ECE 101: Introduction to Electrical and Computer Engineering

Spring 2016

Instructor: Dr. Pelin Kurtay
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Instructor Office Hours: Tuesdays 9:30-11:30 a.m. and 2:00-4:30 p.m.
Nguyen Engineering Building Room 3100

Class TA: Mr. Arun Bharg Palaparthy
TA Email: apalapar@gmu.edu

Lab TAs: Ms. Lakshmi Bhamidipati (lbhamid2@gmu.edu)- Sections 202 and 203
Mr. Arun Bharg Palaparthy (apalapar@gmu.edu)- Sections 201 and 204

Catalog Description: Introduces fundamental concepts in Electrical and Computer engineering and provides insight to the various careers in each field. Both theory and practical applications of electronic components are covered through examples of real world applications. Topics are reinforced through hands-on laboratory experiments.

Course Objectives:
The ECE-101 course essentially aims to fulfill the following main objectives:

• To provide an understanding of basic electrical and computer engineering (ECE) theory, concepts and their applications.
• To introduce students to mathematical foundations used in electrical and computer engineering
• To introduce students to contemporary issues and state of the art technologies through in-class discussions and examples. By visiting various websites and discussing latest developments in the electrical and computer engineering field, students get a better appreciation and understanding on trends and industry directions.
• To provide hands-on practical experience through laboratory experiments. By performing the laboratory experiments, mathematical abilities are reinforced and theoretical discussions of the lecture are tied in to practical applications.
• To develop problem solving skills and critical thinking skills. By solving exercises in class and through homework assignments, students develop and expand on their problem solving abilities. Troubleshooting circuits and debugging equipment issues during the labs also develops problem solving and critical thinking skills.
• To provide an understanding of the various careers in the ECE field and of professional and ethical responsibility as students and future engineers.

Accreditation:
The Electrical Engineering and Computer Engineering programs are accredited by ABET Inc. ECE-101 is used to measure two outcomes (f) and (j) of the following 11 ABET outcomes:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
Program Educational Objectives
Program Educational Objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. They are consistent with the mission of George Mason University and the Engineering Criteria of ABET. Program Educational Objectives of each program are developed in consultation with program constituencies, which include students, alumni, employers, faculty and Department's Advisory Board and are periodically reviewed, revised and documented. The objectives of both the Electrical Engineering program and the Computer Engineering program are the same.

These Program Educational Objectives are:
(The 2013 version, approved by ECE Advisory Board on March 9, 2013):
Graduates of the Computer Engineering and/or Electrical Engineering program are expected within three to five years of graduation to have:

- Established themselves as successful and productive engineering professionals or engaged in advanced study such as a graduate degree program.
- Worked effectively in team environments and individually.
- Fulfilled their responsibilities in the areas of ethics, continuing professional development and effective communications.

Rationale:
The course mainly provides a foundation for upper level classes. Students gain background in electrical and computer engineering concepts necessary to succeed in higher level courses.

Credit Hours: 3
Prerequisites: None
Required Textbook: *None*
Other Reference Materials: Instructor’s notes, websites and videos posted on Blackboard

Administrative support:

Ms. Patricia Sahs
Academic Programs Coordinator
psahs@gmu.edu

Ms. Jammie Chang
Academic Programs Manager
jchangni@gmu.edu

Location: 3100 Engineering Building
Phone: 703-993-1569
Student Resources

GMU provides many useful resources that students can take advantage on campus. Some of these include career services, the university writing center, university life and counseling and psychological services. A full list of these services is available on the following link. Students are highly encouraged to use these resources.

http://ctfe.gmu.edu/teaching/student-support-resources-on-campus/

Mason Diversity Statement

George Mason University is fully committed to diversity. Further information on the University’s statement regarding this matter may be found from the following link:

http://ctfe.gmu.edu/professional-development/mason-diversity-statement/

Privacy

Instructors respect and protect the privacy of information related to individual students. Issues relating to an individual student will be discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student.

Assessable work other than final exams will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor, or via another secure method). Under no circumstances will a student’s graded work be returned to another student.

Students should also strive to respect the privacy of the faculty and staff and should not expect the instructor to respond to emails during times that are outside of regular business hours.

Disability Accommodations

If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Office of Disability Services (SUB I, Rm. 2500; 993-2474; http://ods.gmu.edu) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

The Office of Disability Services (ODS) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.

Accommodations for disabled students must be made in advance – ODS cannot assist students retroactively, and at least one week’s notice is required for special accommodations related to exams. Any student who needs accommodation should contact the Instructor during the first week of the semester so the sufficient time is allowed to make arrangements.
**Honor Code**

The integrity of the University community is affected by the individual choices made by each of us. GMU has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct.

Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me. The link below contains further information about the GMU honor code:

[http://oai.gmu.edu/](http://oai.gmu.edu/)

**Classroom Conduct:**

You are expected to be punctual, alert, and prepared for each class. Be considerate of other students, i.e., be quiet for the duration of the class period, except when you have something to contribute. Do not surf on the Internet during class time. Please feel free to ask questions and / or offer pertinent comments in class. If you are confused, more than likely, someone else is too. If you need extra help, please schedule an appointment in advance or drop by during regular office hours. Cell phones have no place in class. Either leave them behind or turn them off prior to entering the classroom.

Open laptops are allowed in the classroom only when specifically suggested by the instructor to be used as part of the instruction process, otherwise they must be closed and packed away. The same policy applies to tablets, smartphones, and other wireless connected devices.

Students are expected to interact with, and address faculty and staff in a professional and respectful manner. If you need to send an email to faculty or staff, please compose them such that it reflects a high level of professionalism. Make sure to include any pertinent information he or she might need to handle your request.

**Communications:**

Registered students will be given access to a section of the Blackboard Learning System for this course which may be accessed by visiting the following link:

[http://mymason.gmu.edu](http://mymason.gmu.edu)

Blackboard will be used as the primary mechanism (outside of in-class lectures) to disseminate course information, including announcements, lecture slides/notes, assignments, and scores for assignments and exams.
Communication with the Instructor on issues relating to the individual student should be conducted using Blackboard Mail, GMU email, via telephone, or in person - not in the public forums on Blackboard, or other network media. Students should not broadcast their messages to and from the instructor to the whole class or other groups of students.

For urgent messages, you should also attempt to contact the Instructor via telephone. GMU policy requires that any communication with a student related in any way to a student's status be conducted using secure GMU systems – if you use email to communicate with the Instructor you MUST send messages from your GMU email account.

Software:

A circuit simulation software called CircuitLab will be used to simulate circuits. The department subscribes to the circuitlab license so usage by students is free of charge. In order to use the software, you will need to create an account by visiting https://www.circuitlab.com/accounts/register/

You will need to use your GMU email address when registering/creating your account.

Examinations:

The examinations are intended to enhance the student’s classroom experience and challenge the student to correctly apply the course material. The final exam will be held during the scheduled final exam session.

http://registrar.gmu.edu/calendars/spring-2016/final-exams/

Grading

Grades will be awarded in accordance with the GMU Grading System for undergraduate students. See Academic Policies on the http://catalog.gmu.edu page under for more information.

The grading scale for this course is:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>97 – 100%</td>
<td>Passing</td>
</tr>
<tr>
<td>A</td>
<td>94 – 96%</td>
<td>Passing</td>
</tr>
<tr>
<td>A-</td>
<td>90 – 93%</td>
<td>Passing</td>
</tr>
<tr>
<td>B+</td>
<td>86 – 89%</td>
<td>Passing</td>
</tr>
<tr>
<td>B</td>
<td>82 – 85%</td>
<td>Passing</td>
</tr>
<tr>
<td>B-</td>
<td>78 – 81%</td>
<td>Passing</td>
</tr>
<tr>
<td>C+</td>
<td>74 – 77%</td>
<td>Passing</td>
</tr>
<tr>
<td>C</td>
<td>70 – 73%</td>
<td>Passing</td>
</tr>
<tr>
<td>C-</td>
<td>66 – 69%</td>
<td>Unsatisfactory *</td>
</tr>
<tr>
<td>D</td>
<td>60 – 65%</td>
<td>Unsatisfactory *</td>
</tr>
<tr>
<td>F</td>
<td>0 – 59%</td>
<td>Failing *</td>
</tr>
</tbody>
</table>

* Grades of "C-" and "D" in this course are considered unsatisfactory. According to departmental policy, no C- or D grades in ECE, BENG, CS or ENGR courses can be submitted for the BSEE, BSCpE, or BSBioE degree. You will need to repeat the course if you obtain a grade of C- or lower.
Raw scores may be adjusted by the Instructor to calculate final grades.

Final grades will be posted to [http://patriotweb.gmu.edu](http://patriotweb.gmu.edu), which is the only vehicle for students to obtain those grades. A student with a "hold" on his/her PatriotWeb account will be unable to access final grades until the hold has been removed by the Registrar.

Grading for the course will be based on the following:

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm exam #1</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm exam #2</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Homework</td>
<td>25%</td>
</tr>
<tr>
<td>Laboratory</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Description of Graded Items**

**Midterm and Final Exams**

Midterm exams are held on the date scheduled on the course calendar at the end of this syllabus. Midterm exams will start at 12:00 noon and the final exam will start at 10:30 a.m. **Any student coming in more than 10 minutes late to an exam may not be permitted to take the exam.** There will be a combination of multiple choice and written questions. All work must be shown to receive full credit for your answers. All exams will be closed notes, closed book, only calculators will be allowed. Make sure to bring a calculator to all the exams. **Calculator sharing will not be permitted during any exam. Graphing calculators are NOT permitted.** The instructor may randomly select calculators for inspection during the final exam.

Students without proper identification (Student ID, Drivers license, etc) will **not be admitted** to any exam. No student will be allowed to leave the classroom within the first 30 minutes of any exam. The final exam will be **comprehensive**, with an emphasis on the latter part of the course. Make-up exams will only be given to students with highly legitimate excuses. **You must present solid proof of your reasons to do so in advance.** Otherwise, a makeup exam will be denied.

**Homework**

There will be 6-8 homeworks that are strictly due **as hard copies** at the beginning of the lecture on the specified due date. The homework assignment and its due date will be posted on Blackboard. **Late submissions or homework via email will not be accepted except under highly legitimate circumstances.** Homework assignments should be done individually. Failure to submit your own work will result in penalty per the honor code. You must show all your work, clearly indicating how you got the answer, not just the answer or else **you will be deducted points.** Not all problems in the homework are assigned equal points-some problems will be assigned more points than others. No one is allowed to hand in hw assignments after class begins (i.e. while the instructor is teaching). If you come in late, please wait until **after** the lecture has ended to submit your paper on the table.
Homework assignments may contain multiple choice questions so please submit your responses to the multiple choice questions on a scantron unless otherwise specified by the instructor. The type of scantron required is the green scantron (Form 882-E)

**Laboratory**

All students must register for both the lecture and one of the laboratory sections. Lab experiments are designed and intended to complement material discussed in the class. Students must be well prepared for the lab sessions to maximize the use of time in the lab. **It is mandatory for all students to read the lab experiments prior to attending the lab sessions.** There is a separate syllabus for the lab component of this course so it is important to familiarize yourself with the policies related to it by reading the lab syllabus. Each student must attend the lab section they are registered for. Registering for one section while attending another is not permitted.

Lab experiments are performed in teams of two students however lab midterm and lab exams are individual efforts. Each student has to purchase a lab kit from the ECE lab tech support room ENGR 3916.

The laboratory manual will be available for download through the Blackboard folder. It is advisable to print and bring the manual to each lab to use as a reference when performing the experiments each week.

**Description of Non-Graded Items**

Each student in the class is requested to submit an electronic photograph that contains an image of only themselves on Blackboard. This helps the instructor gain familiarity with the names of the students in the large sections of the course.

**Other Course Policies**

- Important announcements may be posted on Blackboard so please make sure to follow the announcements and discussion board periodically. The discussion board on Blackboard may also be used for online discussions between students.
- **Late submissions or assignments sent via email will not be accepted except under highly legitimate circumstances.** Failure to submit your own work will result in penalty per the honor code.
- Any student acting in disrupting behavior may be asked to leave the classroom by the instructor.
- You may direct your questions to the course instructor during regular office hours. You may also request an appointment to meet with her if you are unavailable during these office hours.
- Students with special requests/circumstances need to contact the instructor within a week after these special circumstances arise.
- The last day to drop the course with no tuition liability is January 26th. The last day to drop is February 19th. The selective withdrawal period is February 22– March 25. Please check the GMU academic calendar for further information: [http://registrar.gmu.edu/calendars/spring-2016/](http://registrar.gmu.edu/calendars/spring-2016/)

Wishing you a great semester!

**ECE-101: Tentative List of Selected Topics (Technical)**

- Syllabus Review
- Voltage, Current, Resistance
- Conductors, Insulators, Semiconductors
- Resistors
- Intro. to Circuits
- Ohm’s Law
Series and Parallel Circuits
Measurement equipment
KVL, KCL
Voltage/Current divider circuits
Review of prefixes and scientific notation
Power
LEDs
Other Diodes
AC/DC
Voltage Rectification
Transformers
Sinusoidal signals
Average, RMS peak and peak-to-peak voltages
Mathematical representation of sine waves
Capacitors
Electronic Filters
Inductors
Transistors
Integrated Circuits
The Binary System
Hexadecimal and other numbering systems
Binary Coded Decimal
7-Segment Display
Text Codes
Digital Logic
Logic Gates
Boolean Expressions
Combinational logic circuits
Sequential logic circuits
Flip-Flops
Analog vs. Digital
Analog to Digital Conversion
Storage systems
Communication systems

ECE-101: Tentative List of Topics (Non-Technical)

Industry trends
Contemporary issues
ECE Careers
Professionalism
Ethical issues
IEEE
ECE related news resources