ENGR1202 - Introduction to Engineering Practices and Principles II

(For electrical and computer engineering students)

Catalog Data  Applications in the disciplines of Electrical and Computer Engineering utilizing the tools and techniques specific to the major. Emphasis on analysis skills, mathematical skills, understanding of the profession/curriculum, and problem solving skills.

References  ECE: All information is available on web – http://coesf.uncc.edu/jahudak/ under Engr 1202 and Mosaic version of AUTOCAD. Information of the structure of the problem session/recitation section is also available on the web site, including grading and requirements.

Goals  ECE: By the end of the semester ECE students will have the information and training needed to complete a team project that incorporates problem solving, critical and creative thinking, project planning, and engineering design using the specific tools and techniques in both microelectronics clean room and computer labs. Students will also be able to communicate their proposed design in presentation form.

Prerequisite  ENGR 1201 with a grade of C or better

Class Topics  Electrical Engineering Project
1. Introduction to electrical and computer engineering
2. Engineering units and semester project description
3. EM frequencies
4. Microelectronics and fabrication in clean rooms
5. Clean room safety and test
6. Wireless technologies and wavelength including cellular, Bluetooth, Wi-Fi, RFID, and GPS
7. Electronic materials- silicon
8. Intro to clean room
9. Wafer cleaning and contamination
10. Dielectric formation and conductor attributes
11. Conduct deposition techniques
12. Wavelength and antenna design
13. Photolithography and schematics
14. Project cost analysis
15. Global issues with technology and wafer dicing
16. Presentation skills and using PowerPoint
17. Final exam review

Computer Engineering Project
1. Basic computer control module
2. Using the modular approach to computer controller design
3. Simple project with computer control modules
Teams are required to submit a PowerPoint presentation of their completed projects. Other topics include: mobile communications systems (mobile phone, Wi-Fi, Bluetooth, RFID) and frequency band considerations; basic antenna design; safety and clean room protocol; working in the microelectronics clean room; basic solid state devices theory; microelectronics tooling and fabrication; Computer related designs using building block modules, using AutoCAD, Excel, and PowerPoint; and proper presentations.

**Outcomes**

ECE: Using the team project, students will learn current mobile communications systems and their design. They will learn to create and fabricate a unique component of these systems using microelectronics fabrication tools and processes. They will also learn microelectronics fabrication methods, cost analysis using Excel, Students will be able to effectively present the results of the semester long project both verbally with a slide presentation and with a written report. ABET G

**Computer Usage**

Electronic submission of homework assignments is required; also AutoCAD, PowerPoint, Word, and Excel

**Laboratory**

ECE: One hour per week will be lectures providing the information necessary to complete the project. The second hour+ will be spent either in the microelectronics cleanroom lab or computer labs learning the techniques needed for completing their project.

**Design Content**

Students will be provided opportunities to develop proficiency in the engineering design process learned in ENGR 1201.

**Grading**

ECE: Attendance, homework, and tests = 40%; recitation grade = 20%, project (either antenna or robot) = 20%, final exam = 20%

**Follow-up Courses**

Courses for EE majors: communications, VLSI design and processing, photovoltaic’s, LEDS, solar cell fundamentals lab, and thin films for micro processing

Courses for Comp majors: programming, robotics, computer design

**Academic Integrity**

Students have the responsibility to know and observe the requirements of the UNCC Code of Student Academic Integrity (2001-2003 UNCC Catalog, p. 275). This code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty.

**Notes**

All materials submitted for grades (e.g. test and final problems, homework assignments) must represent the student's original work. Students may discuss homework problems, including comparing answers. Copying another student's work, or copying a solutions manual is strictly forbidden. It is the responsibility of every student to know and observe the requirements of the UNCC Code of Student Academic Integrity. This Code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty. Any student violating the Code will be subject to the penalties described in this document. If in
doubt, please ask before you engage in any activity about which you are unsure.

**Instructor**  ECE: Mr. John Hudak