Course Syllabus,
EESC 6360-501, Digital Signal Processing I (DSP I)
Fall 2024

Course Information:

Class Number: 83355
Course Number: EESC 6360
Class Section: 501 (Fall 2024)
Course Name: DSP I. Lecture Course. 3 Credit Hours.
Term: Fall 2024. Aug. 19 – Dec. 5, 2024.
Class Schedule: Tue. & Thu, 5:30 pm – 6:45 pm, (Lecture Sessions)
Class Location: ECSN 2.110

- Lecture Sessions: As per UTD Policy, **Lecture sessions require In-Person attendance of all students.**
- Depending on the UTD policy and the instructor choice, lecture sessions **MAY ALSO BE** recorded online using Microsoft Teams Meeting and may be available on eLearning site.

NOTE: The UTD, ECS, and ECE Dept and the COVID policies and rules will be followed in the semester.

Instructor and contact Information:

Name: Professor Issa Panahi, PhD ECE
Office Phone: 972-883-8427 Email: issa.panahi@utdallas.edu
Office Location: ECSN 4.214
Office Hours: By appointment in office or online. Tue & Thu, 11: am- 12: pm.

The Course Teaching Assistant (TA): TA's name, email, and office hours will be announced.

Course Enrollment Requirements:
Pre-requisite: Credit cannot be received for more than one of the following courses:
EE 3302, CE 3303, BMEN 3302.

Class Attributes: Auditing of the course is not allowed for unenrolled students.

Course Description:

This core graduated course presents fundamentals of and serves as a follow-up course to digital signal processing. It covers detailed topics to analysis and design of discrete-time linear time invariant signals and systems. The course topics includes selected topics on time and frequency domain methods for Linear Time-Invariant Discrete-Time signals and systems, Linear convolution, Correlation, and Difference equation. Details on Z-Transform, Fourier-Series and Fourier-Transform. Causality and Stability concepts and testing. Sampling Theorem, and signal reconstruction. Discrete Fourier Transform and brief discussion about its fast computation algorithms using Fast Fourier Transform (FFT) and Geortzel techniques. Structure and design of some digital IIR and FIR filters are discussed. Signal energy and power are discussed. The course covers selected topics from Chapters 1 through 7 and the first few sections of Chapter 10 of the Textbook, plus additional topics from instructor. The main reference for study remains to be the course Textbook, and the lecture notes.

- Lecture notes will be made available to all students registered in this course before class sessions in advance via email. They **MAY or MAY NOT BE** posted on the eLearning site.

Student Learning / Course Objectives/Outcomes:

Objectives	***Outcomes***
* Analysis and design of Linear Time-Invariant (LTI) Discrete-time signals and systems in Time-Domain. Convolutions and Difference Equations.	a, b, c
* Analysis and design of LTI signals and systems using Z-Transform.	b, c
* Analysis and design of LTI signals and systems in Z-Domain, and Frequency-Domain (Fourier Series and Transforms).	a, b, c
* Correlation of signals in Time-Domain, Z-Domain, and Frequency-Domain.	a, b, c
* Filter structures and implementations.	b, c
* FIR Filters and Linear-Phase filter structure and designs	a, b, c, d
* Analysis and design of LTI signals and systems on digital computers using Concept of Discrete Fourier Transform (DFT), and FFT.	a, b, c d

a. an ability to understand concepts in the theory of electrical engineering.
b. an ability to understand concepts in applications of electrical engineering.
c. an ability to apply knowledge of electrical engineering to formulate and analyze problems in engineering.
d. an ability to learn emerging concepts in theory and applications of electrical engineering.
e. an ability to design and conduct experiments as well as to analyze and interpret data.
f. an ability to communicate effectively.

Course Resources - Materials, and Textbooks:

1. **Course Lecture notes:** Will be provided to the enrolled students.
2. **Textbook:** "DIGITAL SIGNAL PROCESSING, Principles, Algorithms, and Applications", 4th Edition, by John G. Proakis and Dimitris G. Manolakis, Prentice Hall 2007. ISBN: 0 - 13 – 187374-1.

Suggested, Additional Materials / References for Study. Relevant Textbooks:

(1) Samir S. Soliman, Mandyam D. Srinath, "Continuous and Discrete Signals and Systems", 2nd Edition, Prentice Hall, ISBN 0-13-518473-8, or later Edition.
(2) Alan V. Oppenheim, Ronald W. Schafer, and John R. Buck, "Discrete-Time Signal Processing", 2nd Edition, Prentice Hall, ISBN 0-13-754920-2, or later Edition.
(3) Sanjit K. Mitra, "Digital Signal Processing; A Computer-Based Approach", 4th Edition, McGraw Hill, ISBN: 978-0-07-338049-0, or later Edition.

- Textbooks and some other reference materials can be ordered and/or purchased, new (~$100) or used (<$100) either online or at the UTD Bookstore.
- The UTD Library has the textbook and the other books.

Assignments & Academic Calendar:

Homework: Weekly homework assignments will be given from the textbook. You may study, work, and learn in groups.
You need to submit each set of your completed assignments individually and on time to the course TA using ONLY your own UTD email address. No late submission will be accepted.

- The homework assignments MAY or MAY NOT be graded, but they will be considered in evaluating

student's performance throughout the semester.

- In-person attendance of enrolled students in lecture sessions will also be considered in evaluating student's performance throughout the semester. Students attendance in class sessions will be taken randomly.

Exams: There will be exams plus the final exam. Exams will be in the form of In-class. Every enrolled student must take every exam.

- **There will be no late exam or makeup exam for anyone.**

Course Layout:

The selected topics and course materials will be presented according to the **Class/Lecture Notes.**

Course Layout (Main Textbook):

Chapter 1: Sections; 1.1 through 1.3, 1.5
Chapter 2: Sections; 2.1 through 2.7
Chapter 3: Sections; 3.1 through 3.7
Chapter 4: Sections; 4.1 through 4.5, EXCEPT: 4.2.7
Chapter 5: Sections; 5.1 through 5.6, EXCEPT: 5.4.7
Chapter 6: Sections; 6.1, 6.2, 6.7
Chapter 7: Sections; 7.1 through 7.4, 7.6
Chapter 9: Sections; 9.1, 9.2.1, 9.2.2, 9.3.1, 9.3.3, 9.3.4, 9.7
Chapter 10: Sections; 10.1, 10.2.1, 10.2.2

Course Exams, Schedule:

- **Exams:** Dates and durations of exams during the semester will be announced by the instructor in advance.
- **Final Exam:** The date and location set by UTD will be followed, unless otherwise set by the instructor.
- **Student Accessibility:** students who may need especial assistance must follow the UTD students accessibility policy and procedures on time and inform the instructor well in advance of any exam.

Grading Policy:

The evaluation of the student's work is the instructor's professional judgment and not subject to negotiation. Final course score will be determined by the scores of the Exam 1 (Midterm Exam) (30%) and the Exam 2 (30%), and the Final Exam (40%). Final course grades will be based on the total numerical course score. Students performance and attendance during the semester will also be considered in final course grade.

Course Assignments & Instructor Policies:

- ✓ No late or makeup exams will be allowed.
- ✓ All assignments (Homework and Exams) will be due by the given deadlines and date/time. No credit will be given to late submissions.
- ✓ Every homework assignment must be given by every individual student in person, or via the UTD email address to the course **TA** on the assigned due dates. No credit will be given to late submissions.
- ✓ Every **COMPLETED EXAM** must be given by every individual student in-person, to the **instructor** and/or to the designated proctor or the course **TA** on the assigned exam date. No credit will be given to late submissions.
- ✓ Students must ONLY use their **UTD email** addresses for any correspondence & communication.
- ✓ Any communication and/or meeting with instructor and with TA must be set by prior appointment.
- ✓ Any change of policies, course topics & materials and exams are all at the discretion of the instructor.
- ✓ Auditing the course by any non-registered/non-enrolled student is prohibited by the UTD/school policy.

Course study and preparation:

Students are highly encouraged to review and study, either individually or together with classmates, the class lecture notes, related topics in the course textbook, and do/re-do/discuss all course topics, examples, homework problems. Study the lecture notes prior to and after class lecture sessions on regular basis all throughout the semester. Participate in classroom discussion and ask questions. All resources are available to you to learn the course materials. So, use them. That is, contact your TA especially about the homework problems and your instructor if need be. Review the course materials and examples and homework problems and their solutions multiple times. If need be, ask to set an online meeting with your TA and/or with the instructor to discuss your specific questions. You can also correspond with your TA via email or ask to set up an in-person meeting.

DO NOT LEAVE STUDYING THE COURSE TOPICS and MATERIALS TO the LAST DAYS and MOMENTS BEFORE THE EXAMS!!!

- **Guidelines and Resources for COVID and any types of health-related issues:**

The information contained in the following link lists the University's health related resources for students and instructors of record.

Please see http://go.utdallas.edu/syllabus-policies.

The instructor may record meetings and lecture sessions of this course. Any recordings will be available to all students registered for this class as they are intended to supplement the classroom experience.

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of **Student AccessAbility** has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not enrolled in the class/course, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Comet Creed:

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources: The information contained in the following link lists the University's academic support resources for all students. Please go to Academic Support Resources webpage for these policies.

UT Dallas Syllabus Policies and Procedures:

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

- **Course & Instructor Policies**

The students are expected to attend every class lecture session in person or online synchronously as set by instructor and school online, and to turn in any assignments on scheduled date/time. No late work is accepted. No make-up exams or quizzes will be given except under extenuating circumstances as determined by the instructor on an individual case basis.

ALL YOUR WORK MUST BE NEAT, CLEAR AND LEGIBLE. OTHERWISE, YOU MAY NOT GET FULL OR ANY CREDIT. YOUR WORK ASSIGNMENTS SHALL NOT BE ON SHEETS TORN OFF FROM NOTEBOOKS, MUST BE YOUR WORK IN YOUR HANDWRITING, OR TYPED USING MS-WORD, AND MUST BE CLEAR

AND EASILY READIBLE IN ENGLISH. SHOW ALL THE STEPS IN YOUR WORK; DO NOT DEPEND ON PARTIAL CREDITS, WHICH WILL BE SOLELY AT THE DISCRETION OF THE INSTRUCTOR.

Academic Integrity: The faculty expects from students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrates a high standard of individual honor in his or her scholastic work. Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As the general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings. Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be detected and dealt with under the university's policy on plagiarism (see general catalog for details). This course may use the resources of turnitin.com, which searches the web sites for possible plagiarism and is over 90% effective.

Email Use: The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of every individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's UT- Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individuals corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at UT-Dallas provides a method for students to have their UT-Dallas mail forwarded to other accounts.

The items, descriptions, and timelines contained in this syllabus are subject to change at the discretion of the Professor.

The End