2020 SQ 289L SYLLABUS

289L: Compound Semiconductor Materials and Device Presentations and Discussions
Location: OLSON 117
Time: MW 2:10 – 4: 00 p.m.
Format: Lectures given by students: MW 2:10-3:30 p.m.
Student discussions: W, 3:40-4:00 p.m.
Course Credit: 4 units for each student.
Instr: Jerry Woodall: Distinguished Professor of ECE
jwoodall@ucdavis.edu
Office: 2001 Kemper Hall
Hours: Thur. 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 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, and skills in organizing lectures.

How the course will operate:

1. Each student will be assigned a topic in order from the list in the syllabus (see next page).

2. Each student will present a comprehensive lecture derived from research from textbooks, journals, and the web to prepare the lecture on the topic assigned to the partnership. The presentation format will be a classroom projected ppt or pdf file.

3. For each Monday class part I a 1 hour 20 minute of a formal presentation will be given from 2:10 to 3:30 p.m. The Monday class will end at that time.

4. For each follow-on Wednesday class, part II continuation of the part I lecture will be presented from 2:10 p.m. to 3:30 p.m. This will be followed by a 10 minute break and then a Q/A session will occur from 3:40-4:00 p.m.

5. The max registration number is 20. If this many register, then each topic will be discussed by 2 team members. One will present on Monday and the other will present on Wednesday.

6. All students must turn in to the instructor an e-file of the lecture within 24 hours immediately following the Wed. class.

Grading:

Lecture: 85%. The grade metrics include: comprehensiveness, clarity, grammar, style, staying on target of teaching the assigned topic.
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 2018 course got at least an A-). **Class attendance is mandatory. Any unexcused absence will result in a reduction of one letter grade for the course.**

Drop Outs: all drop-outs must notify Prof. Woodall of this intention by the end of the Wednesday class of the first week. There will be no drop-outs allowed after that date. Swapping team members or topics: All students may swap pair wise topics and/or pair wise individual partners in advance of the scheduled presentation of the swapped topics. The date or order of topic presentation cannot be changed.

Suggested format:
1. History/background of topic
2. Basic operational science tutorial of the device(s)
3. Comprehensive discussion of current apps and why device is used for app.
4. Related competitive devices
5. Likely future evolution of device and apps.

Weekly Compound Semiconductor Topics:

1. First class
    1.1 Introductory remarks Prof. Woodall
    1.2 Example lectures on M class by Prof. Woodall on Energy Storage
2 Review and current status of solar cells and other PVs
3. Review and current status of LEDs
4. Review and current status of injection lasers
5. Review and current status of BJTs and HBTs
6. Review and current status of MESFETs and MOSFETS
7. Review and current status of photodetectors (excluding PVs)
8. Review and current status of specialty devices, including, RTD, cascade lasers, superlattice devices, etc.
9. 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
10. Review and current status of 2-D materials and devices