Engineering 100, Section 300, Fall 2015
Introduction to Engineering
Music Signal Processing

Jeff Fessler	Professor; EECS	fessler@umich.edu	4431 EECS	Thu 9:30-10:30AM and by appt
Paul Kominsky	Lecturer; Tech Comm	paulko@umich.edu	311 GFL	Thu 12-1 and by appt
Tom Bowden	Lecturer; Tech Comm	tebowden@umich.edu	316 GFL	Thu 1:30-2:30 and by appt
Sydney Williams	GSI; BME	sydneynw@umich.edu		Tue 12-1PM EECS atrium lab
Izzy Salley	Instr. Asst.	isalley@umich.edu		Tue 1-2PM Shapiro library 1st fl

Room Key: EECS = Electrical Engineering and Computer Science Bldg.; GFL= Gorguze Family Laboratory; DOW = Dow Engineering Bldg.; PIER = Pierpoint Commons Bldg.; GGBL = G.G. Brown Laboratory; DC=Duderstadt Center, LBME=Lurie Biomedical Engin. Bldg.

Lectures: Tue & Thu, 10:30-Noon, 1500 EECS

Day	Lab Sec.	Lab Time	Lab Instr.	Lab Room	Disc. Sect.	Disc. Time	Disc. Instr.	Disc. Room
Mon	301	1:30-3:30	SW	B507 PIER	302	12:30-1:30	PK	1363 GGBL
Fri	307	10:30-12:30	IS	4440 EECS	308	9:30-10:30	TB	1363 GGBL

Required Course Materials
Lectures, Labs, Matlab files and reading material will all be posted on the Canvas website for the course: https://umich.instructure.com. Sign in with your UM ID and Kerberos password and select the Engin 100 tab.

Textbooks:
Recommended: Bary-Khan, P., Hildinger E., & Hildinger, E. (2008 or 2010). *A Practical Guide to Technical Reports and Presentations*. Pearson Customized Publishing.

Introduction
In this course, you will develop and apply technical, communication, team, and engineering ethics skills. Based on these skills, you will do three projects. The first project is to build a simple computer-based tone synthesizer and transcriber. The second project is to analyze the signals used in touch-tone telephony and then design a computer-based touch-tone analyzer that decodes touch-tone signals as well as a synthesizer that generates touch-tone signals. The third project is an open-ended, team-based design project; a representative example is to build a computer-based music synthesizer that offers at least four instrument choices and to design an analyzer that transcribes the synthesized music into a format similar to musical staff notation. Weekly labs and homework sets will prepare you for the project work. In these assignments, you will learn the basics of digital signal processing, including sampling, Fourier analysis, and spectrograms. Thus this course serves as an introduction to signal processing (part of electrical engineering) and to engineering and design in general.

The primary point of this course is do practical engineering and to approximate the process engineers experience when they design, build, test a product and present their results. For example, if a team produces a transcriber that works better than that of another team, but does a worse job working as a team and presenting its results, then the first team will get a lower grade (see "Grading" below). This practice is realistic because in the real world, it is just as important to communicate your results, as it is to achieve those results. If you cannot communicate what you have accomplished to your bosses, clients or customers, and peers, then it does not matter how good it is! The course grading therefore reflects this fact (see the grading table for grading details).

The Tuesday lectures usually will focus on signal processing concepts such as sampling, the discrete Fourier transform (used to analyze the spectrum of signals) and spectrogram (time-varying signal spectra). We will also present the basics of Matlab as needed. Matlab is a computer program that is used extensively in signal processing and in many other areas of engineering. You will learn more about Matlab in Engineering 101. The Tuesday lectures will prepare you for the technical aspects of the labs and projects. All the slides will be available on the Canvas web site; you may wish to print them out or download onto a laptop before lecture.

To support you in the quest for good communication, the Thursday lectures usually will focus on technical communications. You will learn about various types of oral and written reports, how to work in teams (a *vital* skill for all engineers), and engineering ethics (much more complex than "don't cheat"). This material will be essential in your career as an engineer.

The Honor Code, Plagiarism and Cheating in Engineering 100

The Honor Code is a summary of ethical standards of conduct for students and faculty in the College of Engineering. It is based on the principles that we are expected to follow for our entire professional careers and it is taken **very** seriously. For a complete description of the Honor Code, you can visit the web site at https://sites.google.com/a/umich.edu/engin-honorcode/

Please review the Honor Code! You will be responsible for understanding it and abiding by it.

In Engineering 100, you often write as a team member rather than solely as an individual student, a fact that may raise questions about what constitutes ethical use of other people's work and what crosses the line into plagiarism. Professionals work cooperatively and with the services of numerous support personnel; as an engineering student, however, you ordinarily work alone and sometimes even competitively. Your student work is covered by the Honor Code that states: "it is dishonorable to receive credit for work which is not the result of one's own efforts."

The following guidelines are intended to help clarify acceptable ways to work cooperatively in this course without conflict with the spirit of the Honor Code. You are expected to follow these guidelines, with any modifications introduced by your instructors. Please discuss with your instructors any areas of uncertainty. Violation of this policy or any part of the Honor Code is grounds for initiation of an action that will be filed with the Dean's Office and will come before the College of Engineering's Honor Council.

You May

- co-author *team* reports and other *team* assignments with other students on your Engineering 100 team. All of the co-authors' names must appear on all copies of any team or group assignment. If you plan to hand in your Engineering 100 assignment to another course (in addition to Engineering 100), you must tell the instructors in both courses well in advance of the due date that the assignment is to be handed in to more than one class. You must also obtain the written permission of instructors in both classes.
- use the services of a proofreader. Since you often have difficulty seeing your own errors, it makes sense to ask a qualified friend or associate to help proofread your reports. However, the ultimate responsibility for editing is yours.

You May **Not**

- hand in as your own or your team's a report or assignment which in whole or in part has been handed in earlier by another student or group of students in any university or college class for whatever purpose or assignment.
- use, without documentation, information from published sources such as reports, journals, textbooks or reference books, including web sources. This includes images, such schematics, graphs, maps or photos. One area where problems have arisen in the past is in downloading information from the Internet without appropriate attribution. We will discuss this issue in the course.
- have someone else help you write any of the individual assignments in this course. (NOTE: You may discuss any take-home individual assignment and your approach to it with others, especially members of your team. You may have someone read it and give you feedback, but you may not have someone else write sections for you.

If you have any questions about this policy, please contact us. Remember, the goal of the assignments is to develop your skills and give you a more fundamental understanding of the material presented in class. It is possible – in fact, necessary – for you to work cooperatively in this course without conflict with the Honor Code and without committing plagiarism. Indeed, because cooperative work is so central to engineering practice, you are urged to work cooperatively when it seems appropriate. It is important that this cooperation *be ethical, done only when allowed and openly acknowledged*. Anything less than that will be regarded here – as it usually is in industry – as a serious breach of engineering ethics.

Assignment Policy

We expect you to complete all work – written and oral assignments, and examinations **on time**. If you miss a

deadline on an individual assignment, you will be penalized 10% per day (beginning from the time that the hard copy is due). If you miss a deadline for an exam, oral presentation, or a written report on a project without prior arrangement with the course instructor and your discussion leader, you will receive a zero for that assignment or exam. Depending on the importance of the project, this may result in a failing grade for the class. In some circumstances, we may accept legitimate excuses and make arrangements for you to turn in the work at a later date. If you know in advance of a conflict that will keep you from completing an assignment on time, please discuss your options with your discussion leader at the time the assignment is made.

Acceptable circumstances include the following (with **appropriate documentation**)

- a medical circumstance. We do accommodate all students with disabilities. If you know or think that this would apply to you, please see a faculty member as soon as possible.
- a death in the family
- other circumstances deemed reasonable by your discussion leader

Unacceptable excuses are many, too many to list, but they include

- I had a project, homework, etc., due in another class and didn't have time to finish this assignment. (You need to learn to budget your time.)
- I didn't like my team members, so I decided not to show up for team meetings. (If you have a problem with team members that you cannot resolve, see your discussion leader or the lead faculty member.)
- I am really nervous about making an oral presentation, so I thought I would skip that part. (Come and talk to us and we will help you overcome this problem.)
- My report was saved on a disk and the computer destroyed it. (You need to learn to back up your work, either on an additional disk or with a hard copy.)

Contesting Grades

We may re-evaluate the grade on any assignment provided you do the following:

1. Provide a request for re-evaluation in writing.
2. Describe in the written request what you believe to be graded incorrectly, why you believe the grade to be incorrect as well as what you believe to be an appropriate correction.
3. Submit the written request for re-evaluation within two weeks of the return of the original graded assignment.

A re-grade request may result in the score being raised, unchanged, or lowered (unlikely, but possible). Each assignment will be re-evaluated only once upon request and all grades are final after re-evaluation.

Assignments & Canvas

Assignments will be posted on our Canvas web site. You must submit hardcopy and/or Canvas upload of all assignments to your instructor at the beginning of class on the due date (the instructors will specify whether you will need both types or just one type of submission). Please submit all work in a neat and legible format.

Peer Evaluation and Participation Grade

The peer evaluation and participation grade will be determined at the end of the semester. You will have an opportunity to evaluate your team members on their participation, quality of work and overall team performance. Your evaluation and the instructor's assessment of classroom participation will determine your peer evaluation and participation grade.

Grade Assignment in this Engineering 100 Course

1. Your total score, out of about 1300 possible points, will be computed by adding up your scores on each assignment, in accordance with the points listed on the syllabus.
2. Final grades will be based on your total score.
3. The grade cutoff between A-/B+ will be around 90%, for B-/C+ about 80%, etc.
4. For reference, the table below lists the score ranges from Fall 2010 in the ENGN 100 section taught by Prof. Fessler/Zahn.

GRADE	A+	A	A-	B+	B	B-	C	F
#getting	1	15	9	6	7	2	1	1
maximum	97.6	93.7	89.4	87.9	85.7	82.2	78.6	25.5
minimum	97.6	89.6	88.3	86.6	83.7	80.9	78.6	25.5