# EGN 1935: Fundamentals of Vehicular Communication

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<tr>
<th>Course title/number, number of credit hours</th>
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<tr>
<td>EGN 1935: Fundamentals of Vehicular Communication</td>
<td>3 credit hours</td>
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## 2. Course prerequisites, co requisites, and where the course fits in the program of study
Programming in Java/C++/C#/Python/C preferred.

## 3. Course logistics

**Term:** Summer 2016

Vehicular communication will be in all cars in the very near future. Cars will be able to “talk” to each other and provide important services such as collision prevention, safety-related information, and even social networking and entertainment. This powerful, cutting-edge technology is currently being developed by the Smart Drive initiative at Florida Atlantic University. This course enables you to learn about and experience this technology. You will participate in learning the concepts of vehicle-to-vehicle (V2V) communication, developing prototype vehicular communication through simulation tools, programming microprocessors and radio chips, as well as building prototype circuits using breadboards, chips, resistors, etc. You will use 3-D printers to create parts, design Printed Circuit Boards (PCBs), and learn to how solder.

The course will be held during for 3 weeks, MWF, 9.30 AM to 4.30 PM, in EE 208 and 212, during summer 2016. Blackboard will be used for posting assignments, material, and grades.

## 4. Instructor contact information

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Assistant Instructor</th>
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<tr>
<td>Dr. Imad Mahgoub</td>
<td>Dr. Monika Rathod</td>
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**Office address:**
Engineering East (EG-96) Bldg., Room 421

**Office Hours:**
561-297-3458
mahgoubi@fau.edu, mrathod@fau.edu

## 5. Teaching Assistant contact information

<table>
<thead>
<tr>
<th>Teaching Assistant</th>
<th>Email address</th>
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<tr>
<td>Alain Edwards</td>
<td><a href="mailto:aedwar50@fau.edu">aedwar50@fau.edu</a></td>
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## 6. Course description

The course will help students gain theoretical and practical knowledge in vehicular communication networks. Students in groups of two will use C programming language to program microprocessor and ZigBee radio chips, and put together a circuit for a prototype car. Each student will learn to use a 3D design application called Inventor, a PCB design studio called EagleCAD, and learn how to solder the PCB. Students will test their prototype vehicles using an emergency vehicle message to change lanes clear the path for the emergency vehicle. This class will teach the computer engineering aspects of designing, developing, testing and creating working prototype models for vehicular communication.

## 7. Course objectives/student learning outcomes/program outcomes

### Course objectives
This course is designed to combine theory, programming and hardware to build prototype vehicles to emulate vehicle-to-vehicle communication.

### Student learning outcomes & relationship to ABET objectives:
(a) an ability to apply knowledge of mathematics, science, and engineering
We believe that this course addresses all of the listed ABET sub-criteria

(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to function on multidisciplinary teams
(d) an ability to identify, formulate, and solve engineering problems
(e) an understanding of professional and ethical responsibility
(f) an ability to communicate effectively
(g) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(h) a recognition of the need for, and an ability to engage in life-long learning
(i) a knowledge of contemporary issues
(j) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

8. Course evaluation method

| Midterm exam 25%; Final exam 25%; Final Team Project 40%; Final demo, video and presentation: 10%; Bonus 5% | Note: The minimum grade required to pass the course is C. |

You will use Blackboard to access documentation and grades.

Individual team member’s grades may differ dependent on input from other teammates.

9. Course grading scale

Grading Scale: It will not be based on a curve. Expected distribution is given below:

10. Policy on makeup tests, late work, and incompletes

There are two exams during the term in this course.

A grace period of 1 day is allowed for submission of assignments. Students are expected to be in attendance during all the class hours.

Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation incomplete grades will not be given.

11. Special course requirements

Students are expected to use their own laptops.

12. Classroom etiquette policy

Students have to use laptops in the class to conduct tool installation, training and programming. Also, classes will be more problem solving oriented – you will be asked to read and try out tutorials ahead of time. There will be significant interaction among the students and the professor/teaching assistants, during the classroom, on a basis to solve problems and gain deeper insight. Have your laptop ready and be prepared to use it during the lectures. Here is a site with Net Etiquette rules: [http://www.albion.com/netiquette/corerules.html](http://www.albion.com/netiquette/corerules.html) - please familiarize yourself with it.
13. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton campus, SU 133 (561) 297-3880 and follow all OSD procedures.

14. Honor code policy

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf

15. Required texts/reading

Reading material will be provided in class

16. Course topical outline, including dates for exams

Students will work in team of two (or three) to develop the prototype vehicle:

1. Development tools: Inventor, EagleCAD, Code Composer Studio, and XCTU
2. Introduction of vehicular communication technology
3. Vehicular networks applications
4. Communication protocols
5. Performance and security
6. Learning binary and hexadecimal number systems
7. Radio frequency communication and programming ZigBee radio chip
8. Inventor to design 3D vehicle part
9. Rapid prototyping using EagleCAD to design PCB
10. Computer architecture and programming microprocessor chip
11. Building a circuit on a breadboard for prototype vehicle
12. Solder PCB for prototype vehicle
13. Simulation tool to observe vehicular network
14. Midterm will be on the 4th class day and final will be on the 8th class day
15. Project Demo, Presentation, & Video