ECE 2026-R **Introduction to Digital Signal Processing**, Summer 2022

Syllabus--Tentative

Instructor:

Prof. David S. Citrin
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Lecture time: TBD

Location: TBD

Course Website: http://canvas.gatech.edu/

Text: *DSP First*, 2nd Edition by McClellan, Schafer & Yoder, Prentice-Hall, ISBN-10: 0136019250, ISBN-13: 9780136019251

Also see dspfirst.gatech.edu

MATLAB student version: http://matlab.gatech.edu/ . Students who use their own laptop MUST install MATLAB prior to the start of the course. Desk-top machines with MATLAB installed are available at GTL. The instructor will not be responsible for troubleshooting software problems.

Grading:
Lab 10% (Written assignments, see lab policy below)
Quiz 1 20% Date TBD
Quiz 2 20% Date TBD

Quiz 3 20% Date TBD
*Final Exam 3*0% Date TBD

We will follow the basic grading scale where: A=90-100; B=80-89; C=70-79; D=60-69; F=0-59. This means raw grades directly translate to letter grades for the course; however, the boundaries may be modified at the end of the semester based on the overall class performance. It is impossible to determine what the exact "cutoffs" will be for each grade but you can be assured that your assigned grade will never be lower than that of the grading scale described above based on your final class average. You are therefore responsible to keep track of your grades and retain copies of all graded materials. Do not ask me where you stand with regard to grades!

Academic Honesty:
All violations of the Georgia Tech Honor Code will be handled by referring the case directly to the Dean of Students for investigation and penalties. Violations of the Honor Code include (but are not limited to) using sources of information that are not permitted on quizzes, exams, or

other assignments, not adequately citing sources of information used, giving assistance to other students in ways that are forbidden, or misrepresenting who you are (submitting work not by yourself).

Communications: Verbal notices may be given in class. It is your responsibility to attend the class and obtain this information in class. Announcements may also be posted on Canvas or delivered via email. Visit course website and read your email regularly.

Lectures:

Lectures are held twice a week as per the GTL class schedule unless otherwise announced and slides at the class website on Canvas. The purposes of the lectures are to inform students of the broad view on topics that are being covered each week. Ideally, the main lectures should motivate each topic and introduce the major components involved in developing a deeper understanding of the course material.

Though I do not keep attendance, your attendance is expected and is a critical part of performing well in the course. In addition, if you miss class, you might miss laboratory work that must be or is best done in class (see below).

It is expected that lectures will be given in person subject to any restrictions related to the COVID-19 pandemic. Currently, French rules require wearing a mask over the nose and mouth in the GTL building. Students not complying will be reported and asked to leave the building.

Lecture notes are posted at dspfirst.gatech.edu (not on Canvas). Also see this website for other materials (practice problems, etc.).

Laboratory (times vary, held in part during classes):

The labs will meet in class on dates TBD. In some cases, they may be assigned in part or whole as homework. Students are encouraged to work in groups of 2-4, taking care of safe health practices in the time of the pandemic. The laboratory explores hands-on applications of the course concepts using MATLAB. It is a critical component of the course. I will not "teach" or provide this part of the course; you should regard it as self-taught with or without collaboration. This is something you will have to work on yourself and with your peers.

Students should install MATLAB on his/her own laptop prior to the first day of class, though it is installed on the machines in the computer room at GTL. The software is covered by the GT site license and can be accessed at http://software.oit.gatech.edu (Links to an external site.) . Note that you may need to use the GT VPN to download software once you are at GTL; therefore, I suggest that you download and install MATLAB *prior* to coming to GTL.

Note that I provide an MATLAB Amnesty Day (date TBD). Students who have turned in previous MATLAB reports can use the class period this day to correct errors in those reports and resubmit them for regrading. There will be no lecture this day.

Bring your laptop to classes the days of labs. For those of you without laptops, you may use the desktop machines in the computer room. If you collaborate on the labs with other students,

you can share a single laptop in class. But all students should be certain they understand the code they write collaboratively and can run it on their own.

There will be approximately six written lab reports, including corresponding codes and plots, compiled into a single pdf file. Each student must turn in his/her own report listing the other students' names with whom he/she has substantially worked. Late assignments will not be accepted. Assignments will be turned in on Canvas. Grading will be on a 5-tier scale:

100 % -- substantially complete and correct, thoroughly carried out

90 % -- mostly complete and correct, some deficiencies

80 % -- basic issues correct, though substantial deficiencies

70 % -- significant attempt, but serious deficiencies

0 % -- no significant attempt

Homework:

Written homework will be assigned approximately weekly. Homework will not be graded. Solutions will be posted within approximately one week of the suggested completion date. It is important to do the homework diligently and to make sure you master the problems as this is the way you will learn the course material. In addition, quiz and final-exam problems will be of a similar nature to homework problems.

Absences:

As mentioned above, class attendance is expected. Students who miss class might also miss important activities related to labs that can impact grades. Institute policy on absences for illness or personal emergencies may be found at:
http://www.catalog.gatech.edu/policies/student-absence-regulations/ (Links to an external site.) (Links to an external site.).
For illnesses or personal emergencies, students are responsible for providing the documentation to the representative at GTL of the Dean of Students (Prof. Paul Voss) where it will be treated and handled confidentially. If you are comfortable with also presenting the documentation to me, please feel free to do so.

If you have an institute (GTL) approved activity that will cause you to miss class, then you must provide me with documentation at least two weeks before the activity.

Under no circumstances will quizzes or the final exam be rescheduled do to travel. I routinely have requests to reschedule because a cheaper airfare is available on a class day, family is visiting Europe, or a train is late. Do not bother asking me.

Office of Disability Services:
If you are a student registered with the Office of Disability Services (ODS), please make sure the appropriate forms and paperwork are completed and I am notified by ODS within the first week of classes. The instructors will abide by all accommodations required by ODS. It is the responsibility of the student to properly arrange test accommodations for each exam with ODS in sufficient time to guarantee space for exam administration. ALL exam accommodations must be handled through ODS. If the student does not register accommodations with ODS for the taking of an exam, then they will have to take the exam at the normally scheduled times without any additional accommodation unless the instructor is given specific directive from ODS on the students behalf due to a mitigating circumstance.

Office Hours:
Online, by arrangement with me.

Student Collaboration:
Students are encouraged to study together for homework, lab reports and exams to openly discuss course topics. However, each assignment that is turned in must reflect the work of each individual student. In other words, you may work with other students on labs and homeworks, but you must write up the work yourself. I also require that in case you have worked substantially with others, you list the names of those students on the assignments you turn in. No copying of work from other students in (or out) of this class is allowed and such activity would represent a violation of the Academic Honor Code. If you are not certain of the nature of a student collaboration you are involved in, please feel free to contact me.

No collaboration is permitted on quizzes or exams. Unless you receive specific instructions, calculators, any printed, written, or online materials including but not limited to notes, books, formula sheets, or consultation with others is permitted.

Student Commitment:
As the student, you agree to commit your time and energy to learn the material by completing all assignments in a timely manner, attending all class sessions, and seeking help when you require it.

Course Description:
Introduction to signal processing for discrete-time systems. Sampling Theorem. Filtering. Frequency response. Discrete-Time Fourier Transform. Discrete Fourier Transform. Z Transform. The course emphasizes the theory, but laboratory exercises will familiarize students with computer-based signal processing. Please note that this is NOT a computing course and I cannot help you with purely computing questions, including but not limited to going over code and installing MATLAB.

Additional Resources:
Extra course materials, including homework, demos, can be found in: https://dspfirst.gatech.edu/ (Links to an external site.) (Links to an external site.).

Course Outcomes:
Upon successful completion of this course, students should be able to:
(1) Express signal processing systems in mathematical form; (2) Write MATLAB code describing a basic signal-processing system; (3) Analyze signals in terms of their frequency content; (4) Describe system behavior in terms of frequency content; (5) Analyze linear system behavior in terms of Fourier transform and frequency response; (6) Analyze mixed analog-digital systems with sampling operations and digital filters; (7) Utilize the z-transform to analyze discrete-time systems in terms of poles and zeroes; (8) Use complex exponential notation to describe signals and systems; and (9) Describe how signal processing is used in applications (e.g., audio and digital image processing).

All of the above is tentative and subject to change. The final syllabus together with a schedule will be issued no later than the end of the first week of class.