Course Syllabus

(In-class, In-person Lecture Course Offering)
EESC 6360, Digital Signal Processing I (DSP I)
(Fall 2022)

Course No: EESC 6360 **Section:** 501 **Credit Hours:** 3 **Prerequisites:**
Class Time-Schedule: Tuesdays, Thursdays, from 5:30 PM to 6:45 PM.
Classroom: ECSN 2.110. **In-Class/in-person lecture Course.**

Student attendance in classroom is required: Until further notice, in every week:

- All students must use and study the sent, posted, course materials, and lecture notes.
- The lecture sessions MAY BE recorded on eLearning via MS-Teams software.
- Every lecture session is given once every week and will not be repeated.

➔ It is recommended and students are highly encouraged to get tested regularly for COVID, be fully vaccinated, use face coverings and masks, wash hands and use hand sanitizers, use physical distancing, all as per CDC and UTD safety and protective procedures, for attending school and every classroom session.

Instructor: Dr. Issa Panahi, PhD, ECE
Office Location: ECSN 4.214
Meeting and Office Hours: By appointment,
MAY BE via email, or Online MS-Teams meeting
Contact: All correspondence with instructor or with TA should be via individual UTD email ONLY
Email: issa.panahi@utdallas.edu

Teaching Assistant (TA): TBD
Office Location: TBD
Office Hours: TBD
Email: TBD

Classroom Safety and COVID-19: Please review ALL the UTD and ECS and ECE Dept policies that must be followed.

Accommodations for Students Who Miss Class for Reasons Unrelated to COVID-19

- Individual faculty maintain their discretion on whether and how to accommodate student absences **unrelated** to COVID-19. Visit Comets United webpage to obtain the latest information on the University's guidance and sources for campus health and safety.

Course Description

This core graduated course presents fundamentals of and serves as a follow-up course to digital signal processing. It covers detail topics to analysis and design of discrete linear time invariant signals sand 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 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 emails and MAY BE by posting on eLearning site .

Course 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 purchased, new (~$100) or used (<$100) either online or purchased at the UTD Bookstore.

Assignments: Coursework includes textbook problems. Some small project MAY/MAY NOT be given. MATLAB or C programming may be needed. All assignments must be turned in by the due dates. Unapproved delay and Late assignment will not be accepted and will receive zero credit and score.

Exams: There may be one or more midterm exams, plus one final exam, all given in classroom, and attendance of every enrolled student is required. The dates for all class assignments, and exams will be announced to students in advance. The final exam date/time/place will be set and announced by UTD. No exam or any course assignment should be missed by any student, unless approved by instructor in advance. **There will be no makeup exam in any form or shape.**

Grading: Final grade of the course will be based on the: (i) Average grade of the HW assignments (5%), (ii) Average of midterm exam(s) and/or project (55%), and (iii) Final exam (40%).

Dates: Final Exam date is usually what the school/UTD determines. The dates for all midterm exams will be announced to students in the course lecture sessions, meetings, and via emails in advance while considering the UTD datelines.

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 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 and examples both 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 emails or ask to set an in-person meeting.

- DO NOT LEAVE STUDYING THE COURSE TOPICS/MATERIALS TO LAST DAYS/MOMENTS BEFORE THE EXAMS !!!

Student Learning / Course Objectives/Outcomes:

Objectives	***Outcomes***
* Analysis and design of Linear Time-Invariant (LTI) 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 Discrete Fourier Transform (DFT), and FFT.	a, b, c d
* Project and technical report.	d, e, f

a. an ability to understand concepts in 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.

Technical Requirements: In addition to a confident level of Matlab or C programming, computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the Getting Started with eLearning webpage.

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.

- **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 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 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 individual 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 descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.