

University of Central Florida  
Department of Electrical Engineering & Computer Science

EEL 4914C

Fall 2014

**Senior Design I**

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Office Hours: TR 8:00-9:00 AM, 11:00AM-12:00 PM  
F 8:00-9:00 AM

Text: SENIOR DESIGN FOR ELECTRICAL AND COMPUTER ENGINEERINGS STUDENTS,  
Pearson Custom Publishing

Software: Varies by Project, Circuit Simulation Software, Schematic Capture Software,  
PCB Software

Catalog: PR: EEE 3307C, EEL 4742C, and consent of Department of EECS. Applications of engineering design to realistic and meaningful problems. Constraints such as economic factors, safety, reliability, aesthetics, ethics, social impact and engineering organizations are considered.

Resources: Internet based, Library, and faculty, mentor, or peer consultations

Credits: 3 hours total, 3 hours lecture and 0 hours laboratory

Computer Usage: This course requires the use of simulation, schematic capture and PCB layout software.

Attendance in class is required. Assignments are due when collected by the instructor. All or only a part of the collected homework may be graded. All exams are mandatory. The final grade will be based on your performance on attendance, exam performance, presentation performance, and final project documentation. In addition failure to comply with course requirements or expectations may result in the lower grade as determined to be appropriate by the instructor.

Any act of academic dishonesty or unprofessional behavior will result in a failing grade on an exam or in the course.

As of Fall 2014, all faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the following academic activity by the end of the first week of classes or as soon as possible after adding the course, but no later than August 27th. Failure to do so may result in a delay in the disbursement of your financial aid. **The assignment to satisfy this requirement is for all students to submit a written description of an idea for a senior design project on or before 9:00 AM Tuesday August 26th, 2014.**

## **EEL 4914C - Preliminary Course Information**

The EEL 4914C and EEL 4915L - Senior Design courses are intended to serve as capstone courses for the Electrical and Computer Engineering Bachelor of Science Degree. The courses provide the opportunity to practice the engineering skills which you have accumulated to date and to learn certain concepts in engineering practice. In EEL 4914C issues of engineering design and management are presented along with discussions of ethics in engineering. Topics of the course lecture include engineering economics, the history of engineering education, engineering management, and engineering research. An engineering design project is jointly agreed upon by the instructor and a student team. The student team studies the problem, develops design alternatives and selects an approach which can be implemented. The design prototype is then completed in EEL 4915L by performing the necessary parts acquisition, circuit hardware realization, and debugging. Once completed the students present the project design and prototype to a faculty review committee for evaluation.

These courses subject the students to an environment unlike the majority of their previous curriculum. Aspects of engineering design not found in classroom academic discussions are encountered. The need to assign responsibilities to team members and to rely on other individuals to perform necessary work for successful completion of team goals is encountered. These and other aspects of team member interactions are often cited as a valuable course experience.

The requirement to succeed to the point of a functioning prototype implies the need to go beyond the circuit prototyping experiences which are common to previous electronics laboratories. The skills necessary for soldering, printed circuit board manufacturing, and wire wrapping are just a few of the prototyping needs which are encountered. These skills along with the knowledge required for efficient component identification and acquisition are learned as a necessity for successful design completion.

This course manual provides many of the details of the Senior Electrical Design course requirements and course format. Discussions of the required course documents are included. Additionally, appendices for tips and techniques for circuit prototyping are added.

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<b>Catalog Data</b>	<p>EEL 4914C Senior Design 3(3,0): Applications of engineering design to realistic and meaningful problems.</p> <p><b>NOTE: All prerequisites will be strictly enforced. Students not having the required prerequisites will be dropped.</b></p>
<b>Objectives</b>	<p>To provide students a complete design experience, including the necessity to set design goals and objectives, integrate knowledge, exercise engineering judgement, plan to meet a budget and a schedule, to work as a team member, and to communicate in writing.</p>
<b>Outcomes</b>	<p>This class is a required course for electrical and computer engineering students and serves as the first part of the capstone design course sequence for all BSEE and BSCpE students. The course goals are to enable students to:</p> <ul style="list-style-type: none"><li>- Engineering Education and the Engineering Profession</li><li>- Engineering Management Fundamentals</li><li>- Knowledge of Product Life Cycles, Research and Development, and Intellectual Property</li><li>- Knowledge of Engineering Economics</li><li>- Fundamental of Engineering Ethics</li><li>- Knowledge of the Engineering Design Process, Engineering Teamwork and Project Documentation</li></ul>
<b>Topics</b>	<ul style="list-style-type: none"><li>- Introduction</li><li>- The Engineering Design Process</li><li>- The History of Engineering Education</li><li>- The Engineering Profession</li><li>- Engineering Management</li><li>- Engineering Research and Development</li><li>- Intellectual Property Protection</li><li>- Creativity</li><li>- Engineering Economics</li><li>- Engineering Ethics</li><li>- Engineering Documentation</li></ul>
<b>Prerequisites by topic</b>	<p>Varies according to the type of project chosen. The student's background will be reviewed individually to determine if they have the necessary academic background for their proposed project.</p>
<b>Textbook</b>	<p>Prentice-Hall Senior Design Package.</p>
<b>References</b>	<p>Depends upon the group's project. Consultation with appropriate faculty and professionals is encouraged. Consider all your sources for information.</p>
<b>Course Content</b>	<p>Engineering Science: 0 credit hours (0%) Engineering Design: 3 credit hours (100%)</p>
<b>Homework</b>	<p>There may be regular homework assignments. Special assignments as appropriate will be made.</p>

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**Computer Usage** There will be no specific computer assignments. However, word processing is required for all documentation. Most projects will utilize computer simulation during the design, while other projects may be based on embedded control, the use of a personal computer, or single board computer applications where software and/or hardware development will be required.

**Exams** There will be two exams.

**Project Topics** Projects can be in any area of electrical and computer engineering but are subject to the instructor's approval. The instructor may propose some projects, however, it is the student's responsibility to find a suitable project. All projects must be physically realized, documented, and demonstrated at the end of the term.

**Project Teams** Each project will be designed and implemented by a project team or group with a size restricted to only groups of three or four members. The instructor may assist in the formation of the teams, but you are encouraged to form your own working teams. If necessary the instructor may dictate the group members.

**Expenses** The Department of Electrical Engineering and Computer Science will not provide project parts beyond what is available in school laboratories. The cost of the project may be exclusively yours, exclusively your sponsor's, or may be shared. The most common case is that the project is funded by the student group or by a sponsoring group, agency, or corporation.

NOTE: If project expenses are paid in part or in whole by the EECS Dept., then the project becomes the property of the school and it must remain at UCF.

**Proposals** By the end of the third week, students should submit a project description indicating the group members, and a preliminary project idea or area of interest. Evaluation and acceptance of the project topic will take place during the fourth week. By the end of the first semester, a complete design of the project should be submitted. The format of the design documentation will be provided later. It should be a complete document including the proposed design and implementation of your project. All details necessary to begin the final prototype should be included.

**Final Documentation** The required final documentation consists of a formal technical document consisting of research, design, theory of operation, construction and testing.

**Laboratory** No formal laboratory work is required. However, virtually all projects require hardware prototyping which will include construction and testing. Laboratory space and facilities will be available for this purpose.

In order to protect project installations, only students that are registered in the class will be allowed in the lab. You can work in the laboratory during non-business hours and on weekends by using your college keycards, and if needed requesting entry to the engineering building from the UCF Police Department. Identification will be required. Due to the policy stated below, the police will not provide entry to a single student. A minimum of two students are required when working in the laboratory.

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**WARNING** University policy requires that for safety reasons, at least two people must be present in the laboratory premises at any time. Violators will be asked to leave the laboratory premises. Since it is not possible to police this policy at all times, violators will be working entirely at their own risk.

**Status Reports** When required by the instructor, each group will submit a weekly report showing the progress accomplished during the preceding week and the plans for the coming week. A report format will be furnished.

**In-Class Presentations** During the course of the two semester each group will make at least two presentations to the rest of the class during normal lecture or laboratory hours. This will serve as a critical design review for your project. The schedule for these presentations will be set just prior to this time.

**Consultations** Consulting on each project will be available either from the course instructor or from any other ECE Department faculty member who has expertise on the subject of your project. Appointments should be for consultation times.

**Grading** EEL4914

Initial Documentation  
Midterm Exam  
Final Exam  
Final Documentation  
Attendance

All elements, with the exception of the final document in EEL4914, are treated as content in which the student must demonstrate mastery of the material. No grades are assigned, only indications of completion are recorded. If a student fails to demonstrate competency on an assignment, the assignment must be repeating until mastered. All required elements of the course must be mastered in order to receive a passing final grade.

All course elements are evaluated by the course instructor. Usually all team members are awarded the same grade, however under certain circumstances team members may receive different grades. In cases where group members do not adequately contribute to the project, members may be dropped from the group and those students will receive a grade of F for the course.

**Important Warning** **The grading in the EEL4915 course requires that your prototype work as specified. Failure to meet this requirement will result in a grade of F or I depending upon the circumstances as dictated by the course instructor.**