling / reclamation, saleable products, effect of mining on metallurgical processes. Plant design, siting of plants, siting of tailing dams

MOT1111	**MINERAL EXPLOITATION 1**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for base of future mining related subject areas and fit for basic decisions in technical subjects related to mining Give a general introduction to discipline areas applicable to the exploitation of minerals
Content	Module is split into 4 sections to give a broad knowledge of the technical content areas related to an introduction to mining engineering i.e. mining, metallurgical processes, geology and surveying. The content areas are integrated so as to give the student a holistic vie of the operations of a mining concern hence the combination into one module. Geology component covers ores and minerals as well as ore bodies particularly applicable in SA. The geological complexities that impact on mining are covered. Methods of establishing the extent and value of ore bodies as well as the accurate location of access roads and tunnels are covered in the mine survey component. Mapping and interpretation of plans and sections of ore bodies is covered in the mine survey component as well as the geology component. Mining methods applicable to various ore structures body is covered in the mining section

MPR2A20	**MINERAL PROCESSING 2A**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)

Purpose	After completion of this module the learners will have acquired the knowledge to understand and appreciate the various mineral processing unit operations on metallurgical processing plants in order to solve mass balancing and efficiency problems in industrial plant operations.
Content	Basic economics, ore transport, flow sheets, ore storage and feeding systems, crushing and milling and size classification unit operations

MPR2B20	**MINERAL PROCESSING 2B**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	After completion of this module the learners will have acquired the knowledge to understand and appreciate the various mineral processing unit operations on metallurgical processing plants in order to solve mass balancing and efficiency problems in industrial plant operations.
Content	Size classification of particles, screening and hydro sizing, thickening , filtration, mass balances

MPR32-1	**MINERAL PROCESSING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	On completion of this module learners will be equipped with the knowledge and confidence to supervise and manage mineral concentration operations in a mineral processing plant by interpretation of sampling results and the taking of corrective steps to optimize process stage and plant efficiencies
Content	Revision of Mineral Processing and Properties of Metals and Minerals, Gravity Concentration, Froth Flotation, Dense Media Separation, Magnetic Separation, Minor Separation Processes, Residue Disposal and Sampling, Practical experiments – Shaking table, spiral, Flotation machine and Magnetic Separator

MSY1111	**MINERAL SURVEY 1**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for base of surveying related subject areas and fit for basic decisions in technical subjects related to mining
Content	Basic Mine Surveying overview with focus on geometry, area and volume calculations, triangles, co-ordinate systems

MSY2111	**MINERAL SURVEY 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for base of surveying related subject areas and fit for basic decisions in technical subjects related to mining
Content	Mine Surveying methods with more advanced calculations

MSY3111	**MINERAL SURVEY 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for base of surveying related subject areas and fit for basic decisions in technical subjects related to mining

Content	Mine Surveying methods with more advanced calculations

MVN1111	**MINERAL VALUATION 1**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for base of surveying related subject areas and fit for basic decisions in technical subjects related to mining
Content	Basic Mine Valuation overview with focus on sampling and valuation methods including pay limit calculations and basic oreflow

MVN2111	**MINERAL VALUATION 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for base of surveying related subject areas and fit for basic decisions in technical subjects related to mining
Content	Basic Mine Valuation overview with focus on sampling and valuation methods including paylimit calculations and basic oreflow

MIN21-1	**MINING 2**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for decision making related to Mining layouts and safe work practice in Mines – well defined problem areas
Content	MINING STRATEGIES: Mining strategies and stopping layouts dependent on the nature of the ore body. Layout selection criteria. MINING LAYOUTS: Metal and coal mining - emphasis on layouts especially gold and platinum (narrow reef with various inclinations) and coal mining tabular seams. Scattered - long wall - cave mining - up dip mining - shrinkage mining - resue mining overhand and underhand methods – board and pillar – coal long wall – pillar extraction. ACCESS: Shaft design and design factors, shaft services, shaft safety - shaft stations and sizes - tunnelling, ore body development. Basics of shaft sinking and equipping. ROCK BREAKING: Explosives science - terminology - types - application. Blast design, Drilling science - drilling - drills. Mechanical breaking - tunnel boring, raise boring, continuous miners. SUPPORT: General interrelationship of support methods and units with mining method. (Detail covered in Mining Services Metal III). PLANNING INFORMATION: Rules of thumb statistics, efficiencies, production, records. INTRODUCTION TO VENTILATION: DUST sources, methods of control, mixing and dilution, sampling and analysis, GASES mixing and dilution, measurement, types of gases - properties and occurrence, regulations. AIR FLOW: basic formula - Atkinsons and other, Renyold's number and modelling of airways resistance, air pressures - total, static and velocity evasees, internal energy and air power, pressure surveys, pressure across doors and stoppings, pressure losses in airways, airways and ducts in series and parallel

MIN32-1	**MINING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for specialized mining layouts. Integrate engineering principles into specialized mining layouts – Massive Mining and open mining technologies

Content	Integrate engineering principles into specialized mining layouts – Massive Mining and open mining technologies

GLG3AMM	**MINING GEOLOGY 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for identification of mineral deposits and minerals and implications of geology to mining activities
Content	Formation Of Economic Deposits, Precious Metals, Base Metals, Industrial Minerals, Fossil Fuels, Geological Exploration, Environment Management, Hand Specimen Geology: Minerals, Rocks

MTL3211	**MINING TECHNICAL SERVICES 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide a strong level of knowledge and applied practice in Rock Engineering and Mine Ventilation at technician level
Content	Dust, Gases, Air Flow, Fans, Ventilation Practice, Reports Etc, Emergency Management, Section B - Rock Mechanics, Basic Theory, Rock Properties And Behaviour Under Stress, Mine Layout And Excavation Design, Computers

CNS211	**NETWORK SYSTEMS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Competent to apply engineering principles, technical knowledge and/or techniques to computer technologies by operating within relevant standards and codes relating to Network Systems
Content	Internetworking basics (OSI model, protocols, addresses); LAN protocols; WAN protocols; Bridging and switching basics; Routing basics; Network management basics; Ethernet technologies; Fiber distributed data interface; Token ring

CNS311	**NETWORK SYSTEMS 3**
Calculation Criteria	Final mark weighting = Semester Mark (100%)
Purpose	Competent to apply engineering principles, technical knowledge and/or techniques to computer technologies by operating within relevant standards and codes relating to Network Systems
Content	Internetworking basics (OSI model, protocols, addresses); LAN protocols; WAN protocols; Bridging and switching basics; Routing basics; Network management basics; Ethernet technologies; Fiber distributed data interface; Token ring

MNM31-1	**NUMERICAL METHODS 1**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The purpose of this module is to develop in the students an approach towards solving engineering problems using Excel and minimum knowledge

	of mathematics since it is a numerical method in solving problems. Real life problems are used so that the students can see the value of the subject and apply it in their work situation
Content	This course is designed to make the learner competent in using computers to solve mathematical and engineering numerical problems with a minimum knowledge of mathematics. It uses basic mathematical concepts and converts them to computer language so that calculations can be performed by the computer. For example solving any type of equation, systems of equations, graph fitting, differentiation, integration and differential equations. Furthermore, the student is exposed to computers and feels more at ease with them

BOS311	**OPERATING SYSTEMS 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Competent to apply engineering principles, technical knowledge and/or techniques to computer technologies by operating within relevant standards and codes relating to Network Systems
Content	Internetworking basics (OSI model, protocols, addresses); LAN protocols; WAN protocols; Bridging and switching basics; Routing basics; Network management basics; Ethernet technologies; Fiber distributed data interface; Token ring

BOA321	**OPERATIONAL RESEARCH 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The purpose of this module is to provide learners with several quantitative techniques to assist in the analysis, design and improving performance or operation of systems. Problem formulation, mathematical modeling and optimization are central to the practice of Operations Research. Students need to be able to identify and solve for the optimal solution
Content	Introduction to Operations Research, Probability Theory, Decision Making by means of the probability theory, decision trees and normal distribution, Inventory and Production Models, Linear Programming: Basic principles, Transportation, Integer Programming, Network analysis, The queueing theory

OPM11A1	**OPERATIONS MANAGEMENT 1A**
Calculation Criteria	
Purpose	To introduce first year students to the science of operations management
Content	*The following are covered during Module A of the course:* 1 - Appreciate the role and scope of the function in the context of the production of goods and services in either profit oriented or not-for-profit endeavours. 2 - Motivate the responsibility of the Operations /Production Manager in terms of formulation and execution of corporate. 3 - Appreciate the need to develop and implement a product strategy that meets the demands of the market. 4 - Select and apply a suitable forecasting technique to facilitate decision-making. 5 - Convey the main considerations relative to the planning of capacity for a given production system.

	6 - Determine the best way to meet forecasted demand by adjusting controllable production variables to minimise cost over the planning period. 7 - Appreciate the need and importance for short term scheduling within the parameters of the aggregate and capacity plans. 8 - Appreciate that Project management is an integrated management methodology allowing for the employment of dedicated resources for a restricted time and specific objective. 9 - Appreciate the role of the Human resource (HR) in OM.

OPM11B1	**OPERATIONS MANAGEMENT 1B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	To introduce first year students to the science of operations management.
Content	Appreciate the strategic and operational implications of location selection. Develop an economic layout that will meet the firm's competitive requirements. Appreciate the essential characteristics of the supply chain in OM. Appreciate the role of investment in inventory in the execution of a business strategy. Recognize MRP as a dependant inventory management technique. Grasp the philosophy of Just-In-Time (JIT) as a factor in pursuing a competitive advantage. Appreciate the necessity for maintenance to ensure reliability of production systems

OPM22A2	**OPERATIONS MANAGEMENT 2A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Upon the completion of this module a student shall possess a sound understanding and the ability to construct and analyse an aggregate production plan. The student is also able to understand the importance of quality and inventory management and use the seven tools of total quality management.
Content	Understand the concept of aggregate planning and the various aggregate planning strategies; Construct and understand aggregate production plan; Discuss aggregate planning in services; Discuss the importance of quality, the four types of quality costs; Discuss the seven tools of TQM and the seven concepts for an effective TQM program; Discuss TQM in services; Discuss the functions of inventory and how inventory is managed; Discuss inventory models for independent demand.

OPM22B2	**OPERATIONS MANAGEMENT 2B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Upon the successful completion of this module a student shall possess a sound understanding of the just in time and lean production concepts, materials requirements planning and short term scheduling. A student will thus be able to construct a basic materials requirements plan and do short term scheduling.
Content	Describe or define Just in Time and lean production; The JIT requirements and goals of JIT partnerships; JIT in services; The nature and strategies of aggregate planning; The transportation method of linear programming; Aggregate planning

	in services; Scheduling issues in short term scheduling; Loading and sequencing jobs; Theory of constraints and scheduling services.

OPM33A3	**OPERATIONS MANAGEMENT 3A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to develop students who can demonstrate focused and fundamental knowledge on the various concepts used in project management and the ability to use project management concepts to handle daily tasks. A student will also be able to understand how operations can be improved, how to prevent operations from failing and the various ways in which an operations can recover from failure.
Content	

OPM33B3	**OPERATIONS MANAGEMENT 3B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Upon the successful completion of this module a student shall possess a sound understanding of supply chain management and be able to analyse case studies efficiently and offer solutions to solve the problems identified in the case study. A student will also be able to do simple material requirements planning on a basic business planning and control system.
Content	Understand what is supply chain management and its related activities; How can the relationships in the supply chain affect the way it works; The different supply chain objectives needed in different circumstances; Analyse case studies and offer solutions; Prepare and analyse materials requirements planning using a basic business planning and control software.

OPP3YR3	**OPERATIONS MANAGEMENT PRACTICE 3**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	A student who has completed his / her experiential training will show and provide that he / she have acquired the necessary knowledge to apply and integrate the concepts to all areas contributing to operations management. This includes understanding and applications of concepts, such as quality, planning, scheduling, productivity, etc. On a practical level the student will be able to analyse and apply these concepts in an organisation to achieve optimal performance.
Content	This practical component encompasses all the applied operations management principles discussed and explained in the National Diploma in Operations Management curriculum

OPT22A2	**OPERATIONS MANAGEMENT TECHNIQUES 2A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to provide students with the knowledge, numerical and analytical skills and value orientation essential for effective and efficient applications of quantitative techniques to production and other problems.
Content	

OPT22B2	OPERATIONS MANAGEMENT TECHNIQUES 2B
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to provide learners with the knowledge and applications of some quantitative techniques models applied in operations.
Content	Understand the Queuing Models and its application to solving practical problems, involving waiting line with the aim of minimizing cost associated to waiting line; Formulation of various Linear Programming (LP) problems; Determine the optimal solution mix by use of the graphical method and simplex technique; Determine the appropriate Network Model to use: and solve network related problems; Understand and be able to formulate Project Management networks.

OPT33A3	OPERATIONS MANAGEMENT TECHNIQUES 3A
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Upon the successful completion of this module a student shall possess sound understanding of be able to recognize and implement applicable manufacturing / service planning and control system quantitative / qualitative strategies for an organisation. The purpose of this module is to expose learners to theoretical (conceptual) and practical (problem-solving) techniques used to handle operations management problem in industry and commerce for todays and future organisations. All organisations - be they private, public or NGOs - are involved in producing a product or service that has to be 'sold' or consumed by some customer. Operations Management Techniques provides decision making techniques and models needed for assisting in the efficient running of organisations. The course will seek to pinpoint the need for an integrated framework that incorporates the design, organisation, planning, control and continuous improvement of all value-adding operations of any organisation. To achieve such a task, Operations Management techniques focuses on optimising all internal processes and resources in the context of resources constraints. The overriding aim is for the organisation to offer products or services that are cost competitive, of consistently high quality, and meet the dynamic delivery objectives of flexibility, dependability and speed. As a result, most of the Operations Management technique principles can be used in any organisation be it in private, public or not-for-profit sectors.
Content	Formulation of various Linear Programming models (LP) ; Determine the optimal solution mix applying LP models; Perform LP Sensitivity Analysis for LP models; Formulate and solve Integer Programming models.

OPT33B3	OPERATIONS MANAGEMENT TECHNIQUES 3B
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Upon the successful completion of this module a student shall possess sound understanding of be able to recognize and implement applicable manufacturing / service planning and control system quantitative / qualitative strategies for an organisation. The purpose of this module is to expose learners to theoretical (conceptual) and practical (problem-solving) techniques used to handle operations management problem in industry and commerce for todays and future organisations. All

	organisations - be they private, public or NGOs - are involved in producing a product or service that has to be 'sold' or consumed by some customer. Operations Management Techniques provides decision making techniques and models needed for assisting in the efficient running of organisations. The course will seek to pinpoint the need for an integrated framework that incorporates the design, organisation, planning, control and continuous improvement of all value-adding operations of any organisation. To achieve such a task, Operations Management techniques focuses on optimising all internal processes and resources in the context of resources constraints. The overriding aim is for the organisation to offer products or services that are cost competitive, of consistently high quality, and meet the dynamic delivery objectives of flexibility, dependability and speed. As a result, most of the Operations Management technique principles can be used in any organisation be it in private, public or not-for-profit sectors.
Content	Quality Management Techniques; Simulation; Maintenance and reliability techniques ; Dynamic Programming

ORE22A2	**ORGANISATIONAL EFFECTIVENESS 2A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is provide the students with a sound understanding of the concepts, techniques and applications of management services techniques for the improvement of productivity in organisations. South African businesses need improvement on quality, processes, performance and layout to ensure organisational efficiency and effectiveness. The student will be able to know on how to function as an advisor to management, supervisory levels and staff within the organisation. The student also will be able to identify and investigate factors that hamper productivity in the organisation, offer alternatives and formally report such findings and recommendations. He or she will also able to select the appropriate direct work measurement technique(s) to measure the work content of a given task, taking into consideration the human factor and the impact of technology on the human environment.
Content	Role of management services – introduction to management services; Productivity concepts and calculations; Restricted work - Time study; Activity sampling; Rated activity sampling; Production study; Presentations ; Report writing

ORE22B2	**ORGANISATIONAL EFFECTIVENESS 2B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is provide the students with a sound understanding of the concepts, techniques and applications of management services techniques for the improvement of productivity in organisations. South African businesses need improvement on quality, processes, performance and layout to ensure organisational efficiency and effectiveness. The student will be able to know on how to function as an advisor to management, supervisory levels and staff within the organisation. The student also will be able to identify and investigate factors that hamper productivity in the organisation, offer alternatives and formally report such findings and recommendations. He or she will also able to select the appropriate direct work measurement technique(s) to measure the work content of a given task, taking into consideration the human factor and the impact of technology on the human environment.

Content	Measurement of Indirect Work; Analytical and Comparative Estimating; Synthesis; Labour Control; Form design; Presentations; Report writing

ORE11A1	**ORGANISATIONAL EFFECTIVENESS 1A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is provide the learners with a sound understanding of the concepts, techniques and applications of management services techniques for the improvement of productivity in organisations. South African businesses need improvement on quality, processes, performance and layout to ensure organisational efficiency and effectiveness The learner will be able to know on how to function as an advisor to management, supervisory levels and staff within the organisation. The learner also will be able to identify and investigate factors that hamper productivity in the organisation, offer alternatives and formally report such findings and recommendations. He or she will also able to use method study to make improvements on the performance of employees, taking into consideration the human factor and the impact of technology on the human environment.
Content	Role of management services – introduction to management services; Productivity; Presentations; Report writing; Ergonomics - Environmental factors and climatic conditions; Method study

ORE11B1	**ORGANISATIONAL EFFECTIVENESS 1B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is provide the learners with a sound understanding of the concepts, techniques and applications of work measurement techniques for the improvement of productivity in organisations. South African businesses need improvement on quality, processes, performance and layout to ensure organisational efficiency and effectiveness. The learner will be able to know on how to function as an advisor to management, supervisory levels and staff within the organisation. The learner also will be able to identify and investigate factors that hamper productivity in the organisation, offer alternatives and formally report such findings and recommendations. He or she will also able to use work measurement study to make improvements on the performance of employees, taking into consideration the human factor and the impact of technology on the human environment.
Content	General Remarks on work measurement; Time study – the equipment; Time study – selecting and timing the job; Time study – rating; Time study – from study to standard time; The use of standard time

ORE33A3	**ORGANISATIONAL EFFECTIVENESS 3A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to provide the learners with a sound understanding of the concepts: individuals and groups and their impact to organisational effectiveness. South African businesses need improvement on their structures, systems, workflow, job designs and human resources to ensure organisational efficiency and effectiveness. A learner who has completed this module will be able to know and apply the necessary knowledge and skills to assist and advise management by having a

	better understanding of the interventions used in dealing with factors affecting organisational effectiveness
Content	Individuals and Groups

ORE33B3	**ORGANISATIONAL EFFECTIVENESS 3B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to provide the learners with a sound understanding of the concepts: individuals and groups and their impact to organisational effectiveness. South African businesses need improvement on their structures, systems, workflow, job designs and human resources to ensure organisational efficiency and effectiveness. A learner who has completed this module will be able to know and apply the necessary knowledge and skills to assist and advise management by having a better understanding of the interventions used in dealing with factors affecting organisational effectiveness.
Content	Individuals and Groups

CET1BO1	**ORGANIC CHEMISTRY**
Calculation criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To develop an understanding of the fundamental principles and concepts of Organic Chemistry as required for further modules in Chemical Engineering.
Content	Organic concepts an terminology specific to reactions. Reactions of alkanes. Preparation and reactions of alkenes and alkynes. Theory and reactions of benzene. Reactions of carboxylic acid and its derivatives.

ET1BP1	**PHYSICAL CHEMISTRY**
Calculation criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To develop the fundamental principles and techniques of physical chemistry as required for further modules in Chemical Engineering.
Content	Thermochemistry, gases, properties of solutions, chemical equilibrium, acid – base equilibria. Chemical kinetics, ionic equilibria and electrochemistry

PMY11-1	**PHYSICAL METALLURGY 1**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	On completion of this module learners will have acquired knowledge of the theoretical background of Physical Metallurgy providing them with an understanding of the behaviour and heat treatment of some metals and alloys with regard to properties such as hardness, mechanical properties and corrosion resistance
Content	The aim of the subject is to give the student basic knowledge and sufficient theoretical background in Physical Metallurgy to better understand metallurgical concepts and processes. Learners must be able to describe the physical and mechanical properties of metals and alloys, the effect of composition and thermal treatment on the properties of metals and alloys. You are also expected to be able to describe the simple equilibrium cooling of

	alloys in binary phase diagrams including the Iron-Iron carbide phase diagram.

PMY22-2	**PHYSICAL METALLURGY 2**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	This module introduces students to the principles of metallurgy used in the metallurgical industry. It gives a wide range of concepts and principles of metallurgy which eventually builds up to the students being able to use deductive methods and lateral approaches to solve metallurgical problems in industry using these general principles.
Content	Basic H/T, Special/Carburising, Plain/Alloy steels, Alloying elements, Types of alloys, Mods 1,2,3, Cast Irons, Types of cast irons/HT/Props, Corrosion principles, Types/combating, Metals at high temps, Metals at low temps, Mods 4,5,6,7,8, Failure investigation, Tools steels, Revision

PMY33-3	**PHYSICAL METALLURGY 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To give the student a deeper understanding of the fundamentals of physical metallurgy.
Content	Fundamentals of Physical Metallurgy, Binary phase diagrams, Ternary Phase diagrams, Diffusion in substitutional solid solutions, Interstitial diffusion, Annealing, Precipitation hardening, The iron-carbon alloy system, The hardening of steel

PHY1ABP	**PHYSICS 1 (PRACTICAL)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

PHY1ABT	**PHYSICS 1 (THEORY)**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

DPS211	**PLANNING DESIGN 2**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The student will have knowledge regarding the principles and art of Site Planning of both an Urban and Regional nature and be competent in design related to the provision of new development layouts and upgrading areas by developing under- utilized vacant land. The student will have knowledge regarding the principles and art of Site Planning of both an Urban and Regional nature and be competent in design related to: The provision of new development layouts, Upgrading areas by developing under-utilized vacant land, Regenerating of areas by means of infill development and urban renewal, Understand the impact of the provision of different housing typologies on the economics, environment and infrastructure of an area.
Content	The process of design and decision making, the components of the design, the site in its context, constraints and opportunities presented by the site, generate a concept plan, activity systems, hierarchical system of roads parking layouts, interface uses, residential layouts street patterns, office

	parks, industrial parks and estate planning. Urban design projects, proportions and scale.

DPSA321	**PLANNING DESIGN 3A**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	To provide the student with the skills to apply principles related to site ad layout planning of an urban and regional nature regarding: Design principles, Factors that need to be considered in development and The provision of new development layouts
Content	Differences between Town Planning concepts and how they relate to Town Planning, design principles, impact of a proposed development on an area , analysis of existing developments, preliminary assessment, concept analysis and drafting/presentation of new proposals, regional and sub-regional framework for township establishment.

DPSB321	**PLANNING DESIGN 3B**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	To introduce the student to the Urban & Regional Planning processes as applied in South Africa.
Content	Introduction to regional planning, Definitions, Models of urban growth, Guidelines for planning and design of settlements, Theories, Current situation of settlements and possible ways to improve, Local government municipal systems act, 2000 (act 32 of 2000), Evaluation of spatial frameworks

EEP3211	**POWER ELECTRONICS 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge relating to Power Electronics, Allow student to analyse and evaluate information
Content	Power semi-conductor devices; diode circuits; controlled rectifiers; dc choppers; Protection of devices and circuits.

PRE21-1	**PRACTICAL METALLURGY 2: EXTRACTION METALLURGY**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	On completion of this module the learners will have acquired the knowledge and skills to conduct laboratory test work in the fields of analytical chemistry, mineral processing and physical metallurgy. Learners will be made aware of the safety aspects of operating and managing laboratories
Content	Laboratory safety, Laboratory reports, Correct use of laboratory glass ware, mass and volume measuring equipment. Experiments: Density determinations, and Settling test calculations, Volumetric Determinations. Laboratory safety, Laboratory reports, Crushing and grinding tests, Screening tests, Sample preparation, Settling tests with and without the use of flocculants and one six period practical is spent in our Physical Metallurgy Laboratory

PRM21-1	PRACTICAL METALLURGY 2: PHYSICAL METALLURGY
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Application of sample preparation and laboratory work in work environment The purpose of this course is to expose students to real life situations that occur in the physical metallurgy industrial sector and in so doing increase the competency when they qualify
Content	The module consists in the following chapters: Metallography, Tension testing, Hardness testing, Spectrographic analysis, Heat treatment, Failure analysis

PRAE331	PRICE ANALYSIS AND ESTIMATING 3
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	To enable the student to interpret specifications and prepare estimates of cost for buildings during the design stages and price items of Bills of Quantities with the aid of drawings and specifications for tendering purposes
Content	Specification, Estimating, Costing, Compiling unit rates, Sub-contractors and suppliers, Analysis of prices

ICP3111	PROCESS CONTROL 3
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The primary purpose of this module as an integral part of the National Diploma is to provide the students with an understanding of chemical engineering process control principles and techniques which will serve as a fundamental basis for the students' further development in chemical engineering.
Content	Transmission of Process Control Signals, The Nature of Process Control. Elements of Process Control (P, PI,PD and PID control.), Process Control Signals, Drawings and Instrumentation. General characteristics of Instruments. Measurement of Pressure, Fluid flow, Liquid level, Temperature, PH, Density and Mass and the various applicable Instrumentation and their operating principals. Process Control Applications.

MPE21-1	PROCESS ENGINEERING 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	After completion of the module learners will be able to appreciate and suggest solutions solving simple engineering problems encountered in the operation and maintenance of process equipment in metallurgical plants
Content	This course continues on from Met. Plant covering more machines such as pumps, layout of pipelines, fluid flow etc. Basic corrosion and wear are also covered. Electrical power generation and distribution and compressed gases

PRI1111	PROCESS INSTRUMENTATION 1
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To prepare the student academically (and in an introductory way also practically) to be able and ready to accept further/advanced practical training

	towards becoming a specialist in the specialized field of Industrial Process Instrumentation
Content	Process Instrumentation diagrammatic symbols; Flow measurement in pipes – flow characteristics and theory - (various techniques and methods), volumetric flow, mass flow, density flow, viscosity etc. Basic level measurement in tanks and vessels. Temperature measurement – RTDs AND TCs –international and other colour codes of thermo-couples. Pressure measurement. Control basics. Control Valves and characteristics.

PRI221	**PROCESS INSTRUMENTATION 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To prepare the student academically (and in an introductory way also practically) to be able and ready to accept further/advanced practical training towards becoming a specialist in the specialized field of Industrial Process Instrumentation
Content	Electronic detectors/sensors and transmitters, Measurement of flow rate and flow volume, Measurement of level, thickness and depth, Temperature Measurement, Analytical instrumentation

PRI3221	**PROCESS INSTRUMENTATION 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To prepare the student academically (and in an introductory way also practically) to be able and ready to accept further/advanced practical training towards becoming a specialist in the specialized field of Industrial Process Instrumentation. The approach in this module is rather system oriented/directed instead of instrument directed as for the first module. This will enable the student to do systematic lateral and analytical thinking, but for an entire system, comprising various units/aspects, and which is further sub-divided in further levels of detail – in order to anticipate the full diverse functioning of the entire system as a whole. This is done to enable the student to do analytical thinking (system wise), to interpret symptoms or behaviours into consequences, outcomes or causes.
Content	Instrumentation for hazardous environment, plant unit operation and control, automatic control applications, control systems, computer application, telemetering applications and analysers

STA2BEM	**PROCESS STATISTICS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Students must be proficient in collecting, organising, analysing and interpreting data to establish statistical and probability models to solve related problems. They must be able to solve problems related to models. In order to carry out decisions within the paradigm of inferential statistics. This module is not only relevant to the learners' present academic program; it is also relevant to her/his future personal and professional life in Science and Technology.
Content	Sampling Distributions, sampling and estimation, Hypothesis Testing, ANOVA, Chi-square, Regression and correlation, Time Series, Multiple Regression & Partial Correlation, Decision Theory

BEP121	PRODUCTION ENGINEERING: INDUSTRIAL 1
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Familiarize the student with the processes/activities involved in operation management i.e. designing, planning and controlling operations and also improvement of operations.
Content	The content covered includes discussions on operations management, design of products/services, layout and flow, Process technology, job design and work organization and the nature of planning and control

BEP231	PRODUCTION ENGINEERING: INDUSTRIAL 2
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Design, development, implementation, operation, maintenance, and control of all processes in the manufacture of a product.
Content	Planning and control, inventory planning and control, supply chain planning and control, material requirement planning, just in time planning and control, quality planning and control, operations improvement, failure prevention and recovery, and total quality control and production

PRS21-1	PRODUCTION OF IRON AND STEEL 2
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To empower students to reach a level of competence in steelmaking so that they will be competent to make a notable contribution in a works where iron and/or steel is produced
Content	Individual assignments: -Blast furnace iron making, Cokemaking, Sintering, Other smelting processes including COREX, Pre-treatment of hot metal, BOP steel making, EAF steel making, Stainless steel making, Low Volume: Foundry etc., High Volume: Plate etc., Ladle metallurgy and casting. Group Assignments: -Mittal (old ISCOR) Vanderbijlpark, Mittal (Old ISCOR) New Castle, Saldanha Steel, Highveld Steel & Vanadium, Columbus Stainless, Cape Gate

PRS302	PRODUCTION OF IRON AND STEEL 3
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	After successfully completing this course, the student shall be familiar with the theory and practice of the various methods of steel making and should now be able to contribute not only to routine maintenance of quality in a steelmaking and related environment, but also to technical problem solving, improving quality by improving processes
Content	Physics & chemistry of steel and slag, Thermo-chemistry & Thermodynamics, Kinetics : rates of reaction, Gases, Physiochemical properties of steel, Physiochemical properties of molten slag, Equilibrium data on liquid steel – slag reactions, Mass & heat balances, Steelworks

CPS111	PROGRAMMING 1
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide basic knowledge on how to program (using C)

Content	Algorithm design, Introduction to datatypes (variables and constants), Introduction to Arithmetic and logical operators, Conditional statements, Introduction to pointers and functions, Introduction to Arrays and strings, Introduction to graphics

CPS211	**PROGRAMMING 2**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Create intermediate complexity computer algorithms and programs using the procedural paradigm and the C programming language
Content	Intermediate complexity problems solved through sequence, selection and iteration, Pointers, Indirection (dereferencing), Pointer arithmetic, Freestore memory, The *malloc (new)* and *free (delete)* system calls, Passing arguments to functions by address (pointers), Returning by address, Recursion, Arrays of basic type on the stack, Array access through subscripting, Array initialization, Basic type arrays on the heap, Data representation using array subscripts, Array access through pointer dereferencing, Two-dimensional arrays (basic data type), Passing stack and heap arrays to functions as arguments, The list data structure, The stack data structure, The bubble sort, The sequential search, Text files, System calls open, write, read and close, File storage of arrays of basic data type, Records. (Called structures in C), Typedef struct, Arrays of records on the stack/heap, Array of pointers and optimum heap memory usage, File storage of arrays of records, RS-232 serial communication.

CPS311	**PROGRAMMING 3**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Create intermediate complexity object oriented paradigm models and programs using UML and the C++ programming language
Content	Introduction to object orientation, Introduction to UML – Classes, data members & member functions, class relationships, defining new types, Typecasting, Event driven program structure using *enum,* Stream input / output, Type *boolean,* Bit operations, UML use-case view, Use-case diagram – actors, use-cases, systems & actor to use-case communication, Use-case description, Finding candidates for classes, data members & member functions, Type Boolean, The static view & its class diagram, Data members (attributes), Member functions (methods), Class representation in C++, UML and its dynamic view, Sequence diagram, Messages, Instance vs. generic, Constructors & destructors, Instantiation - stack & heap and related main memory mapping, Application in C++, Reference, *Const* (constant) modifier, Stray object pointers, Copy constructor, Pointer attributes & the copy constructor, The copy constructor & and array of objects, Inline function implementation, Function overloading (polymorphism), Polymorphism & the constructors, Function signature, The *this* pointer, UML inheritance (generalization / specialization), Inheritance in C++, Inheritance and the constructors, Inter class relationships, Aggregation (composition), Inter class relationships, Association, The role of constructors, default and non-default, in establishing relationships, Class implementation of linked list, Project requirements (Sa 4)

EL3871A	**PROJECT WORK A**
Calculation Criteria	Final mark weighting = Portfolio(100%)

Purpose	Project : Land use management application: The student will be competent in preparing a full application (with relevant documentation) as well as going practically through the process of a rezoning application for a property, to be submitted to a local authority for possible approval.
Content	Project 1: Land use management application: The student will be given a site that has been purchased by a developer, and prepare a complete application in terms of applicable legislation. Student will also have to collect the relevant application forms as well as information required for such applications, from the relevant sources of planning information. Student will have to compile advertisements for the application to be published in a newspaper as well as compile a site development plan for the new proposed development to support the application. A motivational memorandum will also be prepared as part of the documentation. Student will be evaluated based on the following; Evidence of visiting the concerned local authority for the collection of information, Title Deed analysis in relation to application, Clear articulation of applicants intention, Conceptualisation of Need & Desirability of Application, Appropriate linkage of Town Planning Schemes / Ordinance to application, Proper indication of proposed controls, Advertisement, Site notice, Power of Attorney in correct format, Attachment of relevant annexures (Locality Map, Zoning Map & Map 2).

EL3871B	**PROJECT WORK B**
Calculation Criteria	Final mark weighting = Portfolio(100%)
Purpose	Project : Regional Layout Plan: The student will have knowledge regarding the principles and art of Site Planning of both an Urban and Rural nature and be competent in design related to: The provision of new development layouts; Group housing schemes and Development plans for rural layouts
Content	Project : Regional Layout Plan: The student will be involved in a regional layout preparation, which according to planning requirements, meet the needs of the community or developer. Included, is a mixture of housing types as well as a rural development layout, conforming to a different design process when designed. This includes giving attention to Road hierarchies, Density calculation, Location of complementary land uses to residential, Preparation of a concept layout plan, Detach housing, Attach housing, Complementary residential uses, Coverage, Floor Area, Floor area ratio and Parking etc. Detached housing, Attached housing, Alternative housing types. Preparing the following: Concept development plan, Development plan, Concept of housing to be provided, Slope analysis, Road network design, Different land uses location concept, Internal & External environment of a site layout analysis, Provision of facilities location, Different densities of housing types

EL3871C	**PROJECT WORK C**
Calculation Criteria	Final mark weighting = Portfolio(100%)
Purpose	The student will engage in understanding urban renewal process, generally dilapidated area by proposing a new development plan for the area as well as an implementation strategy based on the theoretical and practical insight gained during the course module.
Content	The students would get exposed to the concepts of urban renewal process and case studies as foundation for preparing towards an urban renewal plan for an identified area of intervention. The students are involved in investigating and preparing an area that has, because of urban dynamics, became dilapidated. Student are practically involved in the process of such urban renewal projects, by analysing and diagnosing a site and then

	proposing principles of intervention. In addition, a urban renewal plan is prepared, which includes a implementation strategy based on the urban renewal plan. Specifically, students are involved in collecting information by surveying the study area. Different plans are also used to identify hard as well as soft areas. Students also analyse information by doing a SWOT analysis as to establish factors that will inform their proposal. A synthesis is formulated as part of a report, which also incorporate the use of photographs and sketches.

EL3871D	**PROJECT WORK D**
Calculation Criteria	Final mark weighting = Portfolio(100%)
Purpose	Project: Spatial frameworks The student will be familiarised with a theoretical understanding of such frameworks, as well as how other planning mechanisms integrate into such a framework.
Content	Project: Spatial Development framework: The students obtain a theoretical understanding of the need and purpose of a spatial development framework to manage planning regions. In addition, student are exposed to how SDF's integrate with other planning mechanisms such as integrated development plans (IDP's), and Town Planning Schemes.

EIP1111	**PROJECTS 1**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide knowledge relating to workshop safety, building and testing of electronic circuits.
Content	Health and Safety in the workshop; Use of basic hand tools; Basics behind soldering; Understand maintenance principles and learn basic faultfinding techniques; Write a project proposal; Learn the fundamentals of printed circuit board manufacturing and etching.

MYP3111	**PYROMETALLURGY 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	After completion the learner should be able to establish heat balances, mass balances, choose proper furnaces for specific processes as well as refractories. The learner should also be able to supervise and manage a pyrometallurgical process to achieve the yield and quality of the desired products.
Content	Pyrometallurgical terminology, connection between thermodynamics and pyrometallurgy, applying pyrometallurgical methods, interpreting practical problems, solid and molten state reactions, basic laboratory experiments

BTQ1111	**QUALITATIVE TECHNIQUES 1**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide knowledge required for base decisions related to data and information and research
Content	The content of each section should include practical examples applicable in the minerals industry. Tests and exams should reflect the practical needs of statistics in the mineral industry production careers emphasis should be to present this subject so as to develop in the student a confidence to apply

	basic statistics in the work place "must knows" should be clearly identified and tested to a high degree of proficiency whilst "nice to know" sections should only have a low weighting in evaluations. emphasis should be on a good understanding of statistical terminology the student should be able to manipulate statistical functions on the standard scientific calculators emphasis should be on interpretation and presentation of data - production of information rather than data it is suggested that the presentations should start with identified problems in the industry. Collection and presentation of data, Measurement of central tendencies, Measurement of dispersion: Log normal distribution, Probability theory: Testing for "normality", Probability distribution, Sampling theory, Decision theory, Regression, Analysis of time series

QAS22A2	**QUALITY ASSURANCE 2A**
Refer to the Learning Guide for more information on the module.	

QAS22B2	**QUALITY ASSURANCE 2B**
Refer to the Learning Guide for more information on the module.	

BQA2111	**QUALITY ASSURANCE 2**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The objectives of this course are to provide a concise introduction to the subject of Quality Assurance. Knowledge and understanding of the basic principles and concepts of statistical quality control are essential to analyse the efficiency of production systems. Quality control is a system of techniques used to economically produce goods and services that meet the customer's requirements. The purpose of this course thus is to present the basic principles and procedures that provide a foundation in the analysis of quality control problems and the application of quality control techniques.
Content	Total Quality Management, Fundamentals of Statistics, Control Charts for Variables, Fundamentals of Probability, Control Charts for Attributes, Acceptance Sampling Plans

TKU21-2	**QUALITY CONTROL 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	This module introduces students to the principles of quality control and quality assurance as used in the metallurgical industry. It highlights the concepts of statistical control by introducing students to statistical control techniques. Students must be able to take these techniques and apply them using the various relevant approaches thereby ensuring the control of any industrial process.
Content	Quality definition, Statistical control techniques, Statistical control techniques, Normal distributions, Probability, Control Charts variables, Control Charts attributes, Acceptance sampling, Acceptance sampling OC curves, Reliability, Quality costs, Quality costs calculations

STAQTA1	**QUANTITATIVE TECHNIQUES A**
Refer to the Rules and Regulations of the Faculty of Sciences for more information	

STAQTB1	QUANTITATIVE TECHNIQUES B
Refer to the Rules and Regulations of the Faculty of Sciences for more information	

BQT1112	QUANTITATIVE TECHNIQUES 1
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for base decisions related to data and information and research
Content	Core statistics – manipulation of Data related to the disciplines of mining technology and Mine surveying

QSB111	QUANTITY SURVEYING 1
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The learners will be able to master the following: Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Conduct a detailed measurement and descriptions of a simple house, Collect, analyse, organize and critically evaluate information
Content	Introduction to Measurements, Principles of Measurements, Foundations, Superstructure, Finishes, Doors and windows, Roof and roof covering

QSB221	QUANTITY SURVEYING 2
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The learners will be able to master the following: Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Conduct a detailed study of the measurement and description of double-storey buildings, Perform practical working-up exercises, Compile bill of quantities, Collect, analyse, organize and critically evaluate information
Content	Columns of various shapes, Beams, Slabs, Staircases, Abstracting, Prepare bills of Quantities

QSG331	QUANTITY SURVEYING 3
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The learners will be able to master the following: Identify and solve problems, Work effectively as a member of a team or group, Communicate effectively verbally and in writing, Conduct a detailed study of the measurement and description of multi-storey buildings, Perform practical working-up exercises, Compile bill of quantities complete with trade preambles, Apply the builders' quantities approach to measurement, Determine valuations and progress payments including basic principles of escalation, Collect, analyse, organize and critically evaluate information
Content	Earthwork, Flat roofs, Staircases, Structural steelwork, Finishes, Windows and doors, Joinery fittings, Plumbing and drainage complete, PC and provisional sums including final account adjustments and builders' work in connection with specialist installations, Working up, Builders' quantities, Valuations and progress payments

EER3111	RADIO ENGINEERING 3
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge relating to radio engineering, i.e. frequency conversion and mixing, amplitude and angle modulation, antennas and amplifiers.
Content	RF Amplifiers; Frequency conversion and mixing, RF Receivers, Amplitude and angle modulation and demodulation; Antennas; Electromagnetic wave propagation;

RCM31-1	REINFORCED CONCRETE & MASONRY DESIGN 3
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required to design Reinforced Concrete and Masonry structural elements
Content	Beams, Slabs, Bases, Columns, Retaining Walls, Enable students to do minor masonry designs

MWT1111	SCIENCE: MINING 1
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Provide knowledge required for base decisions in technical subjects related to mining
Content	Core physics, chemistry, mechanics and electricity applicable to mining subjects and mining technology and related subject areas

SSG111	SITE SURVEYING 1
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The purpose of this course is to allow the candidates to develop skills in surveying and setting out of buildings, with the use of instruments such as measuring tapes, levelling instruments and theodolites. The student is required to spend a large portion of the allocated time on fieldwork, solving practical problems.
Content	Linear surveying, Setting out, Levelling, Contouring, Sections, Traversing and Tacheometry

EIS2111	SOFTWARE DESIGN 2
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To provide knowledge on software design
Content	Process flow charts, pseudo code, design and coding in Visual Basic 2005

EIS3111	SOFTWARE DESIGN 3
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	To provide knowledge on design skills for Web Development and Database Technology

Content	Introduction to object-oriented techniques, web applications using ASP.NET 2.0, database technology using ADO.NET, introduction to HCI

BPO311	**SOFTWARE ENGINEERING 3**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Since the 1960s, there has been growing concern about the so-called "software crisis". Many software projects are delivered late and over-budget, if they are delivered at all. This course attempts to make future practitioners in the field aware of this issue, as well as aware of their obligations as engineers within this field
Content	In order to achieve the abovementioned objectives (see section on Purpose of the Module), we will consider the development and management of large software products. This will be done by combining a study of the methods, tools and techniques used for creating and evolving software products with the practical skills needed to deliver quality software on time and within budget. The methodologies will include requirements, specification, design, testing, validation and maintenance. The practical side of this course includes a substantial project. Over and above these we will also address some of the Critical Cross Field Outcomes that have been identified by the Department of Education. These are discussed further in this study guide.

CEGA211	**SOIL MECHANICS 2A**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To provide the student with broad knowledge on the fundamentals of soil mechanics
Content	Soil and its formation, Phase relationships, Soil classification, Standard procedures and symbols for recording soil profiles, Soil compaction, The Californian Bearing Ration (CBR), Dynamic cone penetration

STA1ZIT	**STATISTICS 1**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

STA1BC1	**STATISTICS 2B**
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.	

MSS21-1	**STATISTICS: MINING 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required for base of mine valuation and geostatistics
Content	Introduction to statistics for the use of the valuation of mineral deposits

SMP301	**STEAM PLANT 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse and solve thermodynamics problems in the mechanics and technology fields

Content	Nozzles; Steam turbine; Rotary compressors; Steam plant – introduction and description; Steam plant ; Conduction, convection and radiation; Psychrometry; Cooling towers.

SOM2111 TST2111	**STRENGTH OF MATERIALS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide basic knowledge to analyse and solve strength of materials problems in the mechanics and technology fields
Content	Simple Stress and Strain; Shearing Force (SF) and Bending Moment (BM); Thin Cylinders; Torsion; Simple plane structures.

SOM312	**STRENGTH OF MATERIALS 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse and solve strength of materials problems in the mechanics and technology fields.
Content	Simple Structures; Strain Energy; Close Coiled helical Springs; Temperature stresses; Bending Stress; Shear Stress; Fatigue

AIS2111	**STRUCTURAL ANALYSIS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	On successful completion of this module, the students will be able to prove competency in solving more advanced structural problems in the civil engineering field, as well as using the knowledge as a basis to build on for further subjects in the field.
Content	Difference between statistical determinate and statistical indeterminate structures, Combined bending and direct stress, Shear stress, Three pinned structures, Struts

AIS3211	**STRUCTURAL ANALYSIS 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	On successful completion of this module, the students will be able to prove competency in solving more advanced structural problems in the civil engineering field, as well as using the knowledge as a basis to build on for further subjects in the field.
Content	Strain energy, Fixed end and continuous beams, Single storey portal frames, Pin jointed frames, Plastic collapse mechanisms, Rectangular and portal frames

MSG3121	**STRUCTURAL GEOLOGY 3**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	Provide knowledge required for base of mine valuation and geostatistics
Content	Introduction to structural geology – structures and solution of structural problems

TSS31-1	STRUCTURAL STEEL & TIMBER DESIGN 3
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide knowledge required to design Structural Steel and Timber structural elements.
Content	Connections, Base plates, Tension Members, Compression Members, Bending Members, Shear in members, Web stiffeners in beams, Enable students to do minor timber designs

SAC3000	STRUCTURES 3
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	To provide the learner with broad knowledge on the fundamentals of: Structural Detailing, Theory of Structures and Structural Design
Content	Structural steel detailing, shear force and bending moment diagrams, beam selection using section modulus, calculation of moment of inertia of a section, beam design, beam deflections, analysis of trusses by joint resolution, introduction to reinforced concrete, reinforced concrete foundations, reinforced concrete columns, slabs and beams, bolted and welded connections, the design of tensile members of steel structures, the design of compression members of steel structures, reinforced concrete pad design, reinforced concrete column design and reinforced concrete slab and beam design

ASS1111	SURVEY AND ANALYSIS 1
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The student must be introduced to Survey and Analysis methods and techniques so as to help him/her to become competent in their use related to both an Urban and Regional scale.
Content	The first two weeks will be spent on introducing, developing and emphasizing the use of samples to conduct a survey and the use of pilot projects, Followed by two weeks introducing Questionnaires with regard to: The correct wording of questionnaires, The use of questionnaires to obtain reliable data and The interpretation of the data obtained. Followed by six weeks of the five different survey types most commonly found in the Town Planning environment, with greater emphasis on a Land Use Survey ; Followed by two weeks of constructing a report and its outline to present data and findings gathered from surveys; Followed by one week spent on how forecasts can be made and why they are needed by Planners, and the final week to deal with alternative methods of collecting data, e.g. aerial photographs, satellite image etc.

CISA211	SURVEYING : CIVIL 2A THEORY
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Solve surveying problems encountered in the civil engineering field, do setting out of buildings and structures for construction purposes and do survey work to draw civil engineering site plans
Content	Sources, determination and correction of errors in Survey measurement, application of standards of precision and accuracy. Map Projections, the South African LO system, distortions and corrections, trigonometric systems. Co-ordinate calculations, traversing, traversing accuracy, triangulation,

	calculation of areas and volumes for earth works quantities, mass haul diagrams. Surveying instruments, their use, care and adjustment, survey requirements on a construction project, circular, transition curves and super-elevation, vertical curves

CISB211	**SURVEYING : CIVIL 2B PRACTICE**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Solve surveying problems in the civil engineering field, do setting out for construction purposes and do survey work to draw civil engineering site plans by means of practical work and assignments
Content	Co-ordinate calculations, traversing, traversing accuracy, triangulation, calculation of areas and volumes for earth works quantities, mass haul diagrams. Surveying instruments, their use, care and adjustment, survey requirements on a construction project, circular, transition curves and super-elevation, vertical curves.

SSS1111	**SURVEYING 1**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The introduction of Surveying into the Town Planning environment and techniques used as to help him/her becoming competent in the use of these techniques related to both an Urban and Regional scale.
Content	Basic principles of surveying, S.A lo system and co-ordinate calculations, instruments, distance measurement, levelling, tacheometry, areas and volumes, setting out of works, practical levelling, practical taped traverse, practical tacheometric surveying, practical setting out

CSUA111	**SURVEYING 1A Theory**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Obtain fundamental knowledge and related practical skills in the application of survey principles in order to draw to scale, calculate distances and directions and set out positions. Apply theory relating to mapping, co-ordinate systems, traversing, levelling, tacheometry, areas and volumes.
Content	Fundamental principles of surveying, Levelling, Longitudinal sections, Cross sections, Traversing, Tacheometry, Areas and volumes, Map projections

CSUB111	**SURVEYING 1B Practice**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	Obtain fundamental knowledge and related practical skills in the application of survey principles in order to draw to scale, calculate distances and directions and set out positions. Apply theory relating to: mapping, co-ordinate systems, traversing, levelling, tacheometry, areas and volumes.
Content	Fundamental principles of Surveying; Levelling; Longitudinal sections; Cross sections; Traversing; Tacheometry; Areas and volumes; Map projections

CSY211	**SYSTEMS ANALYSIS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)

Purpose	This aim of this course is to provide an introduction to Systems Analysis and Design. Topics include analysing the business case, requirements modelling, enterprise modelling, and development strategies. Students also learn about data design, the user interface, input, and output design, system architecture, systems implementation and systems operations and support.
Content	In order to achieve the abovementioned objectives (see section on Purpose of the Module), we will consider the development and management of large software products. This will be done by combining a study of the methods, tools and techniques used for creating and evolving software products with the practical skills needed to deliver quality software on time and within budget. The methodologies will include requirements, specification, design, testing, validation and maintenance. The practical side of this course includes a substantial project. Over and above these we will also address some of the Critical Cross Field Outcomes that have been identified by the Department of Education. These are discussed further in this study guide.

SAD01A1	**SYSTEMS ANALYSIS AND DESIGN 1A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to be able to identify opportunities for and utilise the computer as a business tool as well as describe common elements of information systems and the movement of data through the system
Content	

SAD01B1	**SYSTEMS ANALYSIS AND DESIGN 1B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of this module is to provide fundamental knowledge of the areas covered for those working in, or entering the workplace in the area of Systems Development.
Content	

MHT302	**THEORY OF MACHINES 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The module extends the work done by dynamics of mechanisms and balancing, the basics of which were established in Mechanics III and Mechanics II (Learning Unit 1). Learning Units 2, 3 and 4 analyse in detail specific machine components such as: cams, multi piston in – line engines and flywheels. The Learning Unit 5 analyses the effect of the gyroscopic couples on different type of machines and mechanisms. Finally the Learning Unit 6 introduces the fundamental principles of the discrete systems vibrations. The theoretical foundation of the students will be established in each section of the work by deriving the relevant equations used and applying that to a wide range of practical problems. The students will do also specific research and give a written and verbal presentation there off to enhance their general knowledge.
Content	Dynamic forces in links: - Coriolis component of acceleration; cam geometry; calculation of the required cam shape and size. Balancing of the reciprocating engines: - redesigning the engine to improve the state of balance. Energy fluctuation of an engine: - crank effort diagrams; fluctuation of speed and acceleration. Gyroscopic couples: - effect of the gyroscopic couples; design

	consideration due to gyroscopic couples. Machine vibration fundamentals: - calculation of the natural frequency of single degree of freedom systems; damped vibrations.

PSSB111	**THEORY OF PLANNING 1B**
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	The student will be introduced to modern Planning Theory as continuation to History and Principles of Planning related to both Land use management and Development layout aspects. This section also specifically introduces familiarity with Town Planning Schemes and land use control mechanisms.
Content	Planning processes, Burgess, Hoyt, Harris 7 and Ullman's theories, classification of cities, Modern city planning, Urban Design Layouts, Land use theory, Stakeholders involved in development, Land use management systems, Town Planning Schemes.

IST2111	**THEORY OF STRUCTURES 2**
Calculation Criteria	Final mark weighting = Semester mark (100%)
Purpose	On successfully completing this module, the learners will be able to prove competency in solving structural problems in the civil engineering field, as well as using knowledge as a basis to build on for further subjects in the field.
Content	The analysis of statically determinate structures that often involves the derivation of recognised formulae from first principles. Plane frame and Space frame analysis, section properties, stress and strain, impact loading, bending analysis, theory of elastic bending and deflection of simple beams

IMT2111	**THERMODYNAMICS 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Provide basic knowledge to analyse and solve thermodynamics problems in the mechanics and technology fields.
Content	Gases; Properties of water and steam; Basic steam plant layout; Condensers; Combustion

IMT313	**THERMODYNAMICS 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To present a thorough treatment of engineering thermodynamics from the classical viewpoint and to prepare students to use thermodynamics in engineering practice.
Content	The Second Law: Define the heat engine, Define entropy, Drawing the T-S diagram, Explore reversible processes on the T-S diagram, Derive mole balance for PFR, Derive mole balance for PBR, Examine entropy and reversibility. The Heat Engine Cycle: Define the Carnot Cycle, Examine modifications of the Carnot Cycle, Define the Joule Cycle, Calculate efficiencies, work ratio, heat supplied, and heat rejected. Steam Plant: Define concepts associated with the Rankine Cycle, Examine modifications of the Rankine Cycle, Reheat Cycle, Calculate efficiencies, work ratio, heat supplied, heat rejected. Nozzles: Understand application of Nozzle shape, critical pressure ratio and nozzle efficiency, Define Supersaturation, Examine steam nozzles. Steam Turbines: How to classify steam turbines, Understand

	principle of operation of Impulse turbine, Draw blade diagrams, Examine stage efficiency, blade efficiency and turbine blade profiles. Gas Turbines: Derivation of the gas turbine cycle from first principles, How to modify the basic cycle. Refrigeration: Differentiate between reverse heat engine cycles. What are vapour pressure refrigeration cycles? Define refrigerating load and unit of refrigeration. Understand the pressure enthalpy diagram

ACT3111	**THERMODYNAMICS: APPLIED 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	The primary purpose of this module as an integral part of the National Diploma is to provide the students with an understanding of Thermodynamics principles which will serve as a fundamental basis for the students' further in Chemical Engineering
Content	The Second Law, The Heat Engine Cycle, Steam Plant, Nozzles, Steam Turbine. Gas Turbine, Refrigeration, Understand the pressure enthalpy diagram

CIT3111	**THERMODYNAMICS: CHEMICAL ENGINEERING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	As a would-be chemical engineer it will be necessary to understand the basic principles of engineering. This is the foundation of all engineering knowledge for your future.
Content	Basic Principles & Definitions, The 1st Law of Thermodynamics, Heat Effects, The 2nd & 3rd Laws of Thermodynamics, Thermodynamics of Flow Processes, Thermodynamics of Pure Substances, Principles of Phase Equilibrium

CET2111	**TRANSPORTATION ENGINEERING 2**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	To give students a thorough grounding in the basic aspects of traffic engineering, road geometric design and drainage. Civil engineers are responsible for, and carry out the planning, design, construction, and maintenance of elements of the transportation system such as freeways roads, streets, harbours, railways, canals, airports, pipelines and other conveyancing systems. Many civil engineers are also involved in the research of new methods, techniques and the use of materials in order to provide improved facilities across the broad spectrum of the transportation field for the benefit of mankind, society and the environment. The field of transportation engineering is very wide indeed and there is a vast scope of opportunity for people trained in the basic fundamentals of civil engineering of which transportation engineering is a major component. In this course however the emphasis will be on road transport facilities involving the design, construction and operation of freeways, roads and streets.
Content	Transportation Planning, Surveys and Setting out, Route Location, Traffic Engineering, Traffic Surveys, Parking, Geometric Design, Hydrology and storm water run-off, Drainage, Culverts

CET3211	**TRANSPORTATION ENGINEERING 3**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)

Purpose	Transportation Engineering III deals with the design and construction of the road pavement structure and supporting embankment required to withstand the predicted loads, which will be imposed by the traffic. The design of several types of surfacing seals will be learned, as well as the operational considerations of construction. The materials, design, manufacture and construction of hot asphalt are given and will help the student to understand the science of road surfacing. The drainage of the subsurface water from the road structure is an extremely important factor required for ensuring stability over the planned lifespan and will also be covered in this course. The design and construction of concrete roads will also be discussed. The design and construction of concrete roads will also be discussed. Civil Engineering technicians must have working knowledge of the principles and procedures involved in the design and construction of roads and earthworks. These skills will enable them to participate as junior members of the engineering team either in a consulting engineering office, or on site as contractors.
Content	Earthworks and Layerworks, Road Construction Materials, Structural Design of Road Pavements, Material Stabilisation, Bituminous Surfacing Seals, Asphalt Surfacing, Road Drainage, Concrete Roads

CEW2B11	**WATER AND WASTEWATER TREATMENT 2B**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Understand basic water and wastewater treatment principles.
Content	Water quality, raw water intake, screening, coagulation, flocculation, sedimentation, filtration, water borne diseases, disinfection, introduction to wastewater treatment, anaerobic digestion, activated sludge, biological filtration, sludge handling and disposal

CEW3A21	**WATER AND SEWAGE RETICULATION 3A**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	Be familiar with basic water and sewage reticulation principles
Content	Flow in pipes, water demand and supply, sanitation, water and sewer networks, pumps

WPD11A1	**WORK PLACE DYNAMICS 1A**
Calculation Criteria	
Purpose	The purpose of the module is to develop academic students who can demonstrate a focused knowledge base and theory of Work place dynamics as a production management function within the organization by remembering and applying the issues of organization behaviour, productivity, efficiency and effectiveness in terms of the Individual, Groups and the Organization and how they can co-exist in the business environment.
Content	What is organization dynamics; Foundations of individual behaviour; Values, attitudes and job satisfaction; Personality and emotions; Perceptions and individual decision making; Basic motivation; Group behaviour and team work; Leadership and trust; Communication; Power and politics; Conflict and negotiations

WPD11B1	**WORK PLACE DYNAMICS 1B**
Calculation Criteria	

Purpose	The purpose of the module is to develop academic students who can demonstrate a focused knowledge base and theory of Work place dynamics as a production management function within the organization by remembering and applying the issues of organization behaviour, communication, conflict management, negotiation process, human resource practices, motivation, organisation culture, change and stress management in terms of the Individual, Groups and the Organization and how they can co-exist in the business environment..
Content	Basic communication; Conflict and negotiation; Human Resource practice; Motivation; Organisational culture; Change an stress management

EB21.3 ALPHABETICAL LIST

BTECH MODULES

NAME		CODE	COUPLET MODULE
Automatic Control 4	SM	TOG431	
Building Entrepreneurship 4	YM	BEN41-1	
Chemical Engineering Technology 4A – Fluid Flow	SM	WARA432	
Chemical Engineering Technology 4B – Unit Operations	SM	WARB432	
Chemical Engineering Technology 4C – Heat/Mass Transfer	SM	WARC432	
Chemical Process Design 4A - Equipment Design	SM	CPDA411	
Chemical Process Design 4B - Plant Design	SM	CPDB411	Chemical Process Design 4A - Equipment Design (CPDA411)
City and Regional Planning 4	YM	CRP431	
Community Studies 4	YM	COMS431	
Computer Networks 4	YM	ECN411	
Concrete Technology 4	YM	TBJ421	
Construction Economics 4	YM	CON41-1	
Construction Law and Procedures 4	YM	CLP41-1	
Construction Management 4	YM	CMO43-1	
Continual Quality Improvement 4		CQI44-2	None
Contract Management: Civil 4	YM	CMC411	
Control Systems 4	YM	ASY411	
Digital Signal Processing 4	YM	DSP411	
Electrical Machines 4	YM	TEF441	
Electrical Protection 4	YM	AEPA411	
Engineering Design Project 4	SM	DES411	
Engineering Management 4	YM	TIF441	
Engineering Management 4A	SM	MNGA411	
Engineering Management 4B	CM	MNGB411	Engineering Management 4A (MNGA411) – 40%
Entrepreneurship 4	SM	EIE411	
Environmental Studies 4	YM	ENS431	
Ferrous Metallurgy 4	SM	MFM41-1	
Financial Planning And Control 3A		BFA44A4	Refer to Faculty of Economic & Financial Sciences
Financial Planning And Control 3B		BFA44B4	Refer to Faculty of Economic & Financial Sciences
Fluid Mechanics 4	SM	TFE441	
Foundation Engineering 4	YM	CFE411	
Foundry Technology 4	YM	FTY42-2	
Geographic Information Systems 4	YM	GIS431	

Geometric Design 4	YM	TGN411	
Human Resources Management: Civil 4	YM	HRM411	
Hydraulics 4	YM	THD411	
Hydrology 4	YM	THB411	
Industrial Minerals 4	SM	MIL41-1	
Industrial Project 4	YM	TBN4000	
Industrial Relations and Negotiations 4	YM	IRN211	
Information Systems 4	SM	IIS411	
Logistics Engineering 4	SM	ILE411	
Maintenance Management 4	YM	OHB41-1	
Management Economics 3		BEB41-1	Refer to Faculty of Economic & Financial Sciences
Management for Planners 4	YM	TPM431	
Mathematics Chemical Engineering	SM	MAT1AE3	
Mechanical Metallurgy 4	SM	TMP42-2	
Mechanics of Machines 4	SM	TMB441	
Metallurgical Geology 3	SM	MGG32-2	
Metallurgical Project 4111	SM	MTP4111	
Metallurgical Project 4112	SM	MTP4112	
Metallurgical Project Management 3	SM	MPE42-1	
Metallurgical Thermodynamics 3	YM	THM32-1	
Micro Systems Design 4	YM	MDS411	
Microcontroller Systems 4	YM	MCS411	
Mineral Survey Legislation 4	SM	MSL41-1	
Mining 2	SM	MIN21-1	
Mining 4A	SM	MINA411	
Mining 4B	CM	MINB411	Mining 4A (MINA411) – 40%
Mining Economics 4	SM	MES41-1	
Mining Legislation 4	SM	MLG42-1	
Mining Project 4	SM	MPT42-1	
Mining Technical Services 3	SM	MTL3211	
Mining Technical Services 4A	SM	MTLA411	
Mining Technical Services 4B	CM	MTLB411	Mining Technical Services 4A (MTLA411) – 40%
Non-Ferrous Extraction Metallurgy 4	SM	MNF41-2	
Operations Management Techniques 4A	SM	BPI44A4	None
Operations Management Techniques 4B	SM	BPI44B4	NDip Operations Management Techniques 3A & 3B (BPI33A3, BPI33B3)
Opto-Electronics 4	YM	OPE411	
Organisational Effectiveness 4A	SM	OEF44A4	
Organisational Effectiveness 4B	SM	OEF44B4	

Operations Management 4A	SM	BPJ44A4	
Operations Management 4B	SM	BPJ44B4	
Pavement Technology 4	YM	PVT411	
Physical Metallurgy 4	SM	PMY43-2	
Planning Design 4	YM	PDES431	
Power Electronics 4	YM	EEP411	
Power Systems 4	YM	EPS411	
Precise Deformation Surveys 4	SM	PDS41-1	
Pre-stressed Concrete Design 4	YM	PCD411	
Process Control 4	SM	ICP411	
Process Control 4	SM	MPE32-1	
Process Economics 1	SM	MPl11-1	
Production Engineering: Chemical Industry 4	SM	PCI411	
Production of Iron and Steel 4	YM	PRS42-2	
Production Technology 4	SM	IPT411	
Project 4	SM	RMD41-2	Research Methodology (RMD41-1)
Project Engineering 4	SM	IPE411	
Project Management 4	YM	CPM411	
Project Research 4	SM	IPR411	
Project: Chemical Engineering 4	YM	PCE411	
Project: Metallurgy 4	SM	MPJ41-1	Physical Metallurgy 4 - PMY43-2 Mechanical Metallurgy 4 TMP42-2
Protection Technology 4	YM	AEPB411	
Quality Assurance 4	SM	BQA411	
Quality Auditing Techniques 4	SM	QAT44-2	Quality Management Systems 3 (QMY44-1)
Quality Management Systems 3	SM	QMY44-1	
Quality Planning & Implementation 4A	SM	QPI44-1	
Quality Techniques 4	SM	STA4BQT	
Quantity Surveying 4	YM	BQS44-1	
Radio Engineering 4	YM	EER411	
Reactor Technology 4	SM	WER411	
Refrigeration and Air Conditioning 4	SM	RAC411	
Reinforced Concrete Design 4	YM	TGM411	
Research Methodology	SM	RMD41-1	
Research Methodology 4	YM	CRM41-1	
Research Project 4: Town & Regional Planning	YM	TRP406	
Reticulation Design and Management 4	YM	CRD411	
Satellite Communications 4	YM	ESC411	
Statistical Quality Techniques 3	SM	STA3AQT	

Strategic Management 4	SM	STM44-4	
Strength of Materials 4	SM	TSH441	
Stress Analysis 4	SM	ESA411	Strength of Materials 4 (TSH441)
Structural Analysis 4	YM	AIS411	
Structural Steel Design 4	YM	TSR411	
Systems Dynamics 4	SM	TSH421	
Theory of Structures 4	YM	TSI441	
Thermodynamics 4	SM	IMT411	
Traffic Engineering 4	YM	TVK411	
Traffic Engineering 4	YM	CVT411	
Transportation Planning 4	YM	TPP411	
Turbo Machines 4	SM	TUM411	
Waste Water Treatment Technology 4	YM	WWT411	
Water Treatment Technology 4	YM	WTT411	

EB21.4 MODULE DESCRIPTIONS: BTECH PROGRAMMES

The outcomes and assessment criteria of each module are stated in the relevant learning guides.

ACS41-1	APPLIED COMPUTER SKILLS 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Programme writing using Microsoft Visual Basic for survey applications
Content	Programme writing using Microsoft Visual Basic

TOG431	AUTOMATIC CONTROL 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to analyse and control mechanical engineering technology and manufacturing processes.
Content	Input path; Output path; Feedback process; Laplace Transformations.

BEN41-1	BUILDING ENTREPRENEURSHIP 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	An idea is not necessarily an opportunity. The focus of this course is to help you develop and systematically apply the entrepreneurial way of thinking in order to create opportunities and successfully bring them to market. The material in this course applies to new or innovative business ventures, whether they take place in new or existing firms, or in small or large firms. It is relevant for start-up and early stage entrepreneurs, entrepreneurial managers, and relevant stakeholders
Content	The Entrepreneurial Process, Idea-Generation, Entrepreneurial goals & screening ventures, Franchising, The Entrepreneur Mind in Thought and Action/ Entrepreneurial Manager, Resource requirements, Entrepreneurial Finance, Obtaining Venture and Growth Capital, The Deal, Obtaining debt capital, Managing Rapid Growth, The End of the Venture

WARA32	Chemical Engineering Technology 4A – Fluid Flow
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark(60%)
Purpose	The objectives of this course are to provide a concise introduction to the subject of fluid mechanics. Knowledge and understanding of the basic principles and concepts are essential to analyse any system in which a fluid is the working medium. The design of virtual all means of transportation requires application of the principles of fluid mechanics. The design of all types of fluid machinery such as pumps, blowers, fans, compressors and turbines clearly requires knowledge of the basic principles of fluid mechanics. The purpose of this course thus is to present the basic laws and physical concepts that provide a foundation in the analysis of any problem in fluid mechanics.
Content	The Bernoulli Equation, Fluid Kinematics, Differential Analysis, Viscous Flow in Pipes, Flow over immersed bodies, Open-Channel Flow

WARB32	Chemical Engineering Technology 4B – Unit Operations
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark(60%)
Purpose	There are many physical operations that are common to a number of individual process industries. Some of these operations involve particulate solids and many of them are aimed at achieving separation of components of a mixture. The separation of solids from a suspension by filtration, the separation of liquids by distillation, or the removal of water by evaporation or drying are typical such unit operations. Designing a distillation unit for the fermentation industry, the petroleum or the organic chemical industry is, in principle the same. The principle pf operation of any unit is therefore studied with respect to the fluid dynamics, heat or

	mass transfer from both the point of view of their individual as well as combined effects.
Content	Multicomponent Distillation, Evaporation, Crystallization, Filtration, Fluidization

WARC32	**CHEMICAL ENGINEERING TECHNOLOGY 4C – HEAT/MASS TRANSFER**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark(60%)
Purpose	Advanced modeling of heat and mass transfer
Content	Learners are equipped with the means of modeling heat and mass transfer for complex systems

CPDA411	**CHEMICAL PROCESS DESIGN 4A - EQUIPMENT DESIGN**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Learn how to apply simulation software (Chemcad), Identify the unit design process, Initiate and execute the specific equipment. (Heat exchanger and Distillation column), Calculate and estimate operating and capital costs holistically, Assess the economics of the design, Investigate safety parameters for the units, Do complex detailed unit design (Heat exchanger and Distillation column)
Content	Planning Of Project, Literature Search, Preliminary Flowsheet And Mass Balance, Submission Of Technical Memo, Computer Aided Design, Design Details Of Individual Pieces Of Equipment, Energy Balances, Hazop Study, Economic Aspects: Cost Calculations And Evaluation, Final Recommendations And Conclusions, Final Report Submitted, Costing Estimation Of Costing

CPDB411	**CHEMICAL PROCESS DESIGN 4B - PLANT DESIGN**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Identify the design process. Initiate and execute complex design projects. Calculate and estimate operating and capital costs holistically. Assess the economics of engineering design. Evaluate the economics of alternate projects and provide recommendations. Investigate safety parameters in design project. Do complex detailed design.
Content	Planning Of Project, Literature Search, Preliminary Flowsheet And Mass Balance, Submission Of Technical Memo, Computer Aided Design, Design Details Of Individual Pieces Of Equipment, Process Control And Instrumentation, Energy Balances, Hazop Study, Plant Layout, Economic Aspects: Cost Calculations And Evaluation, Final Recommendations And Conclusions, Final Report Submitted, Costing, Estimation Of Costing, Irr Calculation

CRP431	**CITY AND REGIONAL PLANNING 4**
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	Students must develop an understanding of the interrelationship among different theories of planning; how these in turn inform planning practice' and how the wider context within which theories emerged influence their development.
Content	Approaches to planning, Plan/ design evaluation, Location theory, Methods of measuring development: impact of development quality of life Analytical techniques: economic viability of regions. Enable the learner to consider and evaluate town and regional environments with reference to, and as a function of sociological phenomena.

COMS431	COMMUNITY STUDIES 4
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	*Acquaint* the learner with sociology. Provide the learner with an understanding of sociological phenomena such as Family, Groups, Culture, Social stratification, Belief systems, Education, Organizations and bureaucracy, Government and politics. Provide the learner with an understanding of the importance and relevance of sociological phenomena to town and regional planning.
Content	The book Sociology, First South African Edition is prescribed for the subject, and all chapters are studied. Refer to the table of contents of the book as below.

ECN411	COMPUTER NETWORKS 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Competent to apply engineering principles, technical knowledge and/or techniques to computer technologies by operating within relevant standards and codes relating to Network Systems
Content	Internetworking basics (OSI model, protocols, addresses); LAN protocols; WAN protocols; Bridging and switching basics; Routing basics; Network management basics; Ethernet technologies; Fiber distributed data interface; Token ring; Network Operating Systems,

TBJ421	CONCRETE TECHNOLOGY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The persons involved in concrete construction need to have a thorough understanding of the material and what is required to use it successfully. The course aims to provide knowledge on the fundamentals of concrete as a material. It also focuses on the application of these fundamentals.
Content	Properties of fresh concrete, Strength of hardened concrete, Deformation of hardened concrete, Durability, Cements, Aggregates, Water and mixtures, Concrete mix proportioning, Quality control and statistics applied to concrete, Construction practice.

TKN4B21	CONTROL SYSTEMS (MECHANICAL) 4B21
Purpose	To enable the student to study the basic components, methods, techniques and mathematical modelling in the analysis and design of control systems as well as the basics of digital systems and measurement techniques.
Content	Control systems introduction, Laplace transforms and the solutions of ODE's in the time domain, State space modelling techniques for discrete systems, Root Locus plots, Analysis of the stability of systems, Frequency domain techniques such as Bode and Nyquist plots, Design of controllers for PID applications, Design of controllers using ZN techniques, State space controller design techniques (dead beat and pole placement), Modelling of mechanical systems – specifically machines, hydraulics and thermodynamic systems, An introduction to micro-controllers in controller designs and Measurement techniques.

CON41-1	CONSTRUCTION ECONOMICS 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Appreciate the importance of microeconomic and macroeconomic principles in the analysis of the construction industry, Demonstrate the link between the construction industry and the wider economy, Appreciate the use of graphical illustrations in economic analysis and in the presentation of results.
Content	Review of economics principles, Value engineering, Financial calculations, Market valuations, Market analysis, Introduction to Property law, Introduction to town planning principles, Life cycle costing, Viability and feasibility studies

CLP41-1	CONSTRUCTION LAW AND PROCEDURES 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Understand how the Law affects the construction sector. Appreciate the different forms of contract and be able to make decisions as to which form is best suited to different types of construction. To enable a student to complete the procedures that form part of any construction process.
Content	Law of contract, Different contracts used in the construction sector, Application of contracts in the construction sector, Dispute resolution, Interim valuations, Adjustment for escalation, Final Accounts, Tenders

CMO43-1	CONSTRUCTION MANAGEMENT 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	To graduate a complete professional who understands the theories, principles and applications of the construction and project management professions
Content	Establish criteria for contract and project briefs, Manage contract and project briefs, Assess and manage contract and project risks, Manage health, safety, welfare and risk control systems, Establish and monitor contract and project teams, Manage and participate in the preparation, processing and selection of estimates, bids and tenders, Manage the planning of work methods, resources and systems to meet contract and project requirements, Control contract and project cost, quality and progress and financial claims, Co-ordinate contract and project handover and evaluation, Evaluate and advise on development factors and potential design solutions, Advise on and co-ordinate project design development, Evaluate and agree design recommendations, Advise on and secure statutory consents, Implement tenders and conclude contracts, Select personnel for activities, Manage the performance of teams and individuals, Enhance working relationships, Advise on problems and solutions, Chair and participate in meetings, Develop self and others, Manage customer care requirements and contribute to a marketing strategy and corporate image.

CQI44-2	CONTINUAL QUALITY IMPROVEMENT 4
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of Continual Quality Improvement is to provide the knowledge of tools and concepts towards recognizing, implementing and managing continual improvement initiatives. A student who completes this module will be able to identify and implement quality activities for continual improvement. The student will be able to use improvement tools such as six sigma principles, process reengineering, benchmarking, and ISO 9000 systems.
Content	Reasons for continual improvement; Assessment of Quality; Processes; Organising for Quality; Quality Culture; Six Sigma; Quality in the Manufacturing Sector, Service sector and Educational Sector; Tools for quality improvement; Theory of Constraints, Lean Principles, Reliability and Maintenance; Change Management; Quality Promotion

CMC411	CONTRACT MANAGEMENT: CIVIL 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To familiarize the student with Civil Engineering tendering procedure and awards, subcontracting, payment and disputes
Content	Civil Engineering estimating, tendering procedure and awards, contracts, site establishment and communications, measurement and payment, cost control and productivity, subcontracting, payment and disputes

ASY411	CONTROL SYSTEMS 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide knowledge of basic concepts and terminology involved with control system technology.
Content	Elementary matrix algebra; Introduction to MATLAB; System simulation using analogue computers; State space equations from transfer functions; State space representation and analysis; Solution of state space differential equations in the time domain; State space transfer function matrix; Eigen values & vectors; Transformation to obtain new state variables; Characteristics of multivariable systems; Observers for M.I.M.O. systems; Stability via the method of liapunov; State variable feedback in multi-variable systems; Modal control; System simulation with a digital computer and Sampled data systems.

DSP411	DIGITAL SIGNAL PROCESSING 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	To master the concepts of Digital signal processing
Content	Time domain analysis, Recursive filter design, Fast Fourier transform. Frequency domain analysis. Non recursive filter design

TEF441	ELECTRICAL MACHINES 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To expose students to more Electrical machines they will come across in industry, and analyse these at a deeper level than they were used to, at the lower levels.
Content	Synchronous machines; special machines; design principles applied to various machines, including those previously dealt with.

AEPA411	ELECTRICAL PROTECTION 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The qualification is intended for Professional Engineering Technologists in the field of Electrical Engineering. Persons achieving this qualification will be able to apply engineering principles, technical knowledge and/or techniques to electrical technologies in the field of power system protection, while operating within relevant standards and codes.
Content	Asymmetrical fault calculations applied to complex power networks, System earthing, Non Unit Protection: Designing and evaluating IDMT Relay Settings, Unit protection, Distance protection, Additional themes in protective relaying & industrial protection

DES411	ENGINEERING DESIGN PROJECT 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to design machinery and installations in the mechanical engineering manufacturing field.
Content	A project proposal solving practical problems in the student work place. All projects must be industry related.

TIF441	ENGINEERING MANAGEMENT 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	High level knowledge of Mine and Engineering Business Management and quantitative and qualitative management techniques and well as current labour relations. Broadly defined applications

Content	Environmental, Financial, Project, Computer Applications

MNGA411	**ENGINEERING MANAGEMENT 4A**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	High level knowledge of Mine and Engineering Business Management and quantitative and qualitative management techniques
Content	Management techniques utilized and appropriate for the Mine management activity at mid and senior level. Students gain knowledge and understanding as well as applications of the following areas: Engineering contracts; Operations management; Project management; Time value of money , including replacement/renewal strategies.

MNGB411	**ENGINEERING MANAGEMENT 4B**
Calculation Criteria	Final mark weighting = Semester mark (40%) + Exam mark (60%)
Purpose	High level knowledge of Mine and Engineering Business Management and quantitative and qualitative management techniques
Content	Management techniques utilized and appropriate for the Mine management activity at mid and senior level including the total quality management philosophy, Maintenance management , Information Management and communication systems; Financial management including budgeting processes; cost estimating and coos management, technology strategy and maintaining technology , entrepreneurial activity ethics in engineering and business.

EIE411	**ENTREPRENEURSHIP 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to develop and evaluate business plans and to solve business problems
Content	Practical Management & Teamwork, Creativity and thinking skills, The Art in Selling a skill, Business Improvement, Marketing, Business Plan development

ENS431	**ENVIRONMENTAL STUDIES 4**
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	The learner will be introduced to the science of the environment related to the environment as a systems, resources, its conservation as well as the management and evaluating the environment. Theory as background and more Town & Regional Planning specific aspects and implications would be focused on when considering new development proposals
Content	The environmental crisis humans are faced with according to the Systems approach as research model, An ecosystem regarding to structure and composition, Eco-dynamics, Classification and organization in the ecosphere, The role of humans in the ecosystem, The environment as a resource, Environmental degradation, Environmental conservation, Resource management, Managing and evaluating the environment, The student will develop ethical considerations related to the environment, The student will have an implication understanding regarding land use applications.

MFM41-1	FERROUS METALLURGY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	On completion of this module the technologists will have acquired the necessary knowledge to understand and supervise some of the operational processes used by the local pyrometallurgical industry, effectively
Content	Blast furnace iron making, Other smelting processes including COREX, Pre-treatment of hot metal, BOP steel making, EAF steel making, Stainless steel making, Ladle metallurgy and casting

BFA44A4	FINANCIAL PLANNING AND CONTROL 3A
Refer to the Rules and Regulations of the Faculty of Economic and Financial Sciences for more information.	

BFA44B4	FINANCIAL PLANNING AND CONTROL 3B
Refer to the Rules and Regulations of the Faculty of Economic and Financial Sciences for more information.	

TFE441	FLUID MECHANICS 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to analyse and solve engineering problems in the fluid-dynamics technology and manufacturing fields
Content	Provide advanced knowledge to analyse and solve engineering problems in the fluid-dynamics technology and manufacturing fields

CFE411	FOUNDATION ENGINEERING 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Successful completion of this module should equip the learner with detailed knowledge which is required for the design of shallow and deep foundations.
Content	Site Investigations, Shallow Foundations, Piling

GIS431	GEOGRAPHIC INFORMATION SYSTEMS 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The learner will understand basic principles regarding utilizing a tool such as a Geographic Information System as well as have the platform on the application thereof, as to be enabled to use these principles and application platforms in the office environment to assist in solving day-to day decision-making problems regarding Town & Regional Planning matters. Learners will have obtained the unique opportunity to spend time on some of the most leading GIS software currently utilized in the South African as well as International market, namely ArcView
Content	The main components of a GIS system, Organize a GIS project, Spatial Coordinates, Spatial data into a project, detecting and correcting different error types, Get new information into a project and relate attributes to the new spatial information, Construct a database, Display information in the format of a map, perform database queries and spatial analysis. Practical: Software based: ArcView 3.2

TGN411	GEOMETRIC DESIGN 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To familiarize the student with all aspects of geometric design of roads.

Content	Route Location, environmental impact, basic design considerations and final design, horizontal and vertical alignment, cross-sectional elements, safety barriers, roundabout, intersection and interchange design, removal of services and expropriation, earthworks and drainage design, lighting, road safety, signposting and standard details, report writing.

GEOS411	**GEOSTATISTICS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Given a typical area of a mine, the student must analyse the data using relevant geostatistics techniques and associated computer programmes to evaluate the mineral reserve of the mine
Content	Project for Geostatistics

GEOP411	**GEOSTATISTICS PROJECT 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Given a typical area of a mine, the student must analyse the data using relevant geostatistics techniques and associated computer programmes to evaluate the mineral reserve of the mine
Content	Project for Geostatistics

HRM411	**HUMAN RESOURCES MANAGEMENT: CIVIL 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To familiarize the student with labour legislation, recruitment and selection, employment contracts, dismissal, discipline and management thereof, dismissal, dispute resolution, negotiations and specialised negotiation areas.
Content	Labour legislation, recruitment and selection, employment contracts, dismissal, discipline and management thereof, dismissal requirements, dispute resolution, introduction to negotiation and specialised negotiation areas.

THD411	**HYDRAULICS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide knowledge required for solving basic hydraulic problems as applicable in civil engineering.
Content	Fluid properties, pressure in fluids, hydrostatic forces, buoyancy, fluid flow, constricted flow meters, notches and weirs, uniform and non-uniform flow in open channels

THB411	**HYDROLOGY 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Be familiar and capable of applying basic hydrological principles as applicable in civil engineering.
Content	Surface water, Flood analysis, SA Hydrology, Water resources analysis, Water storage, Environmental impact, Ground water

MIL41-1	**INDUSTRIAL MINERALS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	After completion of this module the learner should be able to construct flowsheets, supervise a metallurgical plant operation and solve production problems relating to throughput , yield of the desired products and efficiencies in the industrial minerals industry

Content	General metallurgical terminology, connection between pyrometallurgy and hydrometallurgy and their connections with thermodynamics. Also, the recovery of minerals as well as gems based on their properties.

	INDUSTRIAL PROJECT 4
Calculation Criteria	Final mark weighting = Portfolio(100%)
Purpose	The student will demonstrate: his / her ability to complete a project at B-Tech level, his / her ability to apply theory at B-Tech level, analyse and compare options, carry out studies, evaluate solutions, and come up with recommendations to solve engineering problems, that he / she has spent a minimum of 240 hours doing the project work, that the he / she presents their own work, that he/ she has applied engineering judgment appropriate to B-Tech level, that he / she has created and carried out a project plan, that he / she has produced written reports and oral presentations to comply with the communication requirements at a B-Tech level.
Content	Project work

IRN211	**INDUSTRIAL RELATIONS AND NEGOTIATIONS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To familiarize the student with labour legislation, recruitment and selection, employment contracts, dismissal, discipline and management thereof, dismissal, dispute resolution, negotiations and organization negotiation areas.
Content	Labour legislation, recruitment and selection, employment contracts, dismissal, discipline and management thereof, dismissal requirements, dispute resolution, introduction to negotiation and specialised negotiation areas.

IIS411	**INFORMATION SYSTEMS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to develop and design a database in Microsoft Access.
Content	Data modelling and analysis, Database design, Fact-finding and information gathering, Information system building blocks, Information system development, Systems analysis, Project feasibility

ILE411	**LOGISTICS ENGINEERING 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The purpose of the module is to give direction in the subject matter of logistics engineering, and the associated management processes, e.g. supply chain management
Content	Introduction to business logistics, Competitive advantage created by logistics, Logistics channel strategy, Logistics planning, Procurement management, Inventory management, Design of storage and handling systems, Operation of a warehouse, The transport system, Transport management, International logistics, E-business in logistics.

OHB41-1	**MAINTENANCE MANAGEMENT 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The purpose of this course is to allow the candidates to have an understanding and be able to offer a functional and professional approach to organizations' requirements in managing their facilities through people and process related practices
Content	Maintenance Management: Introduction to Property Maintenance, Execution of to Property Maintenance, Property Maintenance Programmes, Building Condition Assessment, Budgeting for Maintenance Work, Prioritising of Maintenance Work,

	Maintenance Contracts, Principles of Life Cycle Costing, Structure of the Maintenance Department. Facilities Management: Introduction to facilities management, Maintenance management, Principles of facilities management, Planning for effective facilities management, Space and services planning, Management of services, Outsourcing of facilities management, Service level agreements, Performance measurement, Bench marking

BEB41-1	**MANAGEMENT ECONOMICS 3**
Refer to the Rules and Regulations of the Faculty of Economics and Financial Sciences	

TPM431	**MANAGEMENT FOR PLANNERS 4**
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	Public Administration, Public Economics, The Balanced Scorecard – measuring and managing business strategy , Financial Perspective, Customer Perspective, Internal-Business-Process Perspective, Learning and Growth Perspective, Linking Balanced Scorecard Measures to your Strategy, Structure and Strategy, Management – Planning, Organising, Budgeting and Controlling, Marketing, The Marketing Plan, Professional practice, Professionalism , Business ethics, Code of conduct, Office administration, Information Technology in the office environment, Personal management e.g. time management; stress management
Content	Introduction – overview of the subject, Public Administration and Public Economics, The Balanced Scorecard, Management and marketing, Professional Practice, Office administration, The following weeks will be spent on in-depth lecturing, self-study of and assignments on the various aspects of the subject as outlined above.

TMP42-2	**MECHANICAL METALLURGY 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The purpose is to give B Tech students an in depth understanding of the engineering materials, both plastic and elastic deformation, as well as the fracture processes encountered in engineering material. The course focuses on both micro and macro deformation characteristics and fundamental approaches to it.
Content	It relates to principles and concepts in the following subjects, Materials testing, Deformation, and Physical metallurgy and specifically covers deformation, fracture mechanics, environmental assisted crack propagation, time dependant deformation, fatigue crack propagation and failure analysis

TMB441	**MECHANICS OF MACHINES 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to solve complex engineering problems in the solid mechanics field.
Content	Introduction to Vibrations; Torsional Vibrations; Forced Vibrations; Forced-damped Vibrations; Transverse Vibration of Beams; Whirling of Shafts; Vibration Monitoring; Vibration analysis software.

MGG32-2	**METALLURGICAL GEOLOGY 3**
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)
Purpose	To develop a knowledge of methods of mineral separation, identification of ores and their associations with gangue minerals using the polarising reflecting microscope, and a knowledge of process mineralogy.
Content	Process mineralogy, ore microscopy, mineral processes and mineralogy, advanced mineralogical methods

MTP4111	**METALLURGICAL PROJECT 4111**

Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The purpose of this module is to make learners competent in Identifying researchable metallurgical problem(s) at the plant, in the industry and/or in the metallurgical field. Setting up the relevant research methodology to approach the above identified research problem(s) Drafting the research project flow-sheet Writing up the research proposal for the identified problem(s)
Content	Introduction to the concept of "Research"; identification and statement of research problem(s), setting research questions; introduction to research methodology concepts, introduction to research instruments; phenomenological research and active experimental research; use of research instruments; presentation of experimental data; graphs; analysis and interpretation of results; use of statistical packages; summarizing the scope of a research work in a high level project flowsheet, introduction to research proposal writing, academic and technical report writing

MTP4112	**METALLURGICAL PROJECT 4112**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	On completion of this module learners will acquire the necessary skills to - conduct research work in the process of addressing Identified researchable metallurgical problem(s) at the plant, in the industry and/or in the metallurgical field. -apply relevant research methodology to approach the above identified research problem(s) -analyse, interpret and discuss the data obtained -write a research report
Content	Introduction to the concept of "Research"; identification and statement of research problem(s), setting research questions; introduction to research methodology concepts, introduction to research instruments; phenomenological research and active experimental research; use of research instruments; presentation of experimental data; graphs; analysis and interpretation of results; use of statistical packages; summarizing the scope of a research work in a high level project flowsheet, introduction to research proposal writing, academic and technical report writing, conducting research work and writing the final B-Tech report

MPE42-1	**METALLURGICAL PROJECT MANAGEMENT 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	After completion of this module learners should be able to plan a metallurgical project with due regard to quality, finance , and timing
Content	Introduction, project life cycle, project selection, estimating, presentation, project integration, scope management, time management, cost management, quality management, human resources, procurement management

THM32-1	**METALLURGICAL THERMODYNAMICS 3**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Thermodynamics III is continuation of work done at diploma level. In this course student are taught to work independently and solve problems related to their practical work. Emphasis is given to practical problem solving with the help of study guide and the prescribed text book. The theoretical background is assumed to have been gained at diploma level. In this cause application of thermodynamic laws in solving problems is tested. Minimum contact with the lecturer is exercised. Students are supposed to consult the lecturer in cases where they have problems.
Content	Enthalpy – Hess's Law, La Place's Law, Kirchoff's equation, Example and problem solving. Entropy – The second Law, Calculations, Randomness, Basic equation of Statistical Thermodynamics (S=KlnW), Calculations involving entropy, Second law

	equation, Gibbs-Helmholtz and calculations, The effect of temperature on the feasibility of a reaction, Mathematical and Graphical solutions to problems. Law of mass action, chemical equilibrium activities – Van't Hoff Isotherm and Iso-chore, Dissociation pressures, Effects of temperature on Equilibrium, The variation of vapour with temperature, Clausius-Clapeyron Equation, Application of ΔG vs. T diagrams to metal extraction and processing, Ellingham diagrams and problems. Law of mass action, chemical equilibrium activities – Van't Hoff Isotherm and Iso-chore, Dissociation pressures, Effects of temperature on Equilibrium, The variation of vapour with temperature, Clausius-Clapeyron Equation, Application of ΔG vs. T diagrams to metal extraction and processing, Ellingham diagrams and problems. Liquid metal solutions – Weight and atomic percentages, Ideal solutions and activity, Raoult's Law, Non-ideal or real solutions, The Gibbs-Duhem equation, Henry's Law, Partial molar quantities, Multi component solutions and Interaction Coefficients, Thermodynamics of the mixing of solutions, Excess thermodynamic quantities, Gasses in metals, Cell thermodynamics, Variation of Redox Potential with pH (Pourbaix Diagrams), Determination of Thermodynamic Quantities – using reversible electrochemical cells, Electrochemical Cells based on Solid Electrolytes, Slag chemistry. Reaction Kinetics – Reaction orders, Reversible reactions, Determination of the order of a reaction, Experimental Techniques, Effects of Temperature on Reaction rates, Theories of Reaction Rates.

MDS411	**MICRO SYSTEMS DESIGN 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	To understand and demonstrate understanding of the architecture of a DSP, and implement DSP algorithms on a DSP processor
Content	Introduction to the DSP micro-controller, architecture, Peripherals. Addressing modes. Instruction set. Programming the dsPIC30F Digital Signal Controller dsPIC30F, hardware specifications, Interrupts & Trap Processing DSP System Design (laboratory sessions)

MCS411	**MICROCONTROLLER SYSTEMS 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	To understand and demonstrate understanding of the use of the peripherals of a microcontroller and apply in interface design.
Content	Extended interrupt structure On-chip timer/counters On-chip serial port structure
	A/D converter Parallel Slave Port Power reduction modes
	Development. Self study/consultation topics: Micro-controller applications

MSL41-1	**MINERAL SURVEY LEGISLATION 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Application of relevant legislation in the Mining environment
Content	Application of relevant legislation in the Mining environment

MINA411	**MINING 4A**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	High level knowledge of Mine design including all services and all variations of Underground operations
Content	To ensure an up to date knowledge of current mining practices and encourage a meaningful interest in the state of the art of mining and mining technology.

MINB411	**MINING 4B**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)

Purpose	High level knowledge of specialized mining activities – marine, small scale and development of surface mining activities and quarry methodologies
Content	Content of Metal and Coal Mining applicable to Management, Computer Applications link with projects, Extended Surface Mining, Small Scale Mining, Marine Mining

MES41-1	**MINING ECONOMICS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Given a typical area of a mine, the student must analyse the data using relevant valuation techniques to evaluate the mineral reserve of the mine
Content	Evaluation of Mining Projects using financial parameters

MLG42-1	**MINING LEGISLATION 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide a broad knowledge of mining related legislation. Provide an in dept knowledge of Mine Health and Safety Act and its applicable regulations.
Content	The Mine Health And Safety Act And Regulations With Amendments, The Minerals Act Regulations Applicable To Mines, Other Legislation, Courts And Enquiries, Applications For Permissions And Exemptions

MPT42-1	**MINING PROJECT 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Integration of all mining technologies into a mine project to meet all ECSA outcomes broadly defined
Content	Full presentation of Greenfield project and theory of project management

MTLA411	**MINING TECHNICAL SERVICES 4A**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide a strong knowledge of Rock Mechanics and Mine Environmental control with solving of broadly defined problems associate with Coal and Metal mining
Content	Dust, Gases, Air Flow, Fans, Ventilation Practice, Reports Etc, Emergency Management, Noise Light Water Radiation, Hazardous Substances, Heat And Psychrometry, Efrigeration, Ventilation Planning, Environmental Management, Rock Engineering, Support Systems And Materials, Local Support, Regional Support, Shaft Pillars, Rock Bursts, Slope Stability, Special Applications: Spontaneous Combustion, Emergency Management, Other Aspects. Metallurgical Practice Revision

MTLB411	**MINING TECHNICAL SERVICES 4B**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To ensure an up to date knowledge of current mining services practices and encourage a meaningful interest in the state of the art of mining and mining technology. Extend knowledge of particularly Rock Mechanics and Ventilation applied to both metal and coal mining. Broadly defined
Content	Content of Metal and Coal Mining Tech Services applicable to Management. Computer applications. Revision and added content to reach the level of the Vent Cert and Rock Mechanics Cert

MNF41-2	NON-FERROUS EXTRACTION METALLURGY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	On completion of this module learners will have acquired the knowledge to understand various non ferrous extraction metallurgical plant processes in order to be able to evaluate process efficiencies and solve operational challenges on non ferrous metallurgical plants
Content	Copper; Lead; Zinc; Aluminium; Platinum GoldUranium.

BPJ44A4	OPERATIONS MANAGEMENT 4A
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Upon the successful completion of this module a student shall possess sound understanding of process capability concepts, techniques and applications. A student is equipped with the necessary competencies and skills to apply process capability analysis for resources optimization in operations management. A student will thus be able to recognize and implement applicable manufacturing / service planning and control system strategies for an organisation and at the same time recognize “specific needs” required for operations process / system to function optimally.
Content	Identify strategic / specific factors affecting service / manufacturing planning and control systems; Understand and be able to identify trends and changes and the impact thereof in world class manufacturing / services with specific references to individual case studies; Understand and apply the dynamics of: Strategic Process Design in Quality & Operations Management; Strategic Planning, application and control of quality in an operations management environment; Strategic capacity and risk analysis planning; Capability Models as applied in process evaluation, optimization and control; Value Chain and impact thereof in operations management; Identify factors which enhance organizational performance and throughput, (1) Quality (2) Process Improvement through Total Quality Management Practices; Failure / Prevention strategies; Identify factors which enhance organizational performance and throughput, (1) Quality (2) Process Improvement (3) Understand, identify and apply Total Quality Management Principles (4) Failure Prevention.

BPJ44B4	OPERATIONS MANAGEMENT 4B
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Upon the successful completion of this module a student shall possess sound understanding and application of process capability concepts, techniques and applications. A student is equipped with the necessary competencies and skills to apply process capability analysis for resources optimization in operations management. A student will thus be able to recognize and implement applicable manufacturing / service planning and control system strategies for an organisation and at the same time recognize “specific needs” required for operations process / system to function optimally and be able to present the output results via a research project.
Content	The research project will cover all aspects of operations management strategies which can have an impact on strategic capacity, risk analysis and capability Models as applied in process evaluation, resource optimization and control; Identifying factors which enhance organizational performance and throughput, (1) Quality (2) Process Improvement through Total Quality Management Practices; Identify factors which enhance organizational performance and throughput, (1) Quality (2) Process

	Improvement (3) Understand, identify and apply Total Quality Management Principles (4) Failure Prevention.

BPI44A4	**OPERATIONS MANAGEMENT TECHNIQUES 4A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	A student who has completed this module will have acquired the necessary knowledge and understanding of the application of Operations Management Techniques and thus be able to apply Management Science and Operations research techniques. On a practical level the student should demonstrate an insight into the application of scientific method that involves a scientific approach to decision making in the operations of organisational systems. Upon the successful completion of this module a student shall possess sound understanding of be able to recognize and implement applicable manufacturing / service planning and control system quantitative / qualitative strategies for an organisation. Operations Management Techniques thus provides decision making techniques and models needed for assisting in the efficient running of organisations. The course will seek to pinpoint the need for an integrated framework that incorporates the design, organisation, planning, control and continuous improvement of all value-adding operations of any organisation. To achieve such a task, Operations Management techniques focuses on optimising all internal processes and resources in the context of resources constraints. The overriding aim is for the organisation to offer products or services that are cost competitive, of consistently high quality, and meet the dynamic delivery objectives of flexibility, dependability and speed. As a result, most of the Operations Management technique principles can be used in any organisation be it in private, public or not-for-profit sectors
Content	Able to formulate all types of linear Programming models and solve for optimality of the scarce resources; Understand and be able to formulate Advance Linear Programming models using simplex solution method; Understand and be able to apply sensitivity analysis duality and dual analysis in the linear programming models and optimal solutions; Understand and be able to formulate Transportation and Assignment problems and solve for optimality; Understand and be able to apply the Management science approach to problem solving. Illustrating using examples from model building or break even analysis.

BPI44B4	**OPERATIONS MANAGEMENT TECHNIQUES 4B**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	Understanding of the application of Operations Management Techniques and thus be able to apply Management Science and Operations research techniques. On a practical level the student should demonstrate an insight into the application of scientific method that involves a scientific approach to decision making in the operations of organisational systems. Upon the successful completion of this module a student shall possess sound understanding of be able to recognize and implement applicable manufacturing / service planning and control system quantitative / qualitative strategies for an organisation. Operations Management Techniques thus provides decision making techniques and models needed for assisting in the efficient running of organisations. The course will seek to pinpoint the need for an integrated framework that incorporates the design, organisation, planning, control and continuous improvement of all value-adding operations of any organisation. To achieve such a task, Operations Management techniques focuses on optimising all internal processes and resources in the context of resources constraints. The overriding aim is for the organisation to offer products

	or services that are cost competitive, of consistently high quality, and meet the dynamic delivery objectives of flexibility, dependability and speed. As a result, most of the Operations Management technique principles can be used in any organisation be it in private, public or not-for-profit sectors.
Content	Non-linear objective functions and/or non-linear constraints; identify conflicting objectives and attempt to obtain a compromised optimal solution; Markovain analysis using practical examples such as equipment maintenance and failure problems; account receivables to estimate the amount of account receivables that will ultimately become bad debts and stock market price movements; formulate Project Management networks and Gantt charts. As well as be able to analyse probabilistic activity times and solve for Project crashing and time/cost trade off for optimality; analyse and report on real life problems using case studies and recommend good and acceptable managerial decisions.

OPE411	**OPTO-ELECTRONICS 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The study of optics and electro-optics concerns the generation of electromagnetic waves, the transmission of information through optical systems as well as the detection of the information
Content	The generation of electromagnetic radiation, the transmission of radiation through free space or interaction with other materials, modification of radiation by free space or by interaction with other materials, image formation and optical signal processing with various optical systems, detection of radiation.

OEF44A4	**ORGANISATIONAL EFFECTIVENESS 4**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	To prepare students to function as a manager of an internal Organisational Development staff function in a goods or service producing organisation with profit- or not-for-profit objectives. The candidate will be able to diagnose, design, and facilitate and lead the implementation of management processes through all levels and functions of organisational activity.
Content	Corporate strategy management. The mission and chosen strategy directs all initiatives and often demands some form of change to be effected in the organization; Change and the management of planned change. This requires insight of the behavioural sciences; i.e. building from the study of organizational behaviour from the 3rd year. Behavioural science not only is a powerful tool, but also must be applied judiciously to ensure success and requires amongst others, consultation and negotiation skills and a good understanding of the process of organizational development; Before any intervention can be launched, the organization must be diagnosed to determine objectives of change and to ensure that all the correct issues are addressed during the intervention process and that a process can be designed to suit the specific needs of the organization; Different types of interventions require different sets of knowledge and skills. A consultant facilitating change and organizational development must be able to distinguish the different types: Human process-, Techno-structural-, Strategic-and Human resource interventions.

PVT411	PAVEMENT TECHNOLOGY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To equip students with understanding and ability to undertake the design, construction, maintenance and rehabilitation of roads and stormwater structures employing best practices available
Content	Road construction materials, Pavement design methods, Pavement maintenance, Surfacing seals – TRH 3

PMY43-2	PHYSICAL METALLURGY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To give the student a deeper understanding of the fundamentals of physical metallurgy.
Content	Thermodynamics review, Free energy and phase diagrams, Solidification, Crystallographic Transformation - Transformation of Cold Worked Material, Diffusional Transformations in the solid state

PDES431	PLANNING DESIGN 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The student will be introduced to the Strategic Planning process. The purpose of this module is further to provide the student with an understanding of the Integrated Development Planning process as well as the Integrated Development Plan (IDP) as a legal requirement for Development Panning in South Africa. The module is further aimed at ensuring that the students achieve competency in the drafting of Spatial Development Frameworks and thus enabling students to implement principles and theories relating to development panning in such plans. The student will also be introduced to planning at a metropolitan scale within the international context.
Content	Strategic Planning, Integrated Development Planning, Spatial Development Frameworks, Metropolitan Planning

EEP411	POWER ELECTRONICS 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Contact, self study, assignments, presentations
Content	Review of Controlled Rectifiers; Review of DC-DC Converters; DC-Drives; Switch-Mode Power Supplies and AC-Drives

EPS411	POWER SYSTEMS 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	To gain understanding, demonstrate the ability to apply fundamental engineering concepts, to analyse, assess, and solve engineering problems in the areas of: Transmission line parameters; Power Line performance; Load flow analysis; and System stability.
	To get exposure to and apply appropriate industrial engineering software as part of a design project, pertaining to Power System Analysis (Dig SILENT student version), in order to assess and evaluate alternatives.
Content	Transmission Line Design Parameter, Steady state operation of transmission lines, Multiport representation of power stems and load flow analysis, Control of power, Transient operation of transmission lines, Stability, High Voltage DC transmission

PDS41-1	PRECISE DEFORMATION SURVEYS 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Refer to the Learning Guide for more information on the module.	

PCD411	PRE-STRESSED CONCRETE DESIGN 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Refer to the Learning Guide for more information on the module.	

MPE32-1	PROCESS CONTROL 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	After completion of this module the learner should be able to establish simple mathematical models that allow for the optimisation, elimination of disturbances and stabilization of the process, thereby yielding the desired products and efficiencies on metallurgical unit operations
Content	The content covers the importance of process control in metallurgical plants. The terminology, the incentives for process control, the construction of useful mathematical models, design of controllers etc in order to generate and discuss alternative control configurations, thus providing the analytical tools for analysing the response of different loops

ICP411	PROCESS CONTROL 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The primary purpose of this module as an integral part of the Baccalaureus Technologiae degree in Chemical Engineering and Extraction Metallurgy is to introduce students to process control techniques in the chemical engineering and extraction metallurgy industries and to introduce them to different process control strategies and how to design them which is very fundamental in the chemical engineering industry.
Content	Understand the role of process control in process operations (chemical engineering industry), Develop familiarity with the basic hardware and instrumentation needed to implement process control, Obtain mathematical models of processes by writing unsteady-state mass and energy balances, Develop simple, empirical models that are used for designing controllers, Analyse dynamic systems using matrix algebra and Laplace transforms, Design and tune feedback controllers, Analyse stability and performance of feedback loops using Laplace and frequency domain techniques, Understand advanced control strategies, Apply advanced multivariable control and statistical process control to chemical processes, Simulate dynamic behaviour of chemical processes and control systems, Acquire hands-on experience with process control hardware and strategies through a significant laboratory experience.

PCI411	PRODUCTION ENGINEERING: CHEMICAL INDUSTRY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide learners with the tools to solve problems encountered in the chemical industry.
Content	Learners are equipped with the means of modeling heat and mass transfer for complex systems.

MPI11-1	PROCESS ECONOMICS 1
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To introduce learners to financial principles in the context of metallurgical plant processes. These include budgeting, fixed and variable costs, interest, management accounting, project evaluation, project scheduling, supply and demand, financing loans, productivity capital investment and linear programming
Content	Financial and economic assessment of projects and processes

PRS42-2	PRODUCTION OF IRON AND STEEL 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	After successfully completing this course, the student shall be familiar with the theory and practice of the various methods of steel making and should now be able to contribute not only to routine maintenance of quality in a steelmaking and related environment, but also to technical problem solving, improving quality by improving processes
Content	Physics & chemistry of steel and slag, Thermo-chemistry & Thermodynamics. Kinetics : rates of reaction, Gases, Physiochemical properties of steel, Physiochemical properties of molten slag, Equilibrium data on liquid steel – slag reactions, Mass & heat balances, Steelworks.

IPT411	PRODUCTION TECHNOLOGY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide deeper understanding of a concept of a complete manufacturing system.
	Introduce the student to the Flexible Manufacturing Systems and Computer Integrated Manufacturing models and tools.
	Introduce the student to the design and operation of modern flexible manufacturing and assembly systems.
Content	Manufacturing Operations, Manufacturing Systems, Advanced Manufacturing Systems, Product Design and CAD/CAM in the Production System, Process Planning and Concurrent Engineering, Production Planning and Control Systems, Lean Production and Agile Manufacturing, Quality Control Systems

IPE411	PROJECT ENGINEERING 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The purpose of the module is to provide skills and knowledge in project management.
Content	Definition of a project and project management, Project life cycle, Project selection, Feasibility studies, Estimation of a project, Project integration, Scope management, Time management, Cost management, Quality control, Human resources

CPM411	PROJECT MANAGEMENT 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To familiarize the student with principles and tools of project management, time scheduling techniques and control, cost estimating, budgeting and control, risk and procurement management, contract close-out and team leadership
Content	Planning of projects, principles and tools of project management, time scheduling techniques and control, cost estimating, budgeting and control, risk and procurement management, contract close-out and team leadership

IPR411	PROJECT RESEARCH 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	After completing Project Research IV, learners will be able to demonstrate skill of identifying an industrial engineering problem, designing and planning methods and means to address it, conducting related research, taking information in, digesting it and applying it in specific situations as required. Although extensive and well explained lectures notes will be handed to learners, they should also broaden the base of their knowledge using the library and the internet. Due to the dynamic characteristic of the service and manufacturing industries and the rapid change of technology learners will need to keep up with the latest developments throughout their career.
Content	Introduction, Presentation of Research methodology concepts, Acceptance of Topics after discussing with learners, project flowsheet, project proposal, learners are assisted while they are conducting their research work, presentation, Feedback, Report writing, Report submission

PCE411	PROJECT: CHEMICAL ENGINEERING 4
Calculation Criteria	Final mark weighting = Portfolio(100%)
Purpose	To expose students to the key elements of managing an engineering task through all stages of the project life cycle.
Content	To provide knowledge on how to undertake the management of an engineering project.

MPJ41-1	PROJECT: METALLURGY 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Project Metallurgy IV is based on applying theory to a practical aspect of metallurgy in the form of a project. It encompasses the broad base of metallurgy used during the diploma studies. Emphasis is given to practical problem solving with the help of study guide and the prescribed text book. The theoretical background is assumed to have been gained at diploma level. In this cause application of Metallurgy learnt previously in solving problems is tested. Minimum contact with the lecturer is exercised. Students are supposed to consult the lecturer in cases where they have problems.
Content	This is a project based course wherein a student completes a project based upon aspects of physical, engineering, mechanical and practical metallurgy

AEPB411	PROTECTION TECHNOLOGY 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The qualification is intended for Professional Engineering Technologists in the field of Electrical Engineering. Persons achieving this qualification will be able to apply engineering principles, technical knowledge and/or techniques to electrical technologies in the field of power system protection, while operating within relevant standards and codes
Content	Introduction to protection, Symmetrical fault calculations and theory, Grading of I.D.M.T. relays, Protection and measurement transformers Circuit Breaking and Fuses

QAT44-2	QUALITY AUDITING TECHNIQUES 4
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	The purpose of Quality Auditing Techniques is to provide the tools and concepts for the professional auditing of quality systems and to meet the requirements for

	registration to SAATCA (Southern African Auditor & Training Certification Association).
Content	Principles of auditing; Audit Management; Planning Audits; Conducting audits; System surveillance; Inconsistencies in ISO 9001; Code of Ethics; ISO 9004 standards; ISO 19011; Quality Assurance; Auditing Formats; Auditing Practical

BQA411	**QUALITY ASSURANCE 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide advanced knowledge to analyse, solve and improve quality related problems in the service and manufacturing industries.
Content	Quality Assurance, Quality Improvement Methods, Quality Management Methods, Statistical Control, Process Capability, Inspection Methods, Six Sigma Management, ISO 9000,

QMY44-1	**QUALITY MANAGEMENT SYSTEMS 3**
Calculation Criteria	
Purpose	The purpose of Quality Management Systems III is to provide the knowledge and skills for the understanding and requirements for the implementation of quality systems.
Content	ISO 9000:2000, Quality Management Systems – Fundamentals & vocabulary; ISO 9000 registration requirements; ISO 9001:2000, Requirements of quality management systems; ISO 9000 documentation requirement; ISO 14000 Environmental Management Standard; OHAS 18000 Standard; ISO 22000 Food Safety standard Including HACCAP; ISO 17025 Laboratory Standard including General Laboratory Practice (GLP); Integrating all Safety, Health, Environmental, Risk and Quality Standards.

QPI44-1	**QUALITY PLANNING & IMPLEMENTATION 4A**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	To provide the knowledge and skills for the understanding and requirements for the implementation of quality systems.
Content	Management Functions; Different Perceptions of Quality; Quality Theory; Global Quality and International Awards; The voice of the Customer; The voice of the Market; Quality in Product and Service; Quality in processes; Quality Management Systems; Quality Implementation Model and quality function deployment; Quality Tools; Strategic Quality Planning

STA4BQT	**QUALITY TECHNIQUES 4**
Refer to the Learning Guide for more information on the module.	

BQS44-1	QUANTITY SURVEYING 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	The general objective of this offering or course is to introduce and expose the learner to the theory and *practice of Quantity Surveying* with the focus and emphasis not only on measurement of the specialist work but also to develop and appreciation and understanding of professional Quantity Surveying practice.
Content	Descriptive quantification and documentation for: Building work all in accordance with the SSM 6th edition and model preambles/preliminaries, Civil engineering work all in accordance with the CEQ 90 and SANS 1200/COLTO, Mechanical work and Electrical work. Construction Contracts for the purpose of professional practice – CIDB. ASAQS bylaws, constitution and code of professional conduct for the purpose of professional practice and CPD. ASAQS bylaws, constitution and code of professional conduct for the purpose of professional practice and CPD.

EER411	RADIO ENGINEERING 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide knowledge relating to radio engineering, i.e. spectral analysis, digital radio, frequency generation, noise and antennas.
Content	Spectral analysis, digital radio, frequency generation, noise and antennas.

WER411	REACTOR TECHNOLOGY 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	WER411 course will cover mole, material and energy balances, Conversion and Reactor Sizing, Rate Law and Stoichiometry, Isothermal Reactor Design, Collection and Analysis of rate Data and finally multiple reactors.
Content	Mole balance, Conversion and reactor sizing, Rate law and stoichiometry, Isothermal reactor design, Collection and analysis of rate data, Multiphase reactors

RAC411	REFRIGERATION AND AIR CONDITIONING 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to analyse and solve engineering problems in the refrigeration and air conditioning technology and manufacturing fields
Content	Mixture of ideal gases and vapours; Psychrometry, Heat transfer and cooling, Refrigeration, Cold storage, Solar power.

TGM411	REINFORCED CONCRETE DESIGN 4
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Be familiar and capable of analysing structural elements in the civil engineering field.
Content	Design of reinforced concrete structures, Computer applications, Bending, shear, bond, and torsion, Beams, slabs and stairs, Columns, cylindrical shell structures, Arches, silos and bunkers, Water retaining structure

CRM41-1	RESEARCH METHODOLOGY 4
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	By participating and applying the principles that the learner will be able to master the following: Identify and solve problems Work effectively as a member of a team, Communicate effectively verbally and in writing, Demonstrate the ability to prepare an analytical document into specific areas of construction research, Collect, analyse, organize and critically evaluate information.

Content	Writing skills, Business communication, Business reports, Research, Planning and design, Setting of problem, Review of related literature, Discovery of knowledge, Data, Writing the research proposal, Methodologies of research design, Types of sampling, Bias in research, Role of statistics as a method of adding meaning to data, Experimental method, Measurement and evaluation. Validity and reliability, Production of technical research report related to building, Presenting the results of research, Writing the research report, Style format and readability of report

RMD41-1	**RESEARCH METHODOLOGY**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	BTech students should start to appreciate a sense for the methodological aspects of their respective disciplines. This module aims to provide the student with the necessary knowledge, understanding and skills needed to not only encourage the practice of research, but also to conceive a scientifically written, fully implementable, academically and methodologically sound research proposal.
Content	

RMD41-2	**RESEARCH PROJECT 4**
Refer to the Learning Guide for more information on the module.	

TRP406	**RESEARCH PROJECT 4: Town & Regional Planning**
Calculation Criteria	Final mark weighting = Semester Mark (100%)
Purpose	To make the student to be knowledgeable in research techniques and be able to identify researchable planning problem (s) and to be able to set up relevant research methodology to approach the problem.
Content	Introduction to the concept of “Research”; identifications and statement of research problems and procedures. Research topic and problem in planning and crystallization of same; Principles of literature review and research gap identification; Theoretical and conceptual frameworks formulation; Hypothesis Testing; Types and forms of data in planning; Definitions and Measurements of Variables in planning; Research Instruments and Questionnaire Design in Planning; Sample Selection and Sample techniques in data collection; Overview of Quantitative Techniques involved in data analysis; Data presentation, summary, Inferences’ drawing and Planning/Policy Implication of Findings; Research documentation skills

CRD411	**RETICULATION DESIGN AND MANAGEMENT 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Provide knowledge required for designing basic water and sewer reticulation networks.
Content	Water demand, analysis of pipe flow, pipe systems, water reticulation networks, network design, sanitation systems, sewer design, stormwater run-off, management of water distribution networks

ESC411	**SATELLITE COMMUNICATIONS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The purpose of this course is to: Recognise and evaluate the application and problems associated with satellite communications, Understand the operation, design and function of orbital mechanics and launchers, Investigate and compare the in-house and out-house operation of satellites including tracking systems and

	control. Formulate satellite antenna design principles, Analyse a satellite network and design of a comprehensive satellite ground to space link, Analyse and investigate the performance and characteristics of modulation and multiplexing techniques for satellite links, Select appropriate multiple access techniques and appraise differences between them, Analyse multiple propagation effects and their impact on satellite to earth link networks, Evaluate multiple access schemes for Very Small Aperture Terminals (VSAT), Differentiate between Low Earth Orbit and Non Geostationary orbits, Analyse the applications and operation of the Global Positioning Network.
Content	Introduction to Satellite Communications, Orbital Mechanics and Launchers, Satellites, Satellite Link Design, Modulation and Multiplexing Techniques for Satellite Links, Multiple Access, Propagation Effects and their Impact on Satellite-Earth Links, VSAT Systems, Low Earth Orbit and Non-Geostationary Satellite Systems, Satellite Navigation and the Global Positioning System.

STA3AQT	**STATISTICAL QUALITY TECHNIQUES 3**
Refer to the Learning Guide for more information on the module.	

STM44-4	**STRATEGIC MANAGEMENT 4**
Calculation Criteria	Minimum Full Period Mark for Examination Admission – 40% Full Period Mark Weight – 50% Examination Mark Weight – 50%
Purpose	This module aims to equip the student with the understanding and knowledge applicable to the field of strategic management. With this knowledge and understanding, the student will be capable of selecting from a range of philosophies and techniques to execute and/or facilitate the management of strategy in collaboration with other key role players in the workplace.
Content	

TSH441	**STRENGTH OF MATERIALS 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to analyse and solve strength of materials problems in the mechanical engineering manufacturing field.
Content	Theories of Failure; Deflection of Beams; Energy Method; Unsymmetrical Bending; Plastic Bending; Shear in Thin Walled sections; Struts

ESA411	**STRESS ANALYSIS 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to determine and analyse stress induced in mechanical components
Content	Review of basic AUTOCAD knowledge; Software ABACUS; Modeling; Designing; Interpreting results.

AIS411	**STRUCTURAL ANALYSIS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Be familiar and capable of analysing structural elements in the civil engineering field.
Content	Advanced structural analysis methods, Applicable computer applications, Two-pinned and fixed arches, Column analogy, Virtual work, Influence lines for indeterminate structures, Space frames

TSR411	**STRUCTURAL STEEL DESIGN 4**

Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Be familiar and capable of analysing structural elements in the civil engineering field.
Content	Design of steel structures, Computer applications, Rigid frame joints and splices, Plastic design of beams and portal frames, Cold-formed sections, Composite structures industrial buildings, Medium rise buildings, Lattice construction for trusses

TSH421	**SYSTEMS DYNAMICS 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	To provide advanced to analyse and simulate engineering problems in both the service and manufacturing fields.
Content	Systems Dynamics, Fundamental Simulation Concepts, Simulation, Modelling Basic Operations, Detailed Modelling, Entity Transfer, Conducting Simulation Studies, Statistical Evaluation of Results, Steady-State Statistical Analysis

TSI441	**THEORY OF STRUCTURES 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Be familiar and capable of analysing structural elements in the civil engineering field.
Content	Advanced structural analysis methods, Applicable computer applications, Model analysis, Analysis of cylindrical shell structure, Yield line analysis for slabs, Plastic theory

IMT411	**THERMODYNAMICS 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to analyse and solve engineering problems in the Thermodynamics technology and manufacturing fields.
Content	Combustion; Internal Combustion Engines; Gas Turbines and Jet Engines; Steam Power Cycles

TVK411	**TRAFFIC ENGINEERING 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Traffic engineering is primarily restricted to the orderly expansion of street, capacity, parking facilities, and traffic-control strategies to accommodate the quality and safety of ever-increasing automobile flows in the urban environment
Content	Traffic characteristics, road user characteristics, highway capacity, traffic studies, speed, flow and density, statistical analysis, parking, traffic safety considerations, traffic control and signing, transport system management, intersections, priority intersections, signalisation and automatic traffic control systems.

TTP411	**TRANSPORTATION PLANNING 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	As society continues to develop, the demand for road travel increases accordingly in terms of the use of public transport, private vehicles and the moving of goods, therefore there exists a continuous need to assess the ability of a transport network to meet this demand by evaluating alternative plans and implementing new facilities and systems
Content	The transportation planning process, data collection, strategic planning: from problems to objectives, transport planning policy development, generation of alternatives, effective public transport, evaluation of alternatives, population forecasting, land use modeling, trip generation, trip distribution, generalised cost,

	modal split, trip assignment, environmental impact assessment, public participation, monitoring and review.

TUM411	**TURBO MACHINES 4**
Calculation Criteria	Final mark weighting = Semester mark(100%)
Purpose	Provide advanced knowledge to analyse and solve engineering problems related to machinery used in the fluid-dynamics technology and manufacturing fields
Content	Review of basic Thermodynamics and Fluid Mechanics; Axial flow compressors and Fans; Axial flow steam and gas turbines; Centrifugal Compressors and Fans; Radial flow gas turbines

WWT411	**WASTE WATER TREATMENT TECHNOLOGY 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	Waste water characteristics and the fundamentals of unit processes employed for treating waste water is taught.
Content	Characteristics of sewage, principle sewage treatment, historical development of waste water treatment, waste water treatment in SA, unit processes in waste water treatment.

WTT411	**WATER TREATMENT TECHNOLOGY 4**
Calculation Criteria	Final mark weighting = Semester mark(40%) + Exam mark (60%)
Purpose	The fundamentals of drinking water treatment and the link between drinking water quality and health is taught. The process of water supply from source selection is also covered.
Content	Water and public health, guidelines for drinking water quality, water treatment, source selection, plant site selection, process design, operation and maintenance

EB22.1 ALPHABETICAL LIST WITH PRE-REQUISITES

BING MODULES

NAME	TYPE	CODE	PRE-REQUISITE
Advanced Manufacturing Systems 4A11	SM	MVS4A11	Manufacturing Methods 3B21 (VVE3B21)
Advanced Modelling 3A11	SM	AMD3A11	
Applied Mathematics 1A10	SM	APM1A10	
Applied Mathematics 1B10	SM	APM1B10	Applied Mathematics 1A10 (APM1A10)
			Engineering Mathematics 0A1 (MATE0A1)
Applied Mathematics 2A10	SM	APM2A10	Engineering Mathematics 0A1 (MATE0A1)
			Engineering Mathematics 0B1 (MATE0B1)
Applied Mathematics 2B10	SM	APM2B10	Engineering Mathematics 0A1 (MATE0A1)
			Engineering Mathematics 0B1 (MATE0B1)
Applied Mechanics 2A11	SM	MGA2A11	Introduction to Engineering Design 1B21 (IIN1B21)
			Physics 1B01 (PHY1B01)
Chemistry 1A10	SM	CEM1A10	
Civil Design 4B21	SM	OWS4B21	All modules up to and including fourth year first semester modules (EB20.3) - registration for CPP4B21 Civil Professional Practice must be in parallel with registration for this module
Civil Professional Practice 4B21		CPP4B21	Registration for this module may only occur in parallel with registration for OWS4B21 Civil Design 4B21
Civil Project Investigation 4B21	SM	PJS4B21	All modules up to and including fourth year first semester modules (EB20.3)
Communication 2B21	SM	COM2B21	
Communication 3B21	SM	COM3B21	
Complementary Studies 3A01	SSM	CPS3A01	60% of all second year modules passed
Complementary Studies 3A02	SSM	CPS3A02	60% of all second year modules passed
Computer Science 1A10	SM	CSC1A10	
Computer Science 1B10	SM	CSC1B10	Computer Science 1A10 (CSC1A10)
Computer Science 2A10	SM	CSC2A10	Computer Science 1A10 (CSC1A10)
			Computer Science 1B10 (CSC1B10)
Computer Science 2B10	SM	CSC2B10	Computer Science 2A10 (CSC2A10)
Computer Science 3A10	SM	CSC3A10	Computer Science 2A10 (CSC2A10)

			Computer Science 2B10 (CSC2B10)
Computer Science 3B10	SM	CSC3B10	Computer Science 2A10 (CSC2A10)
			Computer Science 2B10 (CSC2B10)
Computer Systems 3B01	SSM	RKE3B01	
Computer Systems 4A11	SSM	RKE4A11	Modelling 2A11 (MOD2A11) (final mark ≥ 40%)
Concrete Technology 1B21	SM	BTK1B21	Chemistry 1A10 (CEM1A10)
Control Systems 3B01	SSM	BHS3B01	Applied Mathematics 2A10 (APM2A10)
			Applied Mathematics 2B10 (APM2B10)
			Signals and Systems 3A11 (SST3A11) (final mark ≥ 40%)
Control Systems 4A11	SM	BHS4A11	Control Systems 3B01 (BHS3B01) (final mark ≥ 40%)
Control Systems 4B21 (Mechanical)	SM	TKN4B21	Modelling 2A11 (MOD2A11)
			Engineering Mathematics 0CA2 (MAT0CA2)
			Engineering Mathematics 0CB2 (MAT0CB2)
Design 2A11 (Mechanical)	SM	OWM2A11	Graphical Communication 1B21 (GKM1B21), Introduction to Engineering Design 1B21 (IIN1B21)
Design 2B21 (Mechanical)	SM	OWM2B21	Introduction to Engineering Design 1B21 (IIN1B21)
			Graphical Communication 2B21 (GKM1B21)
Design 3A11 (Mechanical)	SM	OWM3A11	Design 2B21 (Mechanical) (OWM2B21)
Design 3B21 (Mechanical)	SM	OWM3B21	Design 3A11 (Mechanical) (OWM3A11)
Design and Engineering Practice 4000	YM	OIP4000	Design 3B21 (Mechanical) (OWM3B21)
			80% of all third year modules passed
Draughting 1B01	SM	DRG1B01	
Electrical Engineering Methods 1A11	SM	EEM1A11	
Electrical Engineering Practical 3B21	SM	EEP3B21	
Electrical Engineering Practical 4A11	SM	EEP4A11	
Electrical Machines 4B02	SSM	EMA4B02	Electromagnetics 3A11 (EMN3A11) (final mark ≥ 40%)
Electrical Projects 2A11	SM	EPJ2A11	
Electromagnetics 3A11	SM	EMN3A11	Electrotechnics 2A11 (ETN2A11) (final mark ≥ 40%)
			Electrotechnics 2B21 (ETN2B21) (final mark ≥ 40%)
Electromagnetics 4B01	SSM	EMN4B01	Electromagnetics 3A11 (EMN3A11) (final mark ≥ 40%)
Electronics 3B21	SM	EKA3B21	Electrotechnics 2A11 (ETN2A11) (final mark ≥ 40%)

Electrotechnics 1B21	SM	ETN1B21	
Electrotechnics 2A11	SM	ETN2A11	Electrotechnics 1B21 (ETN1B21) (final mark ≥ 40%)
Electrotechnics 2B21	SM	ETN2B21	Electrotechnics 2A11 (ETN2A11) (final mark ≥ 40%)
Engineering Economics and Practice 2B21	SM	IEP2B21	
Engineering Mathematics 0A1	SM	MATE0A1	
Engineering Mathematics 0B1	SSM	MATE0B1	Engineering Mathematics 0A1 (MATE0A1) (admission to exam)
Engineering Mathematics 0AA2	SSM	MAT0AA2	Engineering Mathematics 0B1 (MATE0B1)
Engineering Mathematics 0AB2	SSM	MAT0AB2	Engineering Mathematics 0AA2 (MAT0AA2)
Engineering Mathematics 0CA2	SSM	MAT0CA2	Engineering Mathematics 0A1 (MATE0A1)
			Engineering Mathematics 0B1 (MATE0B1
Engineering Mathematics 0CB2	SSM	MAT0CB2	Engineering Mathematics 0A1 (MATE0A1)
			Engineering Mathematics 0B1 (MATE0B1)
			Engineering Mathematics 0CA2 (MAT0CA2) (admission to exam)
Engineering Practice 3B21	SM	INP3B21	
Environmental Management for Engineers 3B01	DSM	ENV3B01	
Fluid Dynamics 3A11	SM	STR3A11	Fluid Mechanics 2A11 (STR2A11)
Fluid Mechanics 2A11	SM	STR2A11	Engineering Mathematics 0B1 (MATE0B1)
Geology 1A10	SM	GLG1A10	
Geotechnical Engineering 3A11	SM	GTG3A11	Engineering Mathematics 0CB2 (MAT0CB2)
			Engineering Mathematics 0AB2 (MAT0AB2)
			Applied Mathematics 2B10 (APM2B10)
Geotechnical Engineering 3B21	SM	GTG3B21	Geotechnical Engineering 3A11 (GTG3A11)
			Geology 1A10 (GLG1A10)
Geotechnical Engineering 4A11	SM	GTG4A11	Geotechnical Engineering 3B21 (GTG3B21)
Graphical Communication 1A11	SM	GKM1A11	
Graphical Communication 1B21	SM	GKM1B21	Graphical Communication 1A11 (GKM1A11)
Heat Transfer 4A11	SM	WAO4A11	Fluid Dynamics 3A11 (STR3A11)
			Thermofluids 3A11 (TMS3A11)
Heritage Assessment 3B02	DSM	HTA3B02	
High Speed Electronics 4A01	SSM	HSE4A01	Electronics 3B21 (EKA3B21) (final mark ≥ 40%)
Hydraulic Engineering 3A11	SM	HMG3A11	Fluid Mechanics 2A11 (STR2A11)
			Engineering Mathematics 0CB2 (MAT0CB2)

			Engineering Mathematics 0AB2 (MAT0AB2)
			Applied Mathematics 2B10 (APM2B10)
Hydraulic Engineering 3B21	SM	HMG3B21	Fluid Mechanics 2A11 (STR2A11)
			Engineering Mathematics 0CB2 (MAT0CB2)
			Engineering Mathematics 0AB2 (MAT0AB2)
			Applied Mathematic 2B10 (APM2B10)
Informatics 2A10	SM	IFM2A10	Computer Science 1A10 (CSC1A10)
			Computer Science 1B10 (CSC1B10)
Informatics 2B10	SM	IFM2B10	Informatics 2A10 (IFM2A10)
Informatics 3A10	SM	IFM3A10	Informatics 2A10 (IFM2A10)
			Informatics 2B10 (IFM2B10)
Informatics 3B10	SM	IFM3B10	Informatics 3A10 (IFM3A10)
Introduction to Engineering Design 1A11	SM	IIN1A11	
Introduction to Engineering Design 1B21	SM	IIN1B21	Introduction to Engineering Design 1A11 (IIN1A11)
Legal Applications in the Engineering Practice 4B21	SM	RTI4B21	
Management Principles and Practice 3B21	SM	EBP3B21	
Manufacturing Methods 3B21	SM	VVE3B21	
Mechanical Engineering Laboratory 3000	YM	MLA3000	80% of all second year modules passed
Modelling 2A11	SM	MOD2A11	
Optical Systems 4B21	SM	OTS4B21	
Physics 1A01	SM	PHY1A01	
Physics 1B01	SM	PHY1B01	Physics 1A01 (PHY1A01)
Physics 2A01	SM	PHY2A01	Physics 1B01 (PHY1B01)
			Engineering Mathematics 0B1 (MATE0B1)
Power Electronics 4A01	SSM	PWE4A01	Electronics 3B21 (EKA3B21) (final mark ≥ 40%)
Power Systems 3A01	SM	KRL3A01	Electrotechnics 2A11 (ETN2A11) (final mark ≥ 40%)
Power Systems 4B21	SM	KRL4B21	Power Systems 3A01 (KRL3A01) (final mark ≥ 40%)
Project Communication 1B21	SM	PJC1B21	
Project Investigation 4000 (Mechanical) PJM4000	YM	PJM4000	Mechanical Engineering Laboratory 3000 (MLA3000)
			80% of all third year modules passed

Project Investigation 4A11 (Electrical & Electronic)	SM	PJE4A11	Must be able to complete the programme within a year from registration for this subject.
Project Investigation 4B21 (Electrical & Electronic)	SM	PJE4B21	Project Investigation 4A11 (PJE4A11)
Project Management 3B21	SM	PJB3B21	
Project Management 4A11	SM	PJB4A11	Project Management 3B21 (PJB3B21)
			Geotechnical Engineering 3B21 (GTG3B21)
			Hydraulic Engineering 3A11 (HMG3A11)
			Hydraulic Engineering 3B21 (HMG3B21)
			Structural Engineering 3B21 (SUS3B21)
			Transport Engineering 3B21 (VVI3B21)
Science of Materials 2B21	SM	MTK2B21	Chemistry 1A10 (CEM1A10)
			Physics 1A01 (PHY1A01)
Science of Materials 3A11	SM	MTK3A11	Science of Materials 2B21 (MTK2B21)
Signal Processing 3B01	SSM	SIG3B01	Signals and Systems 3A11 (SST3A11)) (final mark ≥ 40%)
			Statistics for Engineers 3A01 (STE3A01)
Signal Processing 4A01	SSM	SIG4A01	Signal Processing 3B01 (SIG3B01)) (final mark ≥ 40%)
			Statistics for Engineers 3A01 (STE3A01)
Signals and Systems 3A11	SM	SST3A11	Engineering Mathematics 0CA2 (MAT0CA2)
			Engineering Mathematics 0AA2 (MAT0AA2)
Statistics for Engineers 3A01	SM	STE3A01	Engineering Mathematics 0B1 (MATE0B1)
Strength of Materials 2B21	SM	SLR2B21	
Strength of Materials for Civil Engineers 2B21	SM	SMC2B21	Applied Mechanics 2A11 (MGA2A11)
			Engineering Mathematics 0CA2 (MAT0CA2)
			Engineering Mathematics 0AA2 (MAT0AA2)
Strength of Materials 3B21	SM	SLR3B21	Strength of Materials 2B21 (SLR2B21)
Strength of Materials 4A11	SM	SLR4A11	Strength of Materials 3B21 (SLR3B21)
Structural Engineering 3A11	SM	SUS3A11	Applied Mechanics 2A11 (MGA2A11)
			Strength of Materials 2B21 (SLR2B21)
			Engineering Mathematics 0CB2 (MAT0CB2)
			Engineering Mathematics 0AB2 (MAT0AB2)
			Applied Mathematics 2B10 (APM2B10)
Structural Engineering 3B21	SM	SUS3B21	Structural Engineering 3A11 (SUS3A11)
Structural Engineering 4A11	SM	SUS4A11	Structural Engineering 3B21 (SUS3B21)
Structural Engineering 4A12	SM	SUS4A12	Structural Engineering 3B21 (SUS3B21)
Surveying 3B21	SM	OPM3B21	

Systems Engineering and Design 3A11	SM	SIO3A11	
Systems Engineering and Design 3B21	SM	SIO3B21	
Telecommunications 3B01	SSM	TEL3B01	Signals and Systems 3A11 (SST3A11)) (final mark ≥ 40%)
			Statistics for Engineers 3A01 (STE3A01)
Telecommunications 4A01	SSM	TEL4A01	Telecommunications 3B01 (TEL3B01)) (final mark ≥ 40%)
Theory of Machines 3B21	SM	MKE3B21	Applied Mechanics 2A11 (MGA2A11)
Thermal Systems 4B21	SM	TML4B21	Thermofluids 3A11 (TMS3A11)
			Heat Transfer 4A11 (WAO4A11)
Thermodynamics 2B21	SM	TRD2B21	60% of all first year modules passed
Thermofluids 3A11	SM	TMS3A11	Thermodynamics 2B21 (TRD2B21)
Thermomachines 4A11	SM	TRM4A11	Thermofluids 3A11 (TMS3A11)
Thermomachines 4B21	SM	TRM4B21	Thermofluids 3A11 (TMS3A11)
			Fluid Dynamics 3A11 (STR3A11)
Transportation Engineering 3B21	SM	VVI3B21	Engineering Mathematics 0CB2 (MAT0CB2)
			Engineering Mathematics 0AB2 (MAT0AB2)
			Applied Mathematics 2B10 (APM2B10)
			Statistics for Engineers 3A01 (STE3A01)
Urban Development Studies 4A11	SM	UDS4A11	Transportation Engineering 3B21 (VVI3B21)
Urban Hydraulics 4A11	SM	SDI4A11	Hydraulic Engineering 3A11 (HMG3A11)
			Hydraulic Engineering 3B21 (HMG3B21)

EB.22.2 B.ING MODULE DESCRIPTIONS

The outcomes of each module are stated in the relevant learning guides.

MVS4A11	**ADVANCED MANUFACTURING SYSTEMS 4A11**		
NQF Level	8	**Credits**	12
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To develop competence and proficiency in modern trends in areas and concepts of design for manufacture, systems design and integration, automation, assembly and equipment optimisation.		
Content	Introduction to automation, Industrial Control Systems, Sensors, Actuators and other control system components, Industrial Robots, Discrete control using programmable logic controllers and personal computers and Material Handling Systems. Introduction to modern and advanced manufacturing systems such as Agile Manufacturing, Fiction Stir Welding and Active Manufacturing.		

AMD3A11	**ADVANCED MODELLING 3A11**		
NQF Level	7	**Credits**	12
Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach students more advanced computing concepts, applications of programming, algorithms and computer architectures.		
Content	Introduction to the C++ programming language with advanced computing concepts like object orientation and advanced data structures. More advanced algorithm archetypes will be introduced and applied. A fundamental view of computer hardware architecture and operating system concepts shall also be introduced.		

APM1A10	**APPLIED MATHEMATICS 1A10**		
NQF Level	6	**Credits**	30
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

APM1B10	**APPLIED MATHEMATICS 1B10**		
NQF Level	6	**Credits**	30
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

APM2A10	**APPLIED MATHEMATICS 2A10**		
NQF Level	6	**Credits**	30
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

APM2B10	**APPLIED MATHEMATICS 2B10**		
NQF Level	6	**Credits**	30
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

MGA2A11	**APPLIED MECHANICS 2A11**		
NQF Level	6	**Credits**	14
Semester module, second year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	Applied Mechanics comprises two modules namely statics and dynamics. A basic understanding and implementing of the principles in statics and dynamics are of the utmost importance throughout an engineer's career. Statics focuses on the behaviour of structural		

	elements to statically applied external physical forces and moments, thus covering simple structural mechanics. It will improve the knowledge of the learner of the basic principles involved in static forces applied to elements such as beams, columns and machine parts. Dynamics focuses on the dynamic behaviour of mechanical systems when forces and moment are applied to them. It will improve the knowledge of the learner to apply basic principles of mechanics in the analysis of elementary structures and machines.
Content	Bending moment; shear force diagrams; relationships between load, shear force and bending moment; moment of inertia and other geometrical properties of sections; shear stress distributions and shear flow; theory of curvature; differential equations for deflections of beams; moment area-method for deflections and superposition for deflections; compression elements and struts. Combined stress due to axial loading and bending moment; balancing of masses. Dynamics: Brake systems; flexible drives; clutches. Velocity and acceleration diagrams for machine elements. Combined stress due to axial loading and bending moment; balancing of masses; Kinetics of rigid bodies; vibration and time response of rigid bodies; governors.

CEM1A10	**CHEMISTRY 1A10**		
NQF Level	5	**Credits**	15
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

OWS4B21	**CIVIL DESIGN 4B21**		
NQF Level	8	**Credits**	28
Semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	The Design module, together with Project Investigation, makes up all of the second semester modules in the final year. Design is a module where all the previous work of the program is incorporated. It therefore fulfils an integration function that also includes aspects such as teamwork, environmental impact analyses, project management, risk considerations, aesthetics, and professional ethics. Note that students may only register for this module provided that all modules up to and including fourth year, first semester are completed.		
Content	Seek solutions to an engineering problem in groups of two to four students; preliminary analysis of three different conceptual solutions in terms of costs, environmental impact and risk; submission of planning report; design documentation, measurement and compilation of a tender document; integration and submission of final design report; oral and visual presentation of the design by the team to a panel of experienced engineers from practice; assessment by lecturers external panel and other team members. Typical projects include dams, sport pavilions, industrial buildings, reservoirs, water towers, bridges.		

CPP4B21	**CIVIL PROFESSIONAL PRACTICE 4B21**		
NQF Level	8	**Credits**	7
Semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To introduce students to the practice of civil engineering across the discipline: consultancy, contracting and parastatal sectors.		
Content	Professional registration and associated issues such as professional liability, ethical constraints, management principles and entrepreneurial activity are presented and discussed with external professionals. Continuing professional development and career		

	development. Relevant site visits. Health and safety, including First Aid practice. Human resource management. Client/Consultant relationships, General Conditions of Contract and other relevant client/contractor contracts. Basic Computer application in Civil Engineering Drawing (CAD): Standard package overview. Dimensioning, elevation and sectional drawings, Civil Engineering and Construction drawings + plans

PJS4B21	**CIVIL PROJECT INVESTIGATION 4B21**		
NQF Level	8	**Credits**	28
Semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	Civil Project Investigation 4B (PJO4B) involves limited research aligned with the research programs of the different research groups at UJ. This module allows the learner to specialise in a divergent, but limited, engineering project in a manner that will enable the learner to plan and complete his/her own project.		
Content	Individual research project based on a civil engineering problem, structured solution under guidance of a designated study leader with interim reports, reporting by means of two seminars, poster, written reports. Note that students may only register for this module provided that all modules up to and including fourth year, first semester are completed.		

COM2B21	**COMMUNICATION 2B21**		
NQF Level	7	**Credits**	14
Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	The Project Communication module is presented in the broadest possible context to ensure that learners are equipped to communicate effectively, both orally and in writing with engineering audiences and the community at large, using appropriate structure, style and graphical support.		
Content	The communication process; formal and informal communication in organisations; verbal and non-verbal communication; conflict and negotiation; information technology; meetings, seminars, etc; presentations, writing reports.		

COM3B21	**COMMUNICATION 3B21**		
NQF Level	6	**Credits**	14
Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	The Project Communication module is presented in the broadest possible context to ensure that learners are equipped to communicate effectively, both orally and in writing with engineering audiences and the community at large, using appropriate structure, style and graphical support.		
Content	The communication process; formal and informal communication in organisations; verbal and non-verbal communication; conflict and negotiation; information technology; meetings, seminars, etc.; presentations, writing reports.		

CPS3A01	**COMPLEMENTARY STUDIES 3A01**		
NQF Level	7	**Credits**	16
Part semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		

Purpose	To expose students to a broader range of perspectives of reality, interpretations of the physical universe, and value systems and how these can influence the wider engineering environment. To broaden the student's perspective on the nature and role of ethics in the engineering profession
Content	The nature of philosophy and ethics: the sort of questions asked by philosophers; the role of argument and debate. Philosophy of science and the philosophy of technology: definitions of the nature and functioning of science and technology. Ethics: The definition and nature of ethics and ethical dilemmas, decision making and case studies in ethics. Environmental aesthetics and ethics: Contemporary ethics and the use of the environment in the context of global warming and the exhaustion of natural resources; human responsibility for the rehabilitation of damaged areas.

CPS3A02	**COMPLEMENTARY STUDIES 3A02**		
NQF Level	7	**Credits**	16
Part semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To expose students to a broader range of perspectives of reality, interpretations of the physical universe, and value systems and how these can influence the wider engineering environment. To broaden the student's perspective in the humanities and social sciences to support an understanding of the world.		
Content	Visual and contextual analysis of art and design. Industrial Revolution – birth of modern society: rise of the middle class; technological advancements; effects on art and design. Modernism: art movements up to WW1; developments in graphic design, product design and architecture. Visual arts in the 20th century: 1950's: effects of WW1; art and design. 1930's and 1940's; effects of WW2; art and design. 1950's: consumerism and its effects; art and design. 1960's: youth culture and its effects; art and design. 1970's: 'reality hits home', art and design. 1980's: the post-modern world – deconstruction; art and design. South African art: 'famous artists'; contemporary trends.		

CSC1A10	**COMPUTER SCIENCE 1A10**		
NQF Level	6	**Credits**	30
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

CSC1B10	**COMPUTER SCIENCE 1B10**		
NQF Level	6	**Credits**	30

CSC2A10	**COMPUTER SCIENCE 2A10**		
NQF Level		**Credits**	
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

CSC2B10	**COMPUTER SCIENCE 2B10**		
NQF Level		**Credits**	
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

CSC3A10	**COMPUTER SCIENCE 3A10**		
NQF Level	7	**Credits**	60

Refer to the Rules and Regulations of the Faculty of Science for more information on the module.

CSC3B10	**COMPUTER SCIENCE 3B10**		
NQF Level	7	**Credits**	60
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

RKE3B01	**COMPUTER SYSTEMS 3B01**		
NQF Level	7	**Credits**	8
Sub-semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of combinatorial and sequential logic.		
Content	Boolean algebra, Karnaugh maps, combinatorial logic design and synthesis, sequential logic design and synthesis		

RKE4A11	**COMPUTER SYSTEMS 4A11**		
NQF Level	8	**Credits**	8
Sub-semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To develop basic understanding of the function of the various components of a computer system and its interaction with other components, including an introduction to key concepts in computer networks.		
Content	Concepts in computer architecture, networks and programming from the perspective of an electrical engineer whose specialty is not computer or software engineering. The student is expected to understand the design of computer systems including data communication and transmission, system interfaces, topology, network models and standards. The student must also design software algorithms and C programs to interact with various peripherals for a microcontroller platform.		

BTK1B21	**CONCRETE TECHNOLOGY 1B21**		
NQF Level	6	**Credits**	14
Semester module, second year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	Concrete Technology 2B provides the learner with a wide range of theoretical and practical knowledge in the field of concrete technology		
Content	Properties of concrete in fresh and hardened state; concrete constituents: cement, aggregates, admixtures and additives; concrete mix design; formwork for concreting and various architectural finishes; concrete degradation and diagnostic procedures; repair and rehabilitation of concrete structures; methods of transporting and placing concrete; precast concrete and production processes; concreting under hot and cold weather conditions.		

BHS3B01	**CONTROL SYSTEMS 3B01**		
NQF Level	8	**Credits**	16
Sub-Semester module, third year, second semester.			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of classical control systems and PID control design.		
Content	Introduction to control systems, mathematical modeling of dynamic systems for control, Laplace transforms and applications to control		

	systems, principle of feedback control, PID control design, introduction to industrial applications and implementation.

BHS4A11	**CONTROL SYSTEMS 4A11**		
NQF Level	8	**Credits**	8
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	Design techniques for the frequency domain: root locus diagram; revision of Bode diagrams; closed loop frequency response; design of lead-, lag-, and lead-lag compensation; determination of pole-zero models from frequency response data. State-space methods: system analysis in terms of state equations; control law design with full state feedback; pole placement; estimator design; compensator design with combined control law and estimator; digital control: digitization algorithms; application of the z-transform to controller design; direct digital design; digital controller design in the state space; practical implications of digital controllers used for analogue systems. Introduction to advanced control topics.		
Content	Design techniques for the frequency domain: root locus diagram; revision of Bode diagrams; closed loop frequency response; design of lead-, lag-, and lead-lag compensation; determination of pole-zero models from frequency response data. State-space methods: system analysis in terms of state equations; control law design with full state feedback; pole placement; estimator design; compensator design with combined control law and estimator; digital control: digitization algorithms; application of the z-transform to controller design; direct digital design; digital controller design in the state space; practical implications of digital controllers used for analogue systems. Introduction to advanced control topics.		

TKN4B21	**CONTROL SYSTEMS 4B21 (Mechanical)**		
NQF Level	7	**Credits**	8
Semester module, third year, second semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to study the basic components, methods, techniques and mathematical modelling in the analysis and design of control systems as well as the basics of digital systems and measurement techniques		
Content	Control Systems introduction, Leplace transforms and the solution of ODE's in the time domain, State space modelling techniques for discrete systems, Root locus plots, Analysis of the stability of systems, Frequency domain techniques such as Bode and Nyquist plots, Design of controllers for PID applications, Design of controllers using ZN techniques, State space controller design techniques (dead beat and pole placement), Modeling of mechanical systems – specifically machines, hydraulics and thermodynamic systems, An introduction to micro-controllers in controller designs and Measurement techniques.		

OWM2A11	**DESIGN 2A11 (Mechanical)**		
NQF Level	5	**Credits**	12
Semester module, second year, First semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable students to further develop spatial perception abilities, techniques and communication skills using computer based systems including CAD, CAM and CAE.		
Content	Manufacturing and manufacturing processes. Materials, load and stress analysis. Deflection and stiffness, failure resulting from static		

	loading, shafts and shaft components, brake systems, clutches, velocity and acceleration diagrams for machine elements. Design Projects: individual design project.

OWM2B21	**DESIGN 2B21 (Mechanical)**		
NQF Level	5	**Credits**	12
Semester module, followed in second year, second semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	Further development of engineering design skills at component and simple systems level.		
Content	Project engineering. Product design specification. Reverse engineering. Bearings. Flexible mechatronics. Design Projects: Individual Design Project.		

OWM3A11	**DESIGN 3A11 (Mechanical)**		
NQF Level	6	**Credits**	12
Semester module, third year, first semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to design machine elements and mechanical assemblies, duly considering function, performance, safety, environmental/social impact manufacture and cost. To further develop student's ability to design machine components and more advanced systems.		
Content	Engineering Design Process (Systems engineering and the design process, Design considerations in mechanical design); Design for manufacture, Design for 3D printing; Design Projects: Individual Design Project, Group Design Project. Multi-disciplinary work.		

OWM3B21	**DESIGN 3B21 (Mechanical)**		
NQF Level	6	**Credits**	12
Semester module, third year, second semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To further develop student design skills at component and systems level.		
Content	Introduction to Fatigue and Fracture mechanics; Stress concentrations; Gears and gear trains; Welding, brazing and bonding (design of permanent joints); Design Projects: Individual Design Project, Group Design Project.		

OIP4000	**DESIGN AND ENGINEERING PRACTICE 4000**		
NQF Level	8	**Credits**	32
Year course, fourth year.			
Calculation Criteria	Final mark weighting = Semester mark (20%) + Exam mark (80%)		
Purpose	To further develop the ability of students to design mechanical systems to professional standards,		
Content	. To complete the design of a mechanical system for manufacturing and implementation. Use of standards and codes.		

DRG1B01	**DRAUGHTING 1B01**		
NQF Level	5	**Credits**	14

Semester module, first year, second semester	
Calculation Criteria	Final mark weighting = semester mark (50%) + exam (50%)
Purpose	To enable the student to develop spatial perception abilities and techniques in order to graphically communicate ideas and designs with colleagues and other professionals.
Content	Technical Drawings, Dimensioning and Tolerances, Working Drawings, Orthographic and Isometric Drawings, Roof and foundation Detailing, Cross and long sections, Intersections, Contour Lines, Structural Steel Drawings, Reinforced Concrete Detailing and Calculations.

EEM1A11	**ELECTRICAL ENGINEERING METHODS 1A11**		
NQF Level	5	**Credits**	8
Semester module, first year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To introduce students to electrical engineering and problem solving methods.		
Content	Problem solving techniques, basic concepts of design and optimisation, breaking a problem into steps, debugging philosophy. Computer programs, University and online resources, applications of math and science, and basic electrical engineering techniques.		

EEP3B21	**ELECTRICAL ENGINEERING PRACTICAL 3B21**		
NQF Level	7	**Credits**	12
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To give students hands-on experience with electrical engineering tools and techniques.		
Content	Practical/Laboratory based module. This module is complementary to the third year electrical engineering modules and incorporates electrical engineering tools and applications of the techniques learned in those modules.		

EEP4A11	**ELECTRICAL ENGINEERING PRACTICAL 4A11**		
NQF Level	8	**Credits**	12
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To give students hands-on experience with electrical engineering tools and techniques.		
Content	Practical/Laboratory based module. This module is complementary to the fourth year electrical engineering modules and incorporates electrical engineering tools and applications of the techniques learned in those modules.		

EMA4B02	**ELECTRICAL MACHINES 4B02**		
NQF Level	8	**Credits**	8
Sub-semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the fundamental aspects of the control of different types of electrical machines		
Content	Electromechanical energy conversion: General considerations with respect to electromechanical energy conversion; electromechanical conversion in conducting structures; rotating converters; analysis of different kinds of converters; general theory of machines and machine primitive; modelling of dynamic behaviour.		

EPJ2A11	**ELECTRICAL ENGINEERING PROJECT 2A11**

NQF Level	6	**Credits**	8
Semester module, second year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To have students build a device incorporating various electrical engineering devices and techniques.		
Content	Semester-long project incorporating basic electronics, machines, programming, and computing. An example project could be a basic robot, made up of a microcontroller, small motors, input buttons and sensors, LED indictors, etc.		

EMN3A11	**ELECTROMAGNETICS 3A11**		
NQF Level	7	**Credits**	8
Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach fundamental field theory and electromechanical energy conversion theory.		
Content	Field Theory: fundamental aspects of the interaction of electromagnetic waves, circuits and matter in different applications and media; analysis and simple design of electromagnetic problems and systems. Electromechanical Energy Conversion: fundamental aspects of magnetic circuits and energy conversion as applied in electric machines, transformers and magnetic structures; analysis and simple design of electric machines, transformers, magnetic structures and related problems and systems.		

EMN4B01	**ELECTROMAGNETICS 4B01**		
NQF Level	8	**Credits**	8
Sub-semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the fundamental aspects of RF structures, waveguides and antennae used in the analysis, specification and design of electromagnetic devices and systems.		
Content	Transmission lines, waveguides, EM propagation and antennae		

EKA3B21	**ELECTRONICS 3B21**		
NQF Level	7	**Credits**	8
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of semiconductor devices, analog and digital circuits, and complex circuit analysis.		
Content	Semiconductor materials and properties; diodes, bipolar junction transistors; field effect devices; amplifiers: design and analysis; operational amplifiers; analog and digital conversion; and logic circuits.		

ETN1B21	**ELECTROTECHNICS 1B21**		
NQF Level	5	**Credits**	12
Semester module, first year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of DC Circuit Analysis, phasor solutions to AC circuits and to provide an introduction into electronics and electrical machines.		
Content	Fundamental circuit analysis: ideal voltage sources and ideal current sources, current and voltage conventions, circuit terminology (node, branch, mesh, loop), parallel and series circuits, Kirchhoff's current and voltage laws, resistors, Ohm's law, circuit analysis with resistors,		

	basic definition of instantaneous power, superposition, maximum power transfer. AC analysis: capacitors, inductors, sinusoidal signals, phasor representation, impedance, phasor solutions to AC circuits, average and effective values. Electronics: ideal amplifiers, terminal characteristics of a diode, ideal and real diodes, terminal characteristics of the BJT, FET and the transistor as a switch. Introduction to digital logic and digital electronics. Electromechanics: ideal transformers, voltage and current transformations, basic construction of a DC machine, series and shunt DC machines.

ETN2A11	**ELECTROTECHNICS 2A11**		
NQF Level	6	**Credits**	12
Semester module, second year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of AC circuits, basic semiconductor devices, and electric machines.		
Content	AC Circuits: Revision of important concepts, three phase networks star and delta, generation and distribution of AC power, grounding and safety, instantaneous and average power in AC circuits, complex power, power factor, impedance transformation, three phase power. Electronics: The diode equation, rectifier circuits and non-linear circuit analysis, zener diodes, BJT as a switch, BJT in the linear region, terminal characteristics of the Enhancement MOSFET, circuit analysis with MOSFETs. Electromechanics: Magnetic circuits, transformers, electromechanical transducers, series and parallel DC machines, Basic operation of induction machine, basic operation of synchronous machine.		

ETN2B21	**ELECTROTECHNICS 2B21**		
NQF Level	6	**Credits**	24
Semester module, second year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of electrical circuits applicable to first order circuits and second order circuits		
Content	Circuit theorems, energy storage elements (capacitors and inductors), complete response of first order circuits, complete response of second order circuits, sinusoidal steady-state analysis, frequency response, digital systems		

IEP2B21	**ENGINEERING ECONOMICS AND PRACTICE 2B21**		
NQF Level	6	**Credits**	8
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of engineering economics, the impact of engineering activity on the social, industrial and physical environment and engineering ethics and professionalism.		
Content	The module firstly exposes learners to concepts in engineering economics such as the time value of money, the product lifecycle, decision making processes and basic economic concepts and product design. Students should be aware of the financial implications of their engineering design decisions and be able to evaluate the financial/economic attractiveness of an engineering project. Students are secondly educated in terms of the impact of engineering activity on the social, industrial and physical environment. The third objective is to develop a sense of ethics and professionalism and create a critical awareness of the need to act professionally and ethically and take responsibility within own limits of		

	competence. This module is intended to be complementary to the module Project Management 3B (PJB3B21).

MATE0A1	**ENGINEERING MATHEMATICS 0A1**		
NQF Level	6	**Credits**	24
Purpose	The purpose of this module is to develop a scope of knowledge of the main areas of the theory of differentiation and integration of one variable functions by means of first principles and otherwise, and to include an understanding of the key terms, concepts, facts, principles, rules and theories.		

MATE0B1	**ENGINEERING MATHEMATICS 0B1**		
NQF Level	6	**Credits**	24
Purpose	The purpose of this module is to develop an understanding of the applications of differentiation and integration of one variable functions, and to include an understanding of the key terms, concepts, facts, principles, rules and theories.		

MAT0CA2	**ENGINEERING MATHEMATICS 0CA2**		
NQF Level	6	**Credits**	30
Purpose	The main purpose of this module is to extended concepts such as limits and continuity, mostly studied in first year calculus, to functions of several variables. Furthermore, the purpose extends to broaden the student's function optimization and integration techniques, to improve the problem solving skills of students and to form a basis of knowledge that would be necessary for further studies in Mathematics.		

MAT0AA2	**ENGINEERING MATHEMATICS 0AA2**		
NQF Level	6	**Credits**	30
Purpose	The primary purpose of this module as an integral part of the Engineering qualification is to: o Provide the students with a well-rounded and broad education that equips them with the mathematical knowledge base, theory and methodology of disciplines that could serve as a basis for the Engineering qualification and entry into the mathematically orientated labour market. o Enable the students to demonstrate initiative and responsibility in mathematics related careers.		

MAT0CB2	**ENGINEERING MATHEMATICS 0CB2**		
NQF Level	6	**Credits**	30
Purpose	The main purpose of this module is to extended concepts such as limits and continuity, mostly studied in first year calculus, to functions of several variables. Furthermore, the purpose extends to broaden the student's function optimization and integration techniques, to improve the problem solving skills of students and to form a basis of knowledge that would be necessary for further studies in Mathematics.		

MAT0AB2	**ENGINEERING MATHEMATICS 0AB2**		
NQF Level	6	**Credits**	30
Purpose	The primary purpose of this module as an integral part of the BSc qualification, Engineering qualification and Information Technology qualification is to: o Provide the students with a well-rounded and broad education that equips them with the mathematical knowledge base, theory and methodology of disciplines that could serve as a basis for entry into the mathematically orientated labour market, professional training and practice and postgraduate studies.		

	o Enable the students to demonstrate initiative and responsibility in mathematics related careers.

INP3B21	**ENGINEERING PRACTICE 3B21**		
NQF Level	7	**Credits**	8
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To expose students to what is to be expected from Practicing Engineers.		
Content	To expose students on what is to be expected from Practicing Engineers regarding professionalism, ethics, management and environmental issues.		

ENV3B01	**ENVIRONMENTAL MANAGEMENT FOR ENGINEERS 3B01**		
NQF Level	6	**Credits**	7
Sub-semester module, third year, second semester			
Purpose	To enable the student to integrate various aspects and perspectives of environmental management by indicating the importance and necessity of incorporating evaluation and assessment skills and tools into the field of environmental management. The importance of this is viewed against the background of the development of small and large development projects as well as projects associated with engineering and the built environment. Integrated environmental management, environmental impact assessment (EIA, social impact assessment (SIA) and environmental monitoring and mitigation will be used to identify the development of environmental problems and impacts which need to be mitigated or rehabilitated. It will also be illustrated and explained how these above mentioned skills and techniques can be used to overcome the ultimate problem of environmental degradation. Furthermore the module is designed to develop academic skills such as reading, presentation and report writing		
Content	Environmental impact assessment: Principles and practice of integrated environmental management, legal framework, case studies.		

STR3A11	**FLUID DYNAMICS 3A11**		
NQF Level	7	**Credits**	12
Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To provide students with the theory related to differential analysis of fluid flow, compressible flow, potential flow and boundary layer flow.		
Content	Differential Analysis of Fluid Flow, Inviscid flow (potential flow), Viscous flow (Navier-Stokes), Flow over immersed Bodies, Boundary Layer Theory, Drag, Compressible flow, Isentropic flow of an ideal gas, Non-isentropic flow of an Ideal gas, Normal Shock Waves, Raleigh/Fanno Flow		

STR2A11	**FLUID MECHANICS 2A11**		
NQF Level	6	**Credits**	12
Semester module, second year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	It integrates concepts from physics, mathematics, kinematics and dynamics to enable a rigorous analysis of fluids at rest and in motion.		
Content	Properties of fluids (density, viscosity, surface tension, modulus of elasticity); submerged objects (pressures, forces, buoyancy, stability); mass, momentum and energy balances for fixed control volumes; practical flow measurement in open and closed systems; laminar and turbulent pipe flow fundamentals; analysis and design of simple piping systems; dimensional analysis with the Buckingham theorem.		

GLG1A10	GEOLOGY 1A10		
NQF Level		**Credits**	15
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

GTG3A11	GEOTECHNICAL ENGINEERING 3A11		
NQF Level	7	**Credits**	14
Semester module, third year, first semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To introduces the student to the theory of fundamental soil mechanics as used in the analysis, synthesis and solution of engineering design problems.		
Content	Soil classification (soil phase composition, Atterberg testing, grading); excavation and placement of soils (compaction, grading); groundwater (soil permeability, one- and two-dimensional flow, flow nets); stress and effective stress (stress distribution in soil masses due to self-weight and applied loads); consolidation and settlement analysis.		

GTG3B21	GEOTECHNICAL ENGINEERING 3B21		
NQF Level	7	**Credits**	14
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To provide the student with a thorough basis in the application of basic soil mechanics theory to engineering design requirements.		
Content	Consolidation and settlement analysis; theory of soil strength; slope stability; lateral earth pressure and retaining walls; bearing capacity and structural foundations; site exploration and characterisation; soil improvement.		

GTG4A11	GEOTECHNICAL ENGINEERING 4A11		
NQF Level	8	**Credits**	14
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark - test and two Geotechnical Reports (50%) + Exam mark (50%)		
Purpose	Geotechnical Engineering 4A deals with the practical application of soil mechanics theory to design problems. It will further develop the theoretical and practical aspects of soil mechanics previously dealt with in Geotechnical Engineering 3A and 3B.		
Content	Deep foundations; difficult soils; soil improvement; site exploration and characterisation; dams and embankments; dam design; buried pipelines; geotechnical earthquake engineering.		

GKM1A11	GRAPHICAL COMMUNICATION 1A11		
NQF Level	5	**Credits**	12
Semester module, first year, first semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to develop spatial perception abilities and techniques in order to graphically communicate ideas and designs with colleagues.		
Content	This course is the culmination of six months of study and reflects his/her knowledge relating to spatial perception and technical drawing skills Spatial Perception, Orthographic Projection, Descriptive Geometry And an Introduction to Technical Drawing Design.		

GKM1B21	GRAPHICAL COMMUNICATION 1B21

NQF Level	5	**Credits**	12
Semester module, first year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to further develop spatial perception abilities and techniques in order to graphically communicate ideas and designs with colleagues.		
Content	This course is the culmination of six months study and reflects his/her knowledge relating to spatial perception and technical drawing skills, Spatial Perception, Orthographic Projection, advanced Technical Drawing, Assembly drawings and an introduction to Computer Aided Design (CAD).		

WAO4A11	**HEAT TRANSFER 4A11**		
NQF Level	8	**Credits**	12
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To provide students with a thorough background in heat transfer relevant to mechanical engineering systems.		
Content	One and multi-dimensional static and transient heat transfer by conduction, convection and radiation. Heat exchangers.		

HTA3B02	**HERITAGE ASSESSMENT 3B02**		
NQF Level	6	**Credits**	7
Sub-semester module, third year, second semester			
Purpose	This course is intended to: Explain what *cultural heritage* is, Sensitise students to the phenomenon and notion of cultural heritage Foster awareness of the variety and value of cultural heritage, Create an awareness of the public and personal value of cultural heritage Inform students on relevant provisions of the National Heritage Resources Act (no.25 of 1999) and Government Notices. Promote an awareness of the responsibilities this act lays on civil engineers, specifically in the field of cultural heritage conservation. Provide an overview of the process of conducting Heritage Assessments as required for demolition and other permit applications and of Heritage Impact Assessments (HIA's) as may be required by the appropriate Provincial or National Heritage Resources Authority.		
Content	Nature of heritage; Heritage impact assessment; theory of heritage and historical consciousness; cultural and natural heritage; legal framework; case studies.		

HSE4A01	**HIGH SPEED ELECTRONICS 4A01**		
NQF Level	8	**Credits**	8
Sub-semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the fundamental aspects of high speed, high frequency digital design as applicable to computers and digital logic circuits. Emphasis is placed on hardware design at PCB level, Signal Integrity (SI) and the Electromagnetic Compatibility (EMC) of digital systems.		
Content	Fundamentals of high-speed digital design, high speed properties of logic gates, measurement techniques, transmission lines, ground planes and layer stacking, terminations, and digital power systems.		

HMG3A11	**HYDRAULIC ENGINEERING 3A11**		
NQF Level	7	**Credits**	14

Semester module, third year, first semester	
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	It is useful to engineers specialising in water treatment and transport, road engineers who have to design drainage structures and structural engineers who have to consider drainage from and around their buildings amongst others
Content	Pipe flow (laminar and turbulent flow, Reynolds number, secondary losses); pipe systems (pipes in series and parallel, multiple reservoirs); pipe networks (setting up and solving network equations, modelling, components); pumps (types and components, characteristic curves, cavitation); pump systems (pumps in series and parallel, working point, selection, optimization); water hammer (compressible pipe flow, pressures, control).

HMG3B21	**HYDRAULIC ENGINEERING 3B21**		
NQF Level	7	**Credits**	14
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	Hydraulic Engineering 3B, along with Hydraulic Engineering 3A, develops the principles of fluid mechanics into a practical set of tools that should enable the learner to approach hydraulic problems in practice. Hydraulic Engineering 3B will thus be a continuation of Fluid Mechanics 2A and Hydraulic Engineering 3A and will focus on hydrology and open channel flow.		
Content	Hydrology: Precipitation (mechanisms, intensity, duration, distribution); flood estimation (deterministic, probabilistic and empirical methods); flood routing through rivers and dams; storage dams (sizing, siltation, evaporation, safety); case studies of SA floods. Open-channel flow: fundamentals (specific energy, best hydraulic section, Froude number); uniform and non-uniform flow profiles; hydraulic control points (weirs, jumps, flumes, piers).		

IFM2A10	**INFORMATICS 2A10**		
NQF Level	6	**Credits**	40
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

IFM2B10	**INFORMATICS 2B10**		
NQF Level	6	**Credits**	40
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

IFM3A10	**INFORMATICS 3A10**		
NQF Level	7	**Credits**	60
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

IFM3B10	**INFORMATICS 3B10**		
NQF Level	7	**Credits**	60
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

IIN1A11	**INTRODUCTION TO ENGINEERING DESIGN 1A11**		
NQF Level	5	**Credits**	8

Semester module, first year, first semester	
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)
Purpose	To introduce students to engineering and enable students to solve fundamental engineering problems.
Content	Introduction to Statistics: Engineering Materials; Force, Force, Moment, Stress, Strain, Compound Bars; Temperature stresses; Rigid-body equilibrium; Free-body diagrams; Method of joints in truss analysis; Method of sections and shear force/bending moment diagrams; Second moment of inertias and bending stresses. Designing, making, fabricating and evaluating engineering components. Perform group work, related to the solving of engineering mechanics problems. Communicate effectively, product portfolios and class presentations. Understand the impact that engineering mechanics can have on society, either directly or indirectly.

IIN1B21	**INTRODUCTION TO ENGINEERING DESIGN 1B21**		
NQF Level	5	**Credits**	8
Semester module, first year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable students to design simple standard machine elements and mechanical assemblies, and to communicate their work.		
Content	Basic overviews of the covered topics, coupled with appropriate analysis and synthesis of solutions to: Statics: Engineering Materials; Force, Moment, Stress, Strain; Compound bars; Temperature stresses; Rigid-body equilibrium; Free-body diagrams; Method of joints in truss analysis; Method of sections and shear force/bending moment diagrams; Second moment of inertias and bending stresses. Dynamics: Torque and power in rotating mechanical systems Report writing.		

RTI4B21	**LEGAL APPLICATIONS IN ENGINEERING PRACTICE 4B21**		
NQF Level	8	**Credits**	8
Semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	The nature of construction is such that variations to the conceptual design are inevitable as a consequence of which the construction contract provides for a unilateral right to the consulting engineer to change the performance required of the contractor. Legal Applications in Engineering Practice 4B therefore lays the foundations for this aspect of the engineering profession.		
Content	Introduction to South African law; law of obligations (introduction; emphasis on delictual/professional and especially contractual liability); mercantile law (introduction); law of patents; law relating to occupational health and safety; infringement of rights and relevant legal provisions (emphasis on remedies, especially mediation and arbitration).		

EBP3B21	**MANAGEMENT PRINCIPLES AND PRACTICE 3B21**		
NQF Level	8	**Credits**	8
Refer to the Rules and Regulations of the Faculty of Management for more information on the module.			

VVE3B21	**MANUFACTURING METHODS 3B21**		
NQF Level	7	**Credits**	12

Purpose	The course aims at introducing the student to fundamental knowledge, methods, concepts and industrial aspects of manufacturing technologies and processes. The analysis and study is based on a scientific and systematic approach with emphasis on the practical integration of manufacturing methods to aspects of design, materials, engineering environment and economical principals. The course stimulates the imagination and utilizes a general engineering background towards manufacturing technologies and optimization.
Content	Relationships between design, materials and manufacturing technologies. Material removal processes: Milling, Turning, EDM and Drilling are foundation. This includes orthogonal cutting, deformations, forces, stresses, shear zones 3D machining principals, Taylor relationships, Tool geometry, Tool wear, Power requirements and kinematics of machine tools are discussed. Forming and Metalworking methods: Extrusion, Rolling and Bending are foundation. This includes mathematical analysis of plastic deformation, slip lines and Hencky's equations, analysis of hot and cold forming processes. Process control, forces and power requirements, effects of pressure. Additive manufacturing and Assembly Methods: Welding, 3D printing and Binding methods are foundation. Introduction to Systems in manufacturing: Concepts of design & process planning, Numerical Control Systems, Adaptive Control based systems, Production and Quality Systems. Introduction to advanced solid state welding technologies like Friction Stir Welding.

MLA3000	**MECHANICAL LABORATORY 3000**		
NQF Level	7	**Credits**	11
Year module, third year			
Calculation Criteria	A single semester test (25%), together with the five different practical marks (15% each x 5 = 75%) will count towards the final mark. There will be no written exam		
Purpose	To ensure that students have an appreciation, including both theoretical and practical application, of the methods and relevance of experimental techniques in mechanical engineering.		
Content	Objectives of engineering/scientific measurements, experimental design, research methodology; accuracy, reliability, data correlation, presentation of results, meaning. Report writing and structure of technical reports and publications. Measurement techniques: Five laboratory practical's.		

MOD2A11	**MODELLING 2A11**		
NQF Level	**6**	**Credits**	12
Semester module, second year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach students programming concepts using the C programming language and computing tools that will be used frequently by engineers.		
Content	The objective of the module is to introduce the engineering student to the basic concepts, structures and mechanisms of structured programming. The course will focus on how to model real-world problems and systems in a manner that can be solved by using a computer program, specifically C, MATLAB and Microsoft Excel. Using these concepts to model real-world problems the course will then explore how to write programs and make use of Excel to solve the problems, analyse and manipulate data and present the results.		

OTS4B21	**OPTICAL SYSTEMS 4B21**

NQF Level	8	**Credits**	12
Semester module, fourth year, first semester.			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principle of fibre optics, optical fibre components, optical fibre sensors, lasers, photo-detectors and fibre optic communication links.		
Content	*Fibre Optics*: Light propagation, attenuation and dispersion in fibre optics, fibre optic components and fibre sensors. *Optical Sources and Detectors*: LEDs, semiconductor lasers, fiber lasers, PIN photo-detectors, APD photo-detectors, and photo-detection noise. *Fibre Optic Communication Links*: Power budget and bandwidth calculation.		

PHY1A01	**PHYSICS 1A01**		
NQF Level	6	**Credits**	30
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

PHY1B01	**PHYSICS 1B01**		
NQF Level	6	**Credits**	30
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

PHY2A01	**PHYSICS 2A01**		
NQF Level	6	**Credits**	24
Refer to the Rules and Regulations of the Faculty of Science for more information on the module.			

PWE4A01	**POWER ELECTRONICS 4A01**		
NQF Level	8	**Credits**	8
Sub-Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of power electronics from component level to converter level including all the associated magnetic components.		
Content	Thermal circuits: Junction temperature in steady state; single pulse operation; repetitive pulses. Components: Terminal properties; losses and drive of power semiconductor components; diodes; thyristors; TRIAC's; DIAC; bipolar- and MOS-transistors. Controlled and uncontrolled rectifiers: half-wave; full-wave; single-phase and three-phase; influence of free-wheeling diodes; power factor; harmonics. DC-to-DC converters: buck-, boost-, flyback-, forward-converters. Single-phase inverter: half-bridge; full-bridge; harmonics; pulse-width modulation.		

KRL3A01	**POWER SYSTEMS 3A01**		
NQF Level	7	**Credits**	8
Sub-Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To introduce electric power systems and the main concepts of electric network theory.		
Content	Circuits: Review basic electric circuit concepts and develop understanding of different techniques available to analyse more complex electric circuits. Use simulation tools and software to solve complex electric circuit problems. Power systems: understand the fundamentals of electrical power systems, including power definitions; develop ability to analyse power electric circuits; and basic energy conversion principles.		

KRL4B21	POWER SYSTEMS 4B21		
NQF Level	8	**Credits**	8
Semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the principles of power systems from component level to system level		
Content	Introduction to power systems, the per-unit system, generator and transformer models, transmission line parameters, line model and performance, power flow analysis, balanced and unbalanced 3-phase faults, FACTS (Flexible AC-Transmission Systems), power quality, harmonics, protection, OHS ACT; ISO 14004		

PJC1B21	PROJECT COMMUNICATION 1B21		
NQF Level	6	**Credits**	12
Semester module, first year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To introduce engineering students to professional and technical communication techniques and standards, both oral and written, through the practical implementation of an engineering project.		
Content	The communication process, formal vs. informal communication in organizations, communication formats and structures, communication tools. Introduction of writing standards, plagiarism, reference techniques, using the internet.		

PJM4000	PROJECT INVESTIGATION 4000 (Mechanical)		
NQF Level	8	**Credits**	32
Year module; fourth year			
Calculation Criteria	Final mark weighting = Semester mark (20%) + Exam mark (80%)		
Purpose	To enable the student to demonstrate that an engineering research project of limited scope may be successfully completed within a prescribed time frame.		
Content	Explore project management including project planning, control, resource scheduling, cost control and time management in practice, Formulation of the research proposal, Lifelong learning skills are demonstrated in the form of a literature survey, A concept and detail experimental design needs to be completed and reported on before practical experimentation or manufacture commences, Plan and complete practical experiments – where applicable, Describe and conclude on results. Deliver seminar presentations and a poster presentation to report on project progress and outcome, Compile a final report in the form of a typeset mini research dissertation outlining the project as a whole.		

PJE4A11, PJE4B21	PROJECT INVESTIGATION (Electrical & Electronic) 4A11, 4B21		
NQF Level	8	**Credits**	42
Year module; fourth year			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To assess learners' ability to successfully complete a project of limited engineering scope, progressing through the full normal project life-cycle. This prepares learners for entry into the industry and similar problems that they will encounter and need to solve with independent research.		
Content	Students must be able to finish their degrees within 6 months after completing this module. Students may only commence with their projects in the first semester. A Project Investigation Committee will		

	handle any grievances or exceptional requests. A number of formal lectures will be presented which students must attend. In the first semester, students are required to meet with their supervisors regularly. In the second semester, students may request meetings with supervisors as needed. A number of deliverables must be submitted at predetermined deadlines throughout the year. Students must give an oral presentation at a seminar scheduled at the end of the first semester. If a student does not show sufficient progress during the first semester, the student will not be allowed to continue with the second semester. At the end of the second semester students must submit a complete report in the form of a thesis, which will be examined by an internal as well as an external examiner. Students must also demonstrate their work at the end of the second semester at a Project Day.

PJB3B21	**PROJECT MANAGEMENT 3B21**		
NQF Level	7	**Credits**	14
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	It provides the learner with a wide range of theoretical and some practical knowledge in the field of project management.		
Content	Introduction to generic project management including project definition, life cycle, management functions, project constraints, terminology and general education and ethical issues; project initiation including project proposal and scoping, statement of work, selection, organisation and administration, communication and negotiation; project implementation including planning, financing, scheduling, resourcing, monitoring and control; project termination including auditing, termination and reporting; latest developments in project management including future considerations, impacts on private and public sector, demographics, information technology, and career paths of the project manager.		

PJB4A11	**PROJECT MANAGEMENT 4A11**		
NQF Level	8	**Credits**	14
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	Project Management 4A provides the learner with a wide range of specialised theoretical and practical knowledge in the field of construction management thereby enabling the learner to manage civil engineering projects with regards to time, cost and quality according to standards required by the civil engineering profession.		
Content	Management and organisational behaviour; construction contractual aspects; construction economics; risk analysis in construction management; construction productivity; construction planning; managing construction equipment.		

MTK2B21	**SCIENCE OF MATERIALS 2B21**		
NQF Level	6	**Credits**	10
Semester module, second year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to make an informative engineering material selection in solving an engineering problem.		
Content	Distinguish between materials engineering and materials science. Recognize the different processes involved in the total materials cycle and recognise the importance of recycling, Recognise the effect of atomic structure on the properties of engineering materials		

MTK3A11	SCIENCE OF MATERIALS 3A11		
NQF Level	7	**Credits**	12
Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to make an informative metallic material selection in solving an engineering problem and predicting its behaviour under different conditions in different environments.		
Content	Distinguish between materials engineering and materials science. Recognize the different processes involved in the total materials cycle and recognise the importance of recycling, Recognise the efct of atomic structure on the properties of engineering materials. Differentiate between the different crystal structures found in solid engineering materials, Differentiate and characterize the different crystal imperfections and their effects in solid engineering materials, Design and specify a solid state diffusion process, Recognize and calculate the mechanical properties of engineering materials including the following: elastic and plastic strength properties including hardness, Recognize and calculate the electrical properties of engineering materials including the following: resistivity, semi-conductivity, capacitance and piezoelectricity, Differentiate between the different structures, properties and processing techniques of: metallic materials including selected ferritic and non ferritic metals, ceramic materials including glasses, clay products, refractories and advanced, ceramics, polymeric materials including thermoplastics, thermosetting plastics and elastomers and composite materials including particle-reinforced, fiber-reinforced and structural composites.		

SIG3B01	SIGNAL PROCESSING 3B01		
NQF Level	7	**Credits**	8
Sub-Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the concept of converting continuous signals and systems into discrete equivalents and designing discrete systems.		
Content	Analogue-to-digital conversion and sampling techniques; discrete time systems and related difference equations; discrete filters, including finite impulse response (FIR) and infinite impulse response (IIR) filters; discrete transforms, Z-transform and discrete Fourier transforms.		

SIG4A01	SIGNAL PROCESSING 4A01		
NQF Level	8	**Credits**	8
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the theoretical principles of analysis and processing of random signals, estimation and binary decision, adaptive filters		
Content	Overview of probability theory, temporal characteristics and spectral characteristics of random processes, linear systems with random inputs, estimation theory, detection theory, adaptive filters, speech processing		

SST3A11	SIGNALS AND SYSTEMS 3A11		
NQF Level	7	**Credits**	12
Semester module, third year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the basic concepts involved in modeling and analysing signals and systems in an engineering context, and to describe signals and systems in the frequency domain rather than only in the		

	time domain. These concepts are used in most other modules in the 3rd and 4th year of study.
Content	The focus of this module is on linear, time-invariant continuous time signals and systems, focusing on the following topics: properties and classification of signals; time domain representation of signals in terms of singularity and other functions; properties and classification of systems; convolution and its applications in the engineering field; Fourier series representation of periodic signals and its applications to engineering; Fourier transform of non-periodic signals and its applications to engineering; Laplace transform of signals and its application to engineering; introduction to analogue filters.

STE3A01	**STATISTICS FOR ENGINEERS 3A01**		
NQF Level	7	**Credits**	8
Semester module, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To develop a basic understanding of elementary probability theory, random variables, random processes and statistical inference to be able to apply the methodology to a variety of engineering oriented problems.		
Content	Introduction to Probability Theory, Random Variables and Processes: Basic axioms of probability theory; probability of simple events; conditional probability rules; Baye's formula; statistical independence; probability distribution and density functions of various discrete and continuous random variables; expected value and variance of a random variable; random processes. Descriptive Statistics: Empirical distributions; histograms; sample mean; sample variance; median; quartiles; percentiles. Statistical Inference: Central Limit Theorem; Sampling distribution of mean, t-distribution, F-distribution, Chi-square-distribution; Confidence Intervals; Hypothesis testing for parameters of a population such as the mean, variance and proportion. Applications in Reliability Theory and Life Testing: Reliability of series and parallel systems; exponential and Weibull models.		

SMC2B21	**STRENGTH OF MATERIALS FOR CIVIL ENGINEERS 2B21**		
NQF Level	6	**Credits**	14
Semester module, second year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To introduce the fundamental concepts of the Strength of Materials. Classical methods of analysis for the evaluation of stresses and strains caused by external forces on common structural elements like beams, rods, columns, etc. will be introduced.		
Content	Introduction to the relationship between microstructure (atomic, crystalline etc.) and strength and deformation of some civil engineering materials. Simple stresses and strain, Axially loaded bars, Shear force and bending moment, Properties of sections, Ben ding stresses in beams, Statically indeterminate systems, Torsion, Plane and principal stresses, Buckling of axially loaded columns.		

SLR2B21	**STRENGTH OF MATERIALS 2B21**		
NQF Level	6	**Credits**	8
Semester module, second year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to comprehend the behaviour of structures when exposed to loads		

Content	Tension, compression and shear, Axially loaded members, Torsion, Shear forces and bending moments, Principal stresses and maximum shear stresses, Two-dimensional stress and strain analysis, the Mohr Circle, Deflection of beams, Statically indeterminate beams, Strain gauges. Stress, Strain, Mechanical Properties of materials, Axial loads, Torsion, Bending, Transverse Shear, Combined Loading, Stress Transformation, Strain Transformation, Deflection of Beams and Shafts.

SLR3B21	**STRENGTH OF MATERIALS 3B21**		
NQF Level	6	**Credits**	12
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable students to analyse and solve advanced strength of materials problems.		
Content	Buckling of Struts, Bending of curved beams, Shear Stresses Due to Bending, Torsional Behaviours of Symmetrical and Asymmetrical Sections, Combined Loads, Helical Springs, Thermal Distortion, Energy and Impact Concepts, Statically Indeterminate Beams, Thick Walled Cylinders and Press Fits, Stresses in Rotating Components and Contact Stresses.		

SLR4A11	**STRENGTH OF MATERIALS 4A11**		
NQF Level	8	**Credits**	12
Semester module fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable the student to perform stress and deformation analysis on three dimensional structures using both analytical and numerical methods.		
Content	Matrix methods in three dimensional elasticity, Stress and strain tensors, their transformation, eigenvalues and eigenvectors, Strain-displacement relationships in different coordinate systems, Three dimensional stress and strain relationships, Three dimensional theories of failure due to static or dynamic loading, Energy principles in elasticity: the theorem of Clapeyron. An introduction to the Finite Element Method. Discretization of a problem. Interpolation functions for simple elements. Formulation of finite element equations for elastic problems by using the variational formulation (minimization of potential energy).		

SUS3A11	**STRUCTURAL ENGINEERING 3A11**		
NQF Level	7	**Credits**	14
Semester module, third year, first semester.			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	Use is made of basic science courses in mathematics and physics to analyse the basic response of structures to primarily static loads but dynamic effects (such as wind) are also considered		
Content	Overview of structural analysis and design, structural elements, types of structures, modelling of structural systems and structural elements, analysis of different types of loads; modelling of supports and reactions, determinacy, indeterminacy and stability of structures (beams and rigid frames), application of the equations of equilibrium; type of trusses, determinacy and stability of trusses, computation of internal forces using the method of joints and method of sections; shear and moment functions, relationship between load, shear force and bending moment; axial, shear force and bending moment diagrams; cables subjected to concentrated and uniformly distributed loads, three-pinned and two-pinned arches; influence lines of beams,		

	plate girders, frames and trusses, absolute maximum response, application of influence lines; calculation of deflections using the method of virtual work, double integration method, moment area method, application to trusses, beams and frames.

SUS3B21	**STRUCTURAL ENGINEERING 3B21**		
NQF Level	7	**Credits**	14
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	The main objective in this course is to provide the students with the necessary tools to analyse indeterminate structural systems. The course also introduces the students to qualitative analysis so that they can visualize the behaviour of structures without carrying out any calculation.		
Content	Qualitative analysis of beams and frames; approximate analysis of statically indeterminate structures, application of the portal and cantilever methods to lateral loaded building frames; Virtual work (flexibility method), slope deflection, moment distribution and the stiffness method, application of these methods to indeterminate trusses, beams and frames, concept of buckling, instability of ideal and practical struts, beams and beam-columns; plastic analysis of structures; stress-strain relationship of steel, bending theory of beams, shape factors, moment-curvature graphs, effect of axial load on plastic moment, static method, virtual or kinematic method; use of structural analysis software to solving problems of multi degree indeterminate structures.		

SUS4A11	**STRUCTURAL ENGINEERING 4A11**		
NQF Level	8	**Credits**	14
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	The module covers the design of concrete structural elements.		
Content	Material properties of concrete and steel for both reinforced and tensioned concrete structures; limit state analysis; design of concrete structural elements, laboratory demonstrations/projects; computer applications.		

SUS4A12	**STRUCTURAL ENGINEERING 4A12**		
NQF Level	8	**Credits**	14
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	The module covers the design of structural steel elements.		
Content	Material properties of steel, limit state analysis, design of structural steel elements (tension members, compression members, trusses and bracing, beams and plate girders, beam-columns, connections, column bases, composite beams), laboratory demonstrations, computer applications.		

OPM3B21	**SURVEYING 3B21**		
NQF Level	7	**Credits**	7
Followed during the first two weeks of the winter recess			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	This module will familiarise the student with all the calculations and practical applications required during construction, thus providing him/her with the extensive knowledge required for making the right management decisions in this context. The module thus provides an		

	in-depth study of the different types of surveys the engineer will have to control on a construction site.
Content	Levelling (control points, road sections, cross-sections, cut and fill requirements); traversing (control points, directions and verticals, distances and co-ordinates, joins and polars); site-surveying (spot heights, contours and grids); triangulation (point fixing by intersection resection and double polars, heights of points by trigonometrical levelling); setting out (gradients with a level, road centrelines with theodolite, curves – transition, circular, vertical).

SIO3A11	**SYSTEMS ENGINEERING AND DESIGN 3A11**		
NQF Level	7	**Credits**	16
Semester module, third year, First semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To expose the student to the principles of Systems Engineering		
Content	Documentation writing skills, introduction: reasons for systems engineering, scope of systems engineering, specification trees, applicable standards, work breakdown structures, design principles for man machine interfacing, requirements management, baseline definitions (requirements, functional, allocated), design reviews, configuration control, system safety, system acceptance, system qualification and certification, risk management, reliability engineering.		

SIO3B21	**SYSTEMS ENGINEERING AND DESIGN 3B21**		
NQF Level	7	**Credits**	16
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To expose the student to the principles of Systems Engineering		
Content	Documentation writing skills, introduction: reasons for systems engineering, scope of systems engineering, specification trees, applicable standards, work breakdown structures, design principles for man machine interfacing, requirements management, baseline definitions (requirements, functional, allocated), design reviews, configuration control, system safety, system acceptance, system qualification and certification, risk management, reliability engineering.		

TEL3B01	**TELECOMMUNICATIONS 3B01**		
NQF Level	7	**Credits**	8
Sub-Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the relevant theoretical principles and applications of analogue modulation theory and analogue telecommunication systems.		
Content	Modulation of sinusoidal carrier with continuous information signal. Frequency division multiplexing. Amplitude modulation, double sideband suppressed carrier modulation, single sideband and vestigial side band modulation, frequency modulation, phase modulation.		

TEL4A01	**TELECOMMUNICATIONS 4A01**		
NQF Level	8	**Credits**	8
Sub-Semester module			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	To teach the theoretical concepts of information theory, digital telecommunication systems, and digital modulation.		

Content	Introduction to information theory and channel coding: entropy, capacity, Shannon's theorems, Markov models, source coding and pseudo-random binary sequences. Introduction to digital telecommunication systems: equalization, the matched filter, binary and M-ary digital telecommunications. Introduction to baseband digital communication systems: inter-symbol interference and eye patterns and correlated multi-level techniques. Introduction to digital modulation systems: modulation of sinusoidal carrier by discrete information signals, amplitude shift keying, frequency shift keying, phase shift keying and a combination of techniques.

MKE3B21	**THEORY OF MACHINES 3B21**		
NQF Level	6	**Credits**	16
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To provide an understanding of the kinematics and dynamics of machine elements.		
Content	Mechanisms and machines. Kinematics: degrees of freedom, links, joints and chains, linkage transformation. Velocity and acceleration of mechanisms, gyroscopes, equivalent mass & moments of inertia. Engine dynamics: Balancing, Gear trains, Cam design and analysis, Servo-mechanisms, flywheels, vibration.		

TML4B21	**THERMAL SYSTEMS 4B21**		
NQF Level	8	**Credits**	12
Semester module, fourth year, second semester			
Calculation Criteria	Final mark weighting = Semester mark(50%) + Exam mark (50%)		
Purpose	To enable the student to solve engineering problems of a fundamental nature in thermo systems.		
Content	Psychromentery. Heating and cooling losses. Heating and air conditioning applications. Cooling and dehumidifying coils. Vapour compression cycle. Expansion valves. Refrigerants. Absorption cooling.		

TRD2B21	**THERMODYNAMICS 2B21**		
NQF Level	6	**Credits**	12
Semester module, second year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To enable students to gain both a thorough understanding of the fundamentals of thermodynamics and an ability to apply these fundamentals too thermodynamic problems. To enable the development of applied competence in some of the following fields of thermodynamics. Mass momentum and energy balances -the first law of Thermodynamics - in control volumes. Energy transfer in thermodynamic equipment. The second law of Thermodynamics; Carnot cycles and efficiency of thermal cycles. Gas cycles for thermodynamic equipment, thermodynamic properties of matter, etc. The objective of the module is to gain both a thorough understanding in the fundamentals of thermodynamics and an ability to apply these fundamentals to thermodynamic problems.		
Content	Mass momentum and energy balances - the first law of Thermodynamics - in control volumes. Energy transfer in thermodynamic equipment. The second law of Thermodynamics; Carnot cycles and efficiency of thermal cycles. Gas cycles for thermodynamic equipment, thermodynamic properties of matter, etc. The objective of the module is to gain both a thorough understanding		

	in the fundamentals of thermodynamics and an ability to apply these fundamentals to thermodynamic problems.

TMS3A11	**THERMOFLUIDS 3A11**		
NQF Level	6	**Credits**	12
Purpose	Further development of applied competence in advanced thermodynamics		
Content	Second Law Analysis for a control volume, Irreversibility and Availability, Power and Refrigeration Systems, Gas Mixtures, Thermodynamic Relations, Chemical Reactions, Combustions		

TRM4A11	**THERMOMACHINES 4A11**		
NQF Level	6	**Credits**	12
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	To develop applied competence in the working of kinetic and reciprocating internal combustion engines (RICE's), i.e. Gas turbines, Patrol and Diesel engines.		
Content	Gas turbines: Cycle analysis (T-s & P-v diagrams),),Design analysis, Shaft Power (power generation) Cycles, Aircraft propulsion cycles, Turbomachinery, Environmental Impact of Gas Turbines, IC-engines: Types of engines with their various characteristics, RICE-engines: Engines types (Patrol & Diesel) with their characteristics, Performance criteria, Patrol, Diesel and Dual thermodynamic cycles (T-s & P-v diagrams) Ideal and real cycles, air and fuel induction, Working fluids and properties, Fuels, thermochemistry and combustion, Engine charging (turbocharging, supercharging, intercooling), Environmental impact of RICEs .		

VVI3B21	**TRANSPORTATION ENGINEERING 3B21**		
NQF Level	7	**Credits**	14
Semester module, third year, second semester			
Calculation Criteria	Final mark weighting = Semester mark (100%)		
Purpose	The purpose of the module is to provide the principles and concepts needed to plan, design and manage multi scale transportation systems in relation to urban demands and associated environmental impacts. The module highlights the multi-layered integration of modes, space and population demand.		
Content	Transportation systems: Transportation modes and trends, Multimodal transport, Demand forecast modelling, transport system evaluation and safety criteria, Congestion, Energy conservation and environmental impact. Road and rail mass transit infrastructure planning, design and operation. Innovations in transit technology.		

UDS4A11	**URBAN DEVELOPMENT STUDIES 4A11**		
NQF Level	8	**Credits**	14
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	The first part of this module (Solid Waste Management) provides the learner with a broad knowledge of solid waste management. The second part of the module (Urban Development) introduces learners to the complexities surrounding urban development and service delivery.		
Content	Solid waste; waste disposal by landfill; landfill classifications; landfill engineering. Urban development: population trends and demography; urban growth and urbanization; transportation and urban		

	development; road infrastructure financing; privatization; and the role of urban infrastructure asset management in promoting socio-economic development and service delivery.

SDI4A11	**URBAN HYDRAULICS 4A11**		
NQF Level	8	**Credits**	14
Semester module, fourth year, first semester			
Calculation Criteria	Final mark weighting = Semester mark (50%) + Exam mark (50%)		
Purpose	Urban Hydraulics is a practical summation of most matters that the learner has become acquainted with in the civil engineering programme, thus far. It is a subject that will prepare the learner for the actual work that they might be confronted with in practice.		
Content	Service levels for municipal infrastructure; water distribution systems (plan, analyse, design); sewer reticulation systems (plan, analyse, design); storm water systems (plan, analyse, design); drinking water quality (quality issues, treatment processes); wastewater quality (quality issues, treatment processes).		