

CRN# 22611 CPET 49100-01 Senior Design Project, Phase II
CRN# 22613 ECET 49100-01 Senior Design Project, Phase II
Spring 2013

Paul I. 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 (O) 260-481-6339
Course Web site: www.etcs.ipfw.edu/~lin
Office Hours:

- Monday 4:30 - 7:30 PM
- Tuesday 9:00 - 10:00 AM, 3:00PM - 6:00PM
- Thursday 9:00 - 10:00 AM
- Other weekday hours – by appointment

Class Meeting Dates/Time
Monday 7:30-8:45 PM (ET 346)
January 14, 21* (Martin Luther King Jr. Holiday), 28
February 4, 11, 18, 25
March 4, 11* (Spring break), 18, 25
April, 1, 8, 15, 22, 29
May 3 (Friday) 8:00 AM - 2PM - Senior Design Presentations

Important Dates:

January 21 – Labor Day Holiday
March 11- 18 – Class suspended (Spring Break)

Recommended Text Books

ECET 491 - **System Engineering Management**, 4th, 2008, by Benjamin S. Blanchard, from John Wiley & Sons, Inc, ISBN 978-0-161735-9
CPET 491 – **Real Time UML**, 3rd, 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.

Course Outcomes: (ETAC/ABET; Engineering Technology Accreditation Commission/Accreditation Board for Engineering Technology, Criteria for Accrediting Engineering Technology Programs, Oct. 29, 2011)

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 (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 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 current and emerging 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 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 (include 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 14, in ET 346)

- Phase I Project Design review/update
 - An updated **progress report, due on January 21 (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 2007 or 2010), and references.
 - Meet with your technical advisor and make a phase II meeting schedule
- 1st progress report due Jan. 21, your project schedule (MS Project format), and advisor meeting schedule due Jan. 21 – before 5:00 PM, send your report electronically to lin@ipfw.edu, and copy your Faculty advisors.**

2. Iterative Design Phase (Jan. 21 – February 25)

- 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 (2nd report) due to both your technical advisor and Prof. Lin on **Feb. 25, 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 25 – March 25)

- 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 (3rd report) due March 25, before 5:00 PM

4. Testing and Evaluation (March 25 – April 2) Complete the system construction

- Final testing and gathering testing results for final report

First testing report (4th report) due on April 8

Second testing report (5th report) due on April 22

5. Final Report (due April 29)

- All ECET Faculty members and the ENG421 professor are invited to attend your presentation.
- The ECET/CPET 491 Senior Design II Assessment Form will be used for evaluation.

Two hard copy and one soft copy of your **final report** are due on Monday, April 29, 2013

6. Project Presentation (8:00am-2:00noon, Friday, May 3, 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 **December 9** (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