

**CRN# 22391 CPET 49100-01 Senior Design Project, Phase II**  
**CRN# 22393 ECET 49100-01 Senior Design Project, Phase II**  
**Spring 2014**

**Paul I-Hai Lin**  
**Professor of Electrical and Computer Engineering Technology**

**Dept. of Computer, Electrical, and Information Technology**  
**Indiana University-Purdue University Fort Wayne**

**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)  
Professor of Electrical and Computer Engineering Technology  
Indiana University-Purdue University Fort Wayne  
Office ET 205C      Email: [lin@ipfw.edu](mailto:lin@ipfw.edu)      (O) 260-481-6339  
Course Web site: [www.etcs.ipfw.edu/~lin](http://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

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

**Important Dates:**

January 20 – Labor Day Holiday  
March 10- 14 – Class suspended (Spring Break)

**Recommended Text Books**

ECET 491 - **System Engineering Management**, 4<sup>th</sup>, 2008, by Benjamin S. Blanchard, from John Wiley & Sons, Inc, ISBN 978-0-161735-9  
CPET 491 – **Real Time UML**, 3<sup>rd</sup>, 2004, by Bruce Douglas, Addison Wesley, ISBN 0-321-16076-2

**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%

Grading scale: A: 90 -100, B: 89 – 80, C: 79 – 70, D: 69 – 60, F: 59 and below.

\* 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 h)
- 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
- 1<sup>st</sup> 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
  - 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
  - Consider system usability (human factor), performance, reliability, supportability, off-the-shelf parts, assembly time, power, weight, size, cost, tradeoff, etc
  - 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 (2<sup>nd</sup> 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<sup>rd</sup> 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<sup>th</sup> report) due on March 31

Second testing report (5<sup>th</sup> report) due on April 14

**5. Final Report – 1<sup>st</sup> 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<sup>st</sup> 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