ECE 380: Signals and Systems
Course Coordinator: Cory Beard

Undergraduate courses: This course is required for the degree program BS in ECE.

Frequency of offering: This course is offered every Fall.

Specifics for FS 2007: Line number: 42762

Class Times and Room: Monday and Wednesday, 5:00–6:50 pm in Room 557 Flarsheim Hall.


Graduate Assistant: Kartik Shah, kdskbb@umkc.edu.

Course description: Continuous and discrete-time signals and systems, linearity and time-invariance, impulse response and convolution. Fourier analysis of discrete and continuous signals and systems and the application of Laplace, z, and Fourier transforms. Prerequisite: ECE 341, and ECE 381 concurrently.


Instructional Strategies/Pedagogical Approach:
Lecture and Discussion Format
The lecture format of the course will be open and frequently involve participation from all members in the class. It will frequently include discussion questions and working problems. These will be conducted in a big group with the class as a whole, individually, or with another student. The purpose is not just to create a more lively atmosphere for class, but also to enhance learning and engagement with the course material.

Teaching Philosophy
- Service provider – The instructor is service provider and students are the clients (the ones who paid a lot of money!). Students are paying the instructor to teach the material in a way that is understandable and prepares them for subsequent courses and research. They expect to be fairly graded, to be provided an accurate assessment of their performance in the class, and to be prepared for their eventual careers. All of these responsibilities the instructor acknowledges and commits to fulfill to the best of his ability.
- Feedback – Student feedback is needed and will be solicited regarding how the course is being taught. At periodic times in the semester the opportunity will be given to anonymously provide feedback and suggestions for improvement.
- Respect – Everyone in class deserves the highest respect as an important member of the engineering community. It is the instructor’s commitment to treat students with all the respect of a colleague.
- Student cooperation – The efforts of the instructor will only be successful with corresponding concerted involvement by students. The student’s role is to take personal initiative by attending class regularly, participating properly in discussion, staying current with lectures, following university rules, completing homework and projects, taking initiative to get help, and being prepared for exams.

Course objectives:
This course introduces the theory and techniques for analyzing the performance of electrical systems in the time and frequency domains. Through the course, students will:
- Characterize signals as a combination of time shifted and scaled versions of simpler signals.
- Find the response of continuous-time systems by finding the zero-input and zero-state responses for a variety of inputs and employ convolution techniques.
- Use the Laplace Transform to find system responses.
- Gain intuition into system stability and frequency response.
• Be able to create block diagram and passive circuit realizations of generic system transfer functions or filter specifications.
• Find the response of discrete-time systems using time-domain techniques and through use of the z-Transform.
• Perform system frequency domain analysis using the Fourier Series and Fourier Transform.
• Apply Fourier Transform methods in design tradeoffs between bandwidth and bit rate in digital communications, U.S. AM Radio, and ideal and practical filters.
• Understand sampling, the Sampling Theorem, and the Nyquist rate.

Semester Schedule of Topics:
- Review of complex numbers and sinusoids – 1 week
- Operations on signals and signal classifications – 1½ weeks
- Time-domain analysis of continuous-time systems – 2 weeks
- Continuous-time analysis using the Laplace Transform – 2 weeks
- Realization of continuous-time systems and stability – 1 week
- Frequency response, Bode plots, and filter design – 1½ weeks
- Time domain analysis of discrete-time systems – 1½ weeks
- Discrete-time system analysis using the z-Transform – 1 week
- The Fourier Series and the Fourier Transform – 1½ weeks
- Applications to digital communications, AM radio, and filters – 1 week

Semester Schedule Activities: Consult the course web site for the up-date schedule for exams and homework assignments.

Evaluation / Assessment Criteria and Grading:
Grades will be determined based on the following activities.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework, Pop quizzes, and Attendance</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 1*</td>
<td>25%</td>
</tr>
<tr>
<td>Exam 2*</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>35%</td>
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</tbody>
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* Three exams will be taken, and the best two scores will be applied toward the grade.

Exams
The course textbook may NOT be used during exams. Students will be allowed to bring one 8.5 by 11 inch page of information. Material can be on both sides of that page and must be handwritten.

Final Exam
The final exam will consist of a comprehensive coverage of the whole course. The purpose of the final exam will be to test the student's proficiency in having accomplished the objectives of the course.

Grading Protests
Grade changes to test scores will only be given if the instructor was mistaken in his understanding of an answer that was provided. Protests will not result in a change of grade if they are simply a disagreement with the judgment of the instructor on partial credit. Students should not be rewarded for their ability to convince the instructor to change a grade. Any protests must be initiated on the day exams are returned.

Attendance and Pop Quizzes
Students will not be required to sign an attendance sheet every week. It is the policy of the University, however, that attendance is required. Therefore, if attendance is particularly bad, the instructor may choose (with no prior notification) to take attendance. This will be applied along with the semester homework grade. Pop quizzes may be given without any previous notification in any class period. These will be given at the end of the class period and will involve material just presented in the lecture that day. Pop quizzes will allow open notes.

Homework
The key to mastering the material in this course is to work lots of problems. The homework in the course will be extensive and it will be important for students to plan to keep up with the assignments.
Homework is due at the beginning of the class on the due date. Problems should be stapled together and include the student name and date due. No late homework will be accepted (no exceptions), and you are welcome to turn in homework early. It is important that an honest effort be made toward every homework problem. Credit will be given toward all problems worked, not just a random sample.

Assignments will be graded as follows. Points will be given for all homework problems that are worked.
1. Random selections of problems – 80% credit for honest effort, 20% for correctness of the answer.
2. The rest of the problems – 100% credit for honest effort.

Homework solutions will be distributed. Students should reference the homework solutions instead of the grading totals to see if they have work problems correctly.

Students are encouraged to collaborate on homework. They are not allowed, however, simply to copy the results of others. This would violate the intent of giving 80% for effort on homework. Groups of students that are found to have homework submissions that are largely identical will be penalized.

Changes to Deadlines
Various extenuating circumstances may arise when the deadline of a particular homework assignment or project may be extended. Students will be notified by e-mail of such changes in deadlines. No extensions will be made, however, once time is within 24 hours of a deadline.

Electronic Mail
E-mail correspondence will be used throughout the course for course announcements, submission of assignments, etc. UMKC e-mail addresses will be the only addresses used for that correspondence.

Make-Ups
Make-up exams will be given only if: 1) notification is provided in ADVANCE of the exam, and 2) the reason is approved as being sufficiently meritorious. If the reason is illness, documentation of the illness from a healthcare professional is required.

Academic Misconduct
Penalties for academic dishonesty will be severe. Academic dishonesty includes cheating, plagiarism or sabotage. The UMKC Academic Catalog is the final authority for definitions and procedures. Below are excerpts.

1. Academic dishonesty, such as cheating, plagiarism, or sabotage. The Board of Curators recognizes that academic honesty is essential for the intellectual life of the University. Faculty members have a special obligation to expect high standards of academic honesty in all student work. Students have a special obligation to adhere to such standards. In all cases of academic dishonesty, the instructor shall make an academic judgment about the student’s grade on that work and in that course. The instructor shall report the alleged academic dishonesty to the Primary Administrative Officer.
   a. The term **cheating** includes but is not limited to:
      (i) use of any unauthorized assistance in taking quizzes, tests, or examinations;
      (ii) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;
      (iii) acquisition or possession without permission of tests or other academic material belonging to a member of the University faculty or staff; or
      (iv) knowingly providing any unauthorized assistance to another student on quizzes, tests, or examinations.
   b. The term **plagiarism** includes, but is not limited to:
      (i) use by paraphrase or direct quotation of the published or unpublished work of another person without fully and properly crediting the author with footnotes, citations or bibliographical reference;
      (ii) unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials; or (iii) unacknowledged use of original work/material that has been produced through collaboration with others without release in writing from collaborators.
c. The term **sabotage** includes, but is not limited to, the unauthorized interference with, modification of, or destruction of the work or intellectual property of another member of the University community.

The University also defines 11 other forms of Academic Dishonesty.

**For this class,** work turned in must be original and represent an individual effort unless otherwise indicated. **IF CHEATING OR PLAGIARISM IS IDENTIFIED, AN AUTOMATIC GRADE OF ZERO WILL BE GIVEN TO ALL PARTIES INVOLVED.**

Names of persons involved in any of these incidents will be forwarded to the campus Primary Administrative Officer. Those students will be subject to sanctions as outlined in the general catalog. Sanctions may result in dismissal from the University.

Measures will be taken in the course to identify and discourage cheating. A seating chart may be used during exams and other measures may be employed.

**Special Considerations**
Any student in this course who has a disability or impairment that prevents the fullest expression of your abilities should contact the course instructor personally as soon as possible so to discuss the appropriate accommodations necessary to complete the course requirements.

These policies are subject to change at any time by the instructor in the event of extenuating circumstances. Proposals for changes to the course syllabus and exam dates will be considered, but only within the first 4 weeks.

**Prepared by:** Cory Beard

**Prepared on:** August 9, 2007