Engineering 100, Section 300, Fall Term 2016
Introduction to Engineering: Music Signal Processing

Andrew E. Yagle	Professor of EECS	aey	4114 EECS	Tues. 12:00-1:00
Sarah Himsel-Burcon	Instr.; Tech Comm	sburcon	324 GFL	W 12-2; Th 12:30-2
Tom Bowden	Instr.; Tech Comm	tebowden	316 GFL	TBA
Mai Le	GSIA	maile	TBA	TBA
Erica Mittelstadt	Instr. Assistant	enmitt	TBA	TBA
Paul Reggentin	Instr. Assistant	paulregg	TBA	TBA

Schedule: CC=Chrysler Center. B507=CAEN computer laboratory in the Pierpont Commons basement. GFL=Gorguze Family Lab (formerly EPB). FXB=Francois-Xavier Bagnoud (Aerospace Engin.) building. B085 FXB=CAEN lab in the basement of FXB. BBB=Bob & Betty Beyster (Computer Science) building.

Day	Lab	Lab time	Instr.	Room	Dis	Disc day&time	Instr.	Room
Wed.	301	10:40-12:30	Erica	B507	302	Tues 1:40-2:30	Sarah	136 ewre
Wed.	303	12:40-2:30	Mai	B507	304	Tues 2:40-3:30	Sarah	1032 fxb
Wed.	305	2:40-4:30	Mai	B507	306	Thur 1:40-2:30	Tom	1012eecs
Wed.	307	4:40-6:30	Paul	B507	308	Thur 2:40-3:30	Tom	1032 fxb

LECTURES:
Tues & Thur
10:40-12:00
1500 EECS

Required Course Materials:
Lectures, Labs, MATLAB files and reading material will all be posted on the Canvas course website: http://canvas.umich.edu . Sign in with your UM ID and Kerberos (UM) password and select Engin 100.
Course Notes: `Music Signal Processing,' Andrew E. Yagle. Posted on Canvas (technical material).
Course Notes: `MATLAB & Mathscript,' Andrew E. Yagle. Posted on Canvas (technical material).
Textbook (suggested): 'A Practical Guide to Technical Reports and Presentations,' Pearson Publishers, Pauline Bary-Khan, Hildinger, & Hildinger (any ed.). Used copies can be found (tech comm. material).

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 four 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 *may* 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 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 four labs and three projects. All are available on the Canvas 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 (midterm and final), 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, see http://ossa.engin.umich.edu/honor-council/

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. Our condolences in advance.
- Other excuses deemed reasonable by your discussion leader

Missing discussion or lab: Let your discussion or lab instructor know. Ideally, you can make up the discussion later that week, or attend another lab. Let that discussion or lab instructor know

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 TC faculty member.) Learning to work in teams is integral to engineering.
- 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 thumb drive and I lost it (Learn to back up your work).

Contesting Scores

We are more than willing to re-evaluate the score 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-scored, why you believe it to be mis-scored as well as what you believe to be an appropriate correction.
3. Any request for re-scores **MUST** be submitted within 2 weeks of the return of the original scored assignment.

Please note that the 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 & Canvas

Assignments will be submitted to our Canvas web site. Lab reports are due by the beginning of your next lab. Discussion reports are due by the beginning of your next discussion. Please show all work neatly and legibly.

Peer Evaluation and Participation Score

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 discussion or lab instructor's assessment of classroom or lab participation will determine your peer evaluation and discussion and lab participation scores.

Scoring for Each Assignment

See the table on the next page for assignments, point value, and who will be grading them.

How Grades Will Be Assigned in Engineering 100

1. Your total score, out of 1000 possible, will be computed by adding up your individual scores on each assignment, in accordance with the table below.
2. We sort (rank-order) the total scores from largest in the class to smallest.
3. We look for gaps in the sorted total scores and use them as grade boundaries.
4. We assign the same grade to each cluster of sorted scores between the gaps.
5. This ensures no one is only a few points from getting a higher (or lower) grade.
6. There are no fixed percentages, e.g., 90% does not ensure you get an A, or A-.
7. Accordingly, ranges and numbers of grades vary significantly from term to term.
8. Scores tend to be high (800s and 900s), so don't get complacent if you do well!

Assignments, Point Values, and Graders for Music Signal Processing:
All Assignments except the Project #3 report are to be submitted on Canvas.
DUE DATES: At beginning of the next week's lab or discussion (see Schedule).

ASSIGNMENT (BY WHOM)		POINT VALUE	EVALUATED BY:
1.0 Lab #1 results	(Indiv.)	25	Lab Instructor
2.0 Personal essay	(Indiv.)	20	Discussion Instructor
3.0 Lab #2 results	(Indiv.)	25	Lab Instructor
4.0 Project #1 oral present.	(Team)	25	Discussion Instructor
5.0 Research memo	(Indiv.)	50	Discussion Instructor
6.0 Lab #3 results	(Team)	50	Lab Instructor
7.0 Lab #4 results	(Team)	50	Lab Instructor
8.0 Project #2 result&memo	(Team)	50 + 20	Lab & Disc. Instructors
9.0 Project #3 oral report	(Team)	75	Discussion Instructor
10.0 Project #3 writ.* report	(Team)	100 + 100	Yagle & Burcon
Peer evaluation	(Indiv.)	25	Discussion Instructor
Lab participation	(Indiv.)	50	Lab Instructor
Disc. participation	(Indiv.)	25	Discussion Instructor
Disc. quiz	(Indiv.)	10	Discussion Instructor
Exam #1	(Indiv.)	150	Yagle & Burcon
Exam #2	(Indiv.)	150	Yagle & Burcon

*Note that you will need to submit two hard copies of your report.