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<td>[Anthony Brizendine]</td>
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<td>[Srinivas Pulugurthu]</td>
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*To: College of Engineering Graduate Committee and UNC Charlotte Graduate Council

From: Deborah Sharer

Date: January 29, 2016

Re: Creation of ELET and ENER 5xxx Courses

The Long Form is used for major curriculum changes. Examples of major changes can include: Undergraduate: Major changes include new undergraduate degrees, minors, concentrations, certificates, and changes to more than 50% of an existing program (Note: changing the name of an academic department does not automatically change the name(s) of the degree(s). The requests must be approved separately by the Board of Governors.) Graduate: Major changes include new graduate courses, major changes to an existing graduate course or major changes to an existing graduate program

Submission of this Long Form indicates review and assessment of the proposed curriculum changes at the department and collegiate level either separately or as part of ongoing assessment efforts.
COURSE AND CURRICULUM PROPOSAL

University of North Carolina at Charlotte

New Graduate

Course and Curriculum Proposal from: Department of Engineering Technology and Construction Management

TITLE: Creation of ELET and ENER 5xxx Courses

PROPOSAL SUMMARY.

A. SUMMARY.
The Department of Engineering Technology and Construction Management (ETCM) wishes to establish 5xxx graduate level courses to allow co-listing with undergraduate department courses. Specifically:

1. ELET 5123 will be created to allow co-listing with the currently existing ELET 4123.
2. ELET 5152 will be created to allow co-listing with the currently existing ELET 4152.
3. An ENER 5000 Special Topics course at the graduate level will be created to accompany an ENER 4000 Special Topics course at the undergraduate level (submitted as a separate proposal).

B. JUSTIFICATION.
1. The ETCM Department currently does not have the ability to co-list senior level undergraduate courses and graduate electives. These courses will allow the creation of these co-listings at the department level.

2. There are no prerequisites or co-requisites for the ENER 5000 course. Prerequisites for ELET 5123 and ELET 5152 will be the same as the respective undergraduate course.

3. The instructors of these courses will follow the university guidelines for the offering of joint 4000 and 5000 level classes.

4. These courses will expand the offerings of courses that may be of interest to students.

C. IMPACT. The offering of this course will not impact current course offerings. It may facilitate the offering of multi-disciplinary courses within the department.

1. These offerings will serve graduate students within the department and may be open to students outside the department who meet defined prerequisites or are given department permission to enroll in a course.

2. These courses will not impact current offerings but will expand offerings.
   a. ELET 5123 may be offered each fall in conjunction with the required ELET 4123
course. ELET 5152 and ENER 5000 will be taught on demand.
b. There will be no impact on other courses.
c. The course cannot be offered with fewer students than defined using the college's
current guidelines for enrollment.
d. Other courses will not be affected since:
   i. ELET 4123 is a program requirement and offered annually.
   ii. ELET 5152 and ENER 5000 will be offered when the corresponding
courses (ELET 4152 and ENER 4000, respectively) are offered as major
   electives.
c. This will only affect the department level of the catalog through co-listing of
limited senior level undergraduate and associated graduate courses.

RESOURCES REQUIRED TO SUPPORT PROPOSAL.

A. PERSONNEL. No additional faculty, part-time teaching or student assistants will be
required to deliver these courses. Qualified faculty members for each course are noted
as follow:
   a. ELET 5123: Dr. Barry Sherlock, Dr. Deborah Sharer
   b. ELET 5152: Dr. Deborah Sharer, Dr. Barry Sherlock
   c. ENER 5000: ELET and/or MET faculty developing the elective.

B. PHYSICAL FACILITY. Current space is adequate for all proposed courses.

C. EQUIPMENT AND SUPPLIES: No new equipment or supplies are required for any
proposed course.

D. COMPUTER. Current computer and software is adequate for all proposed courses.

E. AUDIO-VISUAL. N/A

F. OTHER RESOURCES. N/A

G. SOURCE OF FUNDING. N/A

CONSULTATION WITH THE LIBRARY AND OTHER DEPARTMENTS OR UNITS

A. LIBRARY CONSULTATION. Indicate written consultation with the Library Reference
Staff at the departmental level to ensure that library holdings are adequate to support
the proposal prior to its leaving the department. (Attach copy of Consultation on
Library Holdings).

B. CONSULTATION WITH OTHER DEPARTMENTS OR UNITS. Each course in this proposal
is an ETCM Department course offering. The curriculum committee approval is the
consultation necessary for this proposal.

C. HONORS COUNCIL CONSULTATION. N/A
INITIATION, ATTACHMENTS AND CONSIDERATION OF THE PROPOSAL

A. ORIGINATING UNIT. Approved as indicated on signature sheet.

B. CREDIT HOUR. (Mandatory if new and/or revised course in proposal)
Review statement and check box once completed:
☐ The appropriate faculty committee has reviewed the course
   outline/syllabus and has determined that the assignments are sufficient to
   meet the University definition of a credit hour.

C. ATTACHMENTS.

1. CONSULTATION: Attach relevant documentation of consultations with
   other units.

2. COURSE OUTLINE/SYLLABUS: Proposed syllabi for each of the 5xxx
   courses is attached, conforming to the Boiler Plate for Syllabi for
   New/Revised Graduate Courses.

   Syllabi for existing ELET4xxx courses is included for reference in
   Appendix 2, along with the proposed syllabi for ENER 4000 which
   was submitted as a separate proposal.

3. PROPOSED CATALOG COPY: Copy should be provided for all courses in
   the proposal. Include current subject prefixes and course numbers, full
   titles, credit hours, prerequisites and/or corequisites, concise
   descriptions, and an indication of when the courses are to be offered as
   to semesters and day/evening/weekend. Copy and paste the current
   catalog copy and use the Microsoft Word “track changes” feature (or
   use red text with “strikethrough” formatting for text to be deleted, and
   adding blue text with “underline” formatting for text to be added).

   Proposed catalog copy provided in Appendix 3.

   a. For a new course or revisions to an existing course, check all
      the statements that apply:
      ___ This course will be cross listed with another course.
      ___ There are prerequisites for this course.
      ___ There are corequisites for this course.
      ___ This course is repeatable for credit.
      ___ This course will increase/decrease the number of credits
         hours currently offered by its program.
      ___ This proposal results in the deletion of an existing
         course(s) from the degree program and/or catalog.

   For all items checked above, applicable statements and content must
   be reflected in the proposed catalog copy.

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OAA/mjw
b. If overall proposal is for a new degree program that requires approval from General Administration, please contact the facultygovernance@uncc.edu for consultation on catalog copy.

4. **ACADEMIC PLAN OF STUDY (UNDERGRADUATE ONLY):** Does the proposed change impact an existing Academic Plan of Study?
   - [ ] Yes. If yes, please provide updated Academic Plan of Study in template format.
   - [x] No.

5. **STUDENT LEARNING OUTCOMES (UNDERGRADUATE & GRADUATE):**
   Does this course or curricular change require a change in Student Learning Outcomes (SLOs) or assessment for the degree program?
   - [ ] Yes. If yes, please provide updated SLOs in template format.
   - [x] No.

6. **TEXTBOOK COSTS:** It is the policy of the Board of Governors to reduce textbook costs for students whenever possible. Have electronic textbooks, textbook rentals, or the buyback program been considered and adopted?
   - [x] Yes. Briefly explain below.
   - [ ] No. Briefly explain below.

Each course in the college is scrutinized with the object of keeping textbook costs down. The courses defined in this proposal will be no exception to this practice.

**IMPORTANT NOTE:** A Microsoft Word version of the final course and curriculum proposal should be sent to facultygovernance@uncc.edu upon approval by the Undergraduate Course and Curriculum Committee and/or Graduate Council chair.
Appendix 1: Library Consultation

UNC CHARLOTTE
J. Murrey Atkins Library

Consultation on Library Holdings

To: Deborah Sharer
From: Jeff McAdams
Date: 02/02/16
Subject: ENER4000/5000, ELET4123/5123, ELET4152/5152

Summary of Librarian’s Evaluation of Holdings:

Evaluator: Jeff McAdams Date: 02/02/16

Check One:
1. Holdings are superior
2. Holdings are adequate
3. Holdings are adequate only if Dept. purchases additional items.
4. Holdings are inadequate

Comments:
Library holdings should be adequate to support student research for this course (see list of items held by subject heading below). Students will have access to relevant databases including Compendex, Inspec, Science Direct, Web of Science, IEEE Xplore, ASTM Digital Library, CRC Engineering Handbooks, and many others.

<table>
<thead>
<tr>
<th>LC Subject Heading</th>
<th>Books</th>
<th>Journals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal processing Digital techniques</td>
<td>658</td>
<td>23</td>
</tr>
<tr>
<td>Electric Filters</td>
<td>150</td>
<td>2</td>
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<tr>
<td>Electric filters, Active Design</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

Evaluator's Signature

02/02/16
Appendix 2: Proposed and Existing Course Outlines

ELET 5123 - Active Filters

Catalog Description: The design, analysis, simulation and implementation of composite, cascaded and summation filters. Topics include: bilinear transfer functions; cascade design with first-order circuits; biquad circuits; Butterworth lowpass circuits; Butterworth bandpass circuits; the Chebyshev response; sensitivity; frequency transformations; highpass and band-elimination filters. Three (3) credit hours.

Prerequisites: ELET3113; ELET3222; ETGR2122 and ETGR2272 or MATH1242 or permission of department

Course Outcomes: Upon successful completion of this course, students will be able to:

- Design and analyze filters making use of bilinear transforms.
- Design active filters by cascading first-order circuits.
- Demonstrate an understanding of the design and analysis of active filters using the biquad circuit.
- Design filters having a lowpass Butterworth response
- Design filters having a bandpass Butterworth response.
- Design lowpass and bandpass filters having a Chebyshev response.
- Perform sensitivity analysis upon a given active filter circuit.
- Make use of frequency transformation methods to convert prototype lowpass filters into highpass, bandpass or band-reject filters.

Instructional Method: This course will primarily be delivered via lecture, with graduate students responsible for additional independent study and dissemination.

Means of Student Evaluation*: Students taking this course for graduate credit will be required to research and disseminate findings on areas of topical interest. Grades will be calculated as follows and a standard 10-point scale will be used for grade assignment:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Two semester exams</td>
<td>50%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Research/Dissemination</td>
<td>20%</td>
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</tbody>
</table>

* Grading policy may be modified by the instructor for each section of the course.

University Policies and Information: The following statements are provided to ensure compliance with federal regulations and SACS standards, as detailed in http://legal.unce.edu/legal-topics/classroom-policies-and-practices/suggested-standard-syllabus-policies#disability.

- Code of Student Academic Integrity
  Students have the responsibility to know and observe the requirements of the UNC Charlotte Code of Student Academic Integrity. This code forbids cheating, fabrication or

Revised 05/06/14
OAA/mjw
falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty. Students are expected to submit their own work, either as individuals or contributors to a group assignment. Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work. Violations of the Code will result in disciplinary action.

- **Code of Student Responsibility**
  Students are expected to uphold the University’s Code of Student Responsibility. The purpose of the Code is to protect the health, safety, welfare, and property of the campus community; foster the personal, social, and ethical development of members; provide an environment conducive to learning; and encourage and create a community that values scholarship, integrity, respect, accountability, dignity, honor, compassion, character, and nobility. Violations of the Code will result in disciplinary action.

- **Rights and Responsibilities in Obtaining Disability Accommodations:**
  Students with disabilities may qualify for special academic accommodations. Students are encouraged to consult with the Office of Disability Services prior to the beginning of the semester to understand their rights and follow policies and procedures.

- **Definition of a Credit Hour**
  To ensure compliance with the federal and SACS definition a credit hour, the following examples are provided.
  
  o A 3-credit course requires three hours of classroom or direct faculty instruction and six hours of out-of-class student work for the equivalent of approximately 15 weeks. Out-of-class work may include but is not limited to: required reading; homework; studying for quizzes and exams; research; written assignments; and project design, simulation, testing and demonstration.

  o A 1-credit laboratory course requires 2.75 hours of classroom or direct faculty instruction and 2 hours of out-of-class student work each week for approximately fifteen weeks. Out-of-class work may include but is not limited to: required reading, library research, laboratory preparation, and preparing lab reports.

*May be modified to accommodate varying credit hours or instructor expectations.

**Textbook:** *Analog Filter Design*, M.E. Van Valkenburg, Oxford University Press

**Class Topics:**

The following topics will be investigated in detail:

- Bilinear Transfer Functions
- Cascade design using first-order circuits
- The Biquad circuit
- Butterworth Lowpass Filters
- Butterworth Bandpass Filters
- The Chebyshev response
- Sensitivity
- Frequency transformations
- Highpass and band-eliminate filters
- Topical research as proposed or assigned by instructor

Revised 05/06/14
OAA/mjw
(Existing Course – reference purposes only)

**ELET 4123 - Active Filters**

**Catalog Description:** The design, analysis, simulation and implementation of composite, cascaded and summation filters. Topics include: bilinear transfer functions; cascade design with first-order circuits; biquad circuits; Butterworth lowpass circuits; Butterworth bandpass circuits; the Chebyshev response; sensitivity; frequency transformations; highpass and band-elimination filters. Three (3) credit hours.

**Prerequisites:** ELET3113; ELET3222; ETGR2122 and ETGR2272 or MATH1242

**Course Outcomes:** Upon successful completion of this course, students will be able to:

- Design and analyze filters making use of bilinear transforms.
- Design active filters by cascading first-order circuits.
- Demonstrate an understanding of the design and analysis of active filters using the biquad circuit.
- Design filters having a lowpass Butterworth response.
- Design filters having a bandpass Butterworth response.
- Design lowpass and bandpass filters having a Chebyshev response.
- Perform sensitivity analysis upon a given active filter circuit.
- Make use of frequency transformation methods to convert prototype lowpass filters into highpass, bandpass or band-reject filters.

**Instructional Method:** This course will primarily be delivered via lecture.

**Means of Student Evaluation**: Students taking this course for graduate credit will be required to research and disseminate findings on areas of topical interest. Grades will be calculated as follows and a standard 10-point scale will be used for grade assignment:

- Two semester exams: 60%
- Final Exam: 30%
- Homework: 10%

* Grading policy may be modified by the instructor for each section of the course.

**University Policies and Information:** The following statements are provided to ensure compliance with federal regulations and SACS standards, as detailed in http://legal.uncc.edu/legal-topics/classroom-policies-and-practices/suggested-standard-syllabus-policies#disability.

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  weeks. Out-of-class work may include but is not limited to: required reading;
  homework; studying for quizzes and exams; research; written assignments; and
  project design, simulation, testing and demonstration.

  - A 1-credit laboratory course requires 2.75 hours of classroom or direct faculty
  instruction and 2 hours of out-of-class student work each week for approximately
  fifteen weeks. Out-of-class work may include but is not limited to: required
  reading, library research, laboratory preparation, and preparing lab reports.

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**Textbook:** *Analog Filter Design*, M.E. Van Valkenburg, Oxford University Press

**Class Topics:** The following topics will be investigated in detail:
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- The Biquad circuit
- Butterworth Lowpass Filters
- Butterworth Bandpass Filters
- The Chebyshev response
- Sensitivity
- Frequency transformations
- Highpass and band-eliminate filters
ELET 5152 - Digital Signal Processing

Catalog Description: Discrete-time signals; discrete-time systems; Linear constant-coefficient difference equations; Periodic sampling; reconstruction from samples; changing the sampling rate; the z-transform; z-transform properties; transform analysis of linear time-invariant systems; digital filter design techniques; discrete Fourier Transform and the FFT algorithm. Three (3) credit hours.

Prerequisite: ELET3113 or permission of department

Course Outcomes: Upon successful completion of this course, students will be able to:

- Explain the principles involved in the sampling of discrete-time systems.
- Make use of the basic network structures used for finite impulse response filter design.
- Design IIR filters based upon an existing analog design.
- Understand and make use of the z-transform in connection with digital signal processing.
- Understand the use of, and make use of, the DFT and the FFT in signal processing.

Instructional Method: This course will primarily be delivered via lecture, with graduate students responsible for additional independent study and dissemination.

Means of Student Evaluation*: Students taking this course for graduate credit will be required to research and disseminate findings on areas of topical interest. Grades will be calculated as follows and a standard 10-point scale will be used for grade assignment:

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  o A 1-credit laboratory course requires 2.75 hours of classroom or direct faculty instruction and 2 hours of out-of-class student work each week for approximately fifteen weeks. Out-of-class work may include but is not limited to: required reading, library research, laboratory preparation, and preparing lab reports.

*May be modified to accommodate varying credit hours or instructor expectations.


**Class Topics:** The following topics will be investigated in detail:

- Discrete-time signals and systems
- Sampling of continuous-time signals
- The Z-transform
- Structures for discrete-time systems
- Filter design techniques
- The discrete Fourier transform
(Existing Course – reference purposes only)
ELET 4152 - Digital Signal Processing

Catalog Description: Discrete-time signals; discrete-time systems; Linear constant-coefficient difference equations; Periodic sampling; reconstruction from samples; changing the sampling rate; the z-transform; z-transform properties; transform analysis of linear time-invariant systems; digital filter design techniques; discrete Fourier Transform and the FFT algorithm. Three (3) credit hours.

Prerequisite: ELET3113

Course Outcomes: Upon successful completion of this course, students will be able to:

- Explain the principles involved in the sampling of discrete-time systems.
- Make use of the basic network structures used for finite impulse response filter design.
- Design IIR filters based upon an existing analog design.
- Understand and make use of the z-transform in connection with digital signal processing.
- Understand the use of, and make use of, the DFT and the FFT in signal processing.

Instructional Method: This course will primarily be delivered via lecture, with graduate students responsible for additional independent study and dissemination.

Means of Student Evaluation*: Students taking this course for graduate credit will be required to research and disseminate findings on areas of topical interest. Grades will be calculated as follows and a standard 10-point scale will be used for grade assignment:

Two semester exams: 50%
Final Exam: 25%
Project: 15%
Homework: 10%

* Grading policy may be modified by the instructor for each section of the course.

University Policies and Information: The following statements are provided to ensure compliance with federal regulations and SACS standards, as detailed in http://legal.uncc.edu/legal-topics/classroom-policies-and-practices/suggested-standard-syllabus-policies#disability.

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  - A 1-credit laboratory course requires 2.75 hours of classroom or direct faculty instruction and 2 hours of out-of-class student work each week for approximately fifteen weeks. Out-of-class work may include but is not limited to: required reading, library research, laboratory preparation, and preparing lab reports.

  *May be modified to accommodate varying credit hours or instructor expectations.


**Class Topics:** The following topics will be investigated in detail:

- Discrete-time signals and systems
- Sampling of continuous-time signals
- The Z-transform
- Structures for discrete-time systems
- Filter design techniques
- The discrete Fourier transform
ENER 5000 – Special Topics

Catalog Description: Examination of specific new areas which are emerging in the various fields of engineering technology and/or construction management. The course builds upon the knowledge the students have gained from their engineering technology and/or construction management curriculum. (1-4 hours) May be repeated for credit.

Prerequisite: Graduate standing in Engineering Technology or Construction Management or permission of the department.

Course Outcomes: To be determined by instructor based on course topics.

Instructional Method: This course will primarily be delivered via lecture, with graduate students responsible for additional independent study and dissemination.

Means of Student Evaluation: Students taking this course for graduate credit will be required to research and disseminate findings on areas of topical interest in addition to undergraduate course requirements. Grade calculations will be determined by instructor based on course requirements.

University Policies and Information: The following statements are provided to ensure compliance with federal regulations and SACS standards, as detailed in http://legal.unc.edu/legal-topics/classroom-policies-and-practices/suggested-standard-syllabus-policies#disability.

- Code of Student Academic Integrity
  Students have the responsibility to know and observe the requirements of the UNC Charlotte Code of Student Academic Integrity. This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonestly. Students are expected to submit their own work, either as individuals or contributors to a group assignment. Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work. Violations of the Code will result in disciplinary action.

- Code of Student Responsibility
  Students are expected to uphold the University’s Code of Student Responsibility. The purpose of the Code is to protect the health, safety, welfare, and property of the campus community; foster the personal, social, and ethical development of members; provide an environment conducive to learning; and encourage and create a community that values scholarship, integrity, respect, accountability, dignity, honor, compassion, character, and nobility. Violations of the Code will result in disciplinary action.

- Rights and Responsibilities in Obtaining Disability Accommodations:
  Students with disabilities may qualify for special academic accommodations. Students are encouraged to consult with the Office of Disability Services prior to the beginning of the semester to understand their rights and follow policies and procedures.

- Definition of a Credit Hour
  To ensure compliance with the federal and SACS definition a credit hour, the following examples are provided.
- A 3-credit course requires three hours of classroom or direct faculty instruction and six hours of out-of-class student work for the equivalent of approximately 15 weeks. Out-of-class work may include but is not limited to: required reading; homework; studying for quizzes and exams; research; written assignments; and project design, simulation, testing and demonstration.

- A 1-credit laboratory course requires 2.75 hours of classroom or direct faculty instruction and 2 hours of out-of-class student work each week for approximately fifteen weeks. Out-of-class work may include but is not limited to: required reading, library research, laboratory preparation, and preparing lab reports.

*May be modified to accommodate varying credit hours or instructor expectations.

**Suggested Textbook:** To be determined by instructor based on course content

**Class Topics:** To be determined by instructor based on course content.
(Proposed syllabus submitted in separate proposal)

**ENER 4000 – Special Topics**

**Catalog Description:** Examination of specific new areas which are emerging in the various fields of engineering technology and/or construction management. The course builds upon the knowledge the students have gained from their engineering technology and/or construction management curriculum. (1-4 hours) *May be repeated for credit.*

**Prerequisite:** Senior standing in Engineering Technology or Construction Management or permission of the department.

**Course Outcomes:** To be determined by instructor based on course topics.

**Instructional Method:** This course will primarily be delivered via lecture, with graduate students responsible for additional independent study and dissemination.

**Means of Student Evaluation:** Students taking this course for graduate credit will be required to research and disseminate findings on areas of topical interest in addition to undergraduate course requirements. Grade calculations will be determined by instructor based on course requirements.

**University Policies and Information:** The following statements are provided to ensure compliance with federal regulations and SACS standards, as detailed in http://legal.uncc.edu/legal-topics/classroom-policies-and-practices/suggested-standard-syllabus-policies#disability.

- **Code of Student Academic Integrity**
  Students have the responsibility to know and observe the requirements of the UNC Charlotte Code of Student Academic Integrity. This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty. Students are expected to submit their own work, either as individuals or contributors to a group assignment. Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work. Violations of the Code will result in disciplinary action.

- **Code of Student Responsibility**
  Students are expected to uphold the University’s Code of Student Responsibility. The purpose of the Code is to protect the health, safety, welfare, and property of the campus community; foster the personal, social, and ethical development of members; provide an environment conducive to learning; and encourage and create a community that values scholarship, integrity, respect, accountability, dignity, honor, compassion, character, and nobility. Violations of the Code will result in disciplinary action.

- **Rights and Responsibilities in Obtaining Disability Accommodations:**
  Students with disabilities may qualify for special academic accommodations. Students are encouraged to consult with the Office of Disability Services prior to the beginning of the semester to understand their rights and follow policies and procedures.

- **Definition of a Credit Hour**

Revised 05/06/14
OAA/mjw
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*May be modified to accommodate varying credit hours or instructor expectations.

**Suggested Textbook:** To be determined by instructor based on course content

**Class Topics:** To be determined by instructor based on course content.
Appendix 3: Proposed Catalog Copy

**ELET 5123 - Active Filters (3)** Prerequisites: ELET3113; ELET3222; ETGR2122 and ETGR2272 or MATH1242. The design, analysis, simulation and implementation of composite, cascaded and summation filters. Topics include: bilinear transfer functions; cascade design with first-order circuits; biquad circuits; Butterworth lowpass circuits; Butterworth bandpass circuits; the Chebyshev response; sensitivity; frequency transformations; highpass and band-elimination filters.

**ELET 5152 – Digital Signal Processing (3)** Prerequisite: ELET3113 or permission of department. Discrete-time signals; discrete-time systems; Linear constant-coefficient difference equations; Periodic sampling; reconstruction from samples; changing the sampling rate; the z-transform; z-transform properties; transform analysis of linear time-invariant systems; digital filter design techniques; discrete Fourier Transform and the FFT algorithm.

**ENER 5000 – Special Topics (1 – 4)** Graduate standing in Engineering Technology or Construction Management or permission of the department Examination of specific new areas which are emerging in the various fields of engineering technology and/or construction management. The course builds upon the knowledge the students have gained from their engineering technology and/or construction management curriculum. *May be repeated for credit.*