Course Syllabus

ELCT 222 – Signals & Systems

Course Coordinator: Undergraduate Program Committee

Catalog Description: Introduction to signal processing and linear systems

Credit Hours 3

Prerequisite(s) by course MATH242 and ELCT 221

Prerequisite by topics Potential & Voltage, Current & Ohm’s Law, KCL & KVL, Nodal & Mesh Analysis,
Thevenin & Norton Equivalent sources, AC Circuits, Differential Equations, Laplace transform methods, Series method

Required Textbook Boylestad, Introductory Circuit Analysis, Pearson.
Oppenheim, Signals & Systems, Pearson

Course Outcomes:
Students who are successful in this class (i.e. earn a C or better) will demonstrate at least the abilities to:

- analyze RL and RC linear circuits and systems in the time and frequency domains.
- sketch frequency response plots (Bode diagrams) for RLC linear circuits.
- use engineering tools such as Matlab to construct accurate frequency response plots.
- analyze first-order linear active filters (using operational amplifiers) in the frequency domain.
- use the techniques of Fourier series, Fourier transforms, and Laplace transforms for the analysis of first- and second-order linear systems

Students who demonstrate higher proficiency will earn higher grades.

Course Topics:
- First-order circuits
- Second-order circuits
- Frequency responses
- First- and second-order linear filter circuits
- Introduction to the Laplace transform
- Application of the Laplace transform
- Fourier series
- Fourier transform
- Introduction to Operational Amplifiers

Course Contribution to Program Outcomes:
ELCT 222 contributes to an achievement of:
- Outcome A – an ability to apply knowledge of mathematics, science and engineering
- Outcome K – an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
General Course Policies

Academic Integrity
Unless otherwise stated, assignments and examination work are expected to be the sole effort of the student submitting the work. Students are expected to follow the University of South Carolina Honor Code and they should expect that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

Accommodating Disabilities
Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasds@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

Diversity
When scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

Recommended Study Habits
- Read the assigned material before class.
- Bring thoughtful questions to class for discussion.
- Prepare for the exams in study groups.
- Take notes during class discussions and while completing reading assignments.

Deviations
Minor deviations from the syllabus are a normal part of any adaptive teaching and learning process.
Instructor’s Addendum for Fall 2015

Instructor: Dr. Charles Brice
Office: Swearingen 3A22
E-mail: brice@cec.sc.edu
Phone: 803.777.7049
Office hours: by appointment
Class Location: Swearingen 2A27
Teaching Assistant: Mirwazul Islam,
islam4@email.sc.edu

Course Delivery Structure:
Lectures

Course Materials:
See the course Blackboard site

Course Assessment
Course assignments include homework (given every week, written), classwork, midterm examinations, and a final examination

Approximate grading scheme is as follows:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>score ≥ 90:</td>
<td>A</td>
</tr>
<tr>
<td>85 ≤ score &lt;90:</td>
<td>B+</td>
</tr>
<tr>
<td>80≤ score &lt;85:</td>
<td>B</td>
</tr>
<tr>
<td>75≤ score &lt;80:</td>
<td>C+</td>
</tr>
<tr>
<td>70≤ score &lt;75:</td>
<td>C</td>
</tr>
<tr>
<td>60≤ score &lt;70:</td>
<td>D</td>
</tr>
<tr>
<td>score &lt; 60:</td>
<td>F</td>
</tr>
</tbody>
</table>

The exam format will be closed book and closed notes, and you will need a calculator, paper, and pencil. Work independently on projects and exams. Turn in your own work.

The weight of the assignments in the final course grade is as follows:

- Homework, Classwork, Participation = 20%
- Midterm Exam 1 = 25%
- Midterm Exam 2 = 25%
- Final Exam = 30%

Course Outline/Schedule
Topics for each class meeting are listed below. However, circumstances may call for a departure from this schedule. Any changes to the schedule will be made in advance. Homework assignments will be handed out at least one week prior to the due date.

<table>
<thead>
<tr>
<th>Course Schedule</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Frequency-domain response</td>
<td>Week 1</td>
</tr>
<tr>
<td>• Frequency response of RLC circuits</td>
<td>Week 2</td>
</tr>
<tr>
<td>• First-order filters</td>
<td>Week 3</td>
</tr>
<tr>
<td>• Second-order filters and resonance</td>
<td>Week 4</td>
</tr>
<tr>
<td>• Filter applications, Midterm Exam 1</td>
<td>Week 5</td>
</tr>
<tr>
<td>• Time-domain response of RL and RC circuits</td>
<td>Week 6</td>
</tr>
</tbody>
</table>

Revision date: 8/19/15
ELCT 222 Fall 2015
Page | 3
<table>
<thead>
<tr>
<th>Course Schedule</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Impulse response and convolution</td>
<td>Week 7</td>
</tr>
<tr>
<td>• Transform application to first and second-order circuits</td>
<td>Week 8</td>
</tr>
<tr>
<td>• Transfer function H(s)</td>
<td>Week 9</td>
</tr>
<tr>
<td>• Relationship of H(s) to ac and dc gain, analysis of filter transfer functions</td>
<td>Week 10</td>
</tr>
<tr>
<td>• Midterm Exam 2, Fourier series</td>
<td>Week 11</td>
</tr>
<tr>
<td>• Fourier series application to circuits</td>
<td>Week 12</td>
</tr>
<tr>
<td>• Fourier transforms and application to circuits</td>
<td>Week 13</td>
</tr>
<tr>
<td>• Course review: Signals and Systems</td>
<td>Week 14</td>
</tr>
<tr>
<td>• Final Exam</td>
<td></td>
</tr>
</tbody>
</table>

**Instructor Policies**

**Attendance Policy**
Students are expected to attend each scheduled class meeting, to be on time, and to be prepared for each class session. Class absences will affect your class participation grade. Quizzes, homework, and participation points cannot be made up except in the case of extreme illness or loss.

**Expectations for Classroom Behavior**
Please be respectful of each other, the instructor, and any guest presenters while in class. We are all here to learn! Any disrespectful or disruptive behavior may result in your referral to the Office of Student Judicial Programs.

**Assignment Submission**
Assignments are always due before class starts on the day noted. Late assignments will be accepted only in cases of emergency.

**Midterm and Final Exams**
Makeup exams will be allowed only with pre-approval of the instructor or with an acceptable, documented reason. Acceptable reasons for makeup exams include severe illness, family emergencies or other unavoidable events including dangerous weather conditions and car accidents. Exam format for makeup exams will be different than the original exam.

**Expectations of the Instructor**
I understand that students expect me to facilitate their learning, to answer their questions appropriately, to be fair and objective in grading, to provide timely and useful feedback on assignments, to maintain adequate office hours, and to treat them as I would like to be treated in their place.