Department of Electrical & Computer Engineering Technology
Division of Engineering, Computer Programming, & Technology
WestCampusBuilding 9, Room 140 (407) 582-1902/1903

http://www.valenciacollege.edu/west/engineering/ **SESSION: Fall 2018**

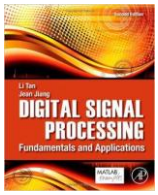
Course Syllabus: CET 4190C – Digital Signal Processing – CRN 14445 (3 credits)

Course Description: This advanced signal processing course includes the study of signals and systems, transformation techniques, digital filter designs, and practical applications of DSP. Students will use MATLAB and a DSP microprocessor to get an in-depth understanding and hands-on experience (Special fee: $58.00)

Prerequisite: EET 3086C (Circuit Analysis) & **CET 3464** (Software Applications in Engineering Tech.)

Class Time and Location: MW - 9:00AM – 10:45PM – Room 11-243 – West Campus

Textbook: *Digital Signal Processing - Fundamentals and Applications, 2nd Edition,* by Li Tan. Academic Press. ISBN: 9780124158931



Software: MATLAB/Octave (Octave is free to download)

Library Resources: Library at the West campus has put together dedicated resources for the BSECET program that can be accessed through ***http://libguides.valenciacollege.edu/bsecet***

Professor's Information:

Name: Dr. Masood Ejaz
Office: West Campus, Bldg. 11 – Room 255
Phone: 407.582.1945
Email: mejaz@mail.valenciacollege.edu

Office hours:

Day	Time	Location
Monday	8:00AM – 9:00AM	11-255
Tuesday	8:00AM – 9:00AM	11-255
Wednesday	8:00PM – 9:00PM	Atlas Email(Preferred) / Canvas Email
Thursday	8:00AM – 12:00PM	11-255
Friday	9:00AM – 12:00PM	Atlas Email(Preferred) / Canvas Email

Student Performance Assessment:

Homework Assignments[1] **10%**
Programming Projects[1] **20%**
Quizzes[2] **20%**
Exam 1[2] **10%**
Exam 2[2] **10%**
Exam 3[2] **10%**
Final Exam[3] **20%**
DSP Board Projects (BONUS) **10%**

A	90-100%
B	80 - 89%
C	70 – 79%
D	60 – 69%
F	< 60%

[1] ***No Late work will be accepted***. **Assignments are collected at the beginning of class.**

[2] ***No make-up*** **quizzes or exams will be given.**

[3] **Final Exam will be *comprehensive***

Note:

- It is the student's responsibility to be in class and take notes. Exams will cover all material covered ***in class*** and homework.
- Students will have one week to finish programming assignments on their own. Professor will explain the assignments during class meetings and will be available to help students out during office hours.
- Homework should be turned in at the beginning of class.
- No make-up quizzes or exams will be given.
- No late work will be accepted

Important Dates:

Monday, Sep 3	Labor Day
Tuesday, Sep 4	Drop/Refund Deadline
Wed - Fri, Sep 5 – 14	No Show Reporting Period
Thursday, Oct 11	College Night (No Class)
Friday, November 9	**Withdrawal deadline for "W" Grade**
Wed – Fri, Nov 21 - 23	Thanksgiving Break
Monday, Dec 10	Final Exam **(9:00AM – 11:30AM)**
Tuesday, Dec 18	Final Grades Viewable in ATLAS

Course Learning Outcomes:

Course Learning Outcomes indicate the knowledge that a student should gain in this course. Performance Indicators represent how that knowledge will be measured.

Course Learning Outcomes	***Performance Indicators***
1. Demonstrate an understanding of the parameters associated with discrete-time signals and systems	• Demonstrate an understanding of discrete sequences and their notations • Measure signal amplitude, magnitude and power • Demonstrate an understanding of discrete linear and time-invariant systems • Demonstrate an understanding of the process to analyze linear time-invariant systems
2. Demonstrate an understanding of sampling and its effects on digital signals	• Demonstrate an understanding of Aliasing and signal ambiguity in frequency domain • Perform sampling of low-pass and band-pass signals • Demonstrate an understanding of the phenomenon of spectral inversion in band-pass sampling

3. Demonstrate an understanding of different time-to-frequency domain transformation techniques	• Demonstrate an understanding of the relationship between the signals in time domain and frequency domain • Perform Discrete Fourier transform (DFT) and Discrete-Time Fourier transform (DTFT) on digital signals • Justify the benefits of using Fast Fourier transform (FFT) • Perform z and Laplace transforms • Decide which transformation technique to use for different situations
4. Demonstrate an understanding of two main digital filter design techniques	• Demonstrate an understanding of convolution process • Design Low-pass, High-pass and Band-pass Finite Impulse Response filters (FIR) • Design Infinite Impulse Response filters (IIR) using Impulse invariance, Bilinear transform, and optimized design methods
5. Demonstrate an understanding of common applications of Digital signal processing	• Decide where to use digital signal processing • Assemble circuits using DSP microprocessor to demonstrate practical applications of DSP

Tentative Schedule:

Week	Class Meetings	Topics	Chapter
1	Monday 08/27	Introduction; Basic Concepts; DSP Examples; Overview of Real-World Applications; Sampling;	1
	Wednesday 08/29	Fourier Series Signal Reconstruction	1 2
2	Monday 09/03	**Labor Day Holiday (No class)**	
	Wednesday 09/05	ADC & DAC	2
3	Monday 03/10	Quantization *Programming Project # 1: Quantization of Analog Signals and Calculation of Quantized noise*	2
	Wednesday 09/12	Digital Signals; Linear Time-Invariant, causal Systems; Difference Equations and Impulse Response;	3
4	Monday 09/17	BIBO Stability; Digital Convolution	3

	Wednesday 09/19	**Exam I (Chapters 1 – 3)**	
5	Monday 09/24	Discrete Fourier Transform (DFT) *Programming Project # 2: Digital Convolution*	4
	Wednesday 09/26	Amplitude Spectrum and Power Spectrum; Spectral Estimation using Window Functions;	4
6	Monday 10/01	Fast-Fourier Transform (FFT)	4
	Wednesday 10/03	z-Transform & its Properties; Inverse z-Transform; *Programming Project # 3: Generation of Digital Signals and Signal Spectral Analysis*	5
7	Monday 10/08	Solution of Difference Equation using z-transform	5
	Wednesday 10/10	Solution of Difference Equation using z-transform	5
8	Monday 10/15	The Difference Equation & Digital Filtering; Difference Equation & Transfer Function;	6
	Wednesday 10/17	**Exam II (Chapters 4 – 5)**	
9	Monday 10/22	The z-Plane Pole-Zero Plot; Digital Filter Frequency Response; Basic types of Filtering	6
	Wednesday 10/24	*Programming Project # 4: Z-transfer Functions, Difference Equations, and Filter Implementation*	
10	Monday 10/29	Realization of Digital Filters	6
	Wednesday 10/31	Realization of Digital Filters	6
11	Monday 11/05	FIR Filter Format; FIR Design using Window Method;	7
	Wednesday 11/07	Fourier Transform Design; Speech noise Reduction (Application)	7
12	Monday 11/12	Fourier transform Design;	7

	Wednesday 11/14	*Programming Project # 5: FIR Design using Window Method*	
13	Monday 11/19	**Exam II (Chapters 6 – 7)**	
	Wednesday 11/21	**Thanksgiving Break (No Class)**	
14	Monday 11/26	IIR Filter Design; Characteristics *Programming Project # 6: FIR Filter Application: Noise Reduction*	8
	Wednesday 11/28	Bilinear Transformation Design method (BLT)	8
15	Monday 12/03	Bilinear Transformation Design method (BLT) *DSP Board Projects*	8
	Wednesday 12/05	*DSP Board Projects* Review	
16	Monday 12/10	**Final Cumulative Exam** **(9:00AM – 11:30AM)**	

DISCLAIMER: **Any Changes in the policy and/or schedule of this syllabus may be made at anytime during the semester at the discretion of the instructor**.

Rules and Comments:

- Absolutely No food or drinks in the classroom or laboratory
- No make-up exams are permitted unless ***prior arrangement*** with the instructor has been made and ***approved***.
- There are no "dropped" exam scores.
- Each student is responsible for his or her own work. All exams and graded assignments are to be exclusively your own work, unless you receive instructions to collaborate. Using any human, written, electronic, or other resource in any manner not explicitly authorized by the instructor will result in a grade of zero on the exam(s) or assignment(s) involved.
- You are expected to be in class **on time**, and to remain in class for the entire period unless permission to leave early has been granted by the instructor. It is disruptive to arrive or depart while class is in session.
- Absences are excused solely at the discretion of the instructor, who may require that you prove the existence of extenuating circumstances before excusing any absence(s).
- More than ***two unexcused*** lecture absences may result in your withdrawal from the course.
- It is *your responsibility to withdraw from the course*. Any withdrawal request after the withdraw deadline may not be granted.
- It is the student's responsibility to keep track of their status and performance (i.e., quizzes, and exam

grades) in class. Student should be able to average their grades based upon the grading policy stated in this syllabus.

- **You are encouraged to ask relevant questions during class**.
- Your attitude will greatly affect your ability to succeed in this course. It will also affect your classmates' attitudes should you choose to participate in class discussions. Always consider this fact carefully before you speak or act. If your comments or actions in class are deemed by the instructor to adversely affect other students' attitudes, they are considered disruptive.
- ***Grades will not be disclosed over the telephone or via e-mail, except through your Atlas account***.
- **Cheating or *any act of academic dishonesty* is prohibited**. Any student caught cheating, the instructor has the right to withdraw the student from the class or result in a failing grade.
- If you want to record any lecture using audio or video devices, you must take permission from the instructor and fellow students.
- **Beepers** and **Cellular phones** must be turned **OFF** or put on **silent mode** during class.
- **Disruptive Behavior:** Any student engaging in disruptive behavior will be advised on the first offense and will be **dropped** from the course on the second offense.
- **You must satisfactorily complete all the course requirements with passing grades in order to receive a passing grade**. The requirement may include (based on the course contents):
  - **In-class requirements** (Exams, Quizzes, Homework)
  - **Lab Assignments** (Successful completion of lab and submission of lab report, if any)
  - **Project Assignments**

Student Core Competencies:

The faculty of Valencia College has established four Core Competencies that describe the learning outcomes for a Valencia graduate. They are: THINK, VALUE, COMMUNICATE, and ACT. These general competencies can be applied in many contexts and must be developed over a lifetime. They specify how learning can be expressed and assessed in practice. They enable students and faculty to set learning goals and assess learning within and across the many disciplines of human inquiry. Use the descriptions and examples of academic work for each to measure your own learning outcomes. Samples of the academic work are great additions to your Learning Portfolio. For further information on student core competencies please go to www.valenciacollege.edu/competencies.

Expected Student Conduct:

Valencia College is dedicated not only to the advancement of knowledge and learning but is concerned with the development of responsible personal and social conduct. By enrolling at Valencia College, a student assumes the responsibility for becoming familiar with and abiding by the general rules of conduct. The primary responsibility for managing the classroom environment rests with the faculty. Students who engage in any prohibited or unlawful acts that result in the disruption of a class may be directed by the faculty member to leave the class. Violation of any classroom or Valencia's rules may lead to disciplinary action up to and including expulsion from Valencia. Disciplinary action could include being withdrawn from class, disciplinary warning, probation, suspension, expulsion, or other appropriate and authorized actions. You will find the Student Code of Conduct in the current Valencia Student Handbook

Students with disabilities:

Students who qualify for academic accommodations must provide a letter from the Office for Students with Disabilities (OSD) and discuss specific needs with the professor, preferably during the first two weeks of class. The Office for Students with Disabilities determines accommodations based on appropriate documentation of disabilities (West Campus SSB 102, ext. 1523).

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