EEL 4102 **Signals and Systems (SAS)** **Fall 2018**

Course Instructor:	Dr. Yasin Yilmaz
Lecture Hours:	Tuesdays and Thursdays, 2:00PM – 3:15PM / CPR 115
Office Hours:	Tuesday 3:30PM – 5:30PM (unless otherwise noted)
Office:	ENB 251
E-mail:	**yasiny@usf.edu (preferred method of contact)**
Teaching Assistants:	Ismail Uluturk - uluturki@mail.usf.edu Ammar Haydari - ammarhaydari@mail.usf.edu
TA Office Hours:	Thursday 3:30PM – 5:30PM (Ismail Uluturk, ENB 353A) Wednesday 12PM – 2PM (Ammar Haydari, ENB 237)
Prerequisites:	EGN 3420 – Engineering Analysis (minimum C grade) and EGN 3374 – Introduction to Electrical Systems II (minimum C grade)
Co-requisite:	EEL 3163C – Computer Tool Lab **(Highly Recommended)**
Textbook:	Linear Systems and Signals by B. P. Lathi, 3rd Edition, Oxford University Press, ISBN: 9780190200176 **(Highly Recommended)**
Supplementary Book:	Signals and Systems: Analysis Using Transform Methods & MATLAB, 2nd Edition, McGrawHill, ISBN-13 978-0073380681 **(Recommended)**
Software:	MATLAB (available for USF students at app.usf.edu) **http://www.mathworks.com/academia/student_center/tutorials/** **https://www.coursera.org/course/matlab** (Weeks 1 & 2) **(Highly recommended if you have never used Matlab before)**

USF Catalog Description:

Mathematical analysis of signals and linear systems. Includes time and frequency domain points of view such as Laplace and Fourier analysis as well as convolution. The time domain viewpoint is developed for linear time invariant systems using the impulse response and convolution. The frequency domain viewpoint is explored through Laplace Transform, Fourier Series and Fourier Transform for continuous time signals and sampling theorem is introduced to bridge the gap between continuous and discrete time signals.

Course Goals:

To introduce students to the fundamental concepts of signals and systems (continuous and discrete time) and to study different techniques to analyze linear systems (using software tools and/or classical methods)

Course Objectives:

The expectations for students taking this course are that at the end of the course they should:

1. Understand the concepts in signals and systems and how to mathematically represent them.
2. Have a working knowledge of continuous-time and discrete-time signals and systems.
3. Be able to work with signals and systems in both the time domain and the frequency domain.
4. Know how to calculate the response of linear systems using both time domain and frequency domain techniques.
5. Understand the concepts in and be able to calculate the Laplace Transform, Fourier Series and the Fourier Transform.
6. Know how to calculate and analyze transfer function of a linear system to determine system response to given input signals, frequency domain characteristics, and stability.
7. Understand the application of sampling theorem for signal sampling and reconstruction.
8. Be able to apply signals and systems techniques to electrical, mechanical, and physical systems.

Student Responsibilities:

1. Stay up-to-date with course content and announcements on Canvas and any e-mail communications regarding EEL 4102 originating through Canvas. **(VERY IMPORTANT)**
2. Must have met all prerequisite requirements prior to taking the course.
3. Read the relevant sections from the textbook before each class.
4. Inform the instructor of any conflicts with regular course schedule and/or exams, at least two weeks prior to date of conflict provided there is a valid reason (i.e., busy work schedule is NOT a valid reason!) (**VERY IMPORTANT)**

Grading and Assignments:

There will be two exams during the semester (midterm exams) and a final exam, tentatively scheduled on page 4 of this syllabus. There will also be 5 homework assignments, which will include MATLAB-based questions, and will be due in 1 week after posting. Finally, there will be quizzes on some weeks announced in that day's class on the discussed course material, which will be due in 2 days after posting.
Exercise questions will be posted from time to time to prepare you for the exams – these will not be graded.

Exam 1 – 25%
Exam 2 – 25%
Final Exam – 30%
Homework Assignments and Quizzes – 20% (10% each)

The final grade in the class will adhere to the normal grading scale of A (90 – 100), B (80 – 89), C (70 – 79), D (60 – 69) and F (< 60). Overall class performance (class curve) may be considered while grading if needed. **No +/- grades will be assigned (i.e., A-, B+, etc.).**

Technology Information:

Access to Internet is **required** to use Canvas system, which is provided by the University of South Florida and is the courseware package utilized in this course. **Every student is responsible for regularly checking the course Canvas web page (http://learn.usf.edu) for announcements, assignments and other important information.** In addition, the students will require MATLAB as software tool for some of the assignments at http://apps.usf.edu/.

Use of Calculators:

No calculators are allowed (and needed) for the exams. Students can use any calculator they want for the homework assignments.

Attendance:

Course Attendance at First Class Meeting: Students are required to attend the first class meeting of courses for which they registered prior to the first day of the term. Names of students who register prior to the first day of the term are printed on the first class roll for each course section. The first class roll is used by instructors to drop students who do not attend the first day of class. Students having extenuating circumstances beyond their control and who are unable to attend the first class meeting must notify the instructor or the department prior to the first class meeting to request waiver of the first class attendance requirement. Students who add courses or late-register during the first week of classes will **not** be on the first class roll and, therefore, will not be dropped for non-attendance by the instructor. **Students are responsible for dropping undesired courses in these categories by the 5th day of classes to avoid fee liability and academic penalty.**

Attendance during the semester is expected – this is NOT an online class, it's a regular, face-to-face class supported with online material.

Academic Integrity Policy: *(approved by the EE faculty as EE Department Policy)*

The faculty of the Electrical Engineering Department is committed to maintaining a learning environment which promotes academic integrity and the professional obligations recognized in

the IEEE Code of Ethics (http://www.ieee.org/about/corporate/governance/p7-8.html). Accordingly, the department adheres to a common Academic Integrity Policy in all of its courses. This policy is to be applied uniformly in a fair and unbiased manner.

University rules regarding academic integrity will be strictly enforced. It is not acceptable to copy, plagiarize or otherwise make use of the work of others in completing homework, project, laboratory report, exam or other course assignments. Likewise, it is not acceptable to knowingly facilitate the copying or plagiarizing of one's own work by others in completing homework, project, laboratory report, exam or other course assignments. It is only acceptable to give or receive assistance from others when expressly permitted by the instructor. Unless specified otherwise, as in the case of all take-home exams, scholarly exchange regarding out-of-class assignments is encouraged. A more complete explanation of behaviors that violate academic integrity is provided at: http://ugs.usf.edu/pdf/cat1314/08ACADEMICPOL.pdf

The minimum penalty for violation of the academic integrity policy stated in the preceding paragraph is the greater of an automatic zero on the assignment or a letter grade reduction in the overall course grade. Student(s) found in violation of the policy on an exam will receive an F or FF in the course. Violations of the policy will be recorded in a letter from the instructor that is kept in the student files held by the department. A second violation of the policy, irrespective of whether it was related to an exam or any other course assignment, will result in expulsion from the Electrical Engineering Department.

Students with Disabilities:
Students in need of academic accommodations for a disability may consult with the office of Students with Disabilities Services to arrange appropriate accommodations. Students are required to give reasonable notice (at least one week) prior to requesting an accommodation. For more information see: http://www.sds.usf.edu/

Religious Observances:
Students who anticipate the necessity of being absent from class due to the observation of a major religious observance must provide notice of the date(s) to the instructor, in writing, by the second class meeting.

Tentative Course Schedule:
The instructor reserves the right to modify the syllabus.
§ means Section with respect to the textbook by Lathi, 3rd Edition.

Date	Class Title	Class Content	Due Items
W1: 8/21	Introduction	Introduction, Course information	
W1: 8/23	Fundamentals	Signals, Energy and Power of signals §1.1	
W2: 8/28	Fundamentals	Classification of signals §1.3	
W2: 8/30	Fundamentals	Signal operations §1.2	
W3: 9/4	Fundamentals	Useful signal models, Even and odd functions §1.4-1.5	
W3: 9/6	Fundamentals	Classification of systems, System model and descriptions §1.6-1.9	
W4: 9/11	Continuous-time systems	System response to internal conditions, Impulse response §2.1-2.3	
W4: 9/13	Continuous-time systems	System response to external input, Convolution §2.4	
W5: 9/18	Continuous-time systems	Classical solutions of differential equations, System stability §2.5	
W5: 9/20	Continuous-time systems	System stability §2.5	
W6: 9/25	Continuous-time systems	System behavior §2.6	

W6: 9/27	Discrete-time systems	Discrete-time signal operations and models §3.1-3.3	
W7: 10/2	Midterm 1 Review	Review session	
W7: 10/4	**Midterm Exam**	**FIRST MIDTERM in CPR 115**	
W8: 10/9	Discrete-time systems	Discrete-time systems, System response to internal conditions, Impulse response §3.4-3.7	
W8: 10/11	Discrete-time systems	System response to external input, classical solutions of difference equations and system stability §3.8-3.9	HW 1
W9: 10/16	Laplace transform	Continuous-time system analysis using Laplace Transform §4.1-4.2	
W9: 10/18	Laplace transform	Definition and properties of Laplace Transform §4.2	HW 2
W10: 10/23	Laplace transform	Solving differential equations and stability analysis with Laplace Transform §4.3	
W10: 10/25	Laplace transform	Stability analysis with Laplace Transform §4.3	HW 3
W11: 10/30	Fourier series	Fourier series and continuous-time signal analysis, Trigonometric and exponential Fourier series §6.1-6.3	
W11: 11/1	Fourier series	Fourier series and continuous-time signal analysis, Trigonometric and exponential Fourier series §6.1-6.3	HW 4
W12: 11/6	Midterm 2 Review	Review session	
W12: 11/8	**Midterm Exam**	**SECOND MIDTERM in CPR 115**	
W13: 11/13	Fourier transform	Fourier transform and continuous-time signal analysis, definition and properties of Fourier transform §7.1-7.3	
W13: 11/15	Fourier transform	Fourier transform and continuous-time signal analysis, definition and properties of Fourier transform §7.1-7.3	HW 5
W14: 11/20	Fourier transform	Filters §7.4-7.6	
W14: 11/22	No class	Thanksgiving Holiday	
W15: 11/27	Sampling	Sampling Theorem §8.1-8.3	
W15: 11/29	No class	Reading Days	
12/4	**Final Exam**	**FINAL in CPR 115 at 12:30-2:30 PM**	