Programme Handbook

Teesside University

2014/5

Higher National Diploma in Mechanical Engineering by Flexible Open Learning

School of Science & Engineering

Teesside University

Teesside University Open Learning
Engineering

Contents

Teesside University Open Learning Engineering (TUOLE)

TUOLE the leading international designer and developer of engineering and technology open learning programmes, has one of the largest portfolios of accredited open learning programmes serving the engineering and process industries worldwide. TUOLE formerly COLU has been operational for 25 years and since 2002 has been part of Teesside University School of Science and Engineering.
Our HND programmes are accredited under licence from Edexcel.
Registration for HND programmes lasts for 5 years and you are expected to complete your programmes within this time period.
It is also important that you realise that open learning study requires a considerable degree of self-discipline. You must be prepared to devote both time and effort to studying not withstanding other distractions that may be present.
For this reason students must complete an appropriate HNC award prior to embarking on the HND, or have significant accredited Prior learning (APL), greater than 60 credits, to carry forward towards the HND. Your Programme Leader will be able to advise students on appropriate APL.

"Excellent course materials. Excellent tutor support. Very prompt marking of assessments with detailed feedback"

Programme Structure

One of the benefits of distance learning is that you can start a programme at any time that suits you and progress at a pace that suits you and your personal circumstances. Students are able to commence study at any time in the year.

Your programme leader will suggest guidelines to help you manage your time effectively. You will be required to complete a minimum of 30 credits per year which typically equates to two modules.

The HND programmes are divided into modules some of which are core (essential) and some electives (your choice).

Your programme leader will help with advice and guidance in your choice of options. Each module is worth a set number of credits and is specified as either level 4 or level 5. Modules are studied consecutively starting with the core modules at level four.
The programme learning outcomes are provided in Appendix 1.
Elective modules can be studied in any order, as there are no prerequisites they are chosen by the student with guidance from programme leader.
Students are able to focus on particular areas of interest in their choice of electives, allowing the programme to relate specifically to their own experience and industrial expertise.

For an HND you must complete a minimum of 245 credits, including the core modules with a minimum of 125 credits at level 5. In practice this means that, as there are a number of core level 5 modules, 6 aditional level 5 modules must be completed as electives.

This may seem confusing but your programme leader will be able to help with any questions you may have.

Core modules	**Level**	**Credit**
Analytical Methods for Engineers	4	15
Engineering Science	4	15
Mechanical Principles	5	15
Project *	5	20
Elective modules		**Credit**
Engineering Applications	4	15
Applications of Pneumatics and Hydraulics	4	15
Heat Transfer & Combustion	4	15
Fluid Mechanics	4	15
Materials Engineering	4	15
Mechatronic System Principles	4	15
Programmable Logic Controllers	4	15
Statistical Process Control	5	15
Engineering Design	5	15
Engineering Thermodynamics	5	15
Business Management Techniques	5	15
Plant Services	5	15
Safety Engineering	5	15

*some modules are subject to availability
The programme learning outcomes are provided in Appendix 1.

Typical programme structure for an HND in Mechanical Engineering

Year	Module title	Module title	Module Title
1	Analytical Methods for Engineers Level 4 Core 15	Engineering Science Level 4 Core 15	Applications of Pneumatics and Hydraulics Level 4 Elective 15
2	Engineering Applications Level 4 Elective 15	Programmable Logic Controllers Level 4 Elective 15	Heat Transfer and Combustion Level 4 Elective 15
3	Fluid Mechanics Level 4 Elective 15	Mechatronics Systems Principles Level 4 Elective 15	Mechanical Principles Level 5 Core 15
4	Engineering Thermodynamics Level 5 Elective 15	Plant Services Level 5 Elective 15	Safety Engineering Level 5 Elective 15

5	Business Management Techniques Level 5 Elective 15	Control Systems and Automation Level 5 Elective 15	Engineering Design Level 5 Elective 15	Project Level 5 Core 20

* The Project module has been designed to allow the students the opportunity to use the knowledge and skills they have acquired throughout the programme alongside their own experience

This structure allows for a student completing three modules per year and four in the final year. As a flexible open learning student you can work at your own pace and complete more modules, as long as the minimum requirement for the completion of 30 credits in a year is met. You should also be aware that studying less than three modules per year will impact on your completion of the programme within the five year registration period.

For students who withdraw from the programme without completing the required credits for the full award a series of fall back certificates can be awarded depending on the number of credits achieved.

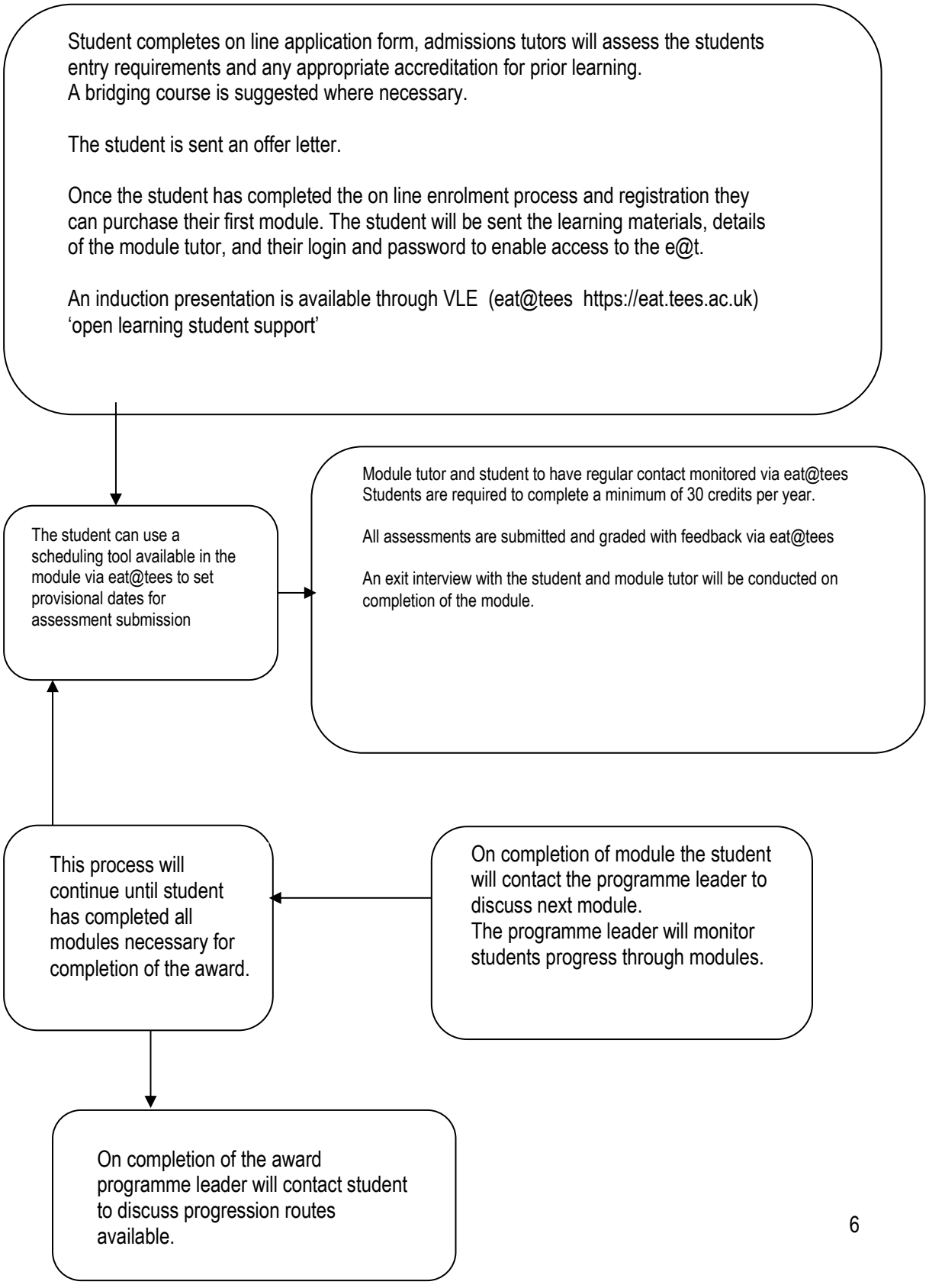
If you have already completed an HNC award you can study the HND as a top up award a typical structure is given below, the choice of modules will depend on previously studied modules.

Typical programme structure for an HND in Mechanical Engineering as a top up from HNC in Mechanical Engineering

Year	Module title	Credit	Module title	Credit
1	Fluid Mechanics Level 4 Elective	15	Mechatronics Systems Principles Level 4 Elective	15
2	Engineering Thermodynamics Level 5 Elective	15	Plant Services Level 5 Elective	15
3	Safety Engineering Level 5 Elective	15	Control Systems and Automation Level 5 Elective	15
4	Business Management Techniques Level 5 Elective	15	Engineering Design Level 5 Elective	15

An HND programme consists of 16 modules of which a minimum of 8 modules must be at level 5, these may include level 5 modules previously completed within an HNC programme

Student Journey



Study packs

You are provided with a self-contained comprehensive study pack for each of the specifically designed modules from the School of Science and Engineering open learning unit. Each module consists of a folder or folders containing a series of lessons grouped into topics. Each lesson has an introduction, your aims, study advice, self-assessment questions and a summary.

While open learning means you study at your own pace, many people find it difficult to develop a 'habit of study' because of the self-discipline needed. To help you overcome this and achieve your long term aim of completing the programme within a realistic timescale, we will suggest a study schedule which will include the requirement to complete a minimum of 30 credits per year.

Your programme and module leader will keep in regular contact with you via e@t.
You are encouraged to remember your programme and module leaders are there for guidance and support. Don't hesitate to ask for help. Your programme and module tutors can be contacted by a variety of means: e@t, email, telephone, fax or (by prior arrangement) a face to face visit.

As you work through each lesson there will be self-assessment questions and answers to help check your learning. At set points in the study pack you will be advised that you are ready to complete an assessment.

It is your responsibility to download assessments when you think you are ready to attempt them. All assessments are available through the e-learning site. When you have completed your assessment you will submit it electronically via e@t, there is guidance on how to submit assessments available.

A short description of the content of each module is given in the following pages, please contact the module tutor for a more in depth discussion. The full list of module leaders is provided in Appendix 3

E-learning@tees

All modules are supported by the e-learning@tees (eat@tees). The modules will include a range of material relevant to the module, such as the module handbook, electronic versions of study packs and a discussion forum.
e@t will also host links to useful websites and on-line documents, information on emerging engineering issues in the press and engineering journals. The VLE (e@t) offers many opportunities for student-to-student and student-to-staff interaction (such as discussion boards, wikis, blogs, a virtual whiteboard and a live chat facility).
e@t is the primary store for all your assessment feedback and provisional grades. You must access the site regularly to check for any notifications and feedback.
If you are having difficulties accessing your e-learning account please contact the ICT helpdesk

- **Email:** sse-helpdesk@tees.ac.uk.
- **Telephone:** 01642 342531
- **Drop in:** IC1.48 between 9.00 and 17.00 (Monday - Friday) [map]

How to succeed in your Studies

Develop the Habit of Learning

The open learning programmes we offer have been developed over many years to enable you to continue your study without the constraints of fixed times and places. You are in control of your learning but to be effective you need to:

- Develop a 'habit of study'
- Have a place to work
- Set aside times when you will not be interrupted
- Produce a regular output of written work
- Organise your books and notes
- Regularly check your targets
- Maintain regular contact your module tutor and programme leader

Getting organised for study

While open learning means you study at your own pace, many people find it difficult to develop a 'habit of study' because of the self-discipline needed. To overcome this and achieve your long term aim of completing a module within a realistic timescale, we will help you to decide on a study schedule.
Your main work involves completing lessons including the self-assessment questions at the end of each lesson. The module is made up of a series of topics composed of a number of lessons.

All lessons have common features:
The introduction or overview of the lesson
Your aims tell you what you should have achieved when you have completed the lesson. They provide learning objectives that are worthwhile referring to while you are working through the lesson.
Study advice helps you plan your work strategy by pointing out any special resources needed or unusual time requirements.
Self-assessment questions enable you to check your progress and find out if you have achieved your objectives. Solutions or answers are provided but you will not help your learning if you look at the answers before you attempt the questions.
The summary reinforces what you have completed and generally provides a quick reference to the contents of the lesson
Remember if at any point in your study you feel that you need help you can contact the academic tutors who are not only subject specialists, but who also have experience and expertise in flexible open learning study.
Students are able to access tutor support on-line, via email, telephone or fax. Students who are in the locality can with prior arrangement meet the tutors face to face.

You will be expected to maintain regular contact with your module tutor and your programme leader.

Note: Students who appear to have dropped out of the course for an extended period of time may be withdrawn from the course.

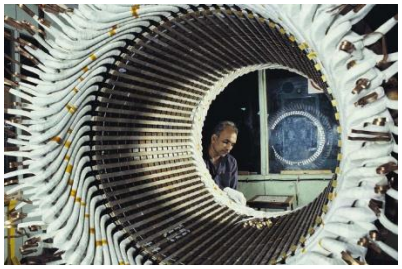
Brief descriptions of the core and elective modules are provided below:

Level 4 Modules

This level of study provides the foundation for the development of knowledge, skills and confidence for the successful progression through the programme

Core modules

Analytical Methods for Engineers *(15 credits):* The aim of this module is to provide the fundamental analytical knowledge and techniques needed to successfully complete the core modules of Higher National Engineering programmes. It is also intended as a base for the further study of analytical methods and mathematics, needed for the more advanced option modules. This module has been designed to enable students to use fundamental algebra, trigonometry, calculus, statistics and probability, for the analysis, modelling and solution of realistic engineering problems at Higher National level.



Engineering Science *(15 credits):* This module investigates a number of mechanical and electrical scientific principles which underpin the design and operation of engineering systems. It is a broad-based unit, covering both mechanical and electrical principles. Its intention is to give an overview which will provide the basis for further study in specialist areas of engineering.

Elective modules

These modules allow you to tailor your HNC programme to focus on particular areas of interest or area relating to your current or future employment.

Engineering Applications *(15 credits):* In this module students identify individual tasks, activities, or programmes of work, whether administrative, theoretical, practical or supervisory, that they have

undertaken as part of their daily working lives and show how those activities have contributed to their professional engineering development. In so doing the module requires that the student document key aspect of the development to date and to critically appraise their career journey, identifying areas of their experience that may be under-developed and producing an action plan for their ongoing professional development.

Programmable Logic Controllers*(15 credits):* This module investigates programmable logic controller (PLC) concepts and their applications in engineering. It focuses on the design characteristics and internal architecture of programmable logic control systems, the signals which are used and the programming techniques. This module will include the loan of a practical kit to allow you to produce and demonstrate a programme for a programmable logic device.

Applications of Pneumatics and Hydraulics*(15 credits):* This module will provide students with a knowledge and understanding of fluid power systems in modern industry by investigating pneumatic and hydraulic diagrams, examining the characteristics of components and equipment, and evaluating the applications of pneumatics and hydraulics.

Mechtronics Systems Principles *(15 credits):* The aim of the module is to introduce the student to the necessary skills and principles which underpin a range of mechatronic systems. The module will encompass small single component systems as well as larger systems integrating components from different engineering disciplines. The module will deal with the control concepts used in mechatronic systems and will focus on system design and maintenance. The approach will be broad-based, to reflect the fact that mechatronics is, by its nature, multidisciplinary and not confined to a single specialised discipline. The intention is to encourage the student to recognise a system, not as an interconnection of different parts but as an integrated whole.

Heat Transfer and Combustion *(15credits):* This module is intended to develop students' knowledge of principles and empirical relationships to enable them to solve practical problems involving heat transfer, combustion and the specification of practical engineering equipment.

Fluid Mechanics *(15 credits):* The module applies the principles of fluid mechanics and the techniques used to predict the behaviour of fluids in engineering applications. The module looks at the forces exerted by a static fluid on immersed surfaces, viscosity, the flow of fluids through pipelines and around bluff bodies and examines hydraulic machines.

Materials Engineering *(15 credits):* In this module students are provided with basic background knowledge and understanding of the properties, selection, processing, applications and utilisation of engineering materials.

Level 5 Modules

This level of study consolidates learning and enables students to start increasing the breadth and depth of their knowledge. These modules include the skills and knowledge required to deal with advanced design

processes, as well as developing the students' analytical and investigative skills.

Core modules

Mechanical Principles *(15 credits):* This module covers a range of mechanical principles which underpin the design and operation of mechanical engineering systems. It includes aspects related to strengths of materials and mechanics of machines. The aim of the unit is to provide a firm foundation for work in engineering design and a basis for more advanced study.

Project *(20 credits):* This module presents the opportunity for students to use the knowledge and skills they have developed at work and in their programme of studies, in the definition, management and completion of a work-related project, including the presentation of their findings to an appropriate audience. The module thereby aims to integrate the skills and knowledge developed in other modules of the course within a major piece of work that reflects the type of performance expected of a higher technician at work.The student is advised to study this module until last and is advised to use a 'real' project based on their own workplace where this is possible.

Elective modules

Engineering Thermodynamics *(15 credits):* This module introduces students to the principles and laws of thermodynamics and their application to engineering systems. The module covers system definition, the first and second laws of thermodynamics, heat engine cycles, the measurement of engine performance and the layout and performance of steam plant.

Plant Services *(15 credits):* This module introduces the relevant physical and chemical principles for use in the evaluation of the production, distribution and use of each of the common plant services such as steam, air and refrigeration services.

Safety Engineering *(15 credits):* This module covers the fundamentals of contemporary Safety Engineering as applied to industrial processes. It consists of an introduction to the terminology, the nature and treatment of hazards, hazard analysis, risk assessment, emergency procedures and the application of protective measures associated with various hazards The main aims of the module are to provide a firm foundation for work in Safety Engineering and to act a basis for more advanced studies of safety practices.

Business Management Techniques *(15 credits):* The aims of the module are to provide an introduction to the role, principles and application of management accounting in the planning, decision making and control of engineering projects, and to develop an awareness of the needs of project planning and scheduling; to develop numerical skills in the context of management accounting and to be able to communicate quantitative and qualitative information in a variety of contexts.

Statistical Process Control (15 credits): This module will provide you with background knowledge and understanding of Statistical Process Control by explaining its underpinning statistical methods and providing the essential key tools used in SPC such as Pareto Analysis, Control Charts and inspection and sampling techniques. It is also shown how the method of SPC is applied in quality management techniques such as Six Sigma.

Engineering Design *(15 credits):* This module gives students an opportunity to experience the process of carrying out a design project and the production of a design report containing specifications in accordance with given customer requirements. A key aim of the module will be to enable students to appreciate that design involves synthesising parameters which affect the eventual design solution.

Students are actively encouraged to read outside the material directly associated with their modules. This "reading around the subject" can be both enjoyable and can help link disparate aspects of the course together in the student's mind. Many successful students will tell you that reading widely is a good way of improving your understanding of the taught material.

Useful Websites

Mathematics resources
www.mathcentre.ac.uk

British Standards Education
www.bsieducation.org

Institute of Engineering and Technology
www.theiet.org

HSE: Information about health and safety at work
www.hse.gov.uk

Academic Staff & Profiles

Programme Leader:

David Cradddock: David Craddock is the

Programme Leader for HNC/D Mechanical Engineering. He gained a BSc (Hons) in Mechanical Engineering from Newcastle Polytechnic and has worked as both production and design engineer. David has a Post Graduate Certificate and an MA in Education. Between periods teaching engineering in the UK he has worked on technical education projects in Bangladesh, Cambodia and Kiribati. David developed an interest in distance education before joining the university as an open learning author and tutor.
Rm: IC2.01 ☎01642 342559
e: D.Craddock@tees.ac.uk

Module Leaders

Derek Casson: Derek Casson is the Programme

Leader for HNC/D Electrical and Electronic Engineering. Derek worked in the telecommunication industry prior to becoming a lecturer in engineering. He gained a HND in Electrical & Electronic Engineering from Leicester Polytechnic and a Certificate of Education from Huddersfield Polytechnic. He also gained a BA (Hons) from the Open University.
Rm: IC2.01 ☎01642 342526
e: D.Casson@tees.ac.uk

David Peel: David Peel is the Program leader

for HNC/D Chemical Engineering. He completed his degree and doctorate in Chemical Engineering at Newcastle University before working in post doctoral research positions in advanced process control at both Newcastle and Oxford University. David joined Teesside University as senior lecturer in Chemical Engineering where he initially stayed for 7 years. Since then he has worked for over a decade in automation R&D and as a consultant to the power industry in the UK and US. David recently returned to teaching and spends part of his time teaching within the mainstream University and part of his time supporting the chemical engineering and process engineering courses in the University's distance learning unit.
Rm: IC2.01 ☎01642 342731
e: D.Peel@tees.ac.uk

Neville Winter: Neville is the Program leader for

HNC/D Instrumentation and Control Engineering. He completed his degree at the University of Northumbria whilst working in an Electrical Engineering role for a muti-national manufacturing company. Neville joined Teesside University as senior lecturer in Electrical Engineering where he has worked for the past two years. Prior to working at the University Neville spent over a decade in industry followed by a lecturing role in a local further education college

delivering higher education programmes. Neville spends part of his time supporting the Electrical and Instrumentation and Control Engineering courses in the University's distance learning unit and the remainder teaching within the mainstream University.
Rm: IC2.01 ☎ 01642 342476
e: n.winter@tees.ac.uk

David Wishart: David is the tutor for HNC/D

Analytical Methods and Engineering Science in the University's distance learning unit. He completed his degree at Loughborough University before working in electronic design for a large Japanese consumer electronics manufacturer in both the UK and Japan. He did this for twenty years before leaving the industry and completing his PGCE in order to embark on a career change as a lecturer in electronics and maths. David joined Teesside University as a distance learning tutor where he works part time alongside a lecturing job teaching Electronic Engineering at a local Further Education college. He is available in the office on Mondays and Fridays.
Rm: IC2.01 ☎ 01642 738215
Email: d.wishart@tees.ac.uk

Student Destinations & Profiles

Rajendra Khadilkar "I'm very pleased by the academic level of studying. I feel that I have acquired useful technical knowledge and skills during my study". Raj did his further study in BEng. Hons at Sunderland and works as offshore Maintenance planner in Oil and Gas industry

Paul Falconer

"The training that I received from Teesside university (TUOLE) has given me the experience and knowledge needed to progress in my career as an instrumentation and control systems design engineer. The qualifications gained at the university can provide good employment opportunities and the possibility of further education." Paul Is a control systems design engineer working within the petrol chemical industry for an Engineering, Procurement and Construction (EPC) contractor, MWKL.

Assessments

Assessment is key to learning. There is much more to assessment than just giving you a mark for a piece of work. Well-designed assessment helps both you and your tutors understand how well you are progressing, and in what areas you may need additional support.

There are two main classes of assessment, formative and summative.
Formative assessment takes the form of the self-assessment questions within the study packs, these are intended to provide feedback for students. If you are unsure of these questions you can contact your tutor for feedback and guidance. The self-assessment questions are designed to help the learner understand his or her strengths and weaknesses. These formative assessment questions are very important. Understanding where you are in the context of understanding the subject is vital to success.
Summative assessment is graded, and contributes to the overall module grade. This includes traditional forms of assessment such as short answer problem solving questions, essays, practical exercises and reports.
A typical assessment schedule is provided in Appendix 2.
A scheduling tool is available at e@t Open learning Student Support.

Assessment Submission

Assessments should be submitted electronically, via e@t https://eat.tees.ac.uk . If your work precludes this then separate arrangements will be made with your module tutor although this should only be in exceptional cases. You are advised to keep a copy of your assessment prior to submission so you have a copy for your own review at a later date.

Guidelines for Assessment Format

Guidance on the production of standard assessment types are given below.

Essay/literature review-based reports

The essay must be written in clear and concise English, normally in the past tense, and should comprise: **(a)**Title; **(b)** Summary; **(c)** Introduction; **(d)** Main Body of Text; **(e)** Discussion with Conclusions if appropriate; **(f)** References**.** Guidance on the presentation of individual sections is given below.

Practical-based reports

The report must be written in clear and concise English, normally in the past tense, and should comprise: **(a)**Title; **(b)** Summary; **(c)** Introduction; **(d)** Methods; **(e)** Results**; (f)** Discussion with Conclusions if appropriate; **(g)** References**.** Guidance on the presentation of individual sections is given below.

Guidelines on Referencing & Citation

References are those books and journal articles which you have consulted and made *direct* use of the material contained in them to generate your submission. Correct referencing and citation ensures you acknowledge the work done by others. Referencing and citation is vital in all your written work because of the University's strict rules on plagiarism.

For modules delivered by the School of Science & Engineering you are required to use the **Harvard System** unless the module specification states otherwise. You will be given clear guidance if you are expected to use alternative referencing systems. The School of Science and Engineering has specific guidelines on referencing and citation available via the link below:
http://lis.tees.ac.uk/referencing/sse_new.pdf

Abbreviations, Units & other details:

Abbreviations should be defined at first mention in both Summary and main text.

Feedback and Marks

Assessment and feedback will follow the University's Assessment and Feedback Policy (University Handbook: Section 1 Assessment and Feedback Policy)
http://www.tees.ac.uk/docs/DocRepo/Quality%20handbook/I-AFP.doc

At this point a provisional grade and feedback will be agreed. Please note the following:

"This feedback is being given for purposes of advice and guidance and to assist your learning and development in this module. References to standards or grades are entirely provisional and subject to confirmation following University procedures. Only University Assessment Boards are able to issue confirmed, definite grades."

Feedback is in the form of individual feedback sheets. These will be completed by staff during their assessment of your work.

Feedback and grade will normally be provided within four working weeks of submission. Your feedback will be available via e@t.

The marking criteria are provided in the appendix 4.

Mitigating Circumstances

It is the student's responsibility to complete the appropriate proforma (and to notify the Programme leader where appropriate) if he/she considers that there are any mitigating circumstances affecting their performance in assessments.

The University Procedure for Mitigating Circumstances can be found at
www.tees.ac.uk/docs/index.cfm?folder=student%20regulations&name=Academic%20Regulations
]

Mitigating Circumstances proformas can be obtained from your programme tutor and the completed forms, plus any supporting evidence, should be returned to the Senior School Administrator (or her nominee) who will issue a receipt to the student.

Illness – Any form of illness or injury which coincides with, or predates, the submission date of an assignment must be supported by written medical evidence. This could constitute either a medical certificate or written communication from a GP. ***Illness or injury as an excuse will not be considered without such evidence.***

Personal Circumstances – In this case ongoing personal or family circumstances which are likely to

affect assignment submission, programme leaders should be informed well in advance of any deadlines. The University has a number of Student Counsellors whom students may see by appointment. The Students, Union also provides Counselling Service for students who wish to contact them and may provide confidential letters of support that would be considered by the Mitigating Circumstances Board. ***The onus is on the student to make contact with someone appropriate.***
Documentary evidence will be required to support the claim.

Assessment Review (appeal)

If you feel that you have been disadvantaged in some way through the assessment process which adversely affects your award / grade, then an opportunity is available for you to make an application for assessment review. Copies of the procedure and the necessary documentation can be obtained from the School of Science & Engineering Administration Office or via the Student Ombudsman Office.

Academic Misconduct

What follows is only a brief summary of the University's Academic Misconduct procedure and should be read in conjunction with the Regulations relating to Academic Misconduct (Taught Components and Programmes) available at: www.tees.ac.uk/docs/index.cfm?folder=student%20regulations&name=Academic%20Regulations
You are strongly recommended to read those Regulations. They provide a detailed explanation of academic misconduct, the procedures which must be followed when an academic misconduct offence is suspected and the possible penalties.

Academic misconduct is defined by the University as any activity or attempted activity which gives an unfair advantage to one or more students over their peers and is treated very seriously.

To ensure that students are treated fairly and equitably, academic misconduct is divided into the following three types:

1. Academic Negligence: This is regarded as the least serious offence and covers first time minor offences. It includes plagiarism that is small in scale, not related to the work of other students, and which is considered to have resulted from ignorance or carelessness.

2. Academic Malpractice: This covers extensive paraphrasing of material with no acknowledgement of the source, systematic failure to reference, submitting work which has already been submitted for another assignment, and subsequent cases of Academic Negligence.

3. Academic Cheating: This is regarded at the most serious offence and covers Plagiarism in dissertations/final year projects/taught doctorate modules, collusion with other students, theft, commissioning/purchasing work, falsification of results/data, and all examination irregularities.

If suspected of academic misconduct, you will be required to attend either an informal or formal meeting and if subsequently found guilty, you will receive a penalty, the most serious of which can be exclusion from the University. The processes and penalties are described in Appendix 2 of the Regulations. If you are found guilty of academic misconduct after the end of your course, any award that you have received may be withdrawn. This can be done after you have graduated.
The University has an Exceptional Cases Procedure, which can be used when it is suspected that a piece of work submitted by a student is not their own work. You could be interviewed to determine the authorship of work. You are therefore strongly advised to retain materials used in developing work.

The following tips may help you to avoid academic misconduct:
<u>Do:</u>

- Familiarise yourself with the regulations and penalties that can be incurred. For professional programmes, a single case of academic misconduct may result in you being discontinued from your course.
- Make sure that you know how to correctly acknowledge other people's work or opinions, and get feedback from your Tutor on whether or not you are doing this correctly.

- Take care when making notes from books or articles. Always keep a record of whether your notes are a paraphrase of the source or a direct quotation, so that you don't inadvertently include quotes without proper acknowledgement. [This is a frequently cited reason students give when accused of academic misconduct.]
- Seek support from your Module or programme Leader if you are experiencing difficulties in completing your work on time.

Don't

- Cut and paste (or reproduce) chunks of material from electronic sources or books/articles. *Even if you acknowledge the source, material not stated as being a direct quotation will make you vulnerable to an accusation of academic misconduct.*
- Loan your work to other students. *If it is then copied, you may be accused of academic misconduct.*
- Borrow work from current or previous students.
- Submit the same work for different assessments.
- Get someone else to do your work. *Essay-writing web sites don't always keep their promises and have been known to inform universities of students who have purchased work.*

Support for Your Learning

Academic Support

If you are experiencing difficulty coping with the material in any module, you should initially approach the Module Leader, and explain the problem. It is primarily the Module Leaders responsibility to deal with these difficulties.

Sub Degree Programme Co-ordinator:

Alternatively, you can consult the Sub degree Programme Co-ordinator, Mrs Julie Winter. An issue of general concern can be raised at the Programme Board.

Off-Campus Support

The library & Information services website (L&IS) provides a range of services which can be accessed by off-campus users. Support is available from our Off-campus Assistant who will help you with any queries about access to L&IS resources. Call 01642 342922 during office hours or 01642 342780 at any time, or email off-campus@tees.ac.uk.

Books and photocopied journal articles can be posted out to you (UK addresses only) for a charge of £3.00 per book and £1.50 per photocopied journal article. To register go to http://lis.tees.ac.uk/postal/register.cfm. More details about this service, and the request forms are available from the L&IS website http://lis.tees.ac.uk/offcampus/

Electronic Resources

The L&IS website (**http://lis.tees.ac.uk**) provides details of services available and acts as a gateway to a wide range of electronic learning resources such as the Catalogue, subject guides, searchable databases, electronic books and electronic journals. A wide range of guides, factsheets and online tutorials are available to help you access and use the resources and facilities. L&IS maintains an online set of Sources for your subject area at: http://lis.tees.ac.uk/subject

Databases for your subject area include:

Scopus – the world's largest abstract and citation database covering 15,000 scientific, technical, medical, social science, psychology and economic peer reviewed journals. Scopus also performs an integrated search of the scientific Web via the search engine Scirus. The Scopus factsheet gives details on how to access and search this database http://lis.tees.ac.uk/factsheets/fs43.pdf

ScienceDirect - one of the most comprehensive databases of primary literature available in the sciences. It contains the full text of more than 2,000 peer reviewed journals in the life, physical, medical, technical, and social sciences. It also contains abstracts from the core journals in the major scientific disciplines. The ScienceDirect factsheet gives details on how to access and search this database http://lis.tees.ac.uk/factsheets/fs44.pdf

Web of Knowledge - provides access to current and retrospective multidisciplinary information from approximately 8,700 of the most prestigious, high impact research journals in the world. It includes the Science Citation Expanded and Social Sciences Citation Index http://lis.tees.ac.uk/factsheets/fs132.pdf

Ebrary - Ebrary is a growing collection of over 44,000 electronic books. It covers multiple subject areas. See the Ebrary factsheet for instructions http://lis.tees.ac.uk/factsheets/fs131.pdf

Library

Library & Information Services (L&IS) support distance learners by providing electronic information resources such as e-books, e-journals, and online databases. On the L&IS website the section entitled 'Subject Guides' lists the relevant resources that are available http://lis.tees.ac.uk/subject and students can access them with their University username and password. Teaching staff can also make use of the L&IS digitisation service to make book chapters and journal articles that cannot be purchased electronically available on E-learning @Tees. Students based in the UK can have books and journal articles posted out to them. Dedicated off-campus support staff are available to assist distance learners with their queries http://lis.tees.ac.uk/offcampus

Online factsheets provide guidance on electronic resources. An information skills online tutorial teaches students how to find electronic journals and how to evaluate information on the Internet. Students can also seek support through the instant messaging 'Chat Reference' service, the AskLisar email service or by telephoning the Subject Librarian for science & engineering. The Hub website http://lis.tees.ac.uk provides advice on referencing and avoiding plagiarism.

For locally based students, or if you are visiting, the University's Library provides access to books including e-books, DVDs, journals, computers and other learning resources. It is designed to provide a user-friendly learning environment, with open access to shelves, ICT equipment and other information services. Visit their website at http://lis.tees.ac.uk/ for more information.

Opening Hours

Term Time	
Monday - Thursday	8am – midnight*
Friday	8am - 8pm*
Saturday	11am - 8pm
Sunday	11am - 10pm

Please note* *that from* ***8 am - 8.30 am and 10 pm - midnight* *the Library is open on a* ***'Self-service'*** *basis. During 'Self-service' hours the Library is only open to Teesside University students and staff. You will need your TUSC (Teesside University SMART Card) to enter the building. The Service Counter, Enquiry Desk and Information Desks will not be staffed, therefore there will be no assistance during these hours. For your safety there will be staff in the building, but their role is to patrol only.*

Vacation Opening Hours	
Monday - Thursday	9.00am - 7.00pm
Friday	9.00am - 5.00pm
Saturday	11.00am - 5.00pm
Sunday	Closed

Library opening times may occasionally vary and are posted on the Library & Information Services (L&IS) web site - http://lis.tees.ac.uk/

Borrower Number and Personal Identification Number

Your TUSC is your Library card and your borrower number is the number above the upper barcode. Your PIN is a 4-digit number unique to you and is required to renew your loans either over the telephone or via the web. You will also require your PIN to access other University systems e.g. Unity, the University portal.

Staff and students can set up their own PINs via - https://myaccess.tees.ac.uk/pcs/ by selecting the option to "Manage your security details". Alternatively you can telephone the Library on 01642 342992 and request your PIN to be posted out to you or ask at the Enquiry Desk in the Library.

ICT Account

Your ICT account is your username and password which you need to log on to the networked computers in the Library. The networked computers give access

to the Internet, Microsoft Office, the Catalogue and specialist databases and software. A wide range of electronic resources can also be accessed off campus from any computer, which has an Internet connection. To do this you will normally need to use your ICT account details.

It is recommended that you set up an automatic redirect to the email address that you access regularly.

Journals

Research and review articles from scientific journals are an important source of information. You will be directed to relevant journals titles by your tutors.

Access to other Libraries

As a part-time student you may be entitled to use the services of other university libraries using the SCONUL Access scheme. Generally you can borrow books and use libraries for reference purposes. Access to PCs and electronic material is not included. Details of the scheme are listed on the SCONUL Access website http://www.access.sconul.ac.uk/

Learning Hub

The Learning Hub is located on the ground floor of the Library. They offer guidance to all students on developing their skills as independent learners and on related areas including maths and statistics. Drop in workshops on topics such as referencing, finding information and writing essays are available throughout the year. Learning Hub staff collaborate with your School to ensure that in depth help is available to you.

Online information on a wide range of topics including referencing, writing, critical thinking skills and information literacy can be accessed via the Library and Information Services website at http://lis.tees.ac.uk

T: 01642 342100

W: http://lis.tees.ac.uk

Further Help

L&IS provides a range of factsheets, quick guides and a useful induction guide.

For further help with finding resources relating to your course please contact the Science & Technology team in the Library or email Clare Barber (Subject Librarian – Science & Engineering): c.barber@tees.ac.uk

For general L&IS and ICT enquiries contact: lisenquiries@tees.ac.uk

For enquiries about loans, reservations, fines etc. contact: usersupport@tees.ac.uk

For off campus support when using online databases and other library resources contact: off-campus@tees.ac.uk

Student Support Officer

The School also has a Student Support Officer, Sandra McCormick (s.McCormick@tees.ac.uk) who can help students to access advice and support, and can often provide guidance directly on many issues. You are welcome to contact Sandra on any matter, large or small. She can be contacted at the Student Advice Desk in the Stephenson Building.

Disabilities Support

The University provides confidential help and support for students who have disabilities or special problems which may affect their study or assessment periods. Specialist staff in University Student Services assess the disability or learning difficulties to ensure that appropriate support or allowances are provided.

Students with disabilities and specific learning difficulties are encouraged to discuss with the advisors how the University might meet their requirements. The aim is to enable students to participate fully in their programme through additional support that may be in the form of finance / equipment / amanuensis.

More details are available at http://www.tees.ac.uk/sections/studentsupport/

In the first instance, students who require special needs provision should contact the School Special Needs Coordinator, Garry Bishop (g.bishop@tees.ac.uk), who will make arrangements for expert assessment of needs, and be able to

communicate agreed arrangements to relevant teaching staff. Students requiring special needs provision are advised to discuss their situation with their Programme Leader. Confidentiality is always respected.

Student Health Service

The Student Health Service has a registered nurse that can provide confidential advice about any health-related problems that you may have. Where appropriate, treatment is available and drop-in clinics are held daily. Advice on health matters can be sought from the University Student Health Advisor on 01642 343202.

A student counselling service is available. More details of these and similar services are available at http://www.tees.ac.uk/sections/studentsupport/

Change of Personal Details

It is important that we are kept informed of any changes in your personal details, such as your name, telephone number or address. Such information is essential so that Assessment /Award results are accurately recorded and posted.

Please send an email to the programme leader as soon as possible, so that we know your email address

Appendix 1

Learning Outcomes

The programme will enable students to develop the knowledge and skills listed below.
On successful completion of the programme, the student will be able to:

Knowledge and Understanding *(insert additional rows as necessary)*	
K1	Demonstrate detailed knowledge and understanding of the mathematical methods necessary to support the application of mechanical principles.
K2	Demonstrate detailed knowledge and understanding of scientific principles underpinning mechanical systems.
K3	Apply, question and relate mechanical engineering principles to produce solutions to a range of mechanical engineering problems.
K4	Demonstrate detailed knowledge and understanding of the management techniques involved in a range of design projects.
K5	Demonstrate a detailed knowledge of mechanical engineering systems and processes and undertake a guided project.
K6	Critically review and select engineering analysis techniques and use them in well defined mechanical engineering problems.
K7	Demonstrate knowledge of workshop/laboratory practice.
Cognitive/Intellectual Skills *(insert additional rows as necessary)*	
C1	Identify and apply suitable computer based methods or quantative methods for simulating mechanical design solutions.
C2	Identify and select suitable tools to enable measurement and testing of well defined mechanical design solutions.
C3	Interpret manufacturers data sheets and justify the use of particular components.
C4	Apply, analyse and interpret measurement and test data from a variety of practical tests or simulations to the solution of mechanical engineering problems.
C5	Identify and select design solutions for a predefined mechanical engineering problem ensuring flexibility and fitness for purpose.
Practical/Professional Skills *(insert additional rows as necessary)*	

P1	Able to act with increased autonomy with reduced need for supervision to produce solutions that integrate knowledge of mathematics, science, information technology, design, business context and mechanical engineering practice to solve routine problems.
P2	Identify and select appropriate codes of practice and industry standards relating to a variety of situations and including quality standards within the mechanicals industry.
Key Transferable Skills *(insert additional rows as necessary)*	
T1	Produce reports and present information verbally appropriate to the context of the mechanical engineering sector.
T2	Use a range of technological equipment and systems appropriate to the discipline.
T3	Demonstrate numerical and statistical skills appropriate to the discipline.

Appendix 2

Assessment Schedule – Typical HND in Mechanical Engineering

Note: This is for guidance only and weeks relate to your start date not University academic week numbers

Module Name	Formative Assessment Type and Week of Completion	Summative Assessment Type and Week of Submission
Year 1		
Analytical Methods for Engineers	Self assessment questions and answers included in the module learning pack.	One single component of assessment, comprising **four** elements, in the form of an in-course assessment. Each assessment is equally weighted and comprises a set of, on average 5-10 short answer questions Element 1 Week 4 Element 2 Week 8 Element 3 Week 12 Element 4 Week 16
Engineering Science	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	One single component of assessment, comprising **four** elements, in the form of an in-course assessment. Each assessment is equally weighted and comprises a set of, on average 5-10 short answer questions. Element 1 Week 20 Element 2 Week 24 Element 3 Week 28 Element 4 Week 32
Applications of Hydraulics and Pneumatics	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	Evidence will be provided from a single component of assessment, comprising three elements, in the form of an in-course assessment. Each assessment comprises a set of, on average 5-10 short answer questions which are related to the sequence and content of the lessons provided within the learning materials. Element 1 week 36 Element 2 week 40 Element 3 week 44
Year 2		

Engineering Applications	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	One single component of assessment, comprising **four** equally weighted elements, in the form of an in-course assessment comprising short project style reports of approximately 500 words each that detail the professional development activities that the student has undertaken in the workplace and show how each activity has contributed to the student's progress and the advancement of their abilities in engineering; technically, managerially, and personally. Element 1 week 4 Element 2 week 8 Element 3 week 12 Element 4 week 16
Programmable Logic Controllers	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	One single component of assessment, comprising **four** equally weighted elements, in the form of an in-course assessment. Element 1 comprises a set of, on average 5-10 short answer questions. Week 20 Element 2 comprises a set of, on average 5-10 short answer questions. Week 24 Element 3 comprises a set of, on average 5-10 short answer questions. Week 28 Element 4 is a practical assessment which is based around several programming design report including ladder diagrams 5-10 pages Week 32
Heat Transfer and Combustion	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	Element 1, 2, 3 and 4 consists of a small number of questions which require a blend of short descriptive answers including the reproduction of diagrams; numerical calculations requiring the interpretation of technical descriptions and the identification and use of relevant formulae, tables and charts. Element 1 will focus upon heat transfer by conduction and modes of heat transfer week 36 Element 2 will focus upon overall heat transfer rates week 40 Element 3 will focus on heat exchangers week 44

		Element 4 will focus on combustion processes Week 48
Year 3		
Fluid Mechanics	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	Evidence will be provided from a single component of assessment, comprising three elements, equally weighted, in the form of an in-course assessment. Each assessment comprises a set of, on average 5-10 short answer questions which are related to the sequence and content of the lessons provided within the learning materials Element 1 week 4 Element 2 week 8 Element 3 week 12
Mechatronics Systems Principles	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	The in-course assessment will take the form of a series of elements of assessment generally comprising 5-10 short answer questions. It will assess their ability to research, interpret and analyse a problem and to produce a workable solution. Element 1 will focus on the philosophy of automation and control theory Week 16 Element 2 will focus on sensors and transducers. Week 20 Element 3 will focus on PLCs and actuators Week 24
Mechanical Principles	Self-assessment questions and answers at the end of each lesson to allow for progression of learning. .	Element 1, 2 and 3 consists of a small number of questions (typically 4-6) which require a blend of short descriptive answers including the reproduction of diagrams; numerical calculations requiring the interpretation of technical descriptions and the identification and use of relevant formulae, tables and charts. Element 1 week 28 Element 2 week 32 Element 3 week 36
Year 4		
Engineering Thermodynamics	Self-assessment questions and answers at the end of each	Elements 1, 2, 3 and 4 consist of a small number of questions (typically 4-6) which require a blend of short descriptive answers including the reproduction of diagrams; numerical calculations requiring the interpretation of technical descriptions and the identification and use of relevant

	lesson to allow for progression of learning.	formulae, tables and charts. Element 1 will focus on Thermodynamic systems and the first law of thermodynamics Week 4 Element 2 will focus on the second law of thermodynamics and entropy Week 8 Element 3 will focus on the internal combustion engine and compressors Week 12 Element 4 will focus on Turbines Week 16
Plant Servics	Self-assessment questions and answers at the end of each lesson to allow for progression of learning.	Elements 1, 2, 3 and 4 each consist of a small number of questions (typically 4-6) which require a blend of short descriptive answers including the reproduction of diagrams; numerical calculations requiring the interpretation of technical descriptions and the identification and use of relevant formulae, tables and charts Element 1 will address the use and interpretation of thermodynamic properties for steam, air and refrigerants. Week 20 Element 2 will address the evaluation of thermodynamic processes involved in production of steam, compressed air and vapour compression in refrigeration. Week 24 Element 3 will address the principles of operation of service plants. Week 28 Element 4 will address the systems associated with steam, compressed air and refrigeration plants. Week 32
Safety Engineering	Self-assessment questions and answers at the end of each lesson to allow for progression of learning.	The in-course assessment will take the form of a series of elements of assessment generally comprising 5-10 questions designed to assess the students' ability to investigate, interpret and analyse a problem and to produce a workable solution. Element 1 will focus on the cost implications of hazardous incidents and safety implementation, accident investigation and analysis, risk assessment for different types of hazard. Week 36 Element 2 will focus on HAZOP procedures, correctly identify deviations from normal process operating conditions, their consequences and appropriate actions to prevent occurrence of deviations and/or consequences, hazard analysis techniques Week 40 Element 3 will focus on workplace safety monitoring, safety assessments, safety audits,

		emergency site plans, plant safety equipment locations, permit to work and associated documentation, control of work in vessels and confined spaces Week 44
Year 5		
Business management Techniques	Self-assessment questions and answers at the end of each lesson to allow for progression of learning.	The in-course assessment will take the form of a series of elements of assessment generally comprising 5-10 questions. It will assess their ability to research, interpret and analyse a problem and to produce a workable solution. Element 1 will focus on financial Sources, engineering company location factors, business articles of association and engineering works organisation and functions. Week 4 Element 2 will focus on break even calculations, net present values, project cost analysis standard costing and budget variance, apportionment of overheads, marginal costing and ABC costing techniques. Week 8 Element 3 will focus on financial planning and control, short, medium, and long term plans, strategic plans, operational planning, company accounts, revenue and costs and capital investment. Week 12 Element 4 will focus on project tendering, planning and scheduling, project management computer software package and programme ,project resources and requirements, Gantt charts, critical path and precedence. Week 16
Control Systems and Automation	Self-assessment questions and answers at the end of each lesson to allow for progression of learning.	Evidence will be provided from a single component of assessment, comprising four, equally weighted, elements equally weighted, in the form of an in-course assessment. Element 1 will take the form of an industry-based case study in which the student will produce an 800 to 1000 word report Week 20 Each of elements 2, 3 and 4 will comprise a small number of questions (typically 4-6) requiring a blend of short descriptive answers including the reproduction of diagrams; numerical calculations requiring the interpretation of technical descriptions and circuit drawings, and the identification and use of appropriate formulae, Week 24 Week 28

		Week 32
Engineering Design	Self-assessment questions and answers at the end of each lesson to allow for progression of learning.	Element 1, which will take the form of a design specification, will cover the key elements of design, the selection of a design method, and justification for it. Week 32 Element 2 will cover the selection of appropriate computer-based technology and the application of a range of communication methods in the production and presentation of a design report Week 36
Project	Self-assessment questions and answers at the end of each lesson to allow for progression of learning.	One single component of assessment comprising **three** equally weighted elements: Element 1 comprises a logbook or project diary documenting the progress of the project on a periodic basis Week 40 Element 2 comprises a project report of approximately 3000 words Week 44 Element 3 oral presentation of the project 5-10 mins Week 48

Appendix 3

Module Leaders contact details

Module	Module Tutor	Contact Tel.	Contact email
Analytical Instrumentation (FOL)	David Peel	+44 (0)1642 342731	D.Peel@tees.ac.uk
Analytical Methods for Engineers (FOL)	David Wishart	+44 (0)1642 738215	d.wishart@tees.ac.uk
Applications of Pneumatics and Hydraulics (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Business Management Techniques (FOL)	David Wishart	+44 (0)1642 738215	d.wishart@tees.ac.uk
Chemical Engineering Unit Operations (FOL)	David Peel	+44 (0)1642 342731	D.Peel@tees.ac.uk
Combinational and Sequential Logic (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Control Systems and Automation (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Digital and Analogue Devices and Circuits (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Distributed Control Systems (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk
Electrical and Electronic Principles (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Electrical Machines (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk
Electrical Services (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk
Electrical Supply and Distribution (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk
Electrical Systems Protection (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk

Electromagnetic Compatibility (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Electronics (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Engineering Design (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Engineering Science (FOL)	David Wishart	+44 (0)1642 738215	d.wishart@tees.ac.uk
Engineering Thermodynamics (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Fluid Mechanics (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Heat Transfer and Combustion (FOL)	David Peel	+44 (0)1642 342731	D.Peel@tees.ac.uk
Instrumentation and Control Principles (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Lighting (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk
Mass and Energy Balance (FOL)	David Peel	+44 (0)1642 342731	D.Peel@tees.ac.uk
Mass Transfer Operations (FOL)	David Peel	+44 (0)1642 342731	D.Peel@tees.ac.uk
Materials Engineering (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Measurement of Process Variables (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk
Mechanical Principles (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Mechatronic Systems Principles (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Microprocessor Systems (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Operational Amplifiers (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk
Plant Services (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk

Programmable Logic Controllers (FOL)	Neville Winter	+44 (0)1642 342476	n.winter@tees.ac.uk
Project (FOL)	David Craddock	+44 (0)1642 342559	d.craddock@tees.ac.uk
Safety Engineering (FOL)	David Wishart	+44 (0)1642 738215	d.wishart@tees.ac.uk
Semiconductor Physical Electronics (FOL)	Derek Casson	+44 (0)1642 342526	d.casson@tees.ac.uk

Appendix 4

Excel – Grading Higher National Units

Each module will be graded as a pass, merit or distinction.

A pass is awarded for the achievement of all outcomes against the assessment criteria specified in the module

Merit and distinction grades are awarded for higher-level achievement.
Edexcel (the awarding body) give generic merit and distinction grade descriptors used by tutors for grading the total evidence produced for each module and describe the student's performance over and above that for a pass grade.

Grade descriptors

Pass grade

A **pass grade** is achieved by meeting all the requirements defined in the assessment criteria for pass for each unit.

Merit grade

MERIT DESCRIPTORS	INDICATIVE CHARACTERISTICS
In order to achieve a **merit** the learner must:	The student's evidence shows:
1. identify and apply strategies to find appropriate solutions	• effective judgements have been made • complex problems with more than one variable have been explored • an effective approach to study and research has been applied
2. select/design and apply appropriate methods/ techniques	• relevant theories and techniques have been applied

	• a range of methods and techniques have been applied • a range of sources of information has been used • the selection of methods and techniques/sources has been justified • the design of methods/techniques has been justified • complex information/data has been synthesised and processed • appropriate learning methods/techniques have been applied
3. present and communicate appropriate findings	• the appropriate structure and approach has been used • coherent, logical development of principles/concepts for the intended audience • a range of methods of presentation have been used and technical language has been accurately used • communication has taken place in familiar and unfamiliar contexts • the communication is appropriate for familiar and unfamiliar audiences and appropriate media have been used

Distinction grade

DISTINCTION DESCRIPTORS	INDICATIVE CHARACTERISTICS
In order to achieve a **distinction** the learner must:	The learner's evidence shows:
1. use critical reflection to evaluate own work and justify valid conclusions	• conclusions have been arrived at through synthesis of ideas and have been justified • the validity of results has been evaluated

	using defined criteria • self-criticism of approach has taken place • realistic improvements have been proposed against defined characteristics for success
2. take responsibility for managing and organising activities	• autonomy/independence has been demonstrated • substantial activities, projects or investigations have been planned, managed and organised • activities have been managed • the unforeseen has been accommodated • the importance of interdependence has been recognised and achieved
3. demonstrate convergent/lateral/ creative thinking	• ideas have been generated and decisions taken • self-evaluation has taken place • convergent and lateral thinking have been applied • problems have been solved • innovation and creative thought have been applied • receptiveness to new ideas is evident • effective thinking has taken place in unfamiliar context