ECE 220 – Continuous-Time Signals and Systems
Department of Electrical and Computer Engineering
George Mason University
Fall 2018

Class Meeting Information
Day and Time: Tuesday and Thursday, 10:30 – 11:45 am
Location: Innovation Hall, Room 105

Instructor Information
Course Instructor: Dr. Jill K. Nelson
Office: 3216 Engineering Building
Email Address: jnelson@gmu.edu
Phone: 703-993-1598
Office Hours: Tuesday, 1-3 pm

Recitation Instructor: Dr. Timothy Beatty
Email Address: tbeatty@gmu.edu
Office Hours: Wednesday, 10 am – 12 pm, ENGR 3202

Teaching Assistant Information
Jay Raval – Laboratory
Email address: jraval2@gmu.edu
Office hours: Monday, 4:30-6:00 pm, ENGR 3204
Tuesday, 3:00-4:30 pm, ENGR 3204

Haotian Zhai – Laboratory
Email address: hzhai@gmu.edu
Office hours: Tuesday, 4:30-6:30 pm, ENGR 3204
Thursday, 9:30-10:30 am, ENGR 3204

Marjan Saadati – Homework grading, Laboratory
Email address: msaadati@gmu.edu
Office hours: TBA

Umair Aslam – Undergraduate assistant
Email address: uaslam@masonlive.gmu.edu
Office hours: Monday, 1:30-3:30 pm, ENGR 3204

Qingyang Dai – Graduate assistant
Email address: qdai@masonlive.gmu.edu
Office hours: TBA

Course Website
The course website is located within Blackboard, accessible via mymasonportal.gmu.edu. You can log into Blackboard using the same login name and password you use to log into your Mason email account. You need to be registered for the course in order to access the course website. Reading assignments, homework assignments, solutions, announcements, and any miscellaneous handouts will be posted on the
website. Please check it frequently for updates.

**Required Textbook**

**Other Required Materials**
- iClicker 2-- [http://www.iclicker.com](http://www.iclicker.com)

**Course Overview**
This course includes key concepts for the description and analysis of continuous-time signals and systems, a fundamental area of electrical and computer engineering (ECE). Students will learn about system properties, convolution, frequency representation and analysis, filter design and implementation, and sampling.

The contact hours for this course include two class meetings, one laboratory session, and one recitation session per week. Class time is divided among short quizzes, short lecture segments on key concepts, and in-class exercises. Students are expected to do the assigned reading prior to coming to class so that they are adequately prepared to answer quiz questions and to participate in the interactive problem-solving sessions.

In addition to content-specific objectives, this course is also designed to engage students in scholarship within the discipline of electrical and computer engineering. This course is designated as a *Discovery of Scholarship* course by the Office of Student Scholarship, Creative Activities, and Research (OSCAR). To fulfill its Discovery-level goals, this course will introduce students to scholarship, both as a general concept, and as done at Mason by students and faculty. They will also learn about the OSCAR program and opportunities for undergraduates to participate in research. By the end of the semester students will understand how knowledge of ECE is generated and disseminated through scholarship, and the importance of scholarship to society.

**Class Meetings**
You are expected to prepare for each class. This includes reviewing previously covered material, as well as completing the assigned reading. The assigned reading for each class period will be posted on the course website. You are expected to complete the assigned reading before coming to class. You will need material in the reading, as well as material from previous class periods, in order to successfully complete problems assigned in class.

Active participation in class has been shown to improve learning and retention. Each class period will include a combination of lecture and in-class problems to facilitate active engagement. The in-class problems will give you a chance to apply the material you have learned from your reading and from the lecture. Responses to most in-class problems will be submitted via iClicker. (More information about iClickers can be found below.) Some in-class problems will be solved individually, and some will be solved in small groups. Many class sessions will begin with a warm-up/review problem focused on the assigned reading and/or material from the previous class session.

Because some class time is devoted to problem solving, not all material will be covered in a lecture format. You are responsible for material covered in the reading, even if it is not covered in lecture, and such material will be included on homework assignments and/or on exams.

You are expected to attend each class period. While attendance is not explicitly recorded, absences will be apparent in your quiz and in-class problem performance. If you are not present, you are responsible for
the material covered during the class and for obtaining notes from another student. Additionally, you are responsible for turning in any assignments due at the beginning of the class period.

All alarms, ringers, etc., must be turned off during class. Engaging in texting, gaming, or other activity not related to class is considered a distraction to the instructor and to those trying to focus on the class. Students engaging in non-class-focused activities will be asked to put away electronic devices or leave the classroom.

**iClickers**
This course will use iClickers, a classroom response system, to facilitate the quizzes and in-class problems. The iClicker system provides immediate feedback about overall class understanding, which can lead to class discussion to clarify misconceptions and common mistakes.

You are expected to purchase an iClicker 2 device for use in this course. To learn more about the iClicker 2, please visit the iClicker website at [http://www.iclicker.com/](http://www.iclicker.com/).

You must register your iClicker 2 device online at [https://www1.iclicker.com/register-clicker/](https://www1.iclicker.com/register-clicker/).

Important information when registering your iClicker:
- GMU uses a Learning Management System (Blackboard).
- Your student ID is the prefix of your email address.

Guidelines for iClicker use:
- You must register your iClicker in order to use it in this course.
- You must bring your iClicker to every class. If you do not bring your iClicker to class, you will not receive credit for the quiz or in-class exercises during that class session.
- You may use only your iClicker and no one else's. If you are caught using more than one iClicker, all of them will be confiscated for the duration of class, and you will receive a 0 for that day's quiz and in-class exercises. Only your iClicker will be returned at the end of class.

**Recitations**
ECE 220 includes one 50-minute recitation per week, led by Dr. Timothy Beatty. The recitation session will include additional examples designed to enhance your understanding of the material covered in class, as well as review of assigned homework problems. Like lecture, recitation is an active learning environment. You will be expected to work problems and to collaborate with others in the session. Extensions of material covered in class may also be presented in recitation. Attendance is expected, and you will be responsible for all material covered in recitation. A part of your grade for the course will be based on your participation in recitation. Additionally, homework assignments will be submitted and returned in the recitation sections.

**Laboratory**
There will be a series of six MATLAB assignments to be completed in the laboratory. The laboratory assignments are a required component of the course. Failure to complete all the lab assignments will result in a failing grade for the course. MATLAB projects must be handed in electronically via Blackboard.

**Homework Assignments**
Homework assignments will be given approximately weekly throughout the course and will be posted on the course website. The assignment due dates will be given in the assignments.
Homework assignments will be submitted in recitation. Homework assignments are due at the beginning of the recitation period on the due date. No late homework assignments will be accepted. Solutions will be posted on the course website. The lowest homework grade will be dropped when computing each student’s overall homework score.

You are expected to do ALL the assigned problems. In making up the exams and in assigning a final grade, I will assume that you have worked ALL the problems. Most exams will include one problem very similar to one of the homework problems. Thus, there will be a very immediate benefit to doing the homework completely and diligently.

Homework submissions should be typed or written neatly. Pages should be stapled, and problems should appear in order. Problem sets may be returned ungraded if they don't meet these requirements.

You are encouraged to work in groups and discuss the assigned problems. However, the work you turn in should be your own. You must write up your own solutions for the homework problems. If you use material from other sources such as, but not limited to, the web, books, journals, etc., you must reference the source. Copying (including copying existing solutions) or other forms of cheating will be reported to the Honor Committee.

Exams
The course will include two mid-term exams (given during class) and one final exam. The dates for these exams are given below:
Midterm Exam 1: Thursday, October 4, in class
Midterm Exam 2: Thursday, November 15, in class
Final Exam: Tuesday, December 18, 10:30 am – 1:15 pm

Each of the mid-term exams will focus on the material that has been covered since the previous exam. However, much of the material in the course builds on the material that is covered before it. Hence, even though the in-class exams are not explicitly cumulative, they will require an understanding of the basic material on which the tested material builds. The final exam will be cumulative, explicitly evaluating your understanding of all material covered in this course.

All exams will be closed book and closed notes unless otherwise stated by the instructor. Absolutely no collaboration is allowed on exams.

Grading
Your final score will be based on a weighted combination of your scores on in-class problems, homework assignments, recitation attendance, quizzes, laboratory projects, and exams as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm 1</td>
<td>18%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>19%</td>
</tr>
<tr>
<td>Laboratory Projects</td>
<td>15%</td>
</tr>
<tr>
<td>Recitation Attendance</td>
<td>4%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>5% (lowest score will be dropped)</td>
</tr>
<tr>
<td>In-Class Problems</td>
<td>4% (lowest score will be dropped)</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>9% (lowest score will be dropped)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>26%</td>
</tr>
</tbody>
</table>

A request for a grade change for any assignment must be provided to the instructor within two class periods after the assignment is returned. The request must include the graded assignment in question and...
a written statement describing why a grade change is requested. The instructor or grader will re-grade the assignment. Note that your score may be either increased or reduced (or remain unchanged) in a re-grade.

**Honor Code**

George Mason is an Honor Code university. The principle of academic integrity is taken very seriously and violations are treated gravely. Three fundamental 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, factual information, graphs or figures from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Note that paraphrased material must also be cited. 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 the instructor.

All students are expected to abide by the George Mason University Honor Code. Any reasonable suspicion of an honor code violation will be reported. You must review the rules of the Mason Honor Code and be familiar with them. The Mason Honor Code can be found at: https://oai.gmu.edu/mason-honor-code/.

**Reposting of Course Material to Other Websites**

The course materials (lecture notes, homework assignments, projects, exams, solutions, and anything else posted on the course website) are copyrighted. You may not upload them to any other website or share them with any on-line or off-line test bank.

**Office of Disability Services (ODS)**

If you are a student with a disability and require special accommodations, please contact me and the Office of Disability Services (ODS) as soon as possible. All special accommodations must be arranged through ODS.

Office of Disability Services (ODS): 703-993-2474; http://ods.gmu.edu

**Other Useful Campus Resources**

- Writing Center: A114 Robinson Hall; 703-993-1200; http://writingcenter.gmu.edu
- University Libraries: “Ask a Librarian” http://library.gmu.edu/ask
- Counseling and Psychological Services (CAPS): 703-993-2380; http://caps.gmu.edu
- The University Catalog: http://catalog.gmu.edu
- University Policies: http://universitypolicy.gmu.edu

**Tentative Weekly Schedule**

- Week 1 – Introduction; basic signals; system properties
- Week 2 – Continuous-time convolution
- Week 3 – LTI systems; differential equations
- Week 4 – Eigenfunctions and Fourier series
- Week 5 – Fourier series; Fourier transform
- Week 6 – More Fourier transform
- Week 7 – Filters
- Week 8 – Sampling and reconstruction
- Week 9 – Filter design
Week 10 – Laplace transform; Bode plots
Week 11 – More Laplace transform; z-transform
Week 12 – More z-transform; block diagrams
Week 13 – Filter implementations and applications
Week 14 – Special topics