

**UCC/UGC/ECCC**

Proposal for New Course

***Please attach proposed Syllabus in*** [***approved university format***](http://www4.nau.edu/avpaa/UCCForms/syllabus.doc)***.***

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Course subject and number: | **EE 286** | 2. Units: | **3** |

[**See upper and lower division undergraduate course definitions.**](http://www4.nau.edu/avpaa/UCCPolicy/Uplow.doc)

|  |  |  |  |
| --- | --- | --- | --- |
| 3. College: | **CEFNS** | 4. Academic Unit: | **Electrical Engineering & Computer Science** |

5**.** Student Learning Outcomes of the new course. *(*[*Resources & Examples for Developing Course Learning Outcomes*](http://www4.nau.edu/avpaa/Assessment/CourseLearningOutcomesPDF_090712.pdf)*)*

|  |  |
| --- | --- |
| **1** | **Apply the design process to a design problem** |
| **2** | **Work effectively in a team with a diverse group of people.** |
| **3** | **Communicate effectively orally** |
| **4** | **Communicate effectively in writing** |
| **5** | **Apply technical knowledge to a realistic design project** |
| **6** | **Relate a broad education and contemporary issues to engineering solutions and express the interactions of global and societal events and engineering** |

6. Justification for new course, including how the course contributes to degree program outcomes, or other university requirements / student learning outcomes. *(*[*Resources, Examples & Tools for Developing Effective Program Student Learning Outcomes*](http://www4.nau.edu/avpaa/Assessment/ProgramLearningOutcomesPDF_090712.pdf)*).*

**A general engineering course, EGR 286, has been in our curriculum as part of the Design4Practice program for over 15 years. A few years ago, we began transitioning this course to the departments and CENE 286 was the first course to accomplish this. At the same time, we transitioned the junior level course from the departments to serve as the interdisciplinary course (EE 386W was replaced by EGR 386W). Now ME 286 and EE 286 are being created to replace EGR 286 in the curriculum, to maintain the integrity of the Design4Practice sequence of project-based design courses. The content of the new course will be tailored more to electrical engineering students and to satisfy certain required learning outcomes mandated by our accreditation body. All six student learning outcomes are important to nine of the thirteen program outcomes, because project-based courses demonstrate student learning very well.**

|  |  |  |
| --- | --- | --- |
| 7. Effective **BEGINNING** of what term and year? | **Fall 2015** |  |
| [**See effective dates calendar**](http://www4.nau.edu/avpaa/timelines/1314Effective.xls)**.** |  |  |

|  |  |
| --- | --- |
| 8.  Long course title: | **ELECTRICAL ENGINEERING DESIGN: THE PROCESS** |
| *(max 100 characters including spaces)* | |

|  |  |
| --- | --- |
| 9. Short course title: | **EE DESIGN: THE PROCESS** |
| *(max. 30 characters including spaces)* | |

10. Catalog course description *(max. 60 words, excluding requisites):*

**The process of engineering design. Teamwork, project management, societal impact, and written and oral communications. Letter grade only. Course fee required.**

11. Will this course be part of any plan (major, minor or certificate) or sub plan (emphasis)?

                                                                                                                                    Yes  No

If yes, include the appropriate plan proposal.

**Electrical Engineering; B.S.E.**

12. Does this course duplicate content of existing courses? Yes  No

If yes, list the courses with duplicate material. If the duplication is greater than 20%, explain why NAU should establish this course.

**The existing course outside our department, EGR 286, will no longer be taught by the Design4Practice faculty for the electrical engineering majors. Changes need to be made to incorporate additional learning outcomes.**

13. Will this course impact any other academic unit’s enrollment or plan(s)?              Yes  No

      If yes, describe the impact. If applicable, include evidence of notification to and/or response from

each impacted academic unit

14. Grading option:      Letter grade Pass/Fail Both

|  |  |  |  |
| --- | --- | --- | --- |
| 15. Co-convened with: |  | 14a. UGC approval date\*: |  |
| (For example: ESE 450 and ESE 550) [See co-convening policy](http://www4.nau.edu/avpaa/UCCPolicy/crosslist.doc).  \*Must be approved by UGC before UCC submission, and both course syllabi must be presented. | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 16. Cross-listed with: |  | | |  | | | | |
| (For example: ES 450 and DIS 450) [See cross listing policy](http://www4.nau.edu/avpaa/UCCPolicy/crosslist.doc).        Please submit a single cross-listed syllabus that will be used for all cross-listed courses. | | | | | | | | |
| 17. May course be repeated for additional units? | | |  | | | Yes     No | | |
| 16a. If yes, maximum units allowed? | |  | | |  | | | |
| 16b. If yes, may course be repeated for additional units in the same term? | | | | | | |  | Yes     No |

|  |  |  |
| --- | --- | --- |
| 18. Prerequisites: | **EGR 186, CS 122, EE 188 and EE 188L with grades of C or better** |  |

If prerequisites, include the rationale for the prerequisites.

**This is a project-based course that uses knowledge from the introductory design course, EGR 186, the introductory computer programming class, CS 122, and the introductory linear circuits class and laboratory, EE 188 and EE 188L. In order to be successful, students will be using the design knowledge and teamwork learned in EGR 186, the programming knowledge of CS 122 and the circuit design knowledge and equipment use skills of EE 188 and EE 188L.**

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| --- | --- | --- |
| 19. Co requisites: |  |  |

If co requisites, include the rationale for the co requisites.

20. Does this course include combined lecture and lab components?                   Yes  No

If yes, include the units specific to each component in the course description above.

|  |  |
| --- | --- |
| 21. Names of the current faculty qualified to teach this course: | **All EE faculty** |

**Answer 22-23 for UCC/ECCC only:**

22. Is this course being proposed for Liberal Studies designation?             Yes  No

       If yes, include a [Liberal Studies proposal](http://www2.nau.edu/~d-ugstdy/_source/docs/LS_Proposal_form.doc) and syllabus with this proposal.

23. Is this course being proposed for Diversity designation?Yes    No

       If yes, include a [Diversity proposal](http://www4.nau.edu/avpaa/EthDiv/Divform2010.doc) and syllabus with this proposal.

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| --- | --- |
| **FLAGSTAFF MOUNTAIN CAMPUS** |  |
| **Scott Galland** | **04/23/2014** |
| Reviewed by Curriculum Process Associate | Date |
|  |  |
| **Approvals**: |  |
|  |  |
| Department Chair/Unit Head (if appropriate) | Date |
|  |  |
| Chair of college curriculum committee | Date |
|  |  |
| Dean of college | Date |
|  |  |
| **For Committee use only:** |  |
|  |  |
| UCC/UGC Approval | Date |

Approved as submitted: Yes  No

Approved as modified: Yes  No

|  |  |
| --- | --- |
| **EXTENDED CAMPUSES** |  |
|  |  |
| Reviewed by Curriculum Process Associate | Date |
|  |  |
| **Approvals:** |  |
|  | |
| Academic Unit Head | Date |
|  | |
| Division Curriculum Committee (Yuma, Yavapai, or Personalized Learning) | Date |
|  | |
| Division Administrator in Extended Campuses (Yuma, Yavapai, or Personalized Learning) | Date |
|  | |
| Faculty Chair of Extended Campuses Curriculum Committee (Yuma, Yavapai, or Personalized Learning) | Date |
|  | |
| Chief Academic Officer; Extended Campuses (or Designee) | Date |
|  |  |

Approved as submitted: Yes  No

Approved as modified: Yes  No



***Department of Electrical Engineering & Computer Science***

**EE 286 Proposed Course Syllabus**

Fall 2015

**General Information**

Course Title: Electrical Engineering Design: The Process

Semester and Sequence Number: Fall 2015, #

Credits: 3 credit hour lecture

Class Meeting Time and Location:  12:45-2:00pm TTH in room 234  
Instructor:   David R. Scott, office in room 258 of Engineering

Email: [David.Scott@nau.edu](mailto:David.Scott@nau.edu)

Office Hours: Posted outside my office

**Catalog Description**

The process of engineering design. Teamwork, project management, societal impact, and written and oral communications. Letter grade only. Course fee required.   
  
**Course Description**

The EE design process class guides students through the basic elements of design with particular focus on the knowledge and skills needed. In EE 286, students are guided through the design process to develop a solution to engineering problem(s), using project management and teams along with other smaller assignments as detailed in the grading section of this syllabus. Material is delivered just in time for the design projects.  
  
**Prerequisites:** (EGR 186, CS 122, EE 188 and EE 188L) with grades of C or better

**Textbook:** *Design for Electrical and Computer Engineers –Theory, Concepts and Practice* by Ralph M. Ford and Chris S. Coulston , McGraw Hill, 2008, ISBN: 978-0-07-338035-3

**Course learning outcomes in relation to ABET program learning outcomes:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Course Learning Outcomes** | **Program Learning Outcomes** | | | | | | | | |
| 1 | Apply the design process to a design problem |  |  | 4 |  |  |  |  |  |  |
| 2 | Work effectively in a team with a diverse group of people. |  |  |  | 5 |  |  |  |  |  |
| 3 | Communicate effectively orally |  |  |  |  |  | 8 |  |  |  |
| 4 | Communicate effectively in writing |  |  |  |  |  |  | 9 |  |  |
| 5 | Apply technical knowledge to a realistic design project | 1 | 3 |  |  | 6 |  |  |  | 13 |
| 6 | Relate a broad education and contemporary issues to engineering solutions and express the interactions of global and societal events and engineering |  |  |  |  |  |  |  | 10 |  |

Program Learning Outcomes referenced in the above table

1. **Apply knowledge of physics and mathematics, including calculus, linear algebra, complex variables and differential equations**
2. Apply knowledge of probability, statistics and transform methods
3. **Construct and test hypotheses about system behavior by designing and conducting engineering experiments and analyzing and interpreting data and information**
4. **Employ professional skills and knowledge of the engineering design process within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability**
5. **Function effectively in diverse disciplinary and multi-disciplinary teams**
6. **Identify engineering problems, formulate descriptive models, and create, evaluate and synthesize solution**
7. Demonstrate knowledge of ethical theories and codes and their application to professional engineering responsibility
8. **Demonstrate effective oral communication skills**
9. **Demonstrate effective written communication skills**
10. **Relate a broad education and contemporary issues to engineering solutions and express the interactions of global and societal events and engineering**
11. Demonstrate global cultural competency
12. Demonstrate the motivation and skills needed for life-long learning
13. **Demonstrate the ability to apply techniques, skills and engineering tools necessary for engineering practice**

**Course learning activities in relation to course learning outcomes:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Learning Activities** | **Course Learning Outcomes** | | | | | |
| 1 | Teaming/Conflict Resolution Assignment(s) |  | 2 | 3 |  |  |  |
| 2 | Societal impacts Assignments |  |  | 3 | 4 | 5 | 6 |
| 4 | Form teams, create bylaws, project management, logbooks/activity reports | 1 | 2 | 3 |  |  |  |
| 5 | Design process and projects | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | Oral presentations |  |  |  | 4 |  |  |
| 7 | Utilize design, simulation and programming tools in the design process. | 1 |  |  |  | 5 |  |
| 8 | Utilize knowledge of mathematics, circuits, physics, etc. in the design process | 1 |  |  |  | 5 |  |
| 9 | Peer evaluations |  | 2 |  | 4 |  |  |
| 10 | Write a final exam to demonstrate your learning |  |  | 3 |  |  |  |

**Basic Curriculum Category:** Engineering Design (100%)

**Assessment of Student Learning**

**Methods of Assessment:** Assessment of individual students' achievement of this course's learning outcomes/objectives is done via contribution to team projects (meeting deliverables, status reports and peer evaluations), individual and team assignments, and a final exam.

**Team Design Projects:**  As noted in the course structure description above, much of the work and learning in the class will be done in teams and will be focused towards design projects. Each project will be assigned various team grades per the key elements of each project. The projects grades will be typically weighted as 15% design tools, 15% software, 30% demonstration, and 30% reporting. Some projects may have different weighting schemes.

An individual’s project grade will be a function of the team’s grade, but modified by a peer and instructor evaluation. This peer and instructor modification is intended to hold each individual accountable to the team and the team’s performance on the specified project deliverables. Students will be penalized on a per project basis for failure to submit peer evaluations.

**Individual Assignments:** Will be done and graded individually; includes societal impact assignment, conflict resolution assignment, and other assignments as deemed appropriate by the instructors.

**Logbook or Activity Report:** Will be kept or completed by each student. The logbook or activity report is a record of the progress of your design and your contributions. It should contain research, your activity, sketches, flowcharts/pseudo code, etc. that record the progress and direction of your design.

**Final Exam:** The final exam consists of an individual written report that summarizes the learning (topic, what was taught, what was learned, problems encountered), an analytical critique of the course's content, methods of delivery of material and general success in achieving the desired outcomes, plus an analytical/computational section. The final exam is prepared outside of class and is due at the END of the scheduled final exam time/date.

**Timeline for Assessment:** All individual assignments and project due dates will be explicitly stated. Late work will not be accepted without prior notification and appropriate excuse.

**Grading System:** Individual grades will be based upon both individual metrics and group metrics; each project has both individual and group components in addition to peer evaluations. Each major activity contributes to a student’s overall grade as follows:

|  |  |  |
| --- | --- | --- |
| **Graded Items** | **Percentage** | **Points** |
| Individual and Team assignments | 15% | 150 |
| Logbook/Activity Reports | 10% | 100 |
| Impacts presentation (individual) | 10% | 100 |
| Team Design Project(s) | 30% | 300 |
| Team Design Final Project | 20% | 200 |
| Individual Final Exam | 15% | 150 |

Your grade will be based upon a point scoring system outlined in the table above. Grade cutoffs will be no higher than 90% for an A, 80% for a B, 70% for a C and 60% for a D.

**Class Schedule:**

Due dates for assignments will be set during the semester.

|  |  |
| --- | --- |
| Week 1 | Introductions, policies, design process |
| Week 2 | Societal impacts |
| Week 3 | Teaming and conflict resolution |
| Week 4 | Project Management |
| Week 5 | Societal impacts individual presentations |
| Week 6 | Team design project #1, tools and activities |
| Week 7 | Team design project #1, tools and activities |
| Week 8 | Team design project #1 presentations |
| Week 9 | Team design project #2 |
| Week 10 | Team design project #2 |
| Week 11 | Team design project #2 |
| Week 12 | Team design project #3 |
| Week 13 | Team design project #3 |
| Week 14 | Team design project #3 |
| Week 15 | Team design project presentations |
| Week 16 | Final Exam |

**Course Policies**

**Attendance:** Attending class is MANDATORY and attendance will be factored into the instructor evaluation of student’s contribution on the team project grade. Each student must participate in the completion of ALL projects ON TIME in order to receive a passing grade; a failing grade will result should any deliverable not be met without prior excuse from the instructor.

**Class Participation:**

If you cannot attend class, you must notify the instructor before class (by phone (523-3162) or by email (David.Scott@nau.edu)) to be exempted from that day’s activities without penalty. Poor attendance in class and/or in team meetings will affect your grade via the peer and instructor evaluations.

**Class Etiquette:**

Be on time for the start of class and appointments outside of class. Apologize if you were late. Do not leave class early, except in an emergency or with prior permission from the instructor. If you know you have to leave early, sit by the door and try not to disturb the class when you leave. Be an active participant in class by following along, taking notes, thinking, asking and responding to questions and contributing to collaborative activities. If you have a cell phone or beeper, please turn it to silent mode. You should not make calls during class.  You should not speak or text message in the classroom when other groups are present. In an emergency or if you and your team agree to take a short break, you may make short phone calls outside the classroom so that you do not distract others who are working.

**Honesty:**

Choose high ethical standards because you are an engineering professional in training. Inform me (anonymously is fine) of any dishonest behavior so I can take appropriate steps to ensure fairness to the class.

**Emergency Evacuation:**

In the event of an emergency, leave your books and put on your coat and quickly leave the building by the nearest exit. Meet for further instructions in front of the Engineering building near the nose sculpture. If you may have difficulty evacuating the building, let your instructor know so that you can receive assistance. Follow the instructions of floor monitors wearing orange vests or of fire department personnel.

**University Policies:**

The Safe Environment, Students with Disabilities, Institutional Review Board, Academic Integrity, Academic Contact Hour, Classroom Management and Professional Ethics and Code of Conduct policies are available at <http://www4.nau.edu/avpaa/policy1.html>