

## Course Syllabus

### **Automotive Safety and Security**

EEL 5934

**Class Periods:** Tue 3:00-4:55pm; Thu 4:05-4:55pm

**Location:** CSE E107

**Academic Term:** Spring 2019

#### **Instructor:**

- Name: Sandip Ray
- Email Address: sandip@ece.ufl.edu
- Office Phone Number: +1 (352) 392-1605
- Office Hours: Wed 3-4:30pm BEN 323

**Teaching Assistants:** TBD

#### **Course Description**

In this course, we will study architectures of current and emergent automotive systems, and get a sense of the trend as we move towards increasingly connected autonomous vehicles. We are on the verge of the so-called 4<sup>th</sup> Industrial Revolution, ushering in a world where all things, humans, and processes, and data continuously communicate with one another enabling them to respond smartly to their environment. Autonomous, connected vehicles constitute one of the most crucial and most complex components of this connected ecosystem. Electronics and software play the central role in realizing the functionality and security needs for autonomous cars. We will explore the role of automotive systems in the context of connectivity and analyze some key challenges in making these systems robust, i.e., safe, secure, and reliable, in this context.

The course will bring together concepts from diverse areas of Computer Science and Computer Engineering, including Computer Architecture, Hardware and System Security, Real-time Systems, Machine Learning, Formal methods, Embedded system design, and Computer Networks. You will get an understanding of the cooperation, conflicts, and trade-offs among these largely disparate areas, and how to account for them the design of realistic, safety-critical applications. You will get the opportunity to have hands-on experience in design and analysis of several aspects of robust, autonomous, automotive systems.

#### **Course Pre-Requisites / Co-Requisites**

No specific pre-requisite. However, students are expected to have a general background on Computer Architecture and Digital Systems Design. Students should also have some familiarity with programming in C/C++, debugging, and the Linux operating system.

#### **Course Objectives**

Upon completion of the course, students should have a of the working principles of current and future automotive systems:

- Electronics and software responsible for various autonomous functionality of the vehicle
- Notions such as functional safety, security, and reliability in current and future cars
- Trade-offs and conflicts involved in automotive electronic design
- Variety of automotive standards, certifications, and regulations
- Current practices in automotive safety and security design
- Automotive software challenges

### ***Materials and Supply Fees***

None

### ***Required Textbooks and Software***

No textbook. Relevant research papers and other notes will be provided in class.

### ***Course Contents (Tentative)***

- Introduction to automotive systems and their evolution
- Challenges and characteristics of autonomous automotive systems
- Introduction to automotive robustness: safety, security, reliability
- Functional Safety: ISO26262 and Its variants
- Automotive security: How to hack a car?
- Trade-offs between security, safety, privacy, and real-time constraints
- Automotive systems and transportation infrastructure: communication and conflicts
- Challenges in automotive supply chain

### ***Attendance Policy, Class Expectations, and Make-Up Policy***

- Attendance is required, but not monitored. Students are responsible for being up-to-date with all information communicated in class.
- The class is interactive. Feel free to interrupt and ask relevant questions. However, questions not directly related to the topic under discussion or requiring elaborate answers may be relegated to office hours.
- Cell phones may not be used as calculators. Cell phones must be turned off at all times including exams and lectures.
- The communication functions including text messaging on all devices must be turned off during exams.
- Students are not allowed to sell or distribute notes provided for this class.
- Excused absences are consistent with university policies in the graduate catalog (<http://gradcatalog.ufl.edu/content.php?catoid=11&navoid=2486#attendance> (<http://gradcatalog.ufl.edu/content.php?catoid=11&navoid=2486#attendance>)) and require appropriate documentation.
- Students who anticipate the necessity of being absent from class due to the observation of a major religious observance must provide notice of the date(s) in writing by the second meeting.
- All late assignments receive zero credits no matter what the reason. This means students must plan to finish their work before deadline to avoid delays due to “technical difficulties”. Online assignments (on Canvas) will timeout at the deadline and cannot be made up. Canvas gets very busy around common

due times, such as midnight, so all assignments will be due at 4 AM for this reason. Emailed assignment will have an arrival timestamp. All emails received after the deadline will be considered late submission.

- The instructor reserves the right to interpret the class policies if confusions may occur.

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### ***Evaluation of Grades***

<b>Assignment</b>	<b>Percentage of Final Grade</b>
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Paper presentation	30%
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Presentation review	30%
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Term paper/project	40%
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TOTAL	100%
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### ***Grading Policy***

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
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93.0 - 100	A	4.00
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90.0 – 92.9	A-	3.67
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87.0 – 89.9	B+	3.33
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83.0 – 86.9	B	3.00
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80.0 – 82.9	B-	2.67
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77.0 – 79.9	C+	2.33
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73.0 – 76.9	C	2.00
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70.0 – 72.9	C-	1.67
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67.0 – 69.9	D+	1.33
63.0 – 66.9	D	1.00
60.0 – 62.9	D-	0.67
0 – 59.9	E	0.00

The class is not curved. If everyone does well, everyone can get an A.

In order to graduate, graduate students must have an overall GPA and a major GPA of 3.0 or better (B or better). Note: A “B-” average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement.

More information on UF grading policy may be found at: <http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020> [\\_ \(http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020\)](http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020)

### ***Students Requiring Accommodations***

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals> [\\_ \(https://evaluations.ufl.edu/evals\)](https://evaluations.ufl.edu/evals). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/> [\\_ \(https://evaluations.ufl.edu/results/\)](https://evaluations.ufl.edu/results/).

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***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.

### **Campus Resources:**

#### *Health and Wellness*

#### **U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352-392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc> [\\_ \(http://www.counseling.ufl.edu/cwc\)](http://www.counseling.ufl.edu/cwc), and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

#### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/> [\\_ \(http://www.police.ufl.edu/\)](http://www.police.ufl.edu/).

#### *Academic Resources*

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu). <https://lss.at.ufl.edu/help.shtml> [\\_ \(https://lss.at.ufl.edu/help.shtml\)](https://lss.at.ufl.edu/help.shtml).

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/> [\\_ \(https://www.crc.ufl.edu/\)](https://www.crc.ufl.edu/).

**Library Support**, <http://cms.uflib.ufl.edu/ask> [\\_ \(http://cms.uflib.ufl.edu/ask\)](http://cms.uflib.ufl.edu/ask). Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/> [\\_ \(https://teachingcenter.ufl.edu/\)](https://teachingcenter.ufl.edu/).

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/> [\\_ \(https://writing.ufl.edu/writing-studio/\)](https://writing.ufl.edu/writing-studio/).

**Student Complaints Campus:** [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf) [\\_ \(https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf\)](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process> [\\_ \(http://www.distance.ufl.edu/student-complaint-process\)](http://www.distance.ufl.edu/student-complaint-process).

# Course Summary:

**Date**

**Details**

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