ELECTRICAL & BIOMEDICAL ENGINEERING
EE 362: Signals and Systems
Syllabus, Fall 2017

TIME: Tu Th 7:30 AM – 8:45 AM
ROOM: SEM 326 Scrugham Engineering and Mines
PRE-REQ: EE 220 CIRCUITS I
INSTRUCTOR: Mohammed Ben-Idris
Office: SEM 337A: Scrugham Engineering and Mines
Email: mbenidris@unr.edu
Phone: (775) 784-6929
Website: https://www.unr.edu/ebme/people/ben-idris

OFFICE HOURS:
Mondays: 10:30 am – 12:00 pm (337A Scrugham Engineering and Mines)
Fridays: 10:30 am – 12:00 pm (337A Scrugham Engineering and Mines)
or by appointment: These should be arranged by email.

GRADER:
TBD e-mail: TBD

REVIEW SESSIONS:
During the semester there will be several review sessions; the time and location of the review sessions will be announced later.

COURSE WEBSITE:
The course website is in the WebCampus Course Management System
Please point your browser to the following URL: https://webcampus.unr.edu/login/canvas
and log-in with your UNR NetID and password.

COURSE DESCRIPTION:
Linear systems and convolution; analysis of continuous and discrete signals and systems in time and frequency domain: orthogonality and Fourier series; continuous and discrete Fourier transforms; Laplace transform, z-transform; and sampling theorem.

STUDENT LEARNING OUTCOMES (a, k):
This course provides engineering students the opportunity to develop both theoretical and practical skills in signals and systems. Upon completing the course the student should be able to:
a. Apply knowledge of mathematics, science, and engineering
   - Quickly sketch time-shifted versions of continuous and discrete functions.
   - Assess the periodicity of discrete-time sinusoid functions.
   - Obtain Euler’s approximation of a differential equation.
   - Derive the sifting property of the impulse.
   - Obtain the input/output relations for discrete and continuous time-invariant systems.
   - Evaluate the convolution operation for two continuous and discrete-time signals.
   - Sketch system block diagrams for systems specified by linear constant coefficient input/output difference equations.
   - Obtain infinite impulse responses for discrete/continuous feedback systems.
   - Compute the coefficients Fourier series for periodic signals.
   - Obtain forward and inverse Fourier transforms of a continuous function.
   - Compute Fourier Transforms for periodic functions.
   - Use the Fourier transforms properties to deal with convolution, modulation, time and frequency shifting, time/frequency scaling, and duality.
   - Apply the sampling theorem.
   - Obtain the discrete time Fourier transform relations and use the standard properties of the discrete Fourier transform.
   - Use inverse transform methods to obtain the discrete and continuous time impulse responses for different Filters.
   - Use the Laplace transform to obtain transfer functions.
   - Explain the relation between the Laplace and Fourier transforms.
   - Find and sketch system frequency responses for both continuous and discrete time systems described by system impulse responses.
   - Use the z-transform for discrete-time signals.
   - Explain the relation between z-transform and DTFT.

k. Use the techniques, skills, and modern engineering tools necessary for engineering practice
   - Write simple MATLAB programs to compute the DFT of a discrete signal, CFT of a continuous signal, impulse response.
   - Sketch and simulate a system using MATLAB/SIMULINK.

TEXTBOOK (Required):

CLASS SLIDES:
Class slides will be uploaded as PDF files to the course website prior to classes.

ATTENDANCE:
Classroom attendance is expected. Solutions to classroom activities and quizzes are not uploaded to the course website. Missed quizzes and/or classroom activities will result in a zero for the missed assignment.

GRADING:
Grading will be based on the following scale. Exams will be out of 100 points. Homework
problems (each problem) will be worth 10 points. Classroom activities & Quizzes (each class) will be worth 10 points. Classroom activities will be graded as follows: 40% on participation, 30% on the first round (individual response) and 30% on the second round (group discussion). The distribution of the grades on the exams and assignments is as follows:

- Exam1 ............................................................... 20%
- Exam2 ............................................................... 20%
- Final Exam (comprehensive) ............................. 35%
- Homework .......................................................... 10%
- Classroom Activities .......................................... 8%
- Quizzes .............................................................. 7%

The grade for any assignment, or problem within an assignment, can be determined by normalizing to the 100 point scale below.

<table>
<thead>
<tr>
<th>Score (out of 100)</th>
<th>Letter Grade</th>
<th>Grade (4.0 scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.1–100</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>87.1–90</td>
<td>A−</td>
<td>3.7</td>
</tr>
<tr>
<td>83.1–87</td>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>80.1–83</td>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>77.1–80</td>
<td>B−</td>
<td>2.7</td>
</tr>
<tr>
<td>73.1–77</td>
<td>C+</td>
<td>2.3</td>
</tr>
<tr>
<td>70.1–73</td>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>67.1–70</td>
<td>C−</td>
<td>1.7</td>
</tr>
<tr>
<td>63.1–67</td>
<td>D+</td>
<td>1.3</td>
</tr>
<tr>
<td>60.1–63</td>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>57.1–60</td>
<td>D−</td>
<td>0.7</td>
</tr>
<tr>
<td>≤ 57</td>
<td>F</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**HOMEWORK POLICY:** Homework will be due on the dates indicated in the Homework assignments. **Homework is due at the start of class.** There will be 10 points possible per problem. Points will be deducted for late homework as follows:

- Homework received 15 minutes after the start of class → 10 points deducted
- Homework received after the end of class → 30 points deducted
- Homework received one hour or more after class → homework not accepted (score of zero entered)

There will be approximately 12 Homework assignments including problems made by instructor and problems out of the textbook. Homework must be neatly written, stapled together, answers must include units and should be boxed or circled. Graders are instructed to remove points for the above missing components, or for poorly prepared assignments. All homework assignments will be counted toward your course grade.
CLASSROOM ACTIVITY & QUIZ POLICIES:
Class activities and quizzes will be given at random times during lectures (beginning, middle, or end of class). These may be individual or team efforts. Class activities and quizzes will be collected during class. Solutions for classroom activities and quizzes will be provided during lecture but not uploaded to the course website. There will be approximately 12 classroom activities and 12 quizzes given in this semester and the top 10 scores of 12 classroom activities and the top 10 scores of the 12 quizzes will count toward your course grade.

EXAM POLICIES:
Students who do not take the final exam will receive a score of 0.0 in the class. Students who request a rescheduled EE 362 Final Exam based on exams conflict must request rescheduling by sending an email to the instructor. The request must be made prior to the last regularly scheduled class day and approval of the request is based on confirmation of enrollment in the classes having concurrent exams, and consistency of the final exam schedules as listed at: https://www.unr.edu/Documents/academic-central/forms/Fall%202017%20Finals%20Schedule(0).pdf

Makeup exams will be given for a valid medical excuse, or if arrangements are made prior to the exam. You can find the Medical Excuse Policy at: https://med.unr.edu/shc/insurance/clinic-policies

EXAM SCHEDULE:
Two 75-minute midterm exams are held in the classroom during the regularly scheduled class time. There are NO formula sheets, or crib sheets for the exams unless it is provided on the exam. The exam dates are:
Exam 1: Tuesday, October 3, 2017
Exam 2: Thursday, November 9, 2017
Final Exam: Thursday, December 14, 2017 (7:30 am – 9:30 am). The Final Exam is also held in the classroom (SEM 326 Scrugham Engineering and Mines) and will be comprehensive.

CALCULATORS FOR EXAMS:
Unless stated otherwise, bring a calculator to the exams. You may use any scientific or graphing calculator, unless it has features described on the “Prohibited” list. Note: you may NOT use cell phones during an exam. Prohibited:
- Pocket organizers;
- Handheld or laptop computers;
- Electronic writing pads or pen-input devices;
- Calculators built into cell phones or other electronic communication devices;
- Calculators with a typewriter keyboard (keys in QWERTY format). Calculators with letter keys not in QWERTY format are permitted.

EXCUSED ABSENCES:
Professionalism is part of the education process. At work, absences due to illness have expectations that you contact the company as soon as possible to notify of the absence. A similar expectation exists for this course. For absences due to illness, please bring a signed doctor’s note to the instructor so arrangements can be made for a makeup or grade adjustment. For absences due to travel and/or interviews, religious holy day observance, etc. you should contact the instructor prior to the absence and make arrangements to turn in any assignment before
the due date.

You can find the Medical Excuse Policy at:
http://www.unr.edu/shc/files/Note%20Policy.pdf

You can find the Class Absence Policy at:
http://www.unr.edu/administrative-manual/3000-3999-students/3020-class-absence-policy

OTHER IMPORTANT DATES:
For detailed calendars please refer to the following link:
https://www.unr.edu/academic-central/academic-resources/academic-calendar
For final exam schedules please refer to the following link:
https://www.unr.edu/Documents/academic-central/forms/Fall%202017%20Finals%20Schedule(0).pdf

ACADEMIC HONESTY:
“Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student’s enrollment without a grade, giving an F for the course or for the assignment. For more details, see the University of Nevada, Reno General Catalog.”

DISABILITY SERVICES:
“Any student with a disability needing academic adjustments or accommodations is requested to speak with the Disability Resource Center (Pennington Student Achievement Center, Suite 230) as soon as possible to arrange for appropriate accommodations.”

AUDIO and VIDEO RECORDING:
“Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.”

ACADEMIC SUCCESS SERVICES:
“Your student fees cover usage of the Math Center (784-4433 or https://www.unr.edu/math-center), Tutoring Center (784-6801 or https://www.unr.edu/tutoring-center), and University Writing Center (784-6030 or http://www.unr.edu/writing-center). These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.”
Approximate Course Schedule and Topics:

<table>
<thead>
<tr>
<th>W</th>
<th>Dates</th>
<th>Topics Covered</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug. 28 - Sept. 1</td>
<td>Introduction &amp; fundamental concepts</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>2</td>
<td>Sept. 4 - Sept. 8</td>
<td>Time-domain models of systems</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>3</td>
<td>Sept. 11 - Sept. 15</td>
<td>Time-domain models of systems&lt;br&gt;The Fourier series and Fourier transform</td>
<td>Chapter 2&lt;br&gt;Chapter 3</td>
</tr>
<tr>
<td>4</td>
<td>Sept. 18 - Sept. 22</td>
<td>The Fourier series and Fourier transform</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>5</td>
<td>Sept. 25 - Sept. 29</td>
<td>The Fourier series and Fourier transform</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>6</td>
<td>Oct. 2 - Oct. 6</td>
<td>Exam 1, (Tuesday, Oct. 3)&lt;br&gt;Fourier analysis of discrete-time signals</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>7</td>
<td>Oct. 9 - Oct. 13</td>
<td>Fourier analysis of discrete-time signals</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>8</td>
<td>Oct. 16 - Oct. 20</td>
<td>Fourier analysis of discrete-time signals</td>
<td>Chapter 4</td>
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<tr>
<td>9</td>
<td>Oct. 23 - Oct. 27</td>
<td>Fourier analysis of systems</td>
<td>Chapter 5</td>
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<tr>
<td>10</td>
<td>Oct. 30 - Nov. 3</td>
<td>Fourier analysis of systems</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>11</td>
<td>Nov. 6 - Nov. 10</td>
<td>The Laplace transform and the transfer function representation&lt;br&gt;&lt;b&gt;Exam 2, (Thursday, Nov. 9)&lt;/b&gt;</td>
<td>Chapter 6</td>
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<tr>
<td>12</td>
<td>Nov. 13 - Nov. 17</td>
<td>The Laplace transform and the transfer function representation</td>
<td>Chapter 6</td>
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<tr>
<td>13</td>
<td>Nov. 20 - Nov. 24</td>
<td>The z-transform and discrete-time systems&lt;br&gt;&lt;b&gt;Thanksgiving Day (Nov. 23)&lt;/b&gt;</td>
<td>Chapter 7</td>
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<tr>
<td>14</td>
<td>Nov. 27 - Dec. 1</td>
<td>The z-transform and discrete-time systems</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>15</td>
<td>Dec. 4 - Dec. 8</td>
<td>The z-transform and discrete-time systems</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>16</td>
<td>Dec. 11 - Dec. 13</td>
<td>Review</td>
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</tbody>
</table>

Dec. 14 – Dec. 20<br>Final Exams<br><b>The Final Exam</b> will be on Thursday, December 14 (7:30 – 9:30 am)<br>SEM 326 (<i>Scrugham Engineering and Mines</i>.)<br>Final exam is comprehensive.