

EEL 4924C: Electrical Engineering Design (Senior Design)

<http://mil.ufl.edu/4924/>

INSTRUCTOR Dr. Eric M. Schwartz MAEB 321 392-2541 ems@mil.ufl.edu Office Hours: Mon per 7; Wed, per 6-7

LECTURES Tues: 4th (10:40-11:30am) & Th: 4th-5th (10:40am-12:35pm) in NEB 101

LABS NEB 212 (*Electrical Computer Engineering Design 1 [EEL 3923] in NEB 246*)

LAB ENGINEER Michael Stapleton NEB 261 392-2727 mstap@ece.ufl.edu Office Hours: **M-F: 9am-5pm**

LAB SUPERVISOR Eric Liebner NEB 236 392-4923 eriel@ece.ufl.edu Office Hours: **M-F: 9am-5pm**

TEACHING ASSISTANTS Alexis Mesa (4924)

alexis2@ufl.edu

Lab Hours: **M: 1-2, 4-7; W: 1-2, 4-7; R: 3**

Mark Tyndall (4924)

mtyndall@ufl.edu

Lab Hours: **W:10-E1; F: 6-9 (plus T: 4; R: 4-5)**

(4924: NEB 212) Joe Giuliani (4924)

g1giuliani86@gmail.com

Lab Hours: **M: 9-10; T: 5-7; R: 7-8 (plus T: 4; R: 4-5)**

(3923: NEB 246) J.D. Crutchfield joovie88@gmail.com, Stefan Craciun craciuns@ufl.edu, Eduardo Moreno emoreno@ufl.edu

REQUIRED TEXTBOOK *Lab phone #: 846-4230 (on campus only)*

None

REQUIRED HARDWARE

The purchase of parts for you project is required. Some parts may be provided for you.

CATALOG COURSE DESCRIPTION [Lab fee: \$113.05]

Credits: 3; Prerequisites: EEL 3923C, Senior standing.

Selected design projects involving engineering applications in the various areas of electrical engineering. ~~Must be taken prior to the semester of graduation.~~ Laboratory.

COURSE OBJECTIVES

To provide the framework for specification of a design problem in a written design proposal, communication and discussion of design progress at weekly oral project briefings, documentation of technical approaches in a patent style notebook checked and signed weekly, and demonstration, presentation, and written documentation of the completed design project.

LECTURE NOTES:

Lectures will **not** be held regularly. Dates for class meetings will be announce in class, on the web, or by email. It is your responsibility to stay informed. Attendance is often **required**.

LAB ACCESS

Students will receive the access code to the lab and will thus have 24-hour, 7-day access.

LAB RULES AND INFORMATION

- No eating or drinking in the lab.
- Students must return all equipment and clean her/his work area before leaving the lab.
- Students must wear eye protection when soldering or using power tools.
- Safe practices must be used when handling high voltages or other dangerous circuits. Think before flipping the switch. Be aware of the location of the fire extinguisher since fires do occur in this lab!
- Leave any personal supplies or equipment left in the lab at your own risk. If you intend to leave anything in the lab, it should be clearly labeled with your name or group name.
- Some equipment (e.g., oscilloscope, LSA, etc.) must be checked in and out of the locked cabinet by a TA or other faculty. This equipment may only be used while a TA or other faculty is present in the lab.
- At some point in the semester you will need to have circuit boards etched with our lab milling machine. There is an online sign up at <http://www.seniordesign.ece.ufl.edu/> to complete when you are ready to have your PCB milled. Make sure you submit all the necessary files need to complete the milling process.

GRADES

Grades are determined by the quality of work with the following items. In order to **pass** the class (and graduate) students **must finish** their design projects and show a **working demonstration**. Therefore the last two items on the below list will be emphasized.

- Project Abstract
- Preliminary Design Report
- Preliminary Design Presentation
- Intermediate Design Reviews
- Weekly Reports
- Board Design Assignment
- Patent Style Notebook
- Constraints and Standards Description
- Experimental Plans/Prototype Test Plan
- Final Design Report
- Final Design Presentation and Demonstration

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The UF grading policies for assigning grade points can be found on the following undergraduate catalog web page: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx> .

An “A” grade project usually has the following characteristics.

- Optimal solution of the problem (not just any solution)
- High level of project complexity
- Project packaged well
- User friendly project
- Exceptional presentation
- Well-designed PCBs (surface mount when possible, few yellow wires, no empty spaces, etc.), usually professionally manufactured (not with our milling machine)
- Project progresses in synchronization with proposed Gantt chart, evidenced by weekly reports

EXAM SCHEDULE

No exams in this course.

PARTIAL LIST OF CLASS EVENTS

- Group and Project Selection – 2 members per group
- Project Selection Abstract Due (Preliminary Project Proposal)
- Preliminary Design Reports Due
- Preliminary Design Presentations (held during class)
- Guest Lectures – Generally given by class faculty or guests. Attendance is mandatory.
 - Career Resource Center
 - Advanced lecture on printed circuit board design (layout and routing) software (Altium Designer)
 - Intellectual Property
- Intermediate Design Reviews (Hardware and Software)
- Mid-semester grade review
- Periodic In-lab Presentations
- Final Design Report Due Along with Final Project Presentation/Demo
- Demo and Poster Session

LABORATORY EQUIPMENT

- Our lab is equipped with all the basic electrical and computer lab equipment including oscilloscopes, logic state analyzers, power supplies, programmers for various processors, etc.
- We have one LPKF ProtoLaser S milling machine and two LPKF S62 milling machines for PCB fabrication of two layer boards (with no through-hole [via] plating).

PROJECT REQUIREMENTS

- No development boards or Arduino devices can be used in your final project without written approval from the Dr. Schwartz (unless you designed and built them yourself).
- All projects must have significant digital, analog, and software component unless written approval is given by Dr. Schwartz.
- Attendance at some classes and labs are required. Failure to attend without prior approval will result in at least a 1/3 letter grade reduction for the course. Late arrival may also result in a course grade reduction.
- Meeting all project objectives guarantees a passing grade of C or better, **but not** necessarily an A.
- No breadboards (also known as protoboards) can be used in your final project.

CLASS ATTENDANCE AND BEHAVIOR

In general, class attendance is not mandatory, but all classes are important. Missing a class may be hazardous to your grade. Some classes **are** mandatory. If you fail to attend these classes without prior approval, your course grade will suffer. Turn off all cell phones, beepers, laptop sound effects, and other noise making devices **before entering** our classroom. If a noise-making device goes off during class, I reserve the right to lower your course grade. If a noise-making device goes off during an exam, you will lose a significant number of points on this exam.

STUDENTS WITH DISABILITIES

Students requesting classroom, laboratory or exam accommodations must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

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UF COUNSELING SERVICES

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling & Wellness Center, <http://www.counseling.ufl.edu>, 3190 Radio Road, (352) 392-1575.
- SHCC mental Health, Student Health Care Center, <http://shcc.ufl.edu/>, Infirmary Building, 1 Fletcher Drive, 392-1161.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161.
- Career Resource Center, <http://www.crc.ufl.edu/>, Reitz Union, 392-1601, career development assistance and counseling

UF CAREER RESOURCE CENTER (CRC)

The CRC offers many unique services, such as career workshops, on-campus interviewing, Cooperative Education & Internship programs, and others - separate handouts detailing these are available. Shown here are a few of the materials and services that students and employers will find at the Career Resource Center, located in a state-of-the-art facility on the west side of the first floor of the J. Wayne Reitz Union. Most of these services are available during all regular business hours.

From the CRC: “Behavioral interviews are the standard now in HR world and we do focus on strategies to answer those types of questions in our workshops and mock interviews. ... Students are encouraged to participate in our Mock Interview program (www.crc.ufl.edu/mockinterview). We also offer a Virtual Mock Interview program on our website for students who wish to practice from home using a webcam.”

SOFTWARE USE

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

ACADEMIC HONESTY

All students admitted to the University of Florida have signed a statement of academic honesty committing them to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action.

This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

CHEATING

CHEATING WILL NOT BE TOLERATED. We will actively search for cheaters. If you are caught, there will be no negotiations. You will fail the course and get reported to the honor court. There are **no excuses and no exceptions**. If you know someone is cheating, **it is your responsibility to report it**. We have and will continue to prosecute cheaters by turning them over to the office of Student Judicial Affairs. For more information about cheating, see the URLs: <http://www.dso.ufl.edu/sccr/honorcodes/conductcode.php> . For the copy of the UF Honor Code and consequences of academic dishonesty, please refer to <http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php>.

WORKING TOGETHER

You are encouraged to work with other students in this course and to consult with other students and faculty. Although you may **consult** with other students, TAs, or Professors, the work of your team **must** be **your** team’s work. Consulting means **“seeking opinions or advice” not** getting working programs or designs, understanding them, and then modifying them to make them your own. The latter constitutes cheating (see above section).

DOCUMENTATION

A printed version of all documents must be turned in during the appropriate class. An electronic version should **also** be submitted (via email) in either MS-Word or pdf format (as described in the assignment) to eel4924@gmail.com.

CONFIDENTIALITY

Please treat all information that you hear about projects of other students in this class as confidential. Patents might be filed in the future, and by agreeing to this confidentiality, you preserve their rights to patent their projects. See <http://mil.ufl.edu/4924/docs/Confid-Disc-Agree.pdf> for the complete confidentiality disclosure agreement. Early in the semester you will submit the completed [Confidentiality and Password](#) document by email to the course email

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R=Room / C=In Class / L=In Lab / X=No requirements; Class in NEB 101 / Lab in NEB 212

Semester Schedule

Week/Day	Date	Class	R	Notes
1 M	9-Jan			
1 Tu	10-Jan			<i>Intro & Project Ideas; Form Teams</i>
1 W	11-Jan			
1 Th	12-Jan	1-2	C	<i>Intro & Project Ideas; Form Teams</i>
1 F	13-Jan			
2 M	16-Jan			
2 Tu	17-Jan	3	C	<i>CRC Presentation</i>
2 W	18-Jan			
2 Th	19-Jan	4-5	C	<i>Processor Lectures</i>
2 F	20-Jan			
3 M	23-Jan	No class		Martin Luther King Jr. Day
3 Tu	24-Jan	6	C	<i>Project Abstract with Block Diagram Due</i> <i>Career Showcase (not-tech)</i>
3 W	25-Jan			<i>Career Showcase (technical)</i>
3 Th	26-Jan	7-8	C	<i>Preliminary Design Presentation Due</i>
3 F	27-Jan			
4 M	30-Jan			
4 Tu	31-Jan	9	C	<i>Preliminary Design Presentations Continued Report Due</i>
4 W	1-Feb			
4 Th	2-Feb	10-11	L	<i>Preliminary Design Report Due</i> <i>In-lab Presentation</i> <i>Processor Selection</i>
4 F	3-Feb			
5 M	6-Feb			
5 Tu	7-Feb	12	C	<i>Intellectual Property</i>
5 W	8-Feb			
5 Th	9-Feb	13-14	L	<i>Altium Lecture</i>
5 F	10-Feb			
6 M	13-Feb			
6 Tu	14-Feb	15	L	(Valentine's Day) <i>In-lab Presentation</i>
6 W	15-Feb			
6 Th	16-Feb	16-17	L	<i>In-lab Presentation</i>
6 F	17-Feb			
7 M	20-Feb	18		
7 Tu	21-Feb		L	<i>In-lab Presentation</i>
7 W	22-Feb			
7 Th	23-Feb	19-20	L	<i>In-lab Presentation</i>
7 F	24-Feb			

Week/Day	Date	Class	R	Notes
8 M	27-Feb			
8 Tu	28-Feb	21	L	<i>In-lab Presentation</i> <i>Responsibility Table is due</i>
8 W	29-Feb			
8 Th	1-Mar	22-23	L	<i>In-lab Presentation</i> <i>Responsibility Table is due</i>
8 F	2-Mar			
8 M-F	4-9 Mar	No class		Spring Break
9 M	12-Mar			
9 T	13-Mar	24	L	<i>Hardware Demo (content verification, in lab)</i> <i>Detailed System Block Diagram Due</i>
9 W	14-Mar			
9 Th	15-Mar	25-26	L	<i>Hardware Demo</i>
9 F	16-Mar			
10 M	19-Mar			
10 Tu	20-Mar	27	L	<i>In-lab Presentation; PCB design(s) submitted; Experimental Plans / Prototype Test Plan Due</i>
10 W	21-Mar			
10 Th	22-Mar	28-29	L	<i>In-lab Presentation / PCB design(s) submitted</i>
10 F	23-Mar			
11 M	26-Mar			
11 Tu	27-Mar	30	L	<i>Software Descriptions/Flowcharts due</i>
11 W	28-Mar			
11 Th	29-Mar	31-32	L	<i>Software Descriptions/Flowcharts due</i>
11 F	30-Mar			
12 M	2-Apr			
12 Tu	3-Apr	33	L	<i>In-lab Presentation</i>
12 W	4-Apr			
12 Th	5-Apr	34-35	L	<i>In-lab Presentation</i>
12 F	6-Apr			
13 M	9-Apr			
13 Tu	10-Apr	36	C	<i>Schedule YOUR Presentation & Demo</i>
13 W	11-Apr			
13 Th	12-Apr	37-38	C	<i>Final Presentations By Appt, 8:30am-10:40am-12:35pm</i>
13 F	13-Apr			Drop Deadline
14 M	16-Apr			
14 Tu	17-Apr	39	C	<i>Final Presentations By Appt, 8:30am-10:40-11:30am</i>
14 W	18-Apr			
14 Th	19-Apr	40-41	L	<i>Final Demonstrations, By Appt, 10:40am-1:30pm, 4-6pm</i>
14 F	20-Apr			
15 M	23-Apr			
15 Tu	24-Apr	42	C	<i>Final Reports Due</i>
15 W	25-Apr			Classes End
15 Th	26-Apr			<i>Demo in Harris Rotunda (NEB) ; Setup: 8:30am-9:00am, Event: 9:00am-12:00pm; Competition Finals: 1pm-2pm</i>