EGN 1935 ECE Adventures

1. **Catalog Description** (2 credit hours) – If you are unsure of your major or want to learn about potential experiences of an Electrical and Computer Engineering student, this course is for you! Learn about robots and experiment with sensors and actuators. You'll discover many basic ECE concepts. Grades are based on attendance and class participation. No exams.

2. **Pre-requisites and Co-requisites** – None.

3. **Course Objectives** - To discover principles of Electrical and Computer Engineering via implementation in an autonomous robotic platform. Students are familiarized with electronic instrumentation (including multi-meters, power supplies, waveform generators and oscilloscopes), electronic equipment (including soldering irons and proto-boards) electronic components (including batteries, switches, LEDs, resistors and logic gates), electro-mechanical actuators (including DC motors, servo motors and solenoids), electronic sensors (including IR emitter/detectors, CdS cells, sonar and cameras) electronic circuits (including switch circuits, LED circuits, voltage divider circuits, motor driver circuits, basic digital circuits, piezo speakers, printed circuit boards), robot software (GUI, C-functions, C programs) to control robot behavior, and presentation software tools (MS PowerPoint).

4. **Contribution of course to meeting the professional component** – N/A

5. **Relationship of course to program outcomes** – N/A

6. **Instructors**
   - Antonio Arroyo, Ph.D., PE, Associate Professor, MAE-B 338, 392-2639, arroyo@mil.ufl.edu. Areas of specialization: Machine intelligence, artificial intelligence, microprocessors and embedded systems microprocessors and embedded systems, expert systems, human-machine interaction, computer software and hardware systems, pattern recognition, digital signal / natural language and speech processing.
   - Eric M. Schwartz, PhD, Master Lecturer, MAE-B 321, 392-2541, ems@mil.ufl.edu. Areas of specialization: Robotics, microprocessors and embedded systems (hardware and software), digital design, autonomous mobile agents, machine intelligence, controls, robot manipulators.

7. **Teaching Assistant** - Mike Franks
   a. Office location - TBA
   b. Telephone
   c. E-mail address
   d. Office hours

8. **Meeting Times** – T 8-9 periods
9. **Class/laboratory schedule**, two 100-minute period sessions per week

10. **Meeting Location** – LAR 330

11. **Material and Supply Fees** - $105.00

12. **Textbooks and Software Required** -
   a. Title: The 6.270 Robot Builder's Guide
   b. Author: Fred Martin
   c. Publication date and edition: MIT Media Lab, Cambridge, MA, 1992
   d. ISBN number:
   e. Downloadable from our web site at the bottom of the page at [http://mil.ufl.edu/imdl/handouts.htm](http://mil.ufl.edu/imdl/handouts.htm)

13. **Recommended Reading** –
   a. Title: Mobile Robots: Inspiration to Implementation
   b. Author: Joseph Jones, Bruce Seiger & Anita Flynn
   d. ISBN number:
   a. Title: Robotic Explorations
   b. Author: Fred Martin
   c. Publication date and edition: Prentice-Hall, 2001
   d. ISBN number:

14. **Course Outline**

<table>
<thead>
<tr>
<th>WEEK/DAY</th>
<th>DATE</th>
<th>LAB #</th>
<th>Lecture #</th>
<th>Tentative Weekly Topics / Comments</th>
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</thead>
<tbody>
<tr>
<td>1 T</td>
<td>10 Jan</td>
<td>0</td>
<td>0</td>
<td>Course Syllabus, Web Site, Motivation, Logistics</td>
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<tr>
<td>2 T</td>
<td>17 Jan</td>
<td>1</td>
<td>1</td>
<td>Power, Batteries, multi-meters, instrumentation, switches, LEDs, Resistors, voltage, current, circuits, ICs, AC vs DC</td>
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<td>3 T</td>
<td>Week of 24 Jan</td>
<td>1</td>
<td>1</td>
<td>Introduction to the Lab, soldering irons, scope, software, adding LED(s) to a robot, dead reckoning, solving a maze, maze contest</td>
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<tr>
<td>4 T</td>
<td>31 Jan</td>
<td>2</td>
<td>2</td>
<td>Voltage Divider, Bump Sensors, pull up/down resistors, Cds cells, variable resistors, resistor ladder networks, A/D, battery level sensor.</td>
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<tr>
<td>5 T</td>
<td>Week of 7 Feb</td>
<td>2</td>
<td></td>
<td>Light sensing with Cds cells, A/D ports, voltage divider, battery level (self-</td>
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<tr>
<td>Date</td>
<td>Topic Description</td>
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<tr>
<td>6 T 14 Feb</td>
<td>DC Motors, Servos, PWM signals, IR sensors, modulation, transistors, H-Bridges, motor drivers</td>
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<tr>
<td>7 T Week of 21 Feb</td>
<td>Add a servo “head” to a robot, add IR and CdS sensors to a robot, PWM signals, cables to connect CdS and IRs</td>
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<td>8 T 28 Feb</td>
<td>Introductory robot programming, simple behavior software, serial and parallel communications, Serial I/O</td>
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<td>9 T Week of 13 Mar</td>
<td>Developing behaviors on a robot, RS-232, interface to a PC, Feedback &amp; Monitoring, find a beacon</td>
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<td>10 T 20 Mar</td>
<td>Digital signals, Sampled-data, tones, sampling frequency, piezo speakers, Making Oral Presentations. Advanced topics, modern sensors, show &amp; tell, MIL, CIMAR, Robot Team plan for the contest, MS PowerPoint basics</td>
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<td>11 T Week of 27 Mar</td>
<td>Adding a piezo speaker to a robot, playing music on a robot, vision, USB.</td>
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<tr>
<td>12 T 3 Apr</td>
<td>Advanced topics, modern sensors, show &amp; tell, MIL, CIMAR, Robot Team plan for the contest, MS PowerPoint basics</td>
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<td>13 T Week of 10 Apr</td>
<td>Multiple sensors/behaviors, Class Contest, Make Video.</td>
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<td>14 T 17 Apr</td>
<td>No class. Work on your presentation (maximum of 6 minutes)</td>
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<tr>
<td>15 T 24 Apr</td>
<td>Final Oral Presentations, Dress up, Video, Wrap up, Evaluations, Feedback</td>
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Students will use a simple language (such as our version of LOGO, POGO, BASIC or function calls in C) to develop very simple behaviors on an autonomous robotic platform. PCs (or personal laptops) will be used to develop some rudimentary robot software. MS Word and MS PowerPoint will also be used.

Students will conduct 6 laboratory projects during the semester (one every two weeks). Each lab sessions corresponds to one or more of the eight topics listed above. In the first lab students are allowed to play, muse and compete in teams attempting to solve a maze with a robot.

15. **Attendance and Expectations** - Attendance is taken in all classes and labs. Students are allowed 1 absence during the semester. Each subsequent absence will result in a 1/3 letter grade deduction (i.e., A to A-, or A- to B+, B+B). It is important to arrive.
promptly to each class/lab; late arrivals will count as $\frac{1}{2}$ of a missed class ($\frac{1}{2}$ class absence).

16. **Grading – Grades are based on ATTENDANCE**, two small oral presentations, and laboratory and class participation. No exams, quizzes or homework.

17. **Grading Scale** –
- A 90.0 - 100
- A- 86.7 - 89.9
- B+ 83.3 - 86.6
- B 80.0 - 83.3
- B- 76.7 - 79.9
- C+ 73.3 - 76.6
- C 70.0 - 73.3
- C- 66.7 - 69.9
- D+ 63.3 - 66.6
- D 60.0 - 63.3
- D- 56.7 - 59.9
- E 56.6 - 0

“A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: [https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx)

18. **Make-up Exam Policy** – This course has no exams.

19. **Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves 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 UF student and to be honest in all work submitted and exams taken in this course and all others.

20. **Accommodation for Students with Disabilities** – Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

21. **UF Counseling Services** – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.
22. **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.

23. **UF Policy regarding Religious Holidays** –

The Florida Board of Education and state law govern university policy regarding observance of religious holidays. The following guidelines apply:

- Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith.
- Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.
- Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

If a faculty member is informed of or is aware that a significant number of students are likely to be absent from class because of a religious observance, the faculty member should not schedule a major exam or other academic event at that time.

A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence. Furthermore, a student who believes that he or she has been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.