



INTRO TO ESE SENIOR DESIGN 2009-2010

***INSTRUCTOR TEAM:
Kenneth R. Laker
Vukan R. Vuchic
Philip D. Farnum***

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<http://www.ese.upenn.edu/seniordesign>

ESE Senior Design Overview

- ✦ Introduction of the Instructor Team
- ✦ What is ESE Senior Design?
- ✦ Attributes of successful projects
- ✦ How do students select projects?
- ✦ Senior design policy and grading
- ✦ Course schedule
- ✦ ESE Senior Design presentations
 - ✦ **Tim McKenna, Anil Venkatesh, Neeraj Wahi & Nick Annetta;**
“Synthetic Aperture Imaging”
 - ✦ **Pete Eschenbrenner, Gizem Goryakin, Deger Atay & Ed Levinson;**
“Systems Engineering for the Planet”
- ✦ Social & refreshments

Introduction of Instructors

- ◆ Philip D. Farnum (pfarnum@voicenet.com)
 - ◆ Electrical engineer: four decades (!) of real-world electrical engineering and systems experience
 - ◆ More than ten years of EE senior design experience
 - ◆ Storehouse of institutional knowledge
 - ◆ Enthusiastic senior design project consultant
- ◆ Vukan R. Vuchic (vuchic@seas.upenn.edu)
 - ◆ Specialties: transit & rail systems, highway & traffic engineering, systems analysis, design & operations
 - ◆ Has lectured courses in Transportation Systems Engineering, City & Regional Planning, Senior Design
 - ◆ Published “Transit Trilogy” - three books on Urban Transit Systems
 - ◆ Consultant to many cities in the US & abroad

Introduction of Instructors

- ★ Kenneth R. Laker (laker@seas.upenn.edu)
 - ★ Electrical engineer: expert in analog & digital semiconductor systems and signal processing
 - ★ Entrepreneur: co-founder of two successful semiconductor startup companies (AANetCom and DFT Microsystems)
 - ★ Manager: past IEEE President, founding CEO DFT Microsystems
 - ★ More than ten years of EE senior design experience



What is ESE Senior Design - Students' Perspective?

- ★ One year, 2 cu open-ended experience
- ★ Design and implement a solution to an engineering problem or opportunity
- ★ Also, students will learn:
 - ★ Teamwork
 - ★ Communication and presentation skills
 - ★ Project management skills
 - ★ Responsibility and Accountability
 - ★ Humility



What is ESE Senior Design - Students' Perspective?

- ◆ Students earn tangible rewards
 - ◆ Grades
 - ◆ Graduation
 - ◆ Recommendations
 - ◆ Awards
 - ◆ Experience
 - ◆ Job opportunities?

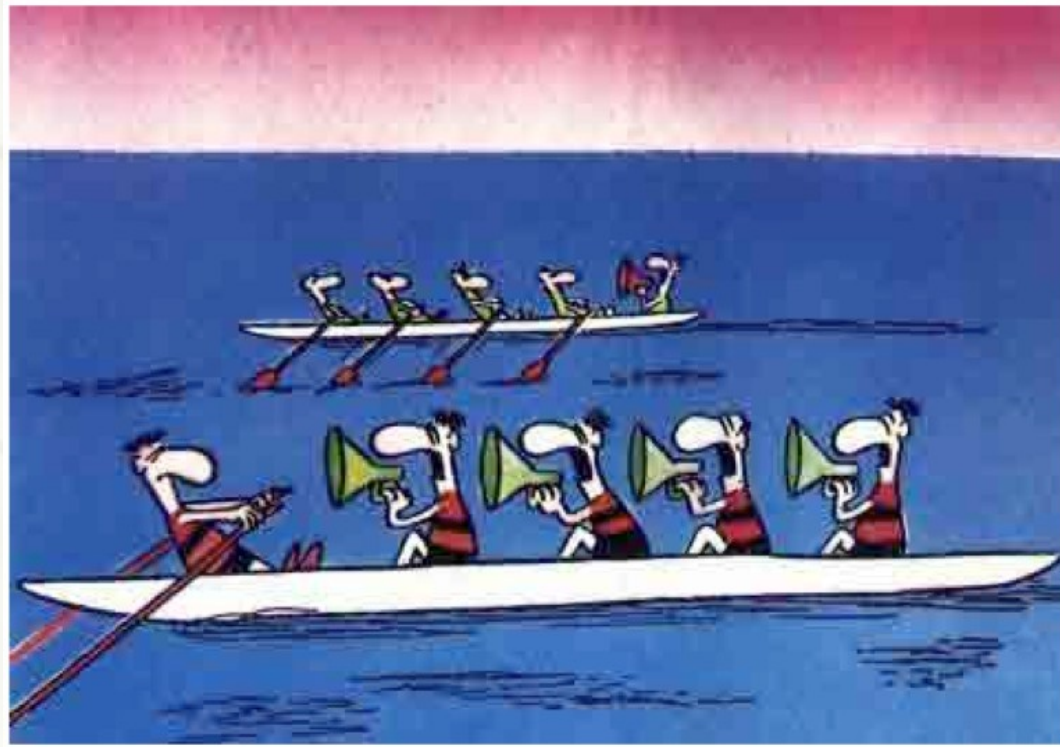
ESE Senior Design is the Merger of EE/CTE and SSE Senior Design

- ★ ESE 441/442 for EE/CTE majors and ESE 490/491 for SSE majors are being merged starting 2008-09
- ★ All ESE students will do senior design in Fall/Spring of senior year
- ★ The project requirements are being updated to take advantage of this merger
 - ★ Systems analysis, a strength of ESE 490/491, will be required of all projects
 - ★ Implementation, a strength of ESE 441/442, will be required of all projects

What Makes a Successful Project - Students Perspective?

- ★ Choosing an appropriate team
 - ★ Team members' skills & knowledge complement each other
 - ★ Team has a good balance of leadership skills and work ethic
- ★ Choosing an appropriate advisor
 - ★ He or she wants the project done, i.e. cares about the result
 - ★ He or she has the time to devote to the project
 - ★ He or she has the technical knowledge to advise the project
- ★ Choosing a good project
 - ★ Topic and scope are appropriate for team and advisor
 - ★ Topic and scope excite the team
 - ★ Project is feasible in one year with resources available to the team

Select an Appropriate Team!



How do Students Go About Selecting a Project?

- ◆ Start with a team, then:
 - ◆ Select a project, and find an advisor
- ◆ Start with a project idea, then:
 - ◆ Find an advisor, and put together a team
- ◆ Start with an advisor and a project, then:
 - ◆ Put together a team



What are Good Sources of Senior Design Projects?

- ★ **New projects offered by advisors**
 - ✦ Descriptions posted on ESE Senior Design Website
- ★ **Expand and/or enhance past projects**
 - ✦ ESE Senior Design Website has archive of past projects
- ★ **New projects proposed by students**
 - ✦ Instructors help students recruit a team and find potential advisors



ESE Senior Design Project Submission/Proposal Forms

- ✦ ESE Senior Design **Project Submission** Form is a means for **Potential Advisors** to offer a new project to the ESE Senior Design class
- ✦ ESE Senior Design **Project Proposal** Form is a means for **Potential Student Teams** to formally submit their anticipated project to the Instructors for approval
- ✦ ESE Senior Design Project forms are available in Adobe PDF and MSWord formats at <http://www.ese.upenn.edu/seniordesign>

University of Pennsylvania
Department of Electrical and Systems Engineering



ESE SENIOR DESIGN PROJECT - STUDENT PROPOSAL FORM

1. Project Title:

2. Student Team Members:

Name:

E-mail:

Name:

E-mail:

Name:

E-mail:

Name:

E-mail:

3. Project Advisor's Name:

4. Brief Project Description (no more than 50 words):

5. Project Design Objectives:

6. Senior Design Project Questions:

A. What knowledge (e.g. courses or topics) and skills (e.g. programming languages or software packages) will this project require? Please rank order the knowledge and skills you have identified, with the most important at the top of the list.

B. What courses or job experience have you had that partially satisfy these requirements?

C. What additional knowledge and/or skills do you need to acquire while working on this project? How do you plan to acquire this knowledge and/or these skills?

D. Does your advisor (or one of his grad students) have the expertise and experience to advise you in the most important knowledge/skill areas (as you determined in question 1 above) of your project, or do you need to get a secondary advisor?

**Deadline: Team
Project Proposals
Due 23 Sep 09**

ESE Senior Design Course Policies

- ◆ Teams typically composed of 3-4 students
- ◆ Projects selected in consultation with instructors and advisors
- ◆ Teams meet regularly with their advisors
- ◆ Appropriate advisors outside the Penn Community are encouraged
- ◆ Each section meets once per week and student attendance is **required**
- ◆ There will be 2-3 full-class meetings each semester for special course needs.
- ◆ Each student is required maintain a Project Notebook.
- ◆ Each team submits a project budget with first written project report

ESE Senior Design Grading

- ★ All team members Receive the Same Grade
 - ★ Individual grades will be given if team effort is judged to have seriously broken down.
 - ★ Advisor input
 - ★ Instructor observations
 - ★ Team member input
- ★ Project management
 - ★ Expect each team to work as a team towards a single common goal.
 - ★ Expect the team to divide the project work effort in an equitable fashion and utilizes each team members knowledge/skills.
 - ★ Project tasks are assigned to individual team members.
 - ★ Every team member has a management role in the project.

ESE Senior Design Grading

- ◆ Fall ESE Senior Design
 - ◆ Team project proposal form
 - ◆ 1st team formal report (includes **schedule** and budget)
 - ◆ In-class Presentations
 - ◆ **Individual project notebooks**
 - ◆ Team one-on-one exam meetings to review progress
 - ◆ **Advisor Input**
 - ◆ Team Fall semester or Phase 1 project report
- ◆ Spring ESE Senior Design
 - ◆ **All the Fall items in blue font**
 - ◆ Demo Day - team presentation & demo
 - ◆ Team final or Phase 2 project report

Important ESE Senior Design Course Deadlines

- ◆ Project Proposal Forms (due 09/24)
- ◆ Final approval of projects (by 10/02)
- ◆ 1st written project report (due 11/06)
- ◆ Phase 1 (2nd) written project report (due 12/16)
- ◆ Demo Day presentation/project demo (last class week in April)
- ◆ Phase 2 (final) written project report (due early May)



*ESE Senior Design is Hard
Work, Intellectually
Rewarding and Fun!*

Get an Early Start!



ESE Senior Design Presentations - Student Teams

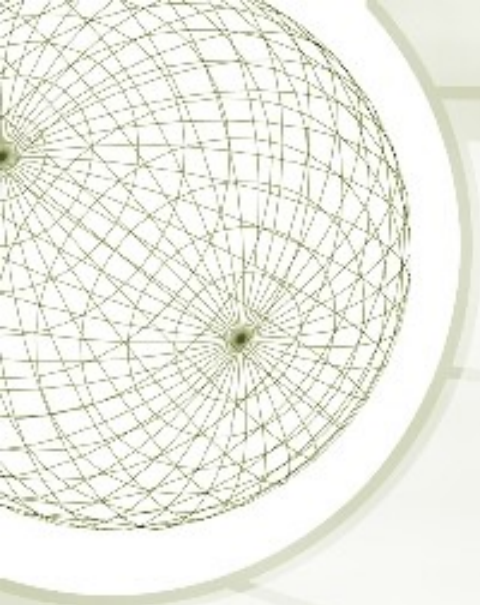
★ Project 1

- ★ Title: **“Synthetic Aperture Imaging”**
- ★ Team: **Tim McKenna, Anil Venkatesh, Neeraj Wahi
& Nick Annetta**
- ★ Advisor: **Jan Van der Spiegel**

★ Project 2

- ★ Title: **“Systems Engineering for the Planet”**
- ★ Team: **Pete Eschenbrenner, Gizem Goryakin,
Deger Atay & Ed Levinson**
- ★ Advisor: **Peter Scott and Walter Sobkiw**

Backup Slides



ESE Senior Design Schedule

- ★ September 2009 (final selection of project, advisor & team)
 - ★ Student/team meetings with potential advisors
 - ★ Students make brief in-class verbal project reports
 - ★ Teams complete their Project Proposal Forms (Wed. 09/23)
 - ★ Instructors meet with each team to review project proposal (Mon. 09/28 - Fri. 10/02)
- ★ October 2009 (project planning underway)
 - ★ 1st round student in-class presentations (start Wed. 10/07)
 - ★ Teams secure advisor commitments (Wed. 10/07)
 - ★ Teams start weekly project meetings with advisors

ESE Senior Design Schedule

- ★ November 2009 (systems analysis underway)
 - ★ 1-on-1 exam meetings with Instructors (start Mon. 11/02)
 - ★ 1st Project Report - with schedule and budget (Fri. 11/06)
 - ★ 2nd Round student in-class presentations (start Wed. 11/11)
- ★ December 2009 (design underway, preliminary results)
 - ★ Phase 1 (2nd) Project Report (Wed. 12/16)
- ★ January-April 2010 (complete design, implementation & validation)
 - ★ No weekly in-class meetings to focus on project execution
 - ★ At least two 1-on-1 exam meetings with Instructors
 - ★ Teams continue weekly project meetings with advisors
- ★ Late April-Early May 2010 (complete presentation, demo & Phase 2 (Final) Project Report)