<table>
<thead>
<tr>
<th>CRN</th>
<th>Title</th>
<th>Units</th>
<th>Instructor</th>
<th>Days/Time</th>
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<tbody>
<tr>
<td>63432</td>
<td>289L - Compound Semiconductor Materials and Device Discussions</td>
<td>4</td>
<td>Woodall</td>
<td>MW 2:10-4:00 pm</td>
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<tr>
<td>63720</td>
<td>289Q - Data Analytics for Computer Engineers</td>
<td>4</td>
<td>Ghiasi</td>
<td>MW 2:10-4:00 pm</td>
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SYLLABUS

289L: Compound Semiconductor Materials and Device Discussions
   Wellman 105
   MW 2:10 – 4:00 p.m.
   Lectures given by students: M 2:10-4:00 p.m. and W 2:10-3:00 p.m.
   Student discussions W 3:00-4:00 p.m. 4 units.
Instr: Jerry Woodall
   Distinguished Professor of ECE
   jwoodall@ucdavis.edu
Office 2001 Kemper Hall
Hours: W 1:30-4:30

Course purpose and goals:

The purpose and goals of this course are to provide a detailed knowledge of all aspects of compound semiconductor materials and devices. The graduate students who are enrolled in the course will teach the course. The goal of this method is to give each and every student the practice and experience of both learning and teaching a course and improving public speaking skills.

How the course will work:
1. Each student in alphabetical order of last name will be assigned in topic order a topic from the list in the syllabus (see next page).
2. The student will do comprehensive research from textbooks, journals, and the web to prepare a 2 hour 40 minute lecture on the topic he or she was assigned. The presentation format will be a ppt file.
3. On Monday’s class a 1 hour 50 minute portion of the lecture will be given. On Wednesday the last 50 minute portion will be given during the first part of the Wednesday class.
4. The last hour part of the Wednesday class will be devoted to open class discussion.
5. The student giving the class lecture must turn into the instructor an e-file of the lecture immediately after the lecture on the Thurs class

Grading:
Lecture 85%: grade metrics include: comprehensiveness, clarity, grammar, style, staying on target of teaching the assigned topic, etc.
Discussion 15%: Participation in discussion of other student lectures, e.g. asking important questions, adding comments for completeness or clarity, etc. (All students taking the SQ 2016 course got at least an A-.

Note: Enrollment is capped at 25 students. This is a fun course so enroll early. If there is full enrollment between 10 and the 25 cap level, two students will partner and share equally for each topic, or the topic list will be adjust to accommodate either 1 or 2 students partnerships.
Weekly Compound Semiconductor Topics:
(SQ -2016 class)

1. Comprehensive review of the early history of compound semiconductor technology
   jwoodall@ucdavis.edu
2. Survey of current and past use/applications of compound semiconductor materials and devices
   Van L. Duong
3. Review and current status of LEDs
   Burcu Erçan
4. Review and current status of injection lasers
   Vache Harootonian
5. Review and current status of BJTs and HBTs
   Andrew P. Lange
6. Review and current status of MESFETs and MOSFETS
   Jiannan Li
7. Review and current status of photodetectors (excluding PVs)
   Ruya Li
8. Review and current status of solar cells
   Duy Nguyen
9. Review and current status of specialty devices, including, RTD, cascade lasers, superlattice devices, etc.
   Anil Shrestha
10. Review and current status of special device and materials processing considerations including doping, selective etching, surface and interface Fermi level pinning, MOS-C, lift off, device isolation, LED, laser, photodetector, solar sell, HEMT and HBT fabrication
    Xin Zhao
EEC 289Q – Data Analytics for Computer Engineers
Spring 2016

Lecture: 4 hours
Prerequisites: EEC172, ‘EEC180B or ECS122A’

Description:
Advances in computing, and the ability to accumulate, process and extract application-dependent information from massive amounts of data have revolutionized scientific and engineering disciplines. Just as one example, large-scale deep convolutional neural networks have led to remarkable advances in image and speech recognition, problems that have been under active research for about half a century.

The goal of the course is to provide an overview of machine learning techniques for students with computer engineering background. The course will introduce some theoretical concepts as well as algorithms from statistical data analysis and predictive modeling, with an emphasis on topics that relate to computer engineering researcher and practitioners, such as integration of algorithms within a complete system (data acquisition, processing, visualization, etc), implementation tradeoffs and scaling considerations. Examples from different application domains, such as healthcare, e-commerce and finance will be discussed.

Grading: Letter based on homework %60 and course project 40%

Textbook:

Expanded Course Outline

1. Introduction
   a. How can we automatically learn from data?
      i. Example applications
      ii. Supervised learning vs. other machine learning paradigms
      iii. Classification vs. regression vs. logistic regression
      iv. Data analytics pipeline (acquisition, preprocessing, segmentation, feature extraction, classification and visualization)
   b. Overview of linear algebra
   c. Software environment and setup (Matlab, R, and Caffe/Torch)

2. Linear Models
   a. Multi-variate linear regression
   b. Linear classification
   c. Space transformation
3. Logistic Regression
   a. Model and learning algorithm
   b. Multiclass classification
   c. Overfitting and regularization

4. Neural Networks
   a. Model and applications
   b. Cost function and backpropagation algorithm
   c. Regularization for neural networks
   d. Practical considerations for backpropagation

5. Convolutional Neural Networks and Deep learning
   a. Model and applications
   b. Auto-encoders
   c. Fine-tuning of deep neural networks

6. Large scale machine learning
   a. Gradient decent for large models and/or large datasets
   b. GPU vs. FPGA implementation