INTRODUCTION TO EE 190D

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COURSE INFORMATION

INSTRUCTOR

PROFESSOR W. J. KAISER

Research Programs with UCLA Undergraduate and Graduate Students: Networked Embedded Systems for applications in environmental monitoring and medical informatics, low power electronics. Past work in low power RF CMOS integrated systems, low power sensor interface and signal processing, circuits, and sensor systems.

COURSE WEB SITE

https://www.eeweb.ee.ucla.edu/handouts.php?/ee180D/1/fall/4

CONTACT INFORMATION

Office: 56-147L Engineering IV
Cell Phone: 310-922-4460
E-mail (preferred): kaiser@ee.ucla.edu
Web: www.ee.ucla.edu/faculty/bios/kaiser.htm
Office Phone (please use e-mail (preferably) or cell phone): 310-206-3236

OFFICE HOURS

M, W 4:00 – 6:00
Th 5:00 – 6:00
And by arrangement. Please contact your instructor.

TEACHING ASSISTANT

CONTACT INFORMATION

Ashutosh Verma
E-mail: ashutosh@ee.ucla.edu

LOCATION INFORMATION

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>M, W</td>
<td>2:00</td>
<td>3:00/3:30-3:50</td>
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<tr>
<td>TH</td>
<td>2:00</td>
<td>4:50</td>
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COURSE INFORMATION

COURSE OBJECTIVES:

1. Provide real world experience in engineering team-oriented design and development
   a. Focus on hands-on design and development
2. Provide exposure to actual engineering program process
   a. Project Planning
   b. Interfaces
   c. Software build and release management
3. Provide background in important technologies:
   a. Embedded computing systems
   b. Wireless networking technology
   c. Distributed systems
   d. Sensor technology
   e. The hardware/software interface
   f. Embedded system software

COURSE PLAN:

1. Focus on actual
2. Provide real world experience in engineering team-oriented design and development
4. Students may pursue different projects
5. Students will have individual support as well as group support
6. Students may make progress at different rates

COMMITMENTS:

3. Instructor and Teaching Assistants
   a. Lecture presentation and answering questions
   b. Instruction and guidance in project planning
   c. Assistance with every aspect of projects
   d. Individual support and group support
   e. Office hour support
   f. General discussions
4. Students:
   1. Attendance at lectures and laboratories (if you have a class conflict, please see me for arrangements)
   2. Questions: In class, after class, office hours, and e-mail anytime and all the time
   3. Feedback to instructor on any interests, concerns, requests, need for help
   4. Effort in reviewing lectures, learning, and presentations
LECTURE NOTES:

1. Available at Course Web Site
2. In-Class combination of viewing notes electronically and use of whiteboard and equipment

COURSE OUTPUT:

1. Midterm individual technical presentations
2. Final individual technical presentations
3. Presentations describing, and demonstrating progress and understanding
4. Weekly student journals describing plans and progress
5. Homework in form of projects and problems

GRADING PLAN:

<table>
<thead>
<tr>
<th>Project Participation</th>
<th>30%</th>
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<tbody>
<tr>
<td>Midterm Presentation</td>
<td>20%</td>
</tr>
<tr>
<td>Final Presentation</td>
<td>30%</td>
</tr>
<tr>
<td>Homework</td>
<td>20%</td>
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</tbody>
</table>

PROJECT PARTICIPATION METRICS:

1. Documentation in Weekly Engineering Journal:
   a. Documentation follows standard engineering team procedures
   b. Documentation should describe progress summary including problems discovered, problems solved
   c. Documentation should cite references used.
   d. Include drawings and sketches
2. Focus in Laboratory:
   a. Must be committed to project and supporting team members
   b. If you encounter an *apparently* unavoidable problem, let instructor know and we will find a way to continue.
   c. Be prepared at all times to explain to your team members, Teaching Assistant, and Instructor, your status, and plans in terms of our course topics and materials.
3. Project Progress Towards Goals
   a. Demonstration of ability to use available resources to seek a solution to requirements or problems encountered (resources include team members, Teaching Assistant, Instructors)
   b. Timely identification of challenges
   c. A project need not be completed according to an initial plan (since we may discover unanticipated challenges.) The project may be descoped and replanned as we proceed. This is completely acceptable and likely for many projects.
ENGINEERING PRESENTATIONS

1. Engineering presentations are critical to progress for engineers. Presentations are made to colleagues, supervisors, management, customers, the engineering and education communities.

2. Midterm Presentation
   a) Description of Project Goals, Technical Approach, Schedule, Status
   b) Standard, formal, Powerpoint template
   c) Includes team demonstration

3. Final Presentation
   a) Review of Project Goals, Technical Approach, Schedule, Status of Complete System
   b) Standard, formal, Powerpoint template
   c) Should include team demonstration that may take many possible forms

4. Presentation Metrics
   a) Adequate description of Goals, Technical Approach, and Status in terms of course content and information derived from references
   b) Ability to answer questions in terms of topics addressed in Lecture.

COURSE WEB SITE:

- eeweb
- Contact Information, Syllabus, Schedule
- Lecture Notes available on Web in before class (Adobe Acrobat format).

**PLEASE DOWNLOAD AND PRINT LECTURE NOTES BEFORE CLASS. BRING HARDCOPY TO CLASS. NOTE TAKING IS ALSO VERY IMPORTANT.**

INTRODUCTIONS

- Your background
- Your interests
- Your goals for EE190D

E-MAIL SIGN-UP

- User account distribution (use BOL or seasnet account to ensure ability to receive large attachments)
- Tutorials
- Help at any time
- Discussions with instructor on project goals
- **First Assignment: e-mail prioritized project preferences**
<table>
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| 1    | • Course Introduction  
      | • System Design and Implementation Projects  
      | • Introduction to Networked Embedded Systems  
      | • Introduction to Computing Platform Architectures  
      | • Introduction to Software Platform Architectures  
      | • Embedded Node Laboratory Systems  
      | • Getting Started |
| 2    | • Introduction to Networking  
      | • Networking Diagnostics  
      | • Networking Demonstrations  
      | • Individual Project Planning and Engineering Journal Preparation |
| 3    | • Networked Embedded System Concepts  
      | • Networking Media Access (MAC) Protocols  
      | • Network Physical Layer Introduction |
| 4    | • Wireless Networking Principles  
      | • Wireless Network Physical Layer Protocols  
      | • Wireless Network MAC Layer Protocols  
      | • Introduction to Network Programming |
| 5    | • IEEE 802.11 Wireless Local Area Networks  
      | • MAC Algorithms  
      | • MAC operations for hidden and exposed terminals  
      | • Midterm Presentations |
| 6    | • Introduction to Routing  
      | • Routing protocols  
      | • Midterm Presentations |
| 7    | • System Self-Organization  
      | • Distributed Processing in Networked Embedded Systems  
      | • Processes and Process Management |
| 8    | • Multithreaded Systems  
      | • Process Coordination and Management  
      | • Processor to Peripheral Interfaces: Device Drivers |
| 9    | • Processor to Platform Interfaces and Demonstrations  
      | • Interrupts, Interrupt Operations, and Demonstrations |
| 10   | • Sensing Principles  
      | • Sensor Technology  
      | • Internetworked Systems and Programming |