ECET/CPET 491 Senior Design Project Phase II - Course Description (2 cr hours)
P: 490. Phase II includes, but is not limited to: (1) continued research and finalized design, (2) oral presentation to faculty and other interested parties, (3) standard-format written technical report.

Instructor Information:

Paul Lin, P.E. (EE)
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Course Web site: www.etcs.ipfw.edu/~lin
Office Hours:
• Monday     3:00PM - 6:00 PM
• Wednesday   3:00PM - 6:00 PM
• Thursday    4:00PM - 6:00 PM
• Other weekday hours – by appointment

<table>
<thead>
<tr>
<th>Class Meeting Dates/Time</th>
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<tbody>
<tr>
<td>Monday 7:30-8:45 PM (ET 346)</td>
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<tr>
<td>January 13, 20* (Martin Luther King Jr. Holiday), 27</td>
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<td>February 3, 10, 17, 24</td>
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<td>March 3, 10* (Spring break), 17, 24, 31</td>
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<td>April, 7, 14, 21, 28</td>
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<tr>
<td>May 2 (Friday) 8:00 AM - 2PM - Senior Design Presentations</td>
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Important Dates:
January 20 – Labor Day Holiday
March 10-14 – Class suspended (Spring Break)

Recommended Text Books

Grading Policy: (No late reports will be accepted)
Project Design (meeting & discussion, communications, project-specific technical details, knowledge and abilities, reports, etc) 50%
Project Implementation/Operation (reports) 20%
Oral Presentation 10%
Final Report 20%

* Purdue University's new grading scale with + and – will not be used.
ECET/CPET 491 Course Outcomes:

Each student must demonstrate that he/she has successfully fulfills the following CPET/ECET 491 course requirements:

1. Use of knowledge and skills:
   1.1 Prototype product and assembly drawings (ETAC/ABET, Criterion 3 item a1)
   1.2 System architecture/subsystem/PCB circuit layout and drawings (ETAC/ABET, Criterion 3 item a2)
   1.3 Use of modeling/simulation (MATLAB, Multisim, etc.) techniques (ETAC/ABET, Criterion 3 item a3)
   1.4 Use of project management tools (ETAC/ABET, Criterion 3 item a4)
   1.5 Use of modern software and development methodologies (ETAC/ABET, Criterion 3 item a5)
   1.6 Application of advanced mathematics (ETAC/ABET, Criterion 3 item b1)
   1.7 Application of system engineering and management concepts (ETAC/ABET, Criterion 3 item b2)
   1.8 Use of current and emerging technological knowledge (ETAC/ABET, Criterion 3 item b3)
   1.9 Apply creativity in hardware system/subsystem/circuit design (ETAC/ABET, Criterion 3 item d1)
   1.10 Apply creativity in software system/subsystem/program design (ETAC/ABET, Criterion 3 item d2)
   1.11 Problem solving knowledge and skills (ETAC/ABET, Criterion 3 item f1)

2. Conduct unit and system testing, collect testing data and interpret results
   2.1 Valid and appropriate subsystem testing results (signal acquisition, processing, reporting, HMI, etc)
      (ETAC/ABET, Criterion 3 item c1)
   2.2 System construction and integration testing results (ETAC/ABET, Criterion 3 item f2)

3. Write progress and project reports - clear and concise technical content, well-organized, professional written report (ETAC/ABET, Criterion 3 item g1)

4. Make oral presentations - professionalism, preparation and use of visual aids (TAC/ABET, Criterion 3 item g2)

5. Demonstrate project performance
   5.1 Experimental circuits setup, testing, and data analysis (ETAC/ABET, Criterion 3 item c2)
   5.2 Creativity in design (ETAC/ABET, Criterion 3 item g2)
   5.3 Teamwork - stakeholders: project sponsor, faculty advisor, etc (ETAC/ABET, Criterion 3 item e)
   5.4 Project related research work (ETAC/ABET, Criterion 3 item f2)
   5.5 Application of ethics - health, safety, wellbeing, etc. (ETAC/ABET, Criterion 3 item i)
   5.6 Diversity in knowledge & solution (ETAC/ABET, Criterion 3 item j1)
   5.7 Knowledge of societal issues - economic, productive, growth, etc. (ETAC/ABET, Criterion 3 item j2)
   5.8 Knowledge of global issues - environment, cultural needs, etc. (ETAC/ABET, Criterion 3 item j3)
   5.9 A commitment to project quality (ETAC/ABET, Criterion 3 item k1)
   5.10 A commitment to project timeliness - project progress, completion times, etc. (ETAC/ABET, Criterion 3 item k2)
   5.11 Project is operational and meet or exceed specifications (ETAC/ABET, Criterion 3 item f3)
   5.12 Familiarity with the project (including ability to answer questions) (ETAC/ABET, Criterion 3 item f4)

Accreditation Board of Engineering Technology (ABET/ETAC) 2012-2013 Criteria for Accrediting Engineering Technology: Criterion 3. Student Outcomes (a – k)

a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;

b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
e. an ability to function effectively as a member or leader on a technical team;
f. an ability to identify, analyze, and solve broadly-defined engineering technology problems;
g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;
h. an understanding of the need for and an ability to engage in self-directed continuing professional development;
i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
j. a knowledge of the impact of engineering technology solutions in a societal and global context; and
k. a commitment to quality, timeliness, and continuous improvement.

Disabilities Statement: If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb, room 113, telephone number 481-6658), as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the web site for SSD at http://new.ipfw.edu/disabilities/

Tentative Schedule/Activities

1. ECET/CPET 491 First Meeting (7:30-8:4 p.m., Monday, January 13, in ET 346)
   - Phase I Project Design review/update
   - An updated progress report, due on January 27 (before 5:00PM), including the following required sections: cover page (project title, student name, advisors, date, affiliation), problem statement, proposed solution (with appropriate block diagrams), system requirement and specifications, required resource and estimated cost, project tasks and schedule (using MS Project 2010 or newer), and references.
   - Meet with your technical advisor and make a phase II meeting schedule 1st progress report due Jan. 27, your project schedule (MS Project format), and advisor meeting schedule due Jan. 27 – before 5:00 PM, send your report electronically to lin@ipfw.edu, and copy your Faculty advisors.

2. Iterative Design Phase (Jan. 20 – February 17)
   - Detailed System Design
     o Define detailed requirements and specifications (hardware/software subsystems and interface, I/O interface, timing, events, constraints, etc) and overall characteristics of your proposed project for implementation
     o Consider system usability (human factor), performance, reliability, supportability, off-the-shelf parts, assembly time, power, weight, size, cost, tradeoff, etc
     o Design a System Architecture (software and/or hardware)
   - Perform circuit simulation, system simulation, and/or mathematical modeling: MATLAB, PSpice, Multisim, etc; log and gather simulated data; analyze, and document the simulation and/or testing results
   - System function modeling (flow chart, data flow diagram, state transition diagrams, activity diagrams, collaboration diagrams, block diagrams, etc); MS Visio, Unified Modeling Language (UML)
   - Make sure all the needed hardware and/or software are ordered

The Design Report (2nd report) due to both your technical advisor and Prof. Lin on Feb. 24, before 5:00 PM, for critical review. If the system design is incomplete and assessed that the student is
not able to make significant progress toward the project objectives, a “F” course grade or withdraw from the course will be recommended by both your technical advisor and Prof. Lin.

3. Design Project Prototyping and/or Development: (February 17 – March 17)
   - Define/refine implementation plan and timeline for project management
   - Prioritized hardware/software co-construction
   - Incrementally build and test your prototype system
   - Document your activity, unit testing results (signal measurement, observation, program running, etc)

   System construction and unit testing report (3\textsuperscript{rd} report) due March 17, before 5:00 PM

4. Testing and Evaluation (March 17 – March 31)
   - Complete the system construction
   - Final testing and gathering testing results for final report

   First testing report (4\textsuperscript{th} report) due on March 31
   Second testing report (5\textsuperscript{th} report) due on April 14

5. Final Report – 1\textsuperscript{st} Draft (due April 21)
   - All ECET Faculty members and Industrial Advisory Committee Members are invited to attend your presentation.
   - The ECET/CPET 491 Senior Design II Assessment Form will be used for evaluation. one soft copy of your final report 1\textsuperscript{st} Draft is due on Monday, April 21, 2013

6. Project Presentation (8:00am-2:00noon, Friday, May 2, 2013)
   - Submit a CD contains all soft copies of project design meeting & communication memos, progress reports, testing reports, programs, data sheets, final project report, presentation slides, due May 2 (Senior Design Portfolio CD)
   - Final project presentation:
     - Microsoft PowerPoint presentation is recommended. A soft copy of this presentation should also send to Prof. Lin.
   - Best Senior Design Projects will be selected by faculty members