Spring 2017
EE/COMPE490: SENIOR CAPSTONE DESIGN
Number of units: 4
Course Syllabus

1. Instructor:  John Kennedy
E101-C
Ph. 619-594-1053
Web:  www.seniordesignlab.com
Email: kennedy.sdsu@gmail.com
Office Hours: Thursday (10:30 - 11:30)
Support Session: EE397 Tuesday (11:00 - 11:50) E101-F

2. Prerequisites:

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<tr>
<th>Electrical Engineering</th>
<th>Computer Engineering</th>
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<tr>
<td>COMPE375</td>
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<td>EE330L</td>
<td>COMPE470L</td>
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<td>EE410</td>
<td>EE330L</td>
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<td>EE430</td>
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3. Class Time:
Lecture: Tuesday and Thursday: (9:30AM – 10:20AM) SH109

Labs:  
SCH#21147 - Monday: (9:00am – 11:40am) Rm. E217
SCH#21150 - Monday: (1:00pm – 3:40pm) Rm. E217
SCH#21148 - Tuesday: (12:30pm – 3:10pm) Rm. E217
SCH#21149 - Thursday: (12:30pm – 3:10pm) Rm. E217

4. Text and Materials:

1. Salt and Rothery:  (Minimum of one copy of text per group)
   Design for Electrical and Computer Engineers,
   John Wiley & Sons, 2002
   ISBN: 0471391468 (Amazon used around $10)

2. Engineering Notebook:  (Required for each student)
   Suggested Type-  75 Sheets, 4x4 Quad., 11 ¾” x 9 ¼”
   National Brand part # 43-648 (Available in the SDSU Book Store)

3. Solderless BreadBoard:  (Required for each student)
   Recommend 830 Tie Points, 4 bus or larger (less than $10)

4. PIC Microcontroller Programmer / Debugger (Optional - available in Lab)
   PICkit 3-  part # PG164130  from Microchip [25% off while in school]
5. **Purpose of this Course:** To provide students with a capstone design experience.

   *At the completion of the course, each student will have:*

   a) actively participated as a member of a design team and made significant contributions to achieving the team’s goals and objectives.

   b) demonstrated individual competence in designing and building an embedded system involving a microprocessor, a sensor and a feedback element.

   c) an understanding of ethical and professional issues faced by engineers.

   d) learned how to prepare an engineering design proposal with clear statements of specifications, design criteria and deliverables.

   e) participated in several individual and group oral presentations.

   f) prepared well-organized written reports both for individual and team design projects.

   g) understand the benefits and the problems of associated with working on an engineering design team.

   h) been exposed to contemporary engineering issues.

6. **Course Format:**

   The course is divided into three parts:

   a) Team based engineering design project.

   b) Individual design project in a scheduled lab (mini-project).

   c) Regularly scheduled lecture class covering a variety of topics.

7. **Class Schedule:**

   First 8 weeks: Formation of design teams, Formulation of projects and project plans, Completion of individual lab projects.

   Last 8 weeks: Focus on team design project Oral and written presentations.
8. **Team Composition:**

   a) Teams will be formed by the instructor during the first Lab meeting.
   
   b) Teams will typically consist of 4-6 members.
   
   c) Teams exist for the entire semester.
   
   d) Teams should have a combination of EE and COMPE students.

9. **Responsibilities of the Team Members:**

   *Individual Design Tasks:* Each team member will actively participate in the design and construction of the project. Which includes the following activities:

   a) Actively participate in the weekly team meetings.
   
   b) Provide technical information for the team web site.
   
   c) Supply text and technical illustrations for power point presentations.
   
   d) Prepare an individual contribution for the final report.

   *Individual Non-design Tasks:* Apart from the team design project responsibilities, each team member will be in charge of coordinating a specific non-design activity. They are:

   a) Project management (MS Project)
   
   b) Editor of the reports
   
   c) Parts Manager (Coordinate ordering parts, budget etc…)
   
   d) Presentation coordinator (PowerPoint, presentation rehearsal coordination)
   
   e) Web page design
   
   f) Repository manager
   
   g) Technical illustration specialist
   
   h) Secretary (Team meeting notes, weekly report submission)
10. **Professional Growth:**

Each student is responsible for participating in a minimum of two professional growth seminars throughout the semester. This requirement may be satisfied by attending the SDSU IEEE meetings or any other professional Engineering society meetings. A one paragraph synopsis of the topic covered in the meeting must be submitted to receive credit.

11. **Individual Responsibilities:**

*Individual Lab Design projects (mini-project):*

Every student in the class will be required to complete these projects in the laboratory. The lab projects must be completed in the order given since the individual labs are the building blocks for the complete mini-project. Once completed the project must be demonstrated to verify proper operation and a lab report will be submitted. All the lab projects must be completed by the end of 8th week by every student to obtain full credit. The mini-project must be completed in order to receive a grade in the class.

- **Week 3:** Sensor Evaluation and Testing
- **Week 4:** Sensor Amplifiers (Instrumentation Amplifiers)
- **Week 5:** Microcontrollers – Configuration of Development Environment
- **Week 6:** Microcontrollers – Timers and Interrupts
- **Week 7:** Microcontrollers – ADC and PWM
- **Week 8:** Embedded control system to meet specifications

*Participation in Lecture class:*

Attendance is required (Part of the grade depends on class participation)

Topics to be discussed during the lecture class:

a) System design and the design process.

b) Project management

c) Understanding data sheets and manufacturers’ application notes.

d) Microcontroller selection, interfacing and programming.

e) Engineering ethics and green systems

g) Prototyping of electronic circuits

h) Schematic capture and printed circuit board (PCB) design.
12. **Grading:**

The approximate grading for the course is as follows:

- 40% Design Project, Documentation and Design Day Presentation
- 20% Individual Lab projects (Mini-Project)
- 15% Attendance and Participation in class and team meetings
- 15% Oral presentations during the semester
- 5% Ethics and Professionalism (Ethics and Professional Growth reports)
- 5% Peer Evaluation

13. **Tentative schedule of deliverables throughout the semester:**

- ✓ Mar. 2, Thursday: Design Project Proposals
- ✓ Mar. 9 - 16: Oral presentation #1 (Oral Project Proposal)
- ✓ Mar. 23, Thursday: Mini-Project Demo and Report deadline
- ✓ Apr. 4, Friday: Preliminary Website online
- ✓ Apr. 4 - 11: Oral presentation #2 (Oral Progress Report)
- ✓ Apr. 20, Thursday: Engineering Ethics Report due
- ✓ Apr. 20 - 27: Practice Final Oral Presentation
- ✓ May 1, Monday: Final Website online to be graded
- ✓ May 2, Tuesday: Final Oral Presentations
- ✓ May 3, Wednesday: Design Day 1:30 - 3:30 Aztec Student Union Center
- ✓ May 4, Thursday: Peer Review
- ✓ May 4, Thursday: Payload Delivery Challenge 1PM
- ✓ May 11, Thursday: Final Report is due by 4PM