

Engineering 100.300

Introduction to Engineering

Music Signal Processing

Faculty:

Andrew E. Yagle	Professor; EECS	ae@eeecs.umich.edu	4114 EECS	Tues. 3:10-5:00
Pauline Bary-Khan	Instr.; Tech Comm	pbkhan@umich.edu	308 EPB	Tues: 1:30-2:30
Paul Kominsky	Instr.; Tech Comm	paulko@umich.edu	EPB	TBA
Tanay Bidasaria	Instr. Asst.; EECS	tanay@umich.edu	EECS	TBA
James Huang	Instr. Asst.; EECS	huangja@umich.edu	EECS	TBA

Schedule:

DAY	TOPIC	INSTR.	CC
Tues	Technical	Yagle	133
Thur	Tech Com	Khan	133

Lectures	10:40-12:00
Discussion	12:40-1:30
Laboratory	1:30-3:30

DAY	LAB	LAB	Pier-	DISC.	DISC.	EECS
	SECT	INSTR.	Point	SECT.	INSTR.	ROOM
Tue	303	Tanay	B521	304	Khan	1003
Wed	305	Tanay	B521	306	Paul	3427
Thu	301	James	B521	302	Khan	1003
Fri	307	James	B521	308	Paul	1008

Required Course Materials:

Reading material will be posted on the CTools website for the course:
www.ctools.umich.edu . Sign in with your UM ID and Kerberos password

Book: ‘A Practical Guide to Technical Reports and Presentations,’ Pearson Publishers, (Pauline) Bary-Khan, Hildinger, & Hildinger, 2008

Project Description:

You will apply the technical communication, teams, and engineering ethics skills you develop in this course to 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 to design a computer-based touch-tone analyzer that decodes touch-tone signals, and a synthesizer that generates touch-tone signals. The third project is to build a computer-based four-instrument music synthesizer, and design an analyzer that transcribes the synthesized music into a format similar to musical staff notation. You will learn basics of digital signal processing, including sampling, Fourier analysis, and spectrograms, in a set of three weekly labs prior to the three projects. Thus this course serves as an introduction to signal processing (part of electrical engineering), as well as an introduction to engineering and design in general.

However, the point of this course is to learn the practice of engineering, not technical material (that will come during the final three years of your undergraduate education). If team A produces a transcriber that works better than team B’s transcriber, but does a worse job working as a team and presenting their results both orally and in written form, then team A will get a lower grade (see “Grading” below). This is very realistic—in the real world, how you present your results is just as important as what those results are. 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 reflects this (see the grading table for grading details).

In general, Tuesday lectures 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). They will also present the basics of Matlab as needed. Matlab is a computer program that is almost universally used in signal processing, and in many other areas of engineering. You will learn more about Matlab in Engineering 101. Material for the Tuesday lectures will be taken from, and used for, the three labs and three projects. All are available on the CTools web site; you may wish to print them out before lecture.

In general, Thursday lectures will focus on technical communications, including various types of oral and written reports, how to work in teams (a vital skill for all engineers!), and engineering ethics situations (much more complex than “don’t cheat”). This material will be essential in your career as an engineer.

Since this is academia, there will also be two exams, for individual assessment.

The Honor Code, Plagiarism and Cheating in Engineering 100

The Honor Code is a summary of ethical standards under which students and faculty in the College of Engineering are expected to conduct themselves. 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

<http://www.engin.umich.edu/students/honorcode/index.html>

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

In Engineering 100, an interesting situation arises in that you are often expected to write as a team member rather than solely as an individual student, a fact which may raise questions about what constitutes ethical use of other people's work and what crosses the line into plagiarism. Professionals obviously work cooperatively and with the services of numerous support personnel; as an engineering student, however, you ordinarily work alone and even competitively. Your student work is covered by the Honor Code which states that "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 in seeing your own errors, it makes sense to ask a qualified friend or associate to help proofread your reports. However, this assistance should be minor and should not extend beyond single-sentence proofreading. In all cases, 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.
- Hand in as your own a report, which in whole or in part, has been written by someone else. NOTE: Your instructor may allow you to use another report as background or as source material. If this is properly attributed, you may use this in the development of your report.
- Use, without documentation, information from published sources such as reports, journals, textbooks or reference books, including web sources. This includes any image, including 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 specifically.
- 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 do not hesitate to 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 that there may be a conflict which 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. Please note that under the Americans with Disabilities Act, we are required to 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.
- Death in the family
- Other excuses 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 are more than willing to re-evaluate the grade on any assignment provided you do the following:

1. Any request for re-evaluation **MUST** be made in writing.
2. The written request **MUST** describe what you believe to be mis-graded, why you believe it to be mis-graded as well as what you believe to be an appropriate correction.
3. Any request for re-grades **MUST** be submitted within 2 weeks of the return of the original graded assignment.

Please note that there are three possible outcomes to a re-grade request: (1) the grade is not changed; (2) the grade is raised; or (3) the grade is lowered. (Yes, we may actually determine upon further reflection to lower the score. Unlikely, but possible.) Also, please note that upon request, each assignment will be re-evaluated only once and all grades are final after re-evaluation.

Assignments & CTools

Assignments will be posted on our CTools web site. A hardcopy and/or CTools submission (the instructors will specify whether you will need both types or just one type of submission) of all assignments must be turned into your instructor at the beginning of class on the due date. Please show all work neatly and legibly.

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. This evaluation along with the instructor's assessment of classroom participation will determine your peer evaluation and participation grade.

ASSIGNMENT	POINTS	GRADING BY
Lab #1 results (Indiv.)	25 (check-off)	IA
Personal Essay (Indiv.)	25 (check-off)	TC
Lab #2 results (Indiv.)	25 (check-off) & 25	IA & TC
Project #1 oral (Team)	25 (check-off) & 25	IA & TC
Research Memo (Indiv.)	50	TC
Lab #3 results (Team)	50 & 50	IA & TC
Project #2 results (Team)	50	IA
Progress Report (Team)	50	TC
Project #3 oral (Team)	100	TC
Project #3 written (Team)	100 & 100	IA & TC
Lab participation (Indiv.)	25	IA
Disc. participation (Indiv.)	25	TC
Peer evaluation (Indiv.)	50	Peers
Exam #1 (Indiv.)	100	AEY & PBK
Exam #2 (Indiv.)	100	AEY & PBK