

## Signal and System Analysis (AEE 2410)

### Course syllabus

**Instructor:** Dr. Abdelouahab Bentrchia

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**Website:** <https://sites.google.com/site/abdelouahabbentrchia/home>

**Class Timings:** see time table on my website or on the office door.

**Office Hours:** see time table on my website or on the office door

#### Textbook:

- A. V. Oppenheim, A. S. Willsky, and S. H. Nawab, "Signals and Systems", Prentice Hall, 1997.

#### Pre-requisite:

- AEE 2110 Electric Circuits I.

#### References:

- C.-T. Chen, Signals and Systems, Oxford University Press, NY, 2004.

#### Grading Criteria:

- 5% Homework
- 5% Project(s)
- 25% Quizzes
- 25% Midterm Exam I (6th-10th Mar)
- 40% Final Exam

#### Quizzes' dates:

- Quiz1 (31 Jan) - Quiz2 (14 Feb) - Quiz3 (28 Feb) - Quiz4 (27 Mar) – Quiz5 (10 Apr)

#### Credit hours:

- 3(3,1,0) hours

## Tentative Schedule

Textbook	week	Topics to be covered
Chapter 1	1,2,3,4	<b>1. Signals and Systems.</b> Continuous-Time and Discrete-Time Signals. Transformations of the Independent Variable. Exponential and Sinusoidal Signals. The Unit Impulse and Unit Step Functions. Continuous-Time and Discrete-Time Systems. Basic System Properties.
Chapter 2	5,6	<b>2. Linear Time-Invariant Systems.</b> Discrete-Time LTI Systems: The Convolution Sum. Continuous-Time LTI Systems: The Convolution Integral. Properties of Linear Time-Invariant Systems. Causal LTI Systems Described by Differential and Difference Equations. Singularity Functions.
Lecture notes	7	<b>Correlation Analysis</b> Autocorrelation function, cross-correlation function, properties.
Chapter 3	8,9	<b>3. Fourier Series Representation of Periodic Signals.</b> A Historical Perspective. The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous-Time Periodic Signals. Convergence of the Fourier Series. Properties of Continuous-Time Fourier Series. Fourier Series Representation of Discrete-Time Periodic Signals. Properties of Discrete-Time Fourier Series. Fourier Series and LTI Systems. Filtering. Examples of Continuous-Time Filters Described by Differential Equations. Examples of Discrete-Time

		Filters Described by Difference Equations.
Chapter 4	10	<b>4. The Continuous-Time Fourier Transform.</b> Representation of Aperiodic Signals: The Continuous-Time Fourier Transform. The Fourier Transform for Periodic Signals. Properties of the Continuous-Time Fourier Transform. The Convolution Property. The Multiplication Property. Tables of Fourier Properties and Basic Fourier Transform Pairs. Systems Characterized by Linear Constant-Coefficient Differential Equations.
Chapter 5	11	<b>5. The Discrete-Time Fourier Transform.</b> Representation of Aperiodic Signals: The Discrete-Time Fourier Transform. The Fourier Transform for Periodic Signals. Properties of the Discrete-Time Fourier Transform. The Convolution Property. The Multiplication Property. Tables of Fourier Transform Properties and Basic Fourier Transform Pairs. Duality. Systems Characterized by Linear Constant-Coefficient Difference Equations.
Chapter 9	12-13	<b>9. The Laplace Transform.</b> The Laplace Transform. The Region of Convergence for Laplace Transforms. Properties of the Laplace Transform. Some Laplace Transform Pairs. Analysis and Characterization of LTI Systems Using the Laplace Transform. System Function Algebra and Block Diagram Representations. The Unilateral Laplace Transform.
	14	<b>General Review for the Final Exam</b>

## Course Policy

- **General policies**

1. Course material such as lecture slides, homework ...etc. will be posted on my website; however posted material is not a substitute for the text book. Therefore, students are expected to purchase the textbook.
2. The student is responsible to check his email (university email) daily for any class announcements. Most of these announcements will be posted on my website, therefore it is also recommended to visit my website at least once a week.
3. Use of mobile phone or other electronic devices or equipment is not allowed during class. All such systems must be turned off or silenced and not used during classes without prior permission from the instructor.
4. It is the student's responsibility to ask questions, for me if you don't ask questions then I assume that you are happy. If for one reason or another, my answer is not satisfactory for you, then you are welcome to visit my office for more discussions and details.

- **Exam policy**

1. Instead of the second major exam, there will be 5 quizzes that span the whole course material. These quizzes will be conducted every two weeks approximately (the dates are mentioned above).
2. There is no need to memorize formulas, a formula sheet will be provided in the exam.

- **Attendance**

1. Only excuses obtained from the Students Affairs Dept. are accepted. Personal excuses are not accepted.
2. Three late arrivals = One absence.
3. Any student who misses more than 25% of all lectures will not be allowed to enter the final exam.

- **Makeup policy**

1. No make-up will be provided for exams unless an official excuse exists which should be validated from the student affairs Dept.

2. Students who miss a quiz or a deadline for homework submission because of an excused absence will not be allowed to make-up the quiz or the homework but instead the calculation of the quiz/homework grade will be adjusted so that the missed grade will not be counted.
3. Any official excuse should be presented to the instructor within one week from the absence.

- **Assignments Policy**

1. HWs will be announced in class and will be posted online along with the deadline for submission in my website. Therefore it is the student's responsibility to check my website regularly for any announcement (at least once a week).
2. All HWs should be submitted on time. Any late homework will be subject to a late penalty as follows: 20% for every one day late, that is, after 5 days no homework will be accepted.
3. All HWs should be submitted to the TA.
4. Only two (2) randomly selected HWs will be graded and that will be your grade, therefore you are strongly encouraged to solve and submit all HWs.
5. The HW solution will be posted online after one week from the due date of the homework.