ENTERED

NOV 1 8 2011

RECORDS

Revised 4/22/2009

UNDERGRADUATE CURRICULUM PROPOSAL COVER SHEET

Title of Proposal – Must begin with Department Abbreviation:

ENEE - BSEE Modifications with ENGR Effects

Check One: [✓] Full Proposal or [ ] Information Item

Effective Date for Curricular Offering: August 2012

FROM: Ahmed Eltom, Electrical Engineering, EMCS 315C, 425-4381
(proposal originator: include spokesperson's name, department, office number, telephone, e-mail)

Does this require new resources from the originating department or other department? No
Please include an explanation if yes.

Faculty of the originating department approved this proposal on 11/15/11 (date), by a vote of 6 aye votes; 0 nay votes; 0 abstentions; 0 eligible voting members absent.

The following have examined this proposal:

	Printed name	Signature, date	Approve	Neutral	Disapprove*
Dept Head/Director:	Ahmed Eltom	A Hmed Eltom	✓		

College Curriculum Committee Date: 11-18-11 Vote: 3-3-2 Signature of Chair: Cecelia M. Wigal

Spokespersons for Affected Departments:

Printed Name, Department	Signature, Date	Approve	Neutral	Disapprove*
Cecelia M. Wigal, Engineering	Cecelia M Wigal 11-18-11			✓

	Printed name	Signature, date	Approve	Neutral	Disapprove*
Dean/Director:	Wm. Sutton	11/18/11		✓	
University Registrar:	Linda Orth	Linda Orth	1/24/12 Comments		
Provost/Representative:	J. Sanders	J Sanders 1/24/12	✓		

Lab/studio fee requested: [ ]

	Printed name	Signature, date	Approve	Disapprove*
Provost:	Phil Oldham			

*Those who disapprove may attach an explanation

ACTIONS on this proposal:	***Curriculum Committee***	***Faculty Senate***
Date the proposal was considered		
Vote of the body:		
Accepted as information item (*indicate date*)		
Approved as submitted (*indicate date*)		
Approved with amendments (amendments indicated and transmitted to all signatories above, date):		
Signature of Chair:		

12-055 UG

Revised 4/22/2009

UNDERGRADUATE CURRICULUM PROPOSAL COVER SHEET

Title of Proposal – Must begin with Department Abbreviation:

ENEE - Modifications to the BSEE Program

Check One: [✔] Full Proposal or [ ] Information Item

Effective Date for Curricular Offering: August 2012

FROM: Ahmed Eltom, Electrical Engineering, EMCS 315C, 425-4381
(proposal originator: include spokesperson's name, department, office number, telephone, e-mail)

Does this require new resources from the originating department or other department? Yes
Please include an explanation if yes. ENGLISH WRITING COURSE ADDED AS REQ'MENT.

Faculty of the originating department approved this proposal on 11/15/11 (date), by a vote of 6 aye votes; 0 nay votes; 0 abstentions; 0 eligible voting members absent.

The following have examined this proposal:

	Printed name	Signature, date	Approve	Neutral	Disapprove*
Dept Head/Director:	Ahmed Eltom	A hmed 11/15/11	✓		

College Curriculum Committee Date: _____ Vote: _____ Signature of Chair: _____

Spokespersons for Affected Departments:

Printed Name, Department	Signature, Date	Approve	Neutral	Disapprove*
Joseph M. Wiesenfeld, English	11/17/11	✓		
Habib Durga Chuard, Physics	11/22/11			✓

Dean/Director:				
University Registrar:	Linda Orth (Printed name)	(Signature, date)	Comments	
Provost/Representative:	J. Sanders (Printed name)	1/24/12 (Signature, date)	✓ Approve	Neutral / Disapprove*

Lab/studio fee requested: [ ]

Provost:	Phil Oldham (Printed name)	(Signature, date)	Approve / Disapprove*

*Those who disapprove may attach an explanation

ACTIONS on this proposal:	***Curriculum Committee***	***Faculty Senate***
Date the proposal was considered		
Vote of the body:		
Accepted as information item (*indicate date*)		
Approved as submitted (*indicate date*)		
Approved with amendments (amendments indicated and transmitted to all signatories above, date):		
Signature of Chair:		

ENTERED

NOV 1 8 2011

Revised 10/2/2009 RECORDS

UNDERGRADUATE CURRICULUM PROPOSAL COVER SHEET

Title of Proposal – Must begin with Department Abbreviation:

ENEE - Modifications to the BSEE Program

Check One: [✓] Full Proposal or [ ] Information Item

Effective Date for Curricular Offering: August 2012

FROM: Ahmed Eltom, Electrical Engineering, EMCS 315C, 425-4381
(proposal originator: include spokesperson's name, department, office number, telephone, e-mail)

Does this require new resources from the originating department or other department? Yes
Please include an explanation if yes. ENGLISH WRITING COURSE ADDED AS REQUIREMENT

Faculty of the originating department approved this proposal on 11/15/11 (date), by a vote of 6 aye votes; 0 nay votes; 0 abstentions; 0 eligible voting members absent.

The following have examined this proposal:

	Printed name	Signature, date	Approve	Neutral	Disapprove*
Dept Head/Director:	Ahmed Eltom	A Eltom 11/17	✓		

College Curriculum Committee Date: 11-18-11 Vote: 5-1-2 Signature of Chair: Cecilia M. Wigal

Spokespersons for Affected Departments:

Printed Name, Department	Signature, Date	Approve	Neutral	Disapprove*
Cecilia M. Wigal Engr-Comp. Engr	Cecilia M. Wigal 11-18-11			✓

	Printed name	Signature, date	Approve	Neutral	Disapprove*
Dean/Director:	W.H. Sutton	W.H. Sutton 11/18/11	✓*		

University Registrar: Linda Orth — Signature, date — Comments

	Printed name	Signature, date	Approve	Neutral	Disapprove*
Provost/Representative:	J. Sanders	J. Sanders 1/24/12	✓		

Lab/studio fee requested: [ ]

	Printed name	Signature, date	Approve	Disapprove*
Provost:	Phil Oldham			

*Those who disapprove may attach an explanation

ACTIONS on this proposal:	***Curriculum Committee***	***Faculty Senate***
Date the proposal was considered		
Vote of the body:		
Accepted as information item (*indicate date*)		
Approved as submitted (*indicate date*)		
Approved with amendments (amendments indicated and transmitted to all signatories above, date):		
Signature of Chair:		

*Objective was only based on review time W.H.

12-05606

ENEE – Modifications to the Bachelor of Science in Electrical Engineering (BSEE) and Related ENGR Courses

Department of Electrical Engineering
College of Engineering and Computer Science

Dr. Ahmed Eltom Department Head Ahmed-Eltom@utc.edu

Proposal Submission Date: November 15, 2011
Proposal Effective Date: Fall, 2012

Note

This proposal was once two separate proposals, "ENEE – BSEE Modifications with ENGR Effects" and "Modifications to the Bachelor of Science in Electrical Engineering (BSEE) Program", and was reviewed within the College of Engineering as such. At the suggestion of the Registrar, and because they are closely related, the two proposals have been combined into a single proposal, "ENEE - Modifications to the Bachelor of Science in Electrical Engineering (BSEE) and Related ENGR Courses". The sign-off sheets for both original proposals should be attached.

Summary

The proposed modifications to the BSEE program would accomplish four goals:

1. Add Electrical Engineering-specific electives in the senior year.
2. Improve specific aspects of the current curriculum, including technical writing, Fundamentals of Engineering (FE) Exam performance, and coverage of ethics.
3. Better distribute material across the sequence of circuits courses.
4. Bring ENGR courses taught by EE faculty and servicing mainly EE students under the EE department with an ENEE prefix.

The modifications require no additional university resources to enact. The changes do not increase the total number of sections the department would teach in a year, as new courses are offset by removing previously required courses.

The number associated with each item in the list below corresponds to the section number in which it is presented in detail. A detailed justification, including course descriptions and syllabi, can be found in the Appendix after the proposed catalog text.

A. Modified or updated courses
   1. "Automatic Control Systems Analysis and Design" (ENEE 3730) heavily modified with digital control material.
   2. Deactivating "Digital Electronics Laboratory" (ENEE 2740L).
   3. "Analog and Digital Communications" (ENEE 4750) updated by more accurately reflecting what is taught in the course.
   4. "Electrical Circuits II" (ENEE 2720) updated by adding sinusoidal steady state analysis, power calculations, analog filters and two-port networks.

5. "Electrical Circuits II Laboratory" (ENEE 2720L) updated to match material from lecture.

B. Prerequisite modifications
1. "Power Electronics" (ENEE 4600) removes lab co-requisite.
2. "Electrical Engineering Design Project" (ENEE 4500) modified pre- and co-requisites.
3. "Electrical Machinery" (ENEE 3800) modified co-requisite and renamed "Electrical Energy Conversion".
4. "Electronic Instrumentation" (ENEE 4800) removed "Advanced Electronics" or "Power Electronics" prerequisite. Replaced with "Analog Electronics".
5. "Microprocessors Applications" (ENEE 4700) updated prerequisites to match addition of "Engineering Programming" (ENEE 2250).
6. "Advanced Electronics Laboratory" (ENEE 3770L) updated prerequisites to reflect deactivation of "Digital Electronics Laboratory" (ENEE 2740L).
7. "Electromagnetic Fields and Waves" (ENEE 3750) updated prerequisites to reflect creation of ENEE 2700.
8. "Linear Controls and Drives Laboratory" (currently ENEE 3730L, proposed to change to ENEE 3790) updated co-requisite course to ENEE 3790 (related to Item A1).
9. "Electrical Circuits I Laboratory" updated co-requisite to accept either ENGR 2700 or ENEE 2700 (related to Item C2).

C. New courses
1. "Fundamentals of Engineering and Professionalism" (ENEE 4900).
2. "Electrical Circuits I for Electrical Engineers" (ENEE 2700).
3. "Engineering Programming" (ENEE 2250) would replace "Engineering Programming" (ENGR 2250), which would be deactivated.

D. Curriculum modifications
1. The existing requirements that students take "Sampled Data and Nonlinear Control Systems" and "Advanced Electronics" or "Power Electronics" would be removed and replaced two EE lecture electives and one EE laboratory elective.
2. Power sequence (ENEE 3800 and 4720) moved ahead in plan of study.
3. "Optics and Modern Physics" (PHYS 2320) replaced with "Professional Writing" (ENGL 2880).
4. "Thermo-Fluids" (ENGR 3050) moved from fall to spring semesters.

E. Deactivated courses – Five courses not offered within the past seven years are proposed for removal from the catalog.

A. Modified Courses

Detailed information (course description, syllabus, evaluation methods, objectives, etc.) is provided in the Appendix for each modified course.

Proposal

1. "Automatic Control Systems Analysis and Design" (ENEE 3730) would be modified by gaining some of the material from "Sampled Data and Nonlinear Control Systems" (ENEE 4780). It is envisioned that these modifications would require a new course number. We suggest the modified course, entitled "Modern Control Systems Analysis and Design" receive the course number ENEE 3790 and this number is used in the subsequent discussions. Material in nonlinear and optimal control would be removed to ensure that the resulting course retained its three-hour status. The existing "Automatic

Control Systems Analysis and Design" (ENEE 3730) would be deactivated along with its lab (ENEE 3730L), which would be renumbered as ENEE 3790L.

2. Some of the assignments in "Digital Electronics Laboratory" (ENEE 2740L) would be moved into the lecture, "Digital Electronics" (ENEE 2740). As such, "Digital Electronics" (ENEE 2740L) would be deactivated.

3. The syllabus and course description of "Analog and Digital Communications" (ENEE 4750) would be updated to remove material pertaining to ethics and more accurately reflect what is taught in the course.

4. Additional material (analog filters and two-port networks) would be added to "Electrical Circuits II" (ENEE 2720) to better utilize the course.

5. Additional material would be added to "Electrical Circuits II Laboratory" (ENEE 2720L) to match the lecture.

Rationale

1. UTC is unique in requiring two controls courses (ENEE 3730 and 4780). This is a hold over when the department offered a dedicated track in Instrumentation and Control. At most other institutions the material on nonlinear and optimal controls that make up a significant portion of "Sampled Data and Nonlinear Control Systems" is either an elective or a graduate course. By combining the relevant material on sampled data control from ENEE 4780 with the traditional linear feedback control material from ENEE 3730 to form the ENEE 3790, hours are freed to offer students an elective in an area of EE of their choosing.

2. The removal of "Digital Electronics Laboratory" (ENEE 2740L), made possible by moving some assignments to the lecture, would free an hour in the curriculum for more pressing uses (see Section C) with minimal impact to the student. The lecture currently has room to incorporate the additional assignments, none of which require lab access to complete.

3. The proposed addition of a course related to ethics and professionalism (see Section C) would duplicate material currently covered in "Analog and Digital Communications" (ENEE 4750). Removing this duplicated material would free space for topics that fall under the banner of communications.

4. The creation of an electrical engineering-specific Circuits I course permits the department to update the material presented in the two courses in ways that benefit electrical engineering students. Adding to the new ENEE 2700 course presents material in its logical order. The space freed by this removal of material, combined with existing slack in the ENEE 2720, permits the addition of, sinusoidal steady state analysis, power calculations, frequency response (analog filters) and two-port networks, both important topics to electrical engineers. Frequency response of analog circuits was previously covered in "Advanced Electronics" (ENEE 3770), which is no longer a required course in the curriculum.

5. Following the same justification as above, the modifications to "Electrical Circuits II Laboratory" (ENEE 2720L) would mirror the changes to the "Electrical Circuits II" lecture (ENEE 2720).

Impact

1. Students would receive less exposure to non-linear controls than previous graduates. There would be little difference, however, between the controls background of a future UTC student and a student from almost any other EE program. Note that the program only this year added a controls lab to the curriculum (ENEE 3730L) that would serve to blunt the reduction in required contact hours (four hours now compared with six hours last year). Students interested in the subject could take a controls course as an elective.
   The only other department affected by this proposed course merging is Computer Engineering. Students in the BSE-Computer Engineering program currently take ENEE 3730, which would be heavily modified with the addition of sampled data control. This would in fact benefit the computer engineering student as they work in the digital domain that would be covered in the new course.

2. The merging of the "Digital Electronics" lecture and lab would have little impact on the student. Many of the existing lab assignments would be retained and become lecture assignments. The loss of instruction in lab report writing would be more than compensated for with the proposed addition of "Professional Writing" (see Section D). The existing laboratory assignments do not require students to attend lab or use any specialized equipment that the student does not already own or can easily purchase.

3. The slight modification to ENEE 4750 affects no other department. Students will benefit from the exposure to additional FE Exam topics.

4. The modifications to ENEE 2720 impact just Electrical Engineering and Computer Engineering departments but would better prepare these students for careers in electronics, as well as the FE Exam.

5. The modifications to ENEE 2720L impact just Electrical Engineering and Computer Engineering departments but would better prepare these students for careers in electronics, as well as the FE Exam.

B. Prerequisite Modifications

Detailed information (course description, syllabus, evaluation methods, objectives, etc.) is provided in the Appendix for each modified course.

Proposal

The course removals and merges necessitate modifications to the pre-requisites of existing courses.

1. "Power Electronics" (ENEE 4600) – Remove co-requisite of ENEE 4600L.

2. "Electrical Engineering Design Project" (ENEE 4500) – Remove prerequisite of ENEE 3800 and pre- or co-requisite of ENEE 4800. Add prerequisite of ENEE 3790 and a pre- or co-requisite of ENEE 4700.

3. "Electrical Machinery" (ENEE 3800) – Change prerequisite of ENEE 3750 to a co-requisite.

4. "Electronic Instrumentation" (ENEE 4800) – Remove prerequisite of "ENEE 3770 and 3770L or ENEE 4600 and 4600L" and add prerequisite of "ENEE 3720 and 3720L". Prerequisite of "ENGR 2250" modified to "ENEE 2250" to match Item C3.

5. "Microprocessors Applications" (ENEE 4700) – Updated prerequisites to match replacement of deactivated ENGR 2250 with ENEE 2250 (see Item C3). Corrected a mistake in the current prerequisites: "ENEE 3720 or ENEE 3720L" should read "ENEE 3720 and ENEE 3720L", as both the lecture and lab are required.

6. "Advanced Electronics Laboratory" (ENEE 3770L) – Updated prerequisites to reflect deactivation of ENEE 2740L (see Item A2).

7. "Electromagnetic Fields and Waves" (ENEE 3750) – Updated prerequisites to reflect creation of ENEE 2700 (see Item C2).

8. "Linear Controls and Drives Laboratory" (currently ENEE 3730L, proposed to change to ENEE 3790) – Update co-requisite course to ENEE 3790 (related to Item A1).

9. "Electrical Circuits I Laboratory" – Updated prerequisites to reflect creation of ENEE 2700 (see Item C2).

Rationale

1. "Power Electronics" – The removal of the laboratory co-requisite enables students to take just the lecture and fill the newly formed lab elective with another course. The students will get less out of the lecture without the lab, but this course is viewed as an elective and thus not critical to the program of study.

2. "Electrical Engineering Design Project" – The existing ENEE 3800 prerequisite and ENEE 4800 pre- or co-requisite are listed to require the students to take the design project during their last semester. The department has now decided to permit students to take the capstone design project at the start of their senior year to better model the other engineering disciplines and increase student flexibility. The requested pre- / co-requisite modification reflects this new desire.

3. "Electrical Machinery" – Electrical machines operate on the electromagnetic principles covered in PHYS 2310 and at the start of ENEE 3750. The modification of the prerequisite of ENEE 3750 to a co-requisite is required in order to move "Electrical Machinery" ahead a semester in the curriculum. Because the material needed for "Electrical Machinery" is covered in class the students have already had (PHYS 2310) and reviewed and expanded upon at the start of ENEE 3750, this change from a prerequisite to a co-requisite will have limited impact.

4. "Electronic Instrumentation" – The removal of the requirement of either "Advanced Electronics" or "Power Electronics" (see Section D) necessitates a modification to this course. Though this course benefits from students having taken one of the two listed electronics courses, it can be taught with students only having completed "Analog

Electronics". The focus of the lecture is slightly modified to deal with the decreased requirements.

5. "Microprocessors Applications" – With the deactivation of ENGR 2250 and the creation of an ENEE 2250 with exactly the same course content, the existing prerequisite to "Microprocessor Applications" of ENGR 2250 must be updated to ENEE 2250. A mistake in the prerequisites is also being rectified.

6. "Advanced Electronics Laboratory" – With the deactivation of ENEE 2740L, the prerequisite to "Advanced Electronics Laboratory" must be modified. As many hands-on assignments from ENEE 2740L will be moved to ENEE 2740 (see Item A2) and it is these assignments that "Advanced Electronics Laboratory" leverages, the prerequisite to "Advanced Electronics Laboratory" will be modified to replace ENEE 2740L with ENEE 2740.

7. "Electromagnetic Fields and Waves" – With the creation of an EE-specific first-semester circuits course (ENEE 2700 – see Item C2), the prerequisites for "Electromagnetic Fields and Waves" must be updated to accommodate the new course.

8. "Linear Controls and Drives Laboratory" – As the modifications to "Automatic Control Systems Analysis and Design" (ENEE 3730) will necessitate a new course number, for which the department suggests ENEE 3790 (see Item A1), the corresponding laboratory must have its co-requisite updated to reflect the new lecture course number.

9. "Electrical Circuits I Laboratory" – The creation of an "Electrical Circuits I for Electrical Engineers" (ENEE 2700, see Item C2) requires the modification of the co-requisites to ENGR 2700L to enable students to take either the new ENEE 2700 or the existing ENGR 2700.

Impact

No other department is affected. See descriptions above for the effect to the individual courses.

C. New Courses

Detailed information (course description, syllabus, evaluation methods, objectives, etc.) is provided in the Appendix for each modified course.

Proposal

1. "Fundamentals of Engineering and Professionalism" would fill the hour obtained by removing the "Digital Electronics Laboratory" (see Section A).

2. "Electrical Circuits I for Electrical Engineers" (ENEE 2700) would replace ENGR 2700 in the BSEE curriculum.

3. "Engineering Programming" (ENEE 2250) would replace "Engineering Programming" (ENGR 2250), which would be deactivated.

Rationale

1. UTC's College of Engineering has historically placed great emphasis on professional registration, the first step of which is the FE exam. Students are strongly encouraged to

take the FE exam prior to graduation. Following in the footsteps of UTK, a review course is proposed for inclusion in the senior year, using the one hour freed with the removal of "Digital Electronics Laboratory" (see Section A). "FE Review & EE Professionalism" would review EE material on the FE exam from the start of the semester up till the exam date, after which the course would focus on engineering professionalism and ethics. The engineering accreditation organization, ABET, required that ethics be covered in the curriculum, a requirement currently fulfilled in "Analog and Digital Communications". However, moving ethics to its own course would free time for additional FE exam material in "Analog and Digital Communications".

2. As recently as the mid-1990's the department offered separate first-semester circuits courses for electrical engineers and the other disciplines. This proposal would restore the EE-specific circuits course, permitting the department to better divide material between the two circuits courses (ENEE 2700 and ENEE 2720) and add additional material that is not relevant to most other disciplines. Second-order circuits would be added to "Electrical Circuits I for Electrical Engineers" and sinusoidal steady state analysis, and power calculations left for "Electrical Circuits II".

3. The department desires to bring "Engineering Programming" (ENGR 2250) "in-house" to completely control the content and instruction, as the course is also critical to the education of an electrical engineer. The course is currently only required by Industrial Engineering and Electrical Engineering, with Nuclear and UTeach students having it as an option. More than 95% of the enrollment, however, is electrical engineering students. With the creation of ENEE 2250, the existing ENGR 2250 would be deactivated.

Impact

1. As a Pass / Fail course "FE Review & EE Professionalism" would require little oversight. Instruction would be spread across the entire department with each professor leading the class for a week in a round-robin fashion not significantly increasing faculty loads. No other departments would be affected.

2. The addition of an EE-specific circuits course (ENEE 2700) would increase faculty teaching loads by one course per year, assuming that one of the fall sections of ENGR 2700 could become an ENEE 2700 section, but this increase would be offset by the proposed course deactivations. Furthermore, the existing general engineering circuits course (ENGR 2700) can be taught by the general engineering program. The modification enables the department to tailor the instruction specifically to electrical engineering students.

3. Industrial Engineering, Nuclear Engineering, and UTeach would have to modify their curricula to change ENGR 2250 to ENEE 2250.

D. Curriculum Modifications

Proposed and current catalog text appears at the end of this document, before the Appendix.

Proposal

1. The requirement that students complete "Sampled Data and Nonlinear Control Systems" (ENEE 4780) and either "Advanced Electronics" and its associated lab (ENEE 3770/L),

or "Power Electronics" and its associated lab (ENEE 4600/L), would be replaced with two EE lecture electives and an EE lab elective, all at the junior or senior level.

2. The power sequence (ENEE 3800 and ENEE 4720) would be moved forward a semester.

3. "Professional Writing" would be added as a required course using the hours freed by dropping the "Optics and Modern Physics" (PHYS 2320) requirement. The hour freed by removing "Digital Electronics Laboratory" (ENEE 2740L) would become an "FE Review and Professionalism" course.

4. "Thermo-Fluids" (ENGR 3050) would be moved from fall to spring and the "Mechanics and Materials" or "Dynamics" option moved from fall to spring. This is addressed by a separate proposal from the College.

The proposed curriculum is shown in Table 1, below, with courses that feature modified content or are proposed for relocation in the curriculum highlighted.

Rationale

1. The most important aspect of this proposal is the addition of EE electives to the BSEE degree. Most other institutions incorporate electives into the junior and senior years to enable students to gain depth in their areas of interest and to differentiate themselves. The addition of EE electives empower the department to easily make regular updates to the course offerings, such as offering undergraduate sections to graduate courses, that are readily accessible to students. The existing curriculum permits students just one technical elective that is generally filled with "Engineering Economy".

2. Moving the power sequence ahead in the curriculum permits students to leverage these courses as prerequisites to certain senior elective courses.

3. "Optics and Modern Physics" (PHYS 2320) covers certain material useful to electrical engineers. However, this material is not a prerequisite to any other course nor is it covered on the FE Exam. Given the importance of technical writing, it was judged more useful to add "Professional Writing" (ENGL 2880) to curriculum than to retain PHYS 2320.

4. By moving the electronics courses that used to exist in the second semester junior year to a senior elective, the second semester of the junior year lightened while the first semester became heavier owing to the addition of ENEE 3800/L. To better balance the semesters "Thermo-Fluids" (ENGR 3050) is moved to the spring.

Table 1. Proposed BSEE Curriculum

Fall		Spring	
Freshman			
CHEM 1110/L	4	ENGR 1040 - Vector Statics	3
ENGR 1030/L - Basic Engr Phys	4	MATH 1920 - Calc II	3
MATH 1910/1 - Calc I	4	MATH 2200 - Linear Algebra	3
ENGL 1010	3	ENGL 1020	3
ENGR 1011 - 3D Modeling	1	ENGR 1850 - Intro to Design	2
		Gen Ed	3
Total	16	Total	17
Sophomore			
ENEE 2250 - Engr Programming	3	Mechanics or Dynamics	3
ENEE 2700 - Circuits I	4	ENEE 2720/L - Circuits II	4
ENGR 2700L - Circuits I Lab		MATH 2550 - Calc III	3
ENGL 2880 Professional Writing	3	ENGR 2220 – Statistics	3
MATH 2450 - Diff EQ	3	ENEE 2740 - Digital Electronics	3
PHYS 2310/L - Electricity & Mag.	4		
Total	17	Total	16
Junior			
Gen Ed	3	ENEE 3730/L – Controls	4
ENEE 3800/L - Electric Machines	4	ENGR 3050 – Thermo-Fluids	3
		ENEE 4720 - Power System	
ENEE 3250 - Signal & Sys	3	Analysis	3
ENEE 3750 - EM Fields & Waves	3	Gen Ed	3
ENEE 3720/L - Analog Electronics	4	Technical Elective	3
Total	17	Total	16
Senior			
ENEE 4750 - Communications	3	EE Elective	3
ENGR 3850 - Junior Design	3	EE Lab Elective	1
ENEE 4700 - Microprocessor Apps	3	ENEE 4800 - Instrumentation	3
EE Elective	3	ENEE 4500 - EE Capstone Design	3
Gen Ed	3	Gen Ed	3
		FE Review & Professionalism	1
Total	15	Total	14

Impact

1. The proposed addition of EE electives has a positive impact on the program as a whole. Because these electives will be filled with existing courses or new undergraduate sections of existing graduate courses, there is no increase in departmental teaching loads. Furthermore, because these modifications occur at the junior and senior years no other department is affected by these electives. Depending on the courses students chose to fulfill these electives, they may graduate with one less electronics lecture and lab. However at most other schools these electronics courses are electives and not required. By making these courses electives, student may tailor their program of study to their career plans. The removal of the "Sampled Data and Nonlinear Control Systems" course

would reduce the students' exposure to digital controls. It should be noted that in most programs nonlinear controls is a graduate topic and the important aspects of sampled data control would be combined into the modified controls course and lab (see Section A).

2. There is no impact to moving the power sequence forward.

3. The removal of PHYS 2320 would impact the Physics Department just as the addition of ENGL 2880 would impact the English department. Discussions have occurred with both departments.

4. Moving "Thermo-Fluids" from the fall to the spring would impact other departments that use this course (Industrial, Computer, and UTeach), as well as Mechanical Engineering which supplies the instructor. All affected departments have been approached and are willing to accommodate the modification.

E. Deactivated Courses

Proposal

The department currently has multiple courses in the catalog that have not been taught in seven or more years and that will not be taught in the foreseeable future. These courses are proposed for removal from the catalog:

- "Power Electronics and Motor Drives" (ENEE 4610)
- "Control of Robotic Systems" (ENEE 4640)
- "Data Communications Systems" (ENEE 4660)
- "Communication Systems" (ENEE 4730)
- "Optical Fiber Communication" (ENEE 4740)

Rationale

Two of the courses have been replaced with more updated courses (ENEE 4610 replaced by ENEE 4600; ENEE 4730 replaced by ENEE 4750) and were never removed from the catalog. The remaining three courses (ENEE 4660, ENEE 4640 and ENEE 4740) were created by professors that have long since retired and it is not envisioned that these courses will ever be taught.

Impact

No departments are affected.

Proposed Catalog Text

Catalog front matter (Program Mission, Program Objectives, Degree and Accreditation, and General Education) remain unchanged. Additions to the current copy are *highlighted in red and italicized*, with ~~deletions struck through in red.~~

Program Requirements

- CHEM 1110 - General Chemistry I and
- CHEM 1110L - General Chemistry I Laboratory

- MATH 1910 - Calculus I and
- MATH 1911 - Calculus I Laboratory

- MATH 1920 - Calculus II
- MATH 2200 - Elementary Linear Algebra
- MATH 2450 - Introduction to Differential and Difference Equations
- MATH 2550 - Multivariable Calculus

- PHYS 2310 - Principles of Physics - Electricity and Magnetism and
- PHYS 2310L - Principles of Physics Laboratory - Electricity and Magnetism

Engineering Fundamentals:

- ENGR 1011 - Introduction to Two- and Three-Dimensional Modeling
- ENGR 1030 - Basic Engineering Science
- ENGR 1030L - Freshman Engineering Laboratory
- ENGR 1040 - Vector Statics
- ENGR 1850 - Introduction to Engineering Design
- ENGR 2220 - Probability and Statistics for Engineering

- ENGR 2460 - Mechanics of Materials

or

- ENGR 2480 - Dynamics

- ~~ENGR 2700 - Electrical Circuits I~~
- *ENEE 2700 - Electrical Circuits I for Electrical Engineers*
- ENGR 3850 - Interdisciplinary Design Project I

Program and Related Courses

- ~~PHYS 2320 - Principles of Physics - Optics and Modern Physics~~
- *ENGL 2880 - Professional Writing*

Engineering Fundamentals:

- ~~ENGR 2250 - Engineering Programming~~
- *ENEE 2250 - Engineering Programming*
- ENGR 2700L - Electrical Circuits I Laboratory
- ENGR 3050 - Thermo-Fluids

Electrical Engineering:

- ENEE 2720 - Electrical Circuits II
- ENEE 2720L - Electrical Circuits II Laboratory
- ENEE 2740 - Digital Electronics
- ~~ENEE 2740L - Digital Electronics Laboratory~~
- ENEE 3250 - Signals and Systems
- ENEE 3720 - Analog Electronics
- ENEE 3720L - Analog Electronics Laboratory
- ~~ENEE 3730 - Automatic Control Systems Analysis and Design~~
- *ENEE 3790 - Modern Control Systems Analysis and Design*
- ~~ENEE 3730L~~ *ENEE 3790L* - Linear Controls and Drives Laboratory
- ENEE 3750 - Electromagnetic Fields and Waves
- *ENEE 4900 - Fundamentals of Engineering and Professionalism*

~~Select one lecture/lab pair:~~
- ~~ENEE 3770 - Advanced Electronics~~
- ~~ENEE 3770L - Advanced Electronics Laboratory~~

~~or~~
- ~~ENEE 4600 - Power Electronics~~
- ~~ENEE 4600L - Power Electronics Laboratory~~

- ENEE 3800 - Electrical Machinery
- ENEE 3800L - Electrical Machinery Laboratory
- ENEE 4500 - Electrical Engineering Design Project
- ENEE 4700 - Microprocessors Applications
- ENEE 4720 - Power System Analysis and Design
- ENEE 4750 - Analog and Digital Communications
- ~~ENEE 4780 - Sampled Data and Nonlinear Control Systems~~
- ENEE 4800 - Electronic Instrumentation

Note: For qualified students, ENGR 4995r, Departmental Thesis (4 hours) may substitute for ENEE 4500 (3 hours).

Electrical Engineering Electives:
- *Two 3-hour 3000-level or 4000-level electrical engineering courses*
- *One 1-hour 3000-level or 4000-level electrical engineering laboratory*

Technical Elective:
- ~~One 3-hour 3000-level or 4000-level electrical engineering course OR~~
- One 3-hour 3000-level or 4000-level engineering or advisor-approved course

Additional Information and Notes
128 hours (138 for co-op graduates).
Minimum 39 hours at the 3000-4000 level.
2.0 GPA in all engineering courses.
See Degree and Graduation Requirements for additional requirements.

Showcase/Suggested Plan of Study

Please see the Courses section of this catalog for complete course descriptions.

Freshman Year

Fall Semester:	**Hrs**	*Spring Semester:*	**Hrs**
ENGR 1030	3	**ENGR 1040**	3
ENGR 1030L	1	**ENGR 1850**	2
MATH 1910	3	**MATH 1920**	3
MATH 1911	1	**MATH 2200**	3
CHEM 1110	3	**ENGL 1020**	3
CHEM 1110L	1	Behavioral and Social Sciences	3
ENGL 1010	3		
ENGR 1011	1		
	16		17

Sophomore Year

Fall Semester:	**Hrs**	*Spring Semester:*	**Hrs**
~~ENGR 2460 or ENGR 2480~~	~~3~~	**ENGR 2220**	3
~~**ENGR 2700**~~	~~3~~	**ENEE 2720**	3
ENGR 2700L	1	**ENEE 2720L**	1
~~**ENGR 2250**~~	~~3~~	**ENEE 2740**	3
MATH 2450	3	~~**ENEE 2740L**~~	~~1~~
PHYS 2310	3	~~PHYS 2320~~	~~3~~
PHYS 2310L	1	MATH 2550	3
ENGL 2880	*3*	*ENGR 2460 or ENGR 2480*	*3*
ENEE 2700	*3*		
ENEE 2250	*3*		
	17		~~17~~ *16*

Junior Year

Fall Semester:	**Hrs**	*Spring Semester:*	**Hrs**
~~ENGR 3050~~	~~3~~	~~**ENEE 3730**~~	~~3~~
ENEE 3250	3	~~**ENEE 3730L**~~	~~1~~
ENEE 3720	3	~~**ENEE 3770 or ENEE 4600**~~	~~3~~
ENEE 3720L	1	~~**ENEE 3770L or ENEE 4600L**~~	~~1~~
ENEE 3750	3	~~**ENEE 3800**~~	~~3~~
Fine Arts	3	~~ENEE 3800L~~	~~1~~
ENEE 3800	***3***	***ENEE 3790***	***3***
ENEE 3800L	*1*	*ENEE 3790 L*	*1*
		ENGR 3050	*3*
		ENEE 4720	*3*
		Technical Elective	*3*
		Behavioral and Social Sciences	3
	~~16~~ *17*		~~15~~ *16*

Senior Year

Fall Semester:	**Hrs**	*Spring Semester:*	**Hrs**
ENGR 3850	3	ENEE 4500	3
ENEE 4700	3	~~ENEE 4750~~	~~3~~
~~ENEE 4720~~	~~3~~	~~Technical Elective~~	~~3~~
~~ENEE 4780~~	~~3~~	~~Humanities~~	~~3~~

~~ENEE 4800~~	~~3~~	Non-Western Cultures and Civilizations	3
ENEE 4750	*3*	*Electrical Engineering Elective*	*3*
Electrical Engineering Elective	*3*	*Electrical Engineering Lab Elective*	*1*
Humanities	*3*	*ENEE 4800*	*3*
		ENEE 4900	*1*
	15		~~15~~ *14*

A "C" OR BETTER IS REQUIRED FOR COURSES IN BOLD.

Proposed Course Descriptions for Modified Courses

Additions to the current copy are *highlighted in red and italicized*, with ~~deletions struck through in red.~~

~~ENGR 2250 - Engineering Programming~~
~~(3) Credit Hours. Introduction to programming with a high-level language. Flowcharting, algorithm design, input/output, data types, files, decisions, loops, arrays. Application to engineering problems including matrix equations. Fall and spring semesters. Lecture 3 hours. Prerequisite: ENGR 1040 with a minimum grade of C or department head approval. Pre- or Corequisite: MATH 2450.~~

ENEE 2250 - Engineering Programming
(3) Credit Hours. Introduction to programming with a high-level language. Flowcharting, algorithm design, input/output, data types, files, decisions, loops, arrays. Application to engineering problems including matrix equations. Fall semester. Lecture 3 hours. Prerequisite: ENGR 1040 with a minimum grade of C or department head approval. Pre- or Corequisite: MATH 2450.

ENEE 2700 – Electrical Circuits I for Electrical Engineers
(3) Credit Hours. Introduction to analysis of electrical circuits. Fundamental electrical system components. Kirchhoff's laws. Resistive circuit analysis. Circuit theorems. Operational amplifiers. Response of first order circuits. Sinusoidal steady-state circuit analysis, and Second-Order Circuits. Fall and spring semesters. Lecture 3 hours. Pre- or Corequisites: MATH 2450 and PHYS 2310 or department head approval. Corequisite: ENGR 2700L. Electrical Engineering majors must take ENGL 2880 as a corequisite to this course or have ENGL 2880 as a prerequisite.

ENGR 2700L - Electrical Circuits I Laboratory
(1) Credit Hours. Introduction to laboratory instrumentation, measurement techniques, and electrical circuit elements. Laboratory experiments to support the introduction to DC circuit analysis, Kirchhoff's laws, network theorems, transient analysis, phasor and AC circuits analysis. Digital computer analysis of electrical circuits using such tools as PSPICE. Fall and summer semesters. Laboratory 3 hours. Pre- or Corequisite: ENGR 2700 *or ENEE 2700* or department head approval.

ENEE 2720 - Electrical Circuits II
(3) Credit Hours. LaPlace transforms. Transient response of dynamic circuits. Transformers. AC circuit analysis, AC power, three-phase circuits, power factor. Digital computer analysis of electrical circuits, *frequency response (active and passive filters, bode plot), and two-port networks.* Spring semester. Lecture 3 hours. Prerequisites: *ENEE 2700 or* ENGR 2700, ENGR

2700L with minimum grades of C, MATH 2450, PHYS 2310/PHYS 2310L or department head approval. Corequisite: ENEE 2720L.

ENEE 2720L - Electrical Circuits II Laboratory
(1) Credit Hours. Measurement and analysis of transformers, AC circuits, power, three-phase systems, and power factor. Transient response, *frequency response (active and passive filters, bode plot), and two-port networks*. Spring semester. Laboratory 3 hours. Corequisite: ENEE 2720.

ENEE 2740 - Digital Electronics
(3) Credit Hours. Digital electronics for the Electrical Engineering student. Semiconductors, digital logic, logic design, digital devices. Analysis of digital circuits employing digital devices. *Realization of digital devices with standard integrated circuit logic families*. Spring semester. Lecture 3 hours. Prerequisites: ENGR 2700 *or ENEE 2700;* and ENGR 2700L, *all* with minimum grades of C or department head approval. ~~Corequisite: ENEE 2740L.~~

~~ENEE 2740L - Digital Electronics Laboratory~~
~~(1) Credit Hours. Fundamental digital behavior of semiconductor devices and amplifiers for the Electrical Engineering student. Realization of digital devices with standard integrated circuit logic families. Laboratory experiences and design projects. Spring semester. Laboratory 3 hours. Prerequisites: ENGL 1020, ENGR 2700 and ENGR 2700L with minimum grades of C or department head approval. Corequisite: ENEE 2740.~~

~~ENEE 3730 - Automatic Control Systems Analysis and Design~~
~~(3) Credit Hours. Analysis and synthesis of feedback control systems for continuous and discrete time systems. Performance criteria. Routh Hurwitz, root locus, Nyquist, Bode, and state space methods for stability determination. Analytic and computer aided techniques for design of systems to meet performance standards. Spring semester. Lecture 3 hours. Prerequisite: ENEE 3250 with a minimum grade of C or department head approval. Electrical Engineering majors must take ENEE 3730L as a corequisite to this course.~~

ENEE 3750 - Electromagnetic Fields and Waves
(3) Credit Hours. Elementary fields and waves, static electric and magnetic fields; potential and vector fields; Gauss's Law; Ampere's Law; line integrals; vector calculus methods; Biot-Savart law; time varying electric and magnetic fields; Maxwell's equations. Fall semester . Lecture 3 hours. Prerequisites: ENGR 2700 *or ENEE 2700*; and ENGR 2700L, *all* with minimum grades of C; MATH 2550 or department head approval.

ENEE 3770L - Advanced Electronics Laboratory
(1) Credit Hours. A series of projects in advanced electronics culminating in a major design project, all totally designed by the student. Spring semester. Laboratory 3 hours. Prerequisite: ENEE ~~2740L~~ *2740* with minimum grade of C. Corequisite: ENEE 3770.

ENEE 3790 - Modern Control Systems Analysis and Design
(3) Credit Hours. Analysis and synthesis of feedback control systems for continuous and discrete time systems. Performance criteria. State-space, Routh-Hurwitz, root locus, Nyquist, and Bode methods for stability determination. Analytic and computer-aided techniques for design of systems to meet performance standards. Spring semester. Prerequisites: ENEE 3250 with minimum grade of C or department head approval. Corequisites: Electrical Engineering majors must take ENEE 3790L.

ENEE ~~3730L~~ *3790L* - Linear Controls and Drives Laboratory
(1) Credit Hours. Introduction to components in an electrical drive system, building real-time control system using Matlab/Simulink interface, PI and dual loop algorithm as applied to servomotor position control, state variable feedback control application, and experiments tailored towards electric drives systems such as open-loop speed control and characterization of dc-motor; dc motor speed control under load and control of induction and permanent magnet ac motors. Spring semester. Laboratory 3 hours. Corequisites: ~~ENEE 3730 and ENEE 3800~~ *ENEE 3790. Prerequisites: ENEE 3800.*

ENEE 3800 - ~~Electrical Machinery~~ *Electrical Energy Conversion*
(3) Credit Hours. Magnetic circuits and transformers. Rotating electrical machinery; DC machines, synchronous machines, induction motors. ~~Spring~~ *Fall* semester. Lecture 3 hours. Prerequisites: ENEE 2720/ENEE 2720L, ~~ENEE 3750~~, with minimum grades of C or department head approval. Corequisite: *ENEE 3750* and ENEE 3800L.

ENEE 4500 - Electrical Engineering Design Project
(3) Credit Hours. Capstone electrical engineering design experience; design of an electrical component or system. Consideration of engineering standards and realistic constraints that include most of the following considerations: economic, environmental, sustainability, constructability, ethical, health and safety, social, and political. Oral presentations and written design report required. Spring semester. Lecture 2 hours, design laboratory 2 hours. Prerequisites: ENGR 3850 (must have been taken in the immediately preceding semester or department head approval), ~~ENEE 3800~~ *ENEE 3790* with a minimum grade of C. *Pre or Co-requisites: ENEE 4700.*

ENEE 4600 - Power Electronics
(3) Credit Hours. Introduces power semiconductor devices and power electronic converters, including single-phase and three-phase ac/dc rectifiers, ac voltage controllers, ac/dc converters and dc/ac inverters. Prerequisites: ENEE 3720 and ENEE 3720L with minimum grades of C. ~~Corequisite: ENEE 4600L.~~

~~ENEE 4610 - Power Electronics and Motor Drives~~
~~(3) Credit Hours. Power semiconductors, converters, controlled rectifiers systems, choppers, and inverters, commutator motor drives, induction motor drives, synchronous generators, motors, and drives. Senior elective, offered on demand. Lecture 3 hours. Prerequisites: ENEE 3730, ENEE 3800, ENEE 3800L with minimum grades of C or department head approval.~~

~~ENEE 4640 - Control of Robotic Systems~~
~~(3) Credit Hours. Information, decision and control problems associated with robotics. Analysis, modeling, and control of automated robotic systems. Sensors and robot vision. Non-linearity issues. Senior elective, offered on demand. Lecture 3 hours. Prerequisite: ENEE 3730 with minimum grade of C or department head approval.~~

~~ENEE 4660 - Data Communications Systems~~
~~(3) Credit Hours. The study and design of digital communication systems. Synchronization of digital systems. Multiple access techniques and protocols for networks and satellite systems. Interference rejection, source encoding, error correction, data security. Senior elective, offered on demand. Lecture 3 hours. Prerequisite: ENEE 4750 with minimum grade of C or department head approval.~~

ENEE 4700 - Microprocessors Applications
(3) Credit Hours. Practical microprocessor principles, programming, and interfacing. Design of programs for basic data acquisition and control using the microprocessor as a system component. Review of number systems and digital logic. Fall semester. Lecture 2 hours, projects 3 hours. Prerequisites: ~~ENGR~~ *ENEE* 2250 or CPSC 1110, ENEE 2740 or CPEN 3700, ENEE 3720~~, or~~ *and* 3720L, *all* with minimum grades of C or department head approval.

~~ENEE 4730 - Communication Systems~~
~~(4) Credit Hours. Definitions and basic concepts of analog and digital modulation techniques. Fourier series and transform techniques used to study transmission of signals through linear filters, time-bandwidth relationships. Amplitude, frequency, and pulse modulation techniques described and analyzed. Periodic sampling and the Nyquist sampling criterion. Fall semester. Lecture 4 hours. Prerequisites: ENGR 2220 and ENEE 3730 with minimum grades of C or department head approval.~~

~~ENEE 4740 - Optical Fiber Communication~~
~~(3) Credit Hours. Optical fiber as a transmission medium using ray theory and wave theory approaches. Characteristics and practical aspects of optical fiber communications Measurements undertaken in the laboratory and field. Light sources and detectors with particular emphasis on System design, application, and performance. Basic principles used for optical sensors. Electro-optic devices. On demand. Lecture 3 hours. Prerequisites: PHYS 2320, MATH 2450, MATH 2550 or department head approval.~~

ENEE 4720 - Power System Analysis and Design
(3) Credit Hours. Power Systems component modeling, transmission lines, machines, transformers. Load flow analysis, symmetrical components, symmetrical and unsymmetrical fault analysis. ~~Fall~~ *Spring* semester. Lecture 3 hours. Prerequisite: ENEE 3800 with minimum grade of C or department head approval.

ENEE 4750 - Analog and Digital Communications
(3) Credit Hours. Definitions and basic concepts of analog and digital modulation techniques. ~~Ethical considerations;~~ global and societal effects of communications technology. Transmission of signals through linear filters, time-bandwidth relationships. Amplitude, frequency, and pulse modulation techniques described and analyzed. Periodic sampling and the Nyquist sampling criterion. Applications of probability to error rates and noise probabilities. *OSI Model.* ~~Spring~~ *Fall* semester. Lecture 3 hours. Prerequisites: ENGR 2220 and ENEE 3250 with minimum grades of C or department head approval.

ENEE 4800 - Electronic Instrumentation
(3) Credit Hours. Basic principles of operation of commonly used sensors. Signal conditioning and grounding considerations. Introduction to programming of virtual instruments using software such as LabVIEW. Specification and design of systems to acquire, condition, display, and control using data from multiple sensors and programmable controllers. Fall semester. Lecture 3 hours. Prerequisites: ~~ENGR~~ *ENEE* 2250, ~~ENEE 3770 and ENEE 3770L or ENEE 4600 and ENEE 4600L~~ *ENEE 3720 and ENEE 3720L* with minimum grades of C or department head approval.

ENEE 4900 - Fundamentals of Engineering and Professionalism
(1) Credit Hour. Pass / Fail. Review of topics covered on the afternoon session of the Fundamentals of Engineering exam. Topics in engineering ethics and professionalism using case studies, and invited speakers from the profession and related fields. Spring semester. Pre- or co-requisite: ENGR 3850.

APPENDIX

ITEM A1. Modifications to ENEE 3730

Note: As it is envisioned that these modifications will necessitate a new course number, the department proposes the modified course be called ENEE 3790 to avoid confusion with existing courses. ENEE 3790 would replace the deactivated ENEE 3730 in the catalog. This modification would also deactivate the existing ENEE 3730L, renumbering it as ENEE 3790L to match the lecture's modified course number. As no modifications, other than the course number, are being made to the lab, its syllabus is not included.

Proposal
Augment ENEE 3730 with an introduction to discrete time controls.

Course Description
Modern Control Systems Analysis and Design (3) Lecture 3 hours. Analysis and synthesis of feedback control systems for continuous and discrete time systems. Performance criteria. State-space, Routh-Hurwitz, root locus, Nyquist, and Bode methods for stability determination. Analytic and computer-aided techniques for design of systems to meet performance standards. Spring semester. Prerequisites: ENEE 3250 with minimum grade of C or department head approval. Corequisites: Electrical Engineering majors must take ENEE 3790L

Pedagogical Objectives
Students will learn to apply engineering problem solving methods to the solutions of typical engineering control systems problems using both analog and discrete time implementations. Fundamental principles and techniques for solving problems associated with engineering control systems applications, including:

- Dynamic Systems Models and Response,
- Basic Properties of Feedback,
- Design and Analysis.

Evaluation Methods
Quizzes, exams, and out-of-class assignments will all be leveraged to evaluate student progress. A likely grade breakdown would be:

Quizzes	15%
Midterm Examination	30%
Assignments	20%
Final Examination	35%

Rationale for Course Modification
The Department of Electrical Engineering currently teaches a two-semester sequence in controls. ENEE 3730 introduces the concepts of feedback control systems as applied to analog, continuous-time implementations. ENEE 4780, the following semester, covers the concepts of discrete and nonlinear control. The department desires to add electives to empower students to tailor their education toward their career interests. Most other electrical engineering programs only require a single controls course, with interested students selecting a second controls course as an elective. The department proposes to adopt this scheme but wishes to expose all students to important concepts in discrete controls. This modification to the existing ENEE 3730 would compress the existing material to make room for an introduction to discrete controls.

Impact

- Economic – The modification of ENEE 3730 incurs no costs to the university.
- Faculty Resources – As a modification of an existing course, no additional teaching resources are required.
- Pedagogical – The modifications to control sequence taken as a whole (removing the requirement of ENEE 4780 and modifying ENEE 3730 to create ENEE 3790) will result in the students receiving less instruction related to control systems unless they chose a related elective. As mentioned above, the material removed from the required curriculum is typically covered as electives at other schools, or, in the case of nonlinear controls, covered at the graduate level. The material in ENEE 4780 that pertains to the Fundamentals of Engineering Exam (the first of two exams required for professional licensure) would be moved into the modified course so students should not be at a disadvantage.
- Other Departments – The only other department impacted by this modification is the Department of Computer Engineering. Their students currently take ENEE 3730 and the modification of this course would expose their students to discrete time control. Given that any control system implemented in a computer would need a discrete time controller, the inclusion of these topics would enhance the value of this course to these students. The Department of Computer Engineering has been consulting in this modification and has given its support.

Syllabus

Modern Control Systems Analysis and Design, Spring Semester

Course: ENEE 3790

Title: Modern Control Systems Analysis and Design

Credit: 3 hours

Faculty: Dr. N. Sisworahardjo, 425-5753, EMCS 315B, nur-sisworahardjo@utc.edu

Prerequisites: ENEE 3250 with minimum grade of C or department head approval

Corequisites: Electrical Engineering majors must take ENEE 3790L

Course Description: Analysis and synthesis of feedback control systems for continuous and discrete time systems. Performance criteria. State-space, Routh-Hurwitz, root locus, Nyquist, and Bode methods for stability determination. Analytic and computer-aided techniques for design of systems to meet performance standards.

ABET Assessment Outcomes:

- Apply knowledge of mathematics, science and engineering (ABET a)
- Identify, formulate and solve engineering problems (ABET e)
- Use techniques, skills and modern engineering tools (ABET k)

Goals & Objectives: Apply engineering problem solving methods to the solutions of typical engineering control systems problems. Fundamental principles and techniques for solving problems associated with engineering control systems applications, including:

- Dynamic Systems Models and Response,
- Basic Properties of Feedback,
- Design and Analysis.

Participation/Attendance Policy:

- Attendance at lectures is strongly recommended but absences are not penalized.
- Attendance at quizzes and tests is **mandatory**.

- Students are responsible for all material covered in the class as well as the announcements for homework assignments, assignment due dates, and test dates.

Late Assignment Submission/Make-Up Policy: Assignments will be considered late after the beginning of class on the due date. Extension may be allowed with instructor approval. Late homework grade will be penalized 10% of the total value for each day or fraction thereof. **All assignments must be completed to receive a passing grade**. Make-up tests will be allowed in extenuating circumstances such as death in the family, illness or accident. **No** make-up quizzes will be given for any reasons.

Evaluation/Assessment: Quizzes will be given in the 15 minutes duration of class and will be announced in advance and will cover material from previous lectures and homework. The lowest quiz grade will be dropped. If a quiz is missed, it automatically becomes the drop grade. Two midterm examinations and one final examination will be given. The midterm examination will be given during the semester. A comprehensive final exam, in accordance with University of Tennessee at Chattanooga (UTC) schedule, will be administered. All exams will be closed book and notes unless otherwise informed.

Grading Policy: The grade in the course will be based on a weighted average formed as follows:

Quizzes	15%
Midterm Examination	30%
Assignments	20%
Final Examination	35%

Grade Assignment: $A \geq 90$, $80 \leq B < 90$, $70 \leq C < 80$, $60 \leq D < 70$, $F < 60$.

Textbook: Modern Control Systems, Richard C. Dorf & Robert H. Bishop, Prentice Hall, ISBN 9780136024583, 2011.

Tentative List of Topics to be covered:

- Mathematical Modeling of Control Systems,
- Mathematical Modeling of M/E Systems,
- Response Analysis and Routh's Stability Criterion,
- Control System Analysis and Design in State Space,
- Control System Analysis and Design by Root-Locus and Frequency-Response Methods.

Academic Dishonesty:

- YOU MAY NOT copy homework/assignments from classmates. You may consult with me or one of your classmates if there is a homework problem that you find difficult.
- Cheating is academic misconduct and will not be tolerated. A course grade of "F" will automatically be assigned to anyone who cheats on assignments or examinations.

Accommodation Statement: If you have a disability that may require special assistance or accommodations, or you have questions related to any accommodations for testing, note takers, readers, etc., please speak with me as soon as possible. All appropriate accommodation will be made, but must be arranged through the CAP office. Students may contact the Office for Students with Disabilities/College Access Program at 425-4006 with questions about services offered to UTC students with qualified disabilities.

ITEM A2. Updates to ENEE 2740

Proposal
The laboratory co-requisite to ENEE 2740 is proposed for removal with some of the lab assignments being moved into the lecture.

Course Description
ENEE 2740 Digital Electronics (3) Lecture 3 hours. Digital electronics for the Electrical Engineering student. Semiconductors, digital logic, logic design, digital devices. Analysis of digital circuits employing digital devices. Realization of digital devices with standard integrated circuit logic families. Spring semester. Prerequisites: ENGR 2700 or ENEE 2700; and 2700L, all with minimum grades of C.

Rationale for Course Modification
Historically students required lab equipment to complete assignments in ENEE 2740L. With the advent of cheap breadboard power supplied (see Breadboard Companion) students can complete all of the current ENEE 2740L assignments outside of lab. This permits many of the lab assignments and circuit designs to be integrated into the lecture. Doing so enables the department to remove the lab component (ENEE 2740L) to free up an hour in the curriculum to offer a review for the Fundamentals of Engineering Exam (ENEE 4900).

Impact
- Economic – No university funds are required to offer this course.
- Faculty Resources – The removal of the laboratory requirement would decrease faculty loads.
- Pedagogical – With the addition of some of the lab's hands-on assignments to the lecture, students will not suffer technically from the removal of the dedicated lab. The lack of lab reports would be a detriment to technical report writing skills, but this is more than compensated by the proposal Engineering Communication class.
- Other Departments – No other departments are affected.

Syllabus

Digital Electronics
ENEE 2740-0 / CRN 22295 (3 hrs)
Spring 2011
TT 8:00-9:15, EMCS 402

Instructor: Dr. Stephen Craven

Prereqs / Corequisite:

ENGR 2700 or ENEE 2700; and ENGR 2700L, all with minimum grades of C

Course Description:

Digital electronics for the Electrical Engineering student. Semiconductors, digital logic, logic design, digital devices. Analysis of digital circuits employing digital devices. Realization of digital devices with standard integrated circuit logic families.

Textbook:

Introduction to Logic Design, 3rd edition, Alan Marcovitz, McGraw Hill, 2010. ISBN: 978-0073191645

Breadboard Companion (http://www.breadboardcompanion.com/)

Objectives:

The objectives of this course are to learn:

1. the basic principles of operation and application of digital electronic devices,
2. the basic analysis techniques for circuits containing digital devices,
3. modern techniques and tools,
4. to apply your knowledge of math, science, and electrical engineering, and
5. to identify and solve electrical engineering problems.

By the end of the semester, the student should be able to design, analyze, and build circuits using standard devices such as combinational logic gates, flip-flops, and multiplexers, making use of concepts including Boolean algebra, Karnaugh maps, and state tables and diagrams.

Grading:

100 - 90	A	Quiz average	30 %
89 - 80	B	Exam average	50 %
79 – 70	C	Assignments	20%
69 – 60	D		
under 60	F		

Quizzes and Exams:

Quizzes will be given on Thursdays, promptly at the beginning of class, and will test understanding of the material covered in previous classes and the student's ability to work problems similar to the assigned problems.

There will be three exams of equal weight. The final exam will be comprehensive, but will focus on the later material. Missed quizzes and exams may not be made up except for documented extreme circumstances; however, two quiz grades will be dropped.

All quizzes and exams will be closed books and notes. Partial credit will be given on all quiz and exam problems.

Assignments:

Several digital circuit design assignments will be given that require students to design, build, and test a digital circuit using 7400-series digital logic and the Breadboard Companion power supply.

Accommodation Statement:

If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think you might need special assistance or a special accommodation in this class or any other class, please speak with your professor

as soon as possible. You may also contact the UTC Office for Students with Disabilities at 425-4006 or go by their office in 102 Frist Hall on the UTC campus.

If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely affecting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438.

Course Archive:

Students are required to maintain a folder (a manila envelope will suffice) of all graded work. These folders will be collected at the end of the semester prior to or at the final exam. Submission of the folder is required for a passing grade in this course. The folder will be available at beginning of the next semester.

Honors Violations:

If a student is caught cheating on any Quiz or Examination, the student will receive a zero for the assignment for the first offense. Ethical behavior is the expected norm.

Communication:

Grades and lecture material will be available on the course's Blackboard site, also known as UTC Online. Students are expected to check their UTC email at least once daily as important announcements will be communicated in this manner.

ITEM A3. Updates to ENEE 4750

Proposal
Remove the ethics component to ENEE 4750 and replace it with an introduction to networking to match what is taught in the course. Move course from spring to fall offering.

Course Description
ENEE 4750 Analog and Digital Communications (3) Definitions and basic concepts of analog and digital modulation techniques. Global and societal effects of communications technology. Transmission of signals through linear filters, time-bandwidth relationships. Amplitude, frequency, and pulse modulation techniques described and analyzed. Periodic sampling and the Nyquist sampling criterion. Applications of probability to error rates and noise probabilities. OSI model. Fall semester. Lecture 3 hours. Prerequisites: Engineering 2220 and ENEE 3250 with grades of C or better.

Pedagogical Objectives
The main objectives of the course would not change. The material related to ethical considerations of communication systems would be removed and replaced with an overview of the OSI model for communication networks.

Rationale for Course Creation
The Fundamentals of Engineering Exam, required for professional licensure, has recently added material related to communication networks, specifically the OSI model. The creation of the proposed Fundamentals of Engineering and Professionalism course (ENEE 4900) allows the ethical topics currently covered in ENEE 4750 to be moved to ENEE 4900, freeing space to briefly cover the OSI model.

Impact
- Economic – No university funds are required to offer this course.
- Faculty Resources – This course is regularly taught. No additional faculty load would be created.
- Pedagogical – The inclusion of this course in the curriculum would improve the pass rate on the FE Exam.
- Other Departments – No other departments are affected.

Syllabus

ENEE 4750 (3 hrs)
Analog and Digital Communications

INSTRUCTOR:
Dr. Stephen Craven

CATALOG DESCRIPTION:
Definitions and basic concepts of analog and digital modulation techniques. Ethical considerations; global and societal effects of communications technology. Transmission of signals through linear filters, time-bandwidth relationships. Amplitude, frequency, and pulse modulation techniques described and analyzed. Periodic sampling and the Nyquist sampling criterion. Applications of probability to error rates and noise probabilities.

PREREQUISITES: ENGR 222 and ENEE 325 with grades of C or better.

TEXTBOOK:

Simon Haykin & Michael Moher, *Introduction to Analog & Digital Communications,* Second Edition, Willey.

OBJECTIVE:

To cover both analog and digital communications methods, modulation, and transmission, to prepare students either for jobs relating to communications or for graduate school.

COURSE OUTLINE: (tentative)

- Review of Fourier Transform
- Modulation Techniques: Amplitude and Angle
- Pulse Modulation
- Selected Topics in Baseband Pulse Transmission
- Selected Topics in Passband Digital Transmission
- Selected Topics in Noise
- Intro to computer networks

GRADING:

100 - 90	A	Quiz average	20 %
89 - 80	B	Exam average	60 %
79 – 70	C	Assignment average	20%
69 – 60	D		
under 60	F		

HOMEWORK:

Homework will be assigned approximately weekly, however it will not be collected. Students are encouraged to use the homework as an evaluation tool for preparing for the quizzes and exams.

QUIZZES AND EXAMS:

Quizzes will be announced at least one class period ahead of time in lecture and on Blackback and will test understanding of the material covered in previous classes and the student's ability to work problems similar to the assigned homework problems. It is expected that there will be a quiz every other week, on average.

There will be three exams of equal weight. The final exam will be comprehensive, but will focus on the later material.

Missed quizzes and exams may not be made up except for documented extreme circumstances; however, one quiz grade will be dropped.

All quizzes and exams will be closed books and notes. Partial credit will be given on all quiz and exam problems.

ASSIGNMENTS:

It is expected that there will be 4 to 6 out-of-class assignments. These will involve computer simulations and laboratory exercises.

ABET CONTRIBUTIONS:

EE professional development

- knowledge of probability and statistics, including applications appropriate to the Electrical Engineering;
- demonstrated a knowledge of advanced mathematics;
- breadth of knowledge of electrical engineering topics;
- contributes to the 1.5 years of appropriate topics for EE

Outcomes expected of this course

(a) ability to apply knowledge of math, engineering, and science,
(e) ability to identify, formulate, and solve engineering problems,
(g) ability to communicate effectively,
(j) knowledge of contemporary issues,
(k) techniques, skills, and modern engineering tools.

ACCOMMODATION STATEMENT:

If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think you might need special assistance or a special accommodation in this class or any other class, please speak with your professor as soon as possible. You may also contact the UTC Office for Students with Disabilities at 425-4006 or go by their office in 110 Frist Hall on the UTC campus.

COURSE ARCHIVE:

Students are required to maintain a folder (a manila folder will suffice), which will include **all graded work**. These folders will be collected at the end of the semester prior to or at the final exam. Submission of the folder is required for a passing grade in this course. The folder will be available at beginning of the next semester.

HONOR VIOLATIONS:

If a student is caught cheating on any Quiz, Examination, or Assignment the student will receive a zero for the assignment for the first offense. Ethical behavior is the expected norm.

ITEM A4. Updates to ENEE 2720.

Proposal
Add new material to ENEE 2720 and update prerequisites.

Course Description
ENEE 2720 Electrical Circuits II (3). LaPlace transforms. Transient response of dynamic circuits. Transformers. AC circuit analysis, AC power, three-phase circuits, power factor. Digital computer analysis of electrical circuits, frequency response (active and passive filters, bode plot), and two-port networks. Spring semester. Lecture 3 hours. ENEE 2700 or ENGR 2700, ENGR 2700L with minimum grades of C, MATH 2450, PHYS 2310/PHYS 2310L or department head approval. Corequisite: ENEE 2720L.

Pedagogical Objectives
The main objectives of the course would not change. Material related to frequency response and two-port networks would be added while material related to second-order circuits would be relocated to ENEE 2700.

Rationale for Course Modification
The creation of an electrical engineering-specific Circuits I course permits the department to update the material between the tow courses in ways that benefit electrical engineering students. Moving second-order systems from "Electrical Circuits II" to the new ENEE 2700 course presents material in its logical order. The space freed by this removal of material, combined with existing slack in the ENEE 2720, permits the addition of frequency response (analog filters) and two-port networks, both important topics to electrical engineers. Frequency response of analog circuits was previously covered in "Advanced Electronics" (ENEE 3770), which is no longer a required course in the curriculum.

Impact
- Economic – No university funds are required to offer this course.
- Faculty Resources – This course is regularly taught. No additional faculty load would be created.
- Pedagogical – The modification of this course would better utilize the available class time and expose students to the important topic of frequency response that is lost with the removal of a previously required second course in electronics.
- Other Departments – Computer Engineering also affected.

Syllabus

ELECTRICAL CIRCUITS II

COURSE #:	ENEE **2720**
COURSE TITLE:	ELECTRICAL CIRCUITS II
LEVEL	Undergraduate;
CREDIT	3.0
INSTRUCTOR:	**Dr. Abdul R Ofoli**

PREREQUISITES and COREQUISITES
ENEE 2700 or ENGR 2700, ENGR 2700L with minimum grades of C, MATH 2450, PHYS 2310/PHYS 2310L or department head approval. Corequisite: ENEE 2720L. Supplementary course fee assessed.

COURSE MEETING TIMES
Lectures: 3 sessions/week, 2hr 10mins/session (**TWR** 5:30 – 7:40 pm) at EMCS 423.

TEACHING/LEARNING STRATEGIES: Mainly lectures with group/team work.

TEXTBOOK
Fundamentals of Electric Circuits, 4th Ed. by Alexander & Sadiku; ISBN: 978-0-07-352955-4

CATALOG DESCRIPTION
LaPlace transforms. Transient response of dynamic circuits. Transformers. AC circuit analysis, AC power, three-phase circuits, power factor. Digital computer analysis of electrical circuits, frequency response (active and passive filters, bode plot), and two-port networks. Spring semester. Lecture 3 hours. ENGR 2700, ENGR 2700L with minimum grades of C, MATH 2450, PHYS 2310/PHYS 2310L or department head approval. Corequisite: ENEE 2720L. Supplementary course fee assessed.

COURSE OBJECTIVES
1. Expand knowledge of the fundamentals of electric circuits (laws, theorems and analysis methods) to alternating current (ac) circuits.
2. Learn the fundamentals of transformers and three phase circuits
3. Learn to use the Laplace transform in obtaining circuit response.
4. Distinguish and relate fundamental concepts, problem formulation and solution methods.
5. Apply your knowledge of math, engineering and science and use modern engineering tools particularly PSpice and Matlab.
6. Build a strong foundation of engineering practices (with the skills to identify and solve electrical engineering problems, and challenge and test results)

TOPICAL OUTLINE:
TOPICS
AC Power Analysis
Three Phase Circuits
Magnetically Coupled Circuits
Mutual Inductance, Linear Transformers, Ideal, auto and three-phase Transformers.
Frequency Response
Bode Plots;
Active and passive filter design
Introduction to Laplace Transform
Application of Laplace Transform
Two-Ports Networks
Impedance, Admittance, Hybrid and Transmission Parameters.

CLASS PARTICIPATION/ATTENDANCE POLICY
Students are strongly encouraged to attend class. It is the student's responsibility to know what material is covered in class and to keep informed of announcements. Credit will be given to excellent attendance in the form of "final grade adjustment" for grades which require up to 1% maximum to move to next grade level.

LATE ASSIGNMENT SUBMISION/MAKE-UP POLICY
All assignments must be submitted in class on the due dates. Missed quizzes and exams may not be made up except for fully documented EXTREME CIRCUMSTANCES. Deduction for late work is 5% per each day after the assignment/report's due date for the first three days and 10% per day from the fourth day.

EVALUATION/ASSESSMENT
A: ≥90; **B:** 80 to < 90; **C:** 70 to <80; **D:** 60 to <70; **F:** <60

Activities		Percentages
Quizzes	30%;	Weekly (can be cancelled without notice)
Homework		10%;
Hourly Exams (2)		30%;
Final Exam		30%;

Weekly quizzes on Thursdays and sometimes Tuesday will be given during the semester and one quiz will be dropped at the end of the semester. **All Quizzes and Exams will be closed books and notes.** You will be able to bring a 1-page, hand written crib sheet (to be handed in with your exam). Some exam problems will require a deeper understanding of the material than the quizzes.

Collaboration for homework assignments with fellow students is welcome but we want to know who you have worked with on the problem set. We also expect individual preparation of the final solution and to hand in your own work. If you worked closely with other students for a problem set, please state their names at the end of the solution (this is to be done by all parties) so you will not be wrongly accused of any cheating.

Calculators
Only calculators approved for taking the FE may be used during quizzes or exams. **NO EXCEPTIONS.** Visit www.ncees.org for a list of calculators. (Example TI 36X Solar, CASIO fx-115ES etc).

ABET Criteria covered:
"a" - Apply knowledge of math, science, and engineering ('a')

"e" - Identify and solve engineering problems

"k" - Techniques, skills, and modern engineering tools

Contribution to Professional Components
"EE-2" Contribute towards the 1.5 yrs of eng topics related to EE.

COURSE ARCHIVE:
Students are required to maintain a folder (a manila folder will suffice), which will include **all graded work.** These folders will be collected prior to or at the final exam. Submission of the folder is required for a passing grade in this course.

COMMUNICATION
To enhance student services, the University will use your UTC email address (UTCID@mocs.utc.edu) for communications. (See http://onenet.utc.edu for your exact address.) Please check your UTC email on a regular basis. If you have problems with accessing your email account, contact the Help Desk at 423/425-2676.

ADA STATEMENT
Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or special accommodations in this class or any other class, call the Office for Students with Disabilities / College Access Program at (425-4006) or go to the office in 110 Frist Hall.

COUNSELING STATEMENT
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PLAGIARISM
Please read and heed the following information regarding academic dishonesty. The instructor cannot and will not tolerate academic dishonesty. For more information, refer to the UTC Student Handbook. *Consequences for plagiarism can include zero points for the assignment, failure of the course, or expulsion from the college.*

What is cheating?
- Supplying or using work or answers that are not your own.
- Providing or accepting assistance with completing examinations.
- Faking data or results.
- Interfering in any way with someone else's work.
- Stealing an examination or solution from the teacher.

ITEM A5. Updates to ENEE 2720L

Proposal
Addition material would be added to ENEE 2720L to mirror the additions to the lecture.

Course Description
ENEE 2720L Electrical Circuits II Laboratory (1) Laboratory 3 hours. Measurement and analysis of transformers, AC circuits, power, three-phase systems, power factor, transient response, frequency response (active and passive filters, bode plot), and two-port networks. Laboratory 3 hours. Corequisite: ENEE 2720.

Pedagogical Objectives
The main objectives of the course would not change. Material related to frequency response and two-port networks would be added.

Rationale for Course Modification
The creation of an electrical engineering-specific Circuits I course permits the department to update the material between the tow courses in ways that benefit electrical engineering students. To complement the addition of frequency response (analog filters) and two-port networks to ENEE 2720, similar assignments would be added to the lab.

Impact
- Economic – No university funds are required to offer this course.
- Faculty Resources – This course is regularly taught. No additional faculty load would be created.
- Pedagogical – The modification of this course would expose students to the important topic of frequency response that is lost with the removal of a previously required second course in electronics.
- Other Departments – Computer Engineering also affected.

Syllabus

ELECTRICAL CIRCUITS II LABORATORY

COURSE #: ENEE **2720L**

COURSE TITLE: ELECTRICAL CIRCUITS II LABORATORY

LEVEL Undergraduate;

CREDIT 1.0

INSTRUCTOR: **Dr. Abdul R Ofoli**

COURSE MEETING TIMES: 1 session/week, 2hr 50min/session

CATALOG DESCRIPTION
Measurement and analysis of transformers, AC circuits, power, three-phase systems, power factor, transient response, frequency response (active and passive filters, bode plot), and two-port networks.

ABET ASSESSMENT OUTCOMES

- Apply knowledge of mathematics, science and engineering (ABET a).
- Identify, formulate and solve engineering problems (ABET e)
- Use techniques, skills and modern engineering tool (ABET k).

OBJECTIVES

To provide hands-on experiences to help students learn how to build and analyze real circuits; compare experimental results to theoretical and simulation-based results and write reports about their experiments. This course complements the material taught in ENEE 2720, and emphasizes the principles of laboratory AC and transient measurements, the operation of lab instruments (multimeters, power supplies, function generators), and report writing.

Upon completion of this course, the student should be able to:

1. Perform AC and transient measurements and characterization on circuits.
2. Use basic electrical laboratory instrumentation (ABET a)
3. Use analysis techniques such as equivalent circuits and phasor diagrams.
4. Model, predict and verify circuit performance using modern computing tools.
5. Write complete technical reports (ABET e).

GRADING

$A \geq 90$, $80 \leq B < 90$, $70 \leq C < 80$, $60 \leq D < 70$, $F < 60$

COURSE ARCHIVE

Students are required to maintain a folder (a manila folder will suffice), which will include all graded work. These folders will be collected at the end of the semester. Submission of the folder is required for a passing grade in this course.

HONOR VIOLATIONS

Academic dishonesty (cheating) will result in a zero grade for the assignment.

ATTENDANCE POLICY

Students are required to attend laboratory and record data.

LAB ASSIGNMENTS

Students will work in lab pairs. If there are an odd number of students, one student can work alone. Students are encouraged to work and study together, but each team will produce one report per laboratory assignment with one group member being principal author and the other editing and critiquing. Principal authorship will rotate between lab group members from week to week. 80% of a student's grade will come from the reports for which the student is the principal author.

1. Laboratory reports **must** follow the format in the laboratory assignment sheets.
2. Reports **must** contain (unless assignment sheet states otherwise):
   a. Cover sheet, signed
   b. Table of contents
   c. Data, with instructor's or TA's initials
   d. Answers to all questions, and
   e. Any other materials specified in the laboratory assignment sheets.

3. Prepare before laboratory. Laboratory assignments should be reviewed ahead of time. You should come to lab with a plan to complete the lab work on time.
4. **YOU ARE EXPECTED TO KNOW HOW OR TO LEARN HOW TO USE THE PSPICE PACKAGE AND PERSONAL COMPUTERS**.
5. Data sheets must be initiated: At the conclusion of the laboratory procedure, all data sheets must be initialed by the lab instructor or assistant. Reports with uninitiated data sheets will not be accepted.
6. Reports are due at next lab session. A report on the experiment, with initialed data sheets attached, will be due the next Tuesday lab session (exceptions will be announced).
7. Reports must be typed.

TYPICAL LAB CONTENTS:

- Introduction to PSpice and Matlab
- First Order Circuit AC Steady State Response
- Measuring Inductor Parameters - Design of an Experiment
- Understanding Current Voltage and Power Relations in DC and Single Phase AC Circuit
- Understanding Three-Phase AC Circuits with Δ and Y Connected Loads
- Measuring Transformer Parameters
- Frequency Response (Includes Bode Plots, Active and Passive Filters Design etc.)
- Two-Ports Networks

ADA STATEMENT (policy regarding disability)

Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, call the Office for Students with Disabilities at 425-4006, come by the office - 102 Frist Hall or see http://www.utc.edu/OSD/.

If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely affecting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438 or http://www.utc.edu/Administration/CounselingAndCareerPlanning/.

ITEM B1. ENEE 4600 Co-requisite Removal

Proposal
For ENEE 4600, remove the current co-requisite of ENEE 4600L. No other aspects of the course would be modified.

Course Description
ENEE 4600 Power Electronics (3) Lecture 3 hours. Introduces power semiconductor devices and power electronic converters, including single-phase and three-phase ac/dc rectifiers, ac voltage controllers, dc/dc converters and dc/ac inverters. Prerequisite: ENEE 3720 and ENEE 3720L with grades of C or better. Spring semester.

Rationale for Prerequisite Modification
To create an electrical engineering laboratory elective the department proposes dropping the requirement that students take the lab along with the lecture for ENEE 4600.

Impact
This modification affects no other departments and costs no addition university resources. Students who elect to take the lecture (ENEE 4600) without taking the lab (ENEE 4600L) will see less application of the covered topics and likely retain less of the presented material. However, the department believes students would benefit overall by the ability to tailor their upper level studies to their career interests.

Syllabus

Power Electronics Spring 2011

COURSE #: ENEE 4600

COURSE TITLE: POWER ELECTRONICS

CREDIT 3.0

PREREQUISITES and COREQUISITES
ENEE 3720 and ENEE 3720L with grades of C or better.

TEACHING/LEARNING STRATEGIES: Mainly lectures with group/team work.

TEXTBOOK
Power Electronics, by Daniel W. Hart
ISBN 978-0-07-338067-4

COURSE DESCRIPTION
Introduces power semiconductor devices and power electronic converters, including single-phase and three-phase ac/dc rectifiers, ac voltage controllers, dc/dc converters and dc/ac inverters.

COURSE OBJECTIVES
1. Learn the basic principles of operation of semiconductor power switches (MOSFETs and BJTs) and their selection based on switching and power losses.

2. Learn the basic analysis techniques for different converter circuits containing semiconductor switches and power electronics components.
3. Learn to use modern techniques and tools such as PSPICE for power electronics circuit analysis;
4. Learn to apply your knowledge of math, science, and electrical engineering;
5. Learn how to identify and solve electrical engineering problems.

COURSE OUTLINE

1. Power Computations
2. Half-Wave Rectifiers
3. Full-Wave Rectifiers
4. AC Voltage Controllers
5. DC-DC Converters
6. DC Power Supplies
7. Inverters
8. Drive Circuits, Snubber Circuits, and Heat Sinks

CLASS PARTICIPATION/ATTENDANCE POLICY

Credit will be given to excellent attendance in the form of "final grade adjustment" for grades which require up to 1% maximum to move to next grade level.

LATE ASSIGNMENT SUBMISION/MAKE-UP POLICY

All assignments must be submitted in class on the due dates. Missed quizzes and exams may not be made up except for fully documented EXTREME CIRCUMSTANCES. Deduction for late work is 5% per each day after the assignment/report's due date for the first three days and 10% per day from the fourth day.

EVALUATION/ASSESSMENT

A: ≥ 90; **B:** 80 to < 90; **C:** 70 to <80; **D:** 60 to <70; **F:** <60

Activities	Percentages	
Quizzes	20%;	Weekly (can be cancelled without notice)
Homework	10%;	
Hour Exams (2)	40%;	
Final Exam	20%;	
Design Project	10%;	Due last week of class

Weekly quizzes up to a maximum of 10 will be given during the semester and a quiz or two might be dropped for 20%. **All Quizzes and Exams will be closed books and notes.** You will be able to bring a 1-page, hand written crib sheet (to be handed in with your exam). Some exam problems will require a deeper understanding of the material than the quizzes.

Collaboration for homework assignments with fellow students is welcome but we want to know who you have worked with on the problem set. We also expect individual preparation of the final solution and to hand in your own work. If you worked closely with other students for a problem set, please state their names at the end of the solution (this is to be done by all parties) so you will not be wrongly accused of any cheating.

Design Project

You will be required to use PSPICE to solve a circuit design problem. The class will be grouped into 3 persons per team, and each team will decide on a project. Late design problems will not receive full credit.

Calculators
Only calculators approved for taking the FE may be used during quizzes or exams. **NO EXCEPTIONS**. Visit www.ncees.org for a list of calculators. (Example TI 36X Solar, CASIO fx-115ES etc).

COMMUNICATION
To enhance student services, the University will use your UTC email address (UTCID@mocs.utc.edu) for communications. (See http://onenet.utc.edu for your exact address.) Please check your UTC email on a regular basis. If you have problems with accessing your email account, contact the Help Desk at 423/425-2676.

ADA STATEMENT
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PLAGIARISM
Please read and heed the following information regarding academic dishonesty. The instructor cannot and will not tolerate academic dishonesty. For more information, refer to the UTC Student Handbook. *Consequences for plagiarism can include zero points for the assignment, failure of the course, or expulsion from the college.*

What is cheating?
- Supplying or using work or answers that are not your own.
- Providing or accepting assistance with completing examinations.
- Faking data or results.
- Interfering in any way with someone else's work.
- Stealing an examination or solution from the teacher.

What is plagiarism?
- Copying a paper from a source text without proper acknowledgement.
- Buying a paper from a research service or term paper mill.
- Turning in another student's work with or without the student's knowledge.
- Copying materials from a source text, supplying proper documentation, but leaving out quotation marks.
- Paraphrasing materials from a source text without appropriate documentation.
- Turning in a paper from a term paper website.

ITEM B2. ENEE 4500 Co-/Pre-requisite Changes

Proposal
Modify the prerequisite to be ENEE 3790 and pre-/co-requisite to be ENEE 4700. Offer course both fall and spring semesters.

Catalog Description
ENEE 4500 Electrical Engineering Design Project (3). Capstone electrical engineering design experience; design of an electrical component or system. Consideration of engineering standards and realistic constraints that include most of the following considerations: economic, environmental, sustainability, constructability, ethical, health and safety, social, and political. Oral presentations and written design report required. Spring semester. Lecture 2 hours, design laboratory 2 hours. Prerequisites: ENGR 3850 (must have been taken in the immediately preceding semester or department head approval), ENEE 3790 with a C or better. Pre or Co-requisites: ENEE 4700.

Rationale
With the proposed movement of the power sequence (ENEE 3800 and ENEE 4720) ahead in the curriculum, the current prerequisite of ENEE 3800 no longer assured that the students were seniors. ENEE 3800 is proposed to be replaced as a prerequisite with ENEE 3790, assuring that students taking the course will be seniors. Similarly, the current co-/pre-requisite of ENEE 4800 was written assuming that ENEE 4800 would be offered in the fall. In the proposed curriculum ENEE 4800 would be returned to the spring, necessitating the selection of a different course offered in the fall of the senior year. ENEE 4700 was chosen to fulfill this role.

Impact
- Economic – No university funds are required to offer this course.
- Faculty Resources – This course is regularly taught. No additional faculty load would be created.
- Pedagogical – The co-/pre-requisite changes merely update the course to reflect the proposed changes in the curriculum. It is always desired that this course be taken during the final year in the program.
- Other Departments – No other departments are affected.

Syllabus

Electrical Engineering Design Project Spring 2011

COURSE: ENEE 4500

TITLE: Electrical Engineering Design Project

CREDIT: 3 hours

FACULTY: Abdul Ofoli, Ph. D. 425-5754
Room 315-E EMCS Office hours: posted by office door or by appointment

PREREQUISITES:

ENGR 3850 (must have been taken in the immediately preceding semester or department head approval), ENEE 3790 with a C or better. Pre- or Corequisite: ENEE 4700.

COURSE OBJECTIVES:
This course embodies the capstone project in Electrical engineering and is the continuation and completion of a design project started in ENGR 3850 during the preceding semester.

MAKE-UP POLICY:
Missed quizzes and exams may not be made up except for fully documented extreme circumstances.

CATALOG DESCRIPTION:
Capstone electrical engineering design experience; design of an electrical component or system. Consideration of engineering standards and realistic constraints that include most of the following considerations: economic, environmental, sustainability, constructability, ethical, health and safety, social, and political. Oral presentations and written design report required. Spring semester. Lecture 2 hours, design laboratory 2 hours.

EVALUATION:

100 – 90 A	Project Presentations 30%
89 - 80 B	Project Reports 30%
79 - 70 C	Participation / Technical Contributions.....40%
69 - 60 D	
under 60 F	

Students will be evaluated on the quality of their project presentations and reports and their participation and technical contributions to the project as a whole. The participation technical contribution component of the grade will be determined, in part, by evaluation of the student by his or her group members.

TEXTBOOK: None

COMMUNICATION:
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ABET CRITERIA:

Apply knowledge of math, science, and engineering
Engineering standards
Design and conduct experiments
Communicate effectively
Contemporary issues
Techniques, skills, and modern engineering tools
Advanced math
Apply statistics to engineering problems

ITEM B3. ENEE 3800 Modifications

Proposal

For ENEE 3800, the department proposes the following modifications:

1. Move the course from the spring to the fall semester,
2. Change the current prerequisite of ENEE 3750 to a co-requisite,
3. Change the name from Electrical Machinery to Electrical Energy Conversion

Course Description

ENEE 3800 Electrical Energy Conversion (3) Lecture 3 hours. Magnetic circuits and transformers. Rotating electrical machinery; DC machines, synchronous machines, induction motors. Fall semester. Lecture 3 hours. Prerequisites: ENEE 2720/2720L with minimum grades of C. Corequisite: ENEE 3750 and ENEE 3800L.

Rationale for Prerequisite Modification

1. To enable students to leverage the material covered in the power course sequence (ENEE 3800 and 4720) during their final two semesters, the department proposes moving the sequence ahead one semester to place both courses during the junior year.
2. ENEE 3800 currently has a prerequisite of ENEE 3750 Electromagnetic Fields and Waves. Moving ENEE 3800 ahead one semester would place these two courses in the fall and prevent students from fulfilling the perquisite requirement. Modifying the prerequisite to a co-requisite would resolve this issue. As the material in ENEE 3750 is presented earlier in the semester than it is required in ENEE 3800, this modification will not impact students.
3. The name change to Electrical Energy Conversion would mirror the change in terminology occurring at other institutions, bringing our course title in line.

Impact

This modification affects no other departments and costs no addition university resources. Students should experience no negative consequences from this modification.

Syllabus

ENEE 3800: Electrical Energy Conversion **(3)**

ENEE 3800 Electrical Energy Conversion (3) Lecture 3 hours. Magnetic circuits and transformers. Rotating electrical machinery; DC machines, synchronous machines, induction motors. Fall semester. Lecture 3 hours. Prerequisites: ENEE 2720/2720L with minimum grades of C. Corequisite: ENEE 3750 and ENEE 3800L.

Textbook:
Sarma, Maulukutla ; ElectricMachines,WestPublishing,1994, second edition .

References:
Electric Machinery, Fitzgerald, Kingsley & Umans, 6th edition, McGraw-Hill, 2003

Meetings: MW 2:00-3:15 pm

Course Objectives:

The student who completes this course will be capable of calculating performance estimates for transformers, AC and DC machines for both single phase and polyphase systems.

Teaching/Learning Strategies

The teaching style for this course will be primarily lecture, with an emphasis on problem solving. Theory will be illustrated with examples of practical application.

Learning in this course depends on reading the text, listening and active involvement in the classroom lectures, and solving homework problems.

Topical Outlines:

Week	Topic
1	Phasor, three phase circuits and power calculations
2	Phasor, three phase circuits and power calculations/Magnetic Cicuits
3	Magnetic circuits
4	Transformers
5	Transformers
6	Electromechanical energy conversion
7	Electromechanical energy conversion
8	Induction Machines
9	Induction machines
10	Induction Machines/Synchronous Machines
11	Synchronous machines
12	Synchronous machines
13	Direct Current machines
14	Direct Current machines

Prerequisites by Topic:

1. Network Analysis
2. Electromagnetic Principles
3. Laplace Transforms
4. Power Principles and Polyphase Circuits

Evaluation Criteria:

Tests(3)	60%
Design Project	15%
Quizes	15%
Homework	10%

Letter grade ranges:

A >= 90 90 > B >= 80 80 >C >= 70 70 > D >= 60 F < 60

Course Policies

Grading

- All assignments and exams will be graded on the basis of 100 points.
- Homework is due in one week from the time it is assigned.
- Late homework will not be graded, but may be handed in for feedback.
- Homework will be due at the beginning of the class period.

Attendance

- You are responsible for all material covered and homework assignments during your absence.
- You are responsible for obtaining all handouts, assignments, etc. distributed during your absence.
- If you must miss class, homework must be turned in before class.
- Makeup exams will not be given, and your exam grade contribution to the final grade will be computed on the basis of the remaining exams if you have a valid excuse in writing attesting to the impossibility of your attendance at the exam.

Design Project: A written report is required

Contribution to Professional Component:

- Breadth of knowledge of electrical engineering topics
- Contributes to the 1.5 years of appropriate topics for EE

Relationship of course to program outcomes

- a) Ability to apply knowledge of math, engineering, and science
- b) Ability to identify, formulate, and solve Electrical Machines problems
- c) Ability to design a system, components, or process using a structural design process

COMMUNICATION

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ADA STATEMENT

Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or special accommodations in this class or any other class, call the Office for Students with Disabilities / College Access Program at (425-4006) or go to the office in 110 Frist Hall.

COUNSELING STATEMENT

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ITEM B4. ENEE 4800 Prerequisite Modification

Proposal
Replace the current prerequisites for ENEE 4800 of ENEE 3770/L or ENEE 4600/L with ENEE 3720/L. Update the existing prerequisite of ENGR 2250 to the new proposed prefix, ENEE 2250 (see Item C3). No other aspects of the course would be modified.

Rationale for Prerequisite Modification
To create an additional electrical engineering elective the department proposes dropping the requirement that students take a second electronics course (ENEE 3770 or ENEE 4600). Because ENEE 4800 Instrumentation required either ENEE 3770 or ENEE 4600, ENEE 4800 must be modified. Before last year's curriculum modification, ENEE 4800 (then known as ENEE 4770) covered the topic of instrumentation at a more basic level that leveraged the topics covered in the second electronics courses (ENEE 3770 or ENEE 4600). In last year's curriculum modifications ENEE 4800 was created by modifying ENEE 4770, removing its electrical engineering capstone project and re-scoping the course.

The syllabus from last year's proposal, with the proposed prerequisite modification, is shown below. The modified course divides time equally between instrumentation basics, LabVIEW (virtual instrumentation), and Programmable Logic Controllers (PLCs). This re-scoping spends much less time on the creation of instrumentation circuits and more time on the use of existing, off-the-shelf components. As such, the revised course does not require a second electronics course (ENEE 3770 or ENEE 4600) as a prerequisite. The modified prerequisites would remove the second electronics course and replace it with the first electronics course, ENEE 3720 Analog Electronics and its associated lab.

Impact
This modification affects no other departments, costs no addition university resources, and, given last year's re-scoping of ENEE 4800, does not impact the student's ability to succeed in this course.

Syllabus

ELECTRONIC INSTRUMENTATION SPRING 2011

COURSE: ENEE 4770

TITLE: Electronic Instrumentation

CREDIT: 3 hours

FACULTY: Abdul Ofoli, Ph.D. 425-5754
Room 315-E EMCS Office hours: posted by my door or by appointment

PREREQUISITES:
ENEE 2250, ENEE 3720 and ENEE 3720L with minimum grades of C or department head approval.

COURSE DESCRIPTION:

Basic principles of operation of commonly used sensors. Signal conditioning and grounding considerations. Introduction to programming of virtual instruments using software such as Lab VIEW. Specification and design of systems to acquire, condition, display, and control using data from multiple sensors and programmable controllers.

COURSE OBJECTIVE:

Study the sensors, transducers, and methods used to take accurate measurements of physical phenomena from the engineering point of view. Develop an understanding of basic data acquisition and signal conditioning techniques and to apply these principles to the development of VIRTUAL INSTRUMENTS using LABVIEW, a graphical programming language. Learn basic programming and application techniques for programmable controllers (PLC's).

MAKE-UP POLICY:

Missed quizzes cannot be made up unless an acceptable written explanation is submitted beforehand or within three days after the missed quiz.

Late laboratory assignments will be penalized 50 % for up to one week late; labs will receive no credit after one week, but all labs must be performed to receive a passing grade.

EVALUATION:

Quizzes 40%
Lab Assignments 20%
Midterm Exam.....20%
Final Exam.....20%

90 – 100 A, 80 - 89 B, 70 - 79 C, 65 - 69 D, below 65 – F

Quizzes will cover material presented in the lecture and/or covered by the assigned study problems. You are encouraged to come to my office for help if you cannot solve a problem even after discussing it with others. Study problems and solutions will be posted on the bulletin board outside my office door on a regular basis. The study problems will not be collected and graded, but if you work and understand them, you will score well on the quizzes.

Quizzes will be on Tuesday of each week and will be closed book when appropriate; at other times, open books will be allowed. If class is not held on Tuesday, the quiz will be given on Thursday. Some quizzes may be of the "take-home" variety, while others may require writing LabVIEW or PLC modules in class.

All lab assignments MUST BE COMPLETED SATISFACTORILY to receive a passing grade in the course.

Students are required to maintain a lab folder, which will include all lab reports. These folders will be collected at the end of the semester prior to or at the final scheduled lab period. Late submission of the folder will not be accepted. The completed folder is required for a passing grade in the course.

TEXT(S): *Introduction to Engineering Experimentation*, 2nd edition, by Wheeler and Ganji

Handout Excerpts from:
LabVIEW For Everyone, 2nd Ed. By Travis, Pearson Publishing; 2002; ISBN 0-13-065096-XCatalog

COMMUNICATION:

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ADA STATEMENT:

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TENTATIVE COURSE SCHEDULE:

5 weeks devoted to each:
I. – Selected chapters in Wheeler; grounding & shielding in handout
II. - LabVIEW: parts of Chapters 1 - 10 in Wells
III. - PLC programming

ABET CRITERIA:

Apply knowledge of math, science, and engineering
Engineering standards
Design and conduct experiments
Communicate effectively
Contemporary issues
Techniques, skills, and modern engineering tools
Advanced math
Apply statistics to engineering problems

Item B5. ENEE 4700 Prerequisite Modification

Proposal

Replace the current prerequisite for ENEE 4700 of ENGR 2250 with ENEE 2250 (see Item C3) and correct a mistake in the existing prerequisite regarding ENEE 3720 for which the current catalog text requires either the lecture or the lab. Both lecture and lab should be required. No other aspects of the course would be modified.

Rationale for Prerequisite Modification

With the creation of ENEE 2250, sharing the same content as the deactivated ENGR 2250 (see Item), the prerequisites for ENEE 4700 must be modified to require the new course. This will have no affect on the students as the coverage in the prerequisite courses is not changing.

Impact

This modification affects no other departments, costs no addition university resources, and does not impact the student's ability to succeed in this course. While computer engineering students do take this course, they do not take ENGR 2250 and therefore are completely unaffected by the modification.

ENEE 4700 - Microprocessors Applications
(3) Credit Hours. Practical microprocessor principles, programming, and interfacing. Design of programs for basic data acquisition and control using the microprocessor as a system component. Review of number systems and digital logic. Fall semester. Lecture 2 hours, projects 3 hours. Prerequisites: ~~ENGR~~ *ENEE* 2250 or CPSC 1110, ENEE 2740 or CPEN 3700, ENEE 3720~~, or~~ *and* 3720L, *all* with minimum grades of C or department head approval.

Syllabus

ENEE 4700-0 (3 hrs)
Microprocessors Applications

INSTRUCTOR:

Dr. Stephen Craven
EMCS 315-F
Phone: 425-4386
Stephen-Craven@utc.edu
Office Hours: TBD

CATALOG DESCRIPTION:

Practical microprocessor principles, programming, and interfacing. Design of programs for basic data acquisition and control using the microprocessor as a system component. Review of number systems and digital logic. Fall semester. Lecture 2 hours, projects 3 hours.

PREREQUISITES: ENEE 2250 or CPSC 1110, ENEE 2740 or CPEN 3700, ENEE 3720 / 3720L, all with minimum grades of C or department head approval.

TEXTBOOKS:

- *MSP430 Microcontroller Basics* by John Davies, Newnes, 2008.

- *MSP430x2xx Family User's Guide* by Texas Instruments, revised April 2011 (rev. H), available for download at: http://www.ti.com/lit/ug/slau144h/slau144h.pdf

OBJECTIVE:

Upon completion of this course, the student should be able to create microprocessor assembler language programs for the TI MSP430, including programs that interface with the physical environment.

COURSE OUTLINE: (tentative)

1. Digital logic and number system review.
2. Programming review (C).
3. Basic microprocessor organization and operation.
   a. Registers
   b. Pipeline
   c. Memories
4. Interrupts and subroutines.
5. Timers.
6. A/D conversion.
7. Digital interfaces and control.

GRADING:

100 - 90	A	Quiz average	30%
89 - 80	B	Exam average	40%
79 – 70	C	Assignment average	30%
69 – 60	D	Total	100%
Under 60	F		

ASSIGNMENTS:

Between 6 and 10 individual programming assignments will be given, each equally weighted.

QUIZZES AND EXAMS:

Between 6 and 10 quizzes will be given at the start of class. The quizzes will be announced at least one class period prior. The lowest quiz grade will be dropped.

A midterm exam and a final exam, both equally weighted, will be given. The date of the midterm is to be decided. The final exam will be held on Tuesday, December 6, 2011, from 2-4 pm.

No quiz or exam make-ups are permitted except in documented extraordinary circumstances.

ABET CONTRIBUTIONS:

UTC Electrical Engineering graduates will have an:

(a) ability to apply knowledge of mathematics, science, and engineering.
(b) ability to design and conduct experiments, as well as to analyze and interpret data.
(c) ability to design a system, component, or process to meet desired needs.
(e) ability to identify, formulate, and solve engineering problems.
(f) understanding of professional and ethical responsibility.

(k) ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CELL PHONES:

Receiving or placing calls on a cell phone while in the classroom should be avoided out of respect for fellow students, since such calls are highly disruptive to the learning environment. **Please silence any phones before coming to class.**

ADA STATEMENT:

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If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely affecting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438 or http://www.utc.edu/Administration/CounselingAndCareerPlanning/

COURSE ARCHIVE:

Students are required to maintain a folder (a manila folder will suffice), which will include **all graded work.** These folders will be collected at the end of the semester prior to or at the final exam. Submission of the folder is required for a passing grade in this course. The folder will be available at beginning of the next semester.

HONOR VIOLATIONS:

If a student is caught cheating on any Quiz, Examination, or Assignment the student will receive a zero for the assignment for the first offense. Ethical behavior is the expected norm.

Item B6. ENEE 3770L Prerequisite Modification

Proposal

Replace the current prerequisite for ENEE 3770L of ENEE 2740L with ENEE 2740 (see Item A2). No other aspects of the course would be modified.

Rationale for Prerequisite Modification

"Advanced Electronics Laboratory" (ENEE 3770L) currently lists "Digital Electronics Laboratory" (ENEE 2740L) as a prerequisite owing to its inclusion of hands-on design assignments leveraging digital electronics. With the deactivation of ENEE 2740L, several of these hands-on assignments will be moved to the "Digital Electronics" lecture, ENEE 2740. As such, the prerequisite for ENEE 3770L should be modified.

Impact

This modification affects no other departments, costs no addition university resources, and, given the addition of hands-on assignments to ENEE 2740, does not impact the student's ability to succeed in this course.

Syllabus

ENEE 3770L Advanced Electronics Laboratory(1)

Required course for electrical engineering.

Catalog Description:

A series of projects in advanced electronics culminating in a major design project, all totally designed by the student. Spring semester. *Laboratory 3 hours.*

Prerequisites:

Corequisite: ENEE 3770
Prerequisite: ENEE 2740

Text book/references:

Reference: "Electronic Design", 4th ed by Roden, et.al., Discovery Press, 2002

Course Objectives:

To provide the student with an understanding of basic design methods in analog and digital electronic circuits along with hands-on experience.

Class/laboratory schedule:

Laboratory one time per week for 190 minutes per class.

Topics Covered:

Transistor Circuits	Oscillator Design
Current Sources	Band-pass Filters
High Performance Op Amps	Analog Computing
Active Filters	555 Timer Circuit

Pulse Shaping Circuits Transfer Functions

Contribution to Professional Component:

Contributes toward the 1.5 years of engineering topics as a 3 credit hour course in engineering sciences

Relationship of course to program outcomes

This course supports electrical engineering outcomes **ABET a, b, c, e, g, k, and EE-6**

Prepared by: Dr. Michel Elizabeth Holder, 2/21/09

Item B7. ENEE 3750 Prerequisite Modification

Proposal
Replace the current prerequisite for ENEE 3750 of ENGR 2700 with ENEE 2700 (see Item A2). No other aspects of the course would be modified.

Rationale for Prerequisite Modification
"Electromagnetic Fields and Waves" (ENEE 3750) currently lists ENGR 2700 as a prerequisite. With the creation of "Electrical Circuits I for Electrical Engineers" (ENEE 2700), the prerequisites to ENEE 3750 must be modified to require this new course instead.

Impact
This modification affects no other departments, costs no addition university resources, and, given the addition of hands-on assignments to ENEE 2740, does not impact the student's ability to succeed in this course.

Syllabus

ENEE 3750

Electromagnetic Fields

Required course
For Electrical Engineering

Catalog Description

ENEE 3750 Electromagnetic Fields and Waves (3)
Elementary fields and waves, static electric and magnetic fields; potential and vector fields; Gauss's Law; Ampere's Law; line integrals; vector calculus methods; Biot-Savart law; time varying electric and magnetic fields; Maxwell's equations. Fall semester. Lecture3 hours.

Prerequisites:
ENGR 2700 or ENEE 2700; and ENGR 2700L, all with grade of C or better; Mathematics 2550

Textbook
Electromagnetic Fields and Waves, M.F. Iskander, Waveland Press Inc., 2000, ISBN 157766115X

Course Objectives (Letters in brackets indicate ABET Outcomes)

Upon completion of this course, the student should be able to:

Apply engineering problem solving methods to the solutions of typical engineering electromagnetic field problems.(ABET a,e,k)

Upon completion of this course, the student should know:

Fundamental principles and techniques for solving problems associated with engineering electromagnetic applications, including:(ABET a,e,k)

- Complex Vectors,
- Maxwell's Equations,
- Uniform Plane Electric and Magnetic Waves,
- Antennas,
- Electrostatic Fields,
- Electric Force and Energy, and
- Magnetostatic Fields.

Class/laboratory schedule:

Lecture either three times per week at 50 minutes per class, or two times per week at 65 minutes per class.

Topical Outline

Week 1	Complex Vectors
Week 2	Maxwell's Equations
Week 3	Uniform Plain Waves
Week 4	Uniform Plain Waves
Week 5	Reflection and Transmission of Waves
Week 6	Reflection and Transmission of Waves
Week 7	Antennas
Week 8	Antennas
Week 9	Antennas
Week 10	Electrostatic Fields
Week 11	Electrostatic Fields
Week 12	Electric Force and Energy
Week 13	Electric Force and Energy
Week 14	Magnetostatic Fields
Week 15	Magnetostatic Fields

Contribution to Professional Component:

Contributes toward the 1.5 years of engineering topics as a 3 credit hour course in engineering sciences.
Contributes to use of advanced mathematics.

Relationship of course to program outcomes

This course supports ABET outcomes a, e & k.
Outcome a: Our graduates will have an ability to apply knowledge of mathematics, science, and engineering
Outcome e: Our graduates will have an ability to identify, formulate, and solve engineering problems.
Outcome k: Our graduates will have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Item B8. ENEE 3790L Co-requisite Modification

Proposal
Replace the current prerequisite for "Linear Controls and Drives Laboratory" of ENEE 3730Lwith ENEE 3790 (see related Item A1). Change the co-requisite of ENEE 3800 to a prerequisite to reflect its move from a spring to a fall course (see Item B3). No other aspects of the course would be modified.

Rationale for Prerequisite Modification
As the modifications to ENEE 3730 (Item A1) require a new course number (ENEE 3790 is assumed), the laboratory that complements this lecture must be modified to require the new lecture as a co-requisite. Additionally, a current co-requisite course (ENEE 3800) is being moved to an earlier semester, necessitating its change from a co-requisite to a prerequisite.

Impact
This modification affects no other departments, costs no addition university resources, and the modifications to ENEE 3790 will only enhance the instruction in this laboratory.

Syllabus

LINEAR CONTROLS AND DRIVES LAB

COURSE #: ENEE 3790L

COURSE TITLE: LINEAR CONTROLS AND DRIVES LAB

CREDIT: 1.0

PREREQUISITES and COREQUISITES
Corequisite: ENEE **3790**. Prerequisite ENEE **3800**

COURSE MEETING TIMES
1 session/week, 2hr 50min/session

TEACHING/LEARNING STRATEGIES
It will sometimes include short lectures (15mins) before the lab. You will be working with a lab partner to design, build, and test assigned lab projects. Each student from a team will prepare his/her own report for each lab performed based on the data the team collected. Make sure to identify all the lab partners on the cover sheet.

TEXTBOOK
Control System Design, by Goodwin, Graebe & Salgado .

COURSE DESCRIPTION
Introduction to components in a electric drive system, building real-time control system using Matlab/Simulink interface, PI and dual loop algorithm as applied to servomotor position control, state variable feedback control application, and experiments tailored towards electric drives systems such as open-loop speed control and characterization of dc-motor; dc motor speed control under load and control of induction and permanent magnet ac motors.

COURSE OBJECTIVES:
At the completion of this new lab course, students will have demonstrated the ability to understand and apply knowledge gained in ***Linear Control Systems*** (ENEE 3730), ***Electrical Machine*** (ENEE 380). Students will be able to demonstrate basic application of motor drives systems, their control and application in energy efficiency.

COURSE OUTLINE
Experiment 1: In this experiment, students will be introduced to the role of the four main components in the DSP-based electric-drives system. They are as follows: 1) Motor coupling system, 2) Power Electronics Drive Board, 3) DSP based DS1104 R&D controller card and CP 1104 I/O board and 4) MATLAB Simulink and Control-desk.

Experiment 2: This will introduce Matlab/Simulink as a dSpace DSP programming tool and the students will build a real-time control system using Matlab/Simulink and interface it with an actual plant or system .e.g. motor system.

Experiment 3: Real-time study of proportional plus integral (PI) control algorithm as applied to a servomotor position control system and the effects of non-ideal plant or system characteristics on the closed loop performance of the controller.

Experiment 4: Students will do hands-on on dual loop control algorithm, with an inner speed loop utilizing PI control, and an outer position loop utilizing proportional control.

Experiment 5: Real-time study of speed observer tuning and usage as well as the torque mode operation as applied to a servomotor speed control.

Experiment 6: Students will do hands-on on state variable feedback control algorithm, using the motor speed and position as feedback in order to achieve better closed loop performance. This experiment will be performed in three parts, the first part will study the effects of changes in the position feedback gain, the second part will study the effects of changes in the velocity feedback gain, and the final part will study the effects of changes to the controller gain.

Other lab experiments which are solely tailored towards electric drives systems are: (i) real-time implementation of a switch-mode dc converter, (ii) no-load dc motor test; control of a dc motor under no-load condition in open loop; open-loop speed control and characterization of dc-motor; dc motor speed control under load (using feedback); control of induction and permanent magnet ac motors etc.

EVALUATION/ASSESSMENT
A: ≥90; **B:** 80 to < 90; **C:** 70 to <80; **D:** 60 to <70; **F:** <60

Activities	Percentages
Prelab:	(10%)
Laboratory Reports:	(80%)
Design project:	(10%)

Students are required to maintain a lab folder, which will include all lab reports. These folders will be collected at the end of the semester prior to or at the final scheduled lab period. Late submission of the folder will not be accepted. The completed folder is required for a passing grade in the course.

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PLAGIARISM
Please read and heed the following information regarding academic dishonesty. The instructor cannot and will not tolerate academic dishonesty. For more information, refer to the UTC Student Handbook. *Consequences for plagiarism can include zero points for the assignment, failure of the course, or expulsion from the college.*

What is cheating?
- Supplying or using work or answers that are not your own.
- Providing or accepting assistance with completing examinations.
- Faking data or results.
- Interfering in any way with someone else's work.
- Stealing an examination or solution from the teacher.

What is plagiarism?
- Copying a paper from a source text without proper acknowledgement.
- Buying a paper from a research service or term paper mill.
- Turning in another student's work with or without the student's knowledge.
- Copying materials from a source text, supplying proper documentation, but leaving out quotation marks.
- Paraphrasing materials from a source text without appropriate documentation.
- Turning in a paper from a term paper website.

Item B9. Modification of ENGR 2700L Co-requisites.

Proposal
Replace the current corequisite for ENGR 2700L of ENGR 2700 with ENEE 2700 or ENGR 2700 (see Item A2). No other aspects of the course would be modified.

Rationale for Prerequisite Modification
"Electrical Circuit I Laboratory" (ENGR 2700L) currently lists ENGR 2700 as a co-requisite. With the creation of "Electrical Circuits I for Electrical Engineers" (ENEE 2700), the co-requisites to ENGR 2700L must be modified to accept either course instead.

Impact
This modification affects no other departments, costs no addition university resources, and, improves the student's ability to succeed in the lecture.

Syllabus

ENGR 2700L (1 hr)
Electrical Circuits I Laboratory

TEXTBOOKS: Fundamentals of Electric Circuits, 4th Edition
By Alexander and Sadiku ISBN: 978-0-07-352955-4

OrCAD Software Available on College of Engineering computers

CATALOG DESCRIPTION:
Introduction to laboratory instrumentation, measurement techniques, and electrical circuit elements. Laboratory experiments to support the introduction to DC circuit analysis, Kirchhoff's laws, network theorems, transient analysis, phasor and AC circuits analysis. Digital computer analysis of electrical circuits using such tools as PSPICE. Laboratory 3 hours. Co- or Pre-requisite: ENGR 2700 or ENEE 2700.

OBJECTIVES:
To provide the student with an understanding of basic analog electrical circuits through hands-on experience.

Upon completion of this course, the student should be able to:

1. Perform fundamental measurements on circuits,
2. Use basic electrical laboratory instrumentation,
3. Predict and verify laboratory results using computer simulation,
4. And write complete technical reports.

GRADING:
100 - 90 A Laboratory average 100%
89 - 80 B
79 – 70 C
69 – 60 D
under 60 F

LAB ASSIGNMENTS:

Lab assignments will be typically provided one week in advance of the lab period in which it will be performed. Students should come to lab having read that week's assignment and completed any required Pre-Lab assignments.

Students will be working with a lab partner to design, build, and test the circuits assigned. The team must obtain the signature of the instructor or teaching assistant on the lab assignment sheet before leaving the lab.

Lab report guidelines will be presented at the first lab meeting. Submitted reports that do not follow the stated guidelines may be returned to the student without grading. In such a case the student will have one week to correct the issue and resubmit. Each team of two will require a wire kit and a solderless breadboard.

ADA STATEMENT:
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COURSE ARCHIVE:
Students are required to maintain a folder (a manila folder will suffice), which will include all graded work. These folders will be collected at the end of the semester prior to or at the final exam. Submission of the folder is required for a passing grade in this course. The folder will be available at beginning of the next semester.

ABET CRITERIA:
Outcome #1: Engineering graduates will have demonstrated the ability to apply fundamental knowledge in engineering sciences, mathematics, physics, chemistry, and computer applications with programming.
Outcome #2: Engineering graduates will have demonstrated the ability to use engineering principles and modern engineering tools to identify, analyze, and solve engineering problems.
Outcome #3: Engineering graduates will have demonstrated the ability to design and conduct experiments, collect, analyze and interpret data, and use modern computer-based tools to evaluate problems.
Outcome #5: Engineering graduates will have demonstrated the ability to communicate effectively.

ITEM C1. Addition of Fundamentals of Engineering and Professionalism

Proposal
A one-hour, pass/fail review course covering topics from the Fundamentals of Engineering Exam and as well ethics and professionalism is proposed.

Course Description
ENEE 4900 Fundamentals of Engineering and Professionalism (1) Lecture 1 hour. Pass / Fail. Review of topics covered on the afternoon session of the Fundamentals of Engineering exam. Topics in engineering ethics and professionalism using case studies, and invited speakers from the profession and related fields. Spring semester. Pre- or co-requisite: ENGR 3850.

Pedagogical Objectives
This course serves two purposes: (1) to provide a mandatory mechanism for students to prepare for the Fundamentals of Engineering (FE) Exam and (2) to cover aspects of professionalism and ethics as required by the engineering accreditation body. Students completing the course should be familiar with the FE Exam format and reference material and better recall of material covered in the afternoon section, resulting in increased overall exam scores. In regards to professionalism and ethics, guest speakers and case studies will instill in the students the importance of ethical and professional behavior.

Evaluation Methods
In addition to attendance, students would have to complete a paper related to an ethical issue that may arise in professional practice in order to pass the course. Attendance would be required with students with more than one unexcused absence failing the course.

Rationale for Course Creation
The College stresses professional licensure, requiring all seniors to take the FE Exam. The exam covers the breadth of the undergraduate curriculum. This course would improve the pass rate on the exam and stress the importance of professional licensure to students. A further benefit of the course is that by covering engineering ethics in this course, the ethical topics currently covered in ENEE 4750 can be removed and replaced with new material.

Impact
- Economic – No university funds are required to offer this course.
- Faculty Resources – The review sessions in this course would be shared across all departmental faculty. The faculty currently offer weekly optional review sessions which would be replaced with this course, resulting in no net increase in faculty load.
- Pedagogical – The inclusion of this course in the curriculum would improve the pass rate on the FE Exam and stress ethics.
- Other Departments – No other departments are affected.

Syllabus

Fundamentals of Engineering and Professionalism, Fall Semester

Course: ENEE 4900

Title: Fundamentals of Engineering and Professionalism

Credit: 1 hour

Faculty: EE Faculty and others

Course Description: Review of topics covered on the afternoon session of the Fundamentals of Engineering exam. Topics in engineering ethics and professionalism using case studies, and invited speakers from the profession and related fields.

ABET Assessment Outcomes:

- An understanding of professional and ethical responsibility (ABET f)
- A recognition of the need for, and an ability to engage in life-long learning (ABET i)

Goals & Objectives: To understand the need to make decisions and/or take actions in professional life. To observe directly the need for life-long learning as an integral part of professional life, particularly in dealing with a changing technological environment.

Participation/Attendance Policy: Attendance at lectures is **mandatory**. Missing more than one session will receive fail grade.

Grade Assignment: Pass or Fail.

Textbook: Fundamentals of Engineering Supplied Reference Handbook, National Council of Examiners for Engineering and Surveying, ISBN 1-932613-19-6 (also downloadable).

Reference: FE Review Manual, 3rd Edition Michael R. Lindeburg, PE, 2011, Professional Publications, Inc., ISBN: 978-1-59126-333-3

Accommodation Statement: If you have a disability that may require special assistance or accommodations, or you have questions related to any accommodations for testing, note takers, readers, etc., please speak with me as soon as possible. All appropriate accommodation will be made, but must be arranged through the CAP office. Students may contact the Office for Students with Disabilities/College Access Program at 425-4006 with questions about services offered to UTC students with qualified disabilities.

ITEM C2. Addition of ENEE 2700

ENEE 2700

Proposal
Add an "Electrical Circuits I for Electrical Engineers" course tailored to electrical engineering.

Course Description
ENEE 2700 Electrical Circuits I for Electrical Engineers (3). Introduction to analysis of electrical circuits. Fundamental electrical system components. Kirchhoff's laws. Resistive circuit analysis. Circuit theorems. Operational amplifiers. Response of first order circuits. Sinusoidal steady-state circuit analysis, and Second-Order Circuits. Fall and spring semesters. Lecture 3 hours. Pre- or Corequisites: MATH 2450 and PHYS 2310 or department head approval. Corequisite: ENGR 2700L. Electrical Engineering majors must take ENGL 2880 as a corequisite to this course or have ENGL 2880 as a prerequisite.

Pedagogical Objectives
1. Learn the fundamentals of electric circuits (basic elements, laws, theorems and analysis methods).
2. Distinguish and relate fundamental concepts, problem formulation and solution methods.
3. Apply your knowledge of math, engineering and science.
4. Use modern engineering tools.
5. Build a strong foundation of engineering practices (with the skills to identify and solve electrical engineering problems, and challenge and test results)

Evaluation Methods
Traditional exams, quizzes, and homework assignments will be used.

Activities	Percentages
Quizzes	30%;
Homework	10%;
Hourly Exams (2)	30%;
Final Exam	30%;

Rationale for Course Creation
As recently as the mid-1990's the department offered separate first-semester circuits courses for electrical engineers and the other disciplines. This proposal would restore the electrical engineering-specific circuits class, permitting the department to better divide material between the two circuits courses (ENEE 2700 and ENEE 2720) and add additional material that is not relevant to most other disciplines. Second-order circuits would be added to "Electrical Circuits I" and the power triangle left for "Electrical Circuits II".

Impact
- Economic – No university funds are required to offer this course.
- Faculty Resources – The addition of this course to the curriculum would increase faculty teaching loads up to one course per year (one of the existing two ENGR 2700 section would become an ENEE 2700 section, but ENEE 2700 would have to be offered in the spring, as well). Given that the general engineering circuits course (ENGR 2700) may be frequently taught by the general engineering program, the actual load increase may be zero. Regardless, faculty resources exist to teach this course twice a year.

- Pedagogical – Electrical and computer engineering students would receive improved instruction that better leverages the sequence of courses they take (ENEE 2700 -> ENEE 2720 -> ENEE 3720 & ENEE 3800).
- Other Departments – Computer Engineering may consider a modification to their curriculum to match the proposed Electrical Engineering curriculum, however there existing curriculum is valid in spite of the proposed modifications.

The transfer agreement with Chattanooga State would need to be updated to reflect the prefix change. Given that the majority of Chattanooga State students enter with both semesters of circuits, the redistribution of material between the two courses should no impact them. Petitions would be required until a modification of the transfer agreement between the two schools can be achieved.

Syllabus

ELECTRICAL CIRCUITS I FOR ELECTRICAL ENGINEERS

COURSE #: ENEE **2700**

COURSE TITLE: ELECTRICAL CIRCUITS I FOR ELECTRICAL ENGINEERS

LEVEL Undergraduate;

CREDIT 3.0

INSTRUCTOR: **Dr. Abdul R Ofoli**

PREREQUISITES and COREQUISITES
Pre- or Corequisites: MATH 2450 and PHYS 2310 or department head approval. Co-requisite: ENGR 2700L

COURSE MEETING TIMES
Lectures: 3 sessions/week, 2hr 10mins/session.

TEACHING/LEARNING STRATEGIES: Mainly lectures with group/team work.

TEXTBOOK
Fundamentals of Electric Circuits, 4th Ed. by Alexander & Sadiku; ISBN: 978-0-07-352955-4

CATALOG DESCRIPTION
Introduction to analysis of electrical circuits. Fundamental electrical system components. Kirchhoff's laws. Resistive circuit analysis. Circuit theorems. Operational amplifiers. Response of first order circuits. Sinusoidal steady-state circuit analysis, and Second-Order Circuits. Fall and spring semesters. Lecture 3 hours. Pre- or Corequisites: MATH 2450 and PHYS 2310 or department head approval. Co-requisite: ENGR 2700L. Electrical Engineering majors must take ENGL 2880 as a corequisite to this course or have ENGL 2880 as a prerequisite.

COURSE OBJECTIVES
1. Learn the fundamentals of electric circuits (basic elements, laws, theorems and

analysis methods).
2. Distinguish and relate fundamental concepts, problem formulation and solution methods.
3. Apply your knowledge of math, engineering and science.
4. Use modern engineering tools.
5. Build a strong foundation of engineering practices (with the skills to identify and solve electrical engineering problems, and challenge and test results)

At completion of the course, the student should be able to employ laws and techniques (such as mesh and node analysis, linearity, superposition, equivalent circuits, power calculations) to analyze dc circuits and first and second order ac circuits under steady state and transient conditions. The student should be well prepared to take higher level courses and solve electrical engineering problems involving circuit principles.

TOPICAL OUTLINE:

- Basics: Units and definitions, Circuit elements, Ohm's law and Kirchhoff's laws.
- Series/parallel resistor circuits, Voltage and current division,
- Nodal analysis.
- Mesh analysis, Thevenin/Norton theorems.
- Maximum power transfer, superposition
- Operational amplifiers
- Inductors and capacitors element relationships, Impedance.
- First –order circuits.
- Second-order circuits.
- Sinusoids and phasors.

CLASS PARTICIPATION/ATTENDANCE POLICY

Students are strongly encouraged to attend class. It is the student's responsibility to know what material is covered in class and to keep informed of announcements. Credit will be given to excellent attendance in the form of "final grade adjustment" for grades which require up to 1% maximum to move to next grade level.

LATE ASSIGNMENT SUBMISION/MAKE-UP POLICY

All assignments must be submitted in class on the due dates. Missed quizzes and exams may not be made up except for fully documented EXTREME CIRCUMSTANCES. Deduction for late work is 5% per each day after the assignment/report's due date for the first three days and 10% per day from the fourth day.

EVALUATION/ASSESSMENT

A: ≥90; **B:** 80 to < 90; **C:** 70 to <80; **D:** 60 to <70; **F:** <60

Activities	Percentages
Quizzes	30%; Weekly (can be cancelled without notice)
Homework	10%;
Hourly Exams (2)	30%;
Final Exam	30%;

Weekly quizzes on Thursdays will be given during the semester and one quiz will be dropped at the end of the semester. **All Quizzes and Exams will be closed books and**

notes. You will be able to bring a 1-page, hand written crib sheet (to be handed in with your exam). Some exam problems will require a deeper understanding of the material than the quizzes.

Collaboration for homework assignments with fellow students is welcome but we want to know who you have worked with on the problem set. We also expect individual preparation of the final solution and to hand in your own work. If you worked closely with other students for a problem set, please state their names at the end of the solution (this is to be done by all parties) so you will not be wrongly accused of any cheating.

ABET Criteria covered:

"a" - Apply knowledge of math, science, and engineering ('a')
"e" - Identify and solve engineering problems
"k" - Techniques, skills, and modern engineering tools

Contribution to Professional Components

"EE-2" Contribute towards the 1.5 yrs of eng topics related to EE.

COURSE ARCHIVE:

Students are required to maintain a folder (a manila folder will suffice), which will include **all graded work**. These folders will be collected prior to or at the final exam. Submission of the folder is required for a passing grade in this course.

COMMUNICATION

To enhance student services, the University will use your UTC email address (UTCID@mocs.utc.edu) for communications. (See http://onenet.utc.edu for your exact address.) Please check your UTC email on a regular basis. If you have problems with accessing your email account, contact the Help Desk at 423/425-2676.

ADA STATEMENT

Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or special accommodations in this class or any other class, call the Office for Students with Disabilities / College Access Program at (425-4006) or go to the office in 110 Frist Hall.

COUNSELING STATEMENT

If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely affecting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438 or http://www.utc.edu/Administration/CounselingAndCareerPlanning/)

PLAGIARISM

Please read and heed the following information regarding academic dishonesty. The instructor cannot and will not tolerate academic dishonesty. For more information, refer to the UTC Student Handbook. *Consequences for plagiarism can include zero points for the assignment, failure of the course, or expulsion from the college.*

ITEM C3. Addition of ENEE 2250

ENEE 2250

Proposal
Modify the prefix for "Engineering Programming" (ENGR 2250) from ENGR to ENEE. Update the catalog description to match the correct semester it is offered. No aspects of the course would be modified. The existing ENGR 2250 would be removed from the catalog.

Course Description
ENEE 2250 Engineering Programming (3) Introduction to programming with a high-level language. Flowcharting, algorithm design, input/output, data types, files, decisions, loops, arrays. Application to engineering problems including matrix equations. Fall semester. Lecture 3 hours. Prerequisite: Engineering 1040 with a grade of C or better; Pre- or Corequisite: Mathematics 2450.

Rationale
As this course is critical to the education of EE students, the department desires to bring it "in-house" to completely control its content and instruction. With the exception of Industrial Engineering, all other disciplines take the sister course (ENGR 2240) instead of ENGR 2250, or, as is the case with the UTeach and Nuclear Engineering, can choose between the two. For the past several years, EE students have compromised 95%+ of the enrollment and the percentage of EEs in the course is expected to remain static or increase in the future.

Impact
- Economic – No university funds are required.
- Faculty Resources – This is an existing course that would be offered with the same regularity. No additional resources are required.
- Pedagogical – No changes are made to the course.
- Other departments – Industrial Engineering, Nuclear Engineering, and UTeach, all under the B.S.E. degree, would require a modification to their curriculums to match this prefix change. As no modifications are made to the course itself, students will be unaffected. The transfer agreement with Chattanooga State would need to be updated to reflect the prefix change. This would be handled through the petition process until the change is made.

Syllabus

ENEE 2250
Engineering Programming (3 Hrs)

Instructor: Dr. Michel E. Holder, P.E.

CATALOG DESCRIPTION: Introduction to programming with a high-level language. Flowcharting, algorithm design, input/output, data types, files, decisions, loops, arrays. Application to engineering problems including matrix equations. Fall semester. Lecture 3 hours. Prerequisites: Engineering 104 with a grade of C or better; Pre- or Corequisite: Mathematics 245.

TEXT: A Concise Introduction to MatLAB by Palm, McGraw-Hill 2008, ISBN 978-0-07-338583-9

C Programming for the Absolute Beginner by Vine, CENGAGE,
ISBN 978-1-59863-480-8

COURSE OBJECTIVES: To allow the student to gain familiarity with the basics of the MATLAB and C programming languages and to develop competence in the application of computers to the solution of elementary engineering problems.

ABET Outcomes to be achieved: an ability to apply fundamental knowledge in engineering sciences, mathematics, physics, chemistry, and computer applications.

GRADE CALCULATION:			
	QUIZZES	**60%**	**90 – 100 A**
	Midterm	**15%**	**80 -- 89 B**
	Final	**15%**	**70 -- 79 C**
	Programs	**10%**	**60 -- 69 D**
		100%	**<60 F**

We will be using a software package called "**Bloodshed**" to compile our C programs. This software can be downloaded FREE and installed on your own PC or laptop.

All exams and quizzes will be closed book. Details of calculations must be presented. Only FE approved calculators may be used. These are the HP 33s and HP 35s, Casio: all fx-115 models, and the TI-30X IIS, TI-36X Pro, and 36X solar.

NOTE: No electronic devices OF ANY KIND, other than the above listed calculators, are allowed in this class. Leave them in your book bag, TURNED OFF. If you have a documentable bona fide emergency, you may leave your cell phone on, PLACED on the floor beside your seat (but not during a quiz or exam).

If your cell phone or any other electronic device interrupts the class IN ANY WAY, three points will be deducted from your semester grade for the first interruption, and five points will be deducted for each ensuing interruption. I STRONGLY urge you to turn all of these devices OFF BEFORE ENTERING THE CLASSROOM.

STUDY PROBLEMS will be assigned for each chapter, but they **WILL NOT be collected and graded.** If you perform the assignments, you will do well on the quizzes and exams; if you **DO NOT** work the assigned problems, you will most likely flunk this course ..... it's up to you. A weekly quiz will be given on Tuesday covering material contained in the study problems or programming assignment and in previous lectures. Some quizzes or exams will require you to write computer code while others may ask you to interpret a given set of instructions. Students must keep a notebook or folder of all graded work. This will be collected at the final exam. The final will only cover new material covered since the midterm exam.

If you have a disability or condition that may require assistance or accommodations, or you have questions related to any accommodations for testing, note takers, readers, etc., contact the Office for Students with Disabilities/College Access Program at 425- 4006, 110 Frist Hall.[1]

ITEM D2. ENEE 4720 Informational Changes

Proposal

Move ENEE 4720 from fall to spring semester and change name from "Power System Analysis and Design" to "Power and Energy Systems". The corresponding change for ENEE 3800 is addressed in Item B7.

Course Description

ENEE 4720 Power and Energy Systems (3) Power systems component modeling, transmission lines, machines, transformers. Load flow analysis, symmetrical components, symmetrical and unsymmetrical fault analysis. Spring semester. Lecture 3 hours. Prerequisite: ENEE 3800 with grade of C or better.

Rationale

To enable students to leverage the material covered in the power course sequence (ENEE 3800 and 4720) during their final two semesters, the department proposes moving the sequence ahead one semester to place both courses during the junior year. The proposed name change would bring the course in line with the current trend at other institutions of including energy in course titles related to power engineering. No other aspect of the course would change.

Impact

- The modification incurs no costs to the university and impacts no other departments.