

Sabancı University  
Faculty of Engineering and Natural Sciences

**ENS 211 - SIGNALS**

Summer 2021-2022  
Course Information

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<b>Lecturer</b>	: Mohaned Chraiti, FENS G044, Phone: x7044. (mohaned.chraiti@sabanciuniv.edu)
<b>Teaching Assistants</b>	: Ömer Rasim Kınacı (kinaciomer@sabanciuniv.edu) Vahit Alp Hıdıroğlu (hidiroglu@sabanciuniv.edu)
<b>Textbook</b>	: <i>Signal Processing First, James H. McClellan, Ronald W. Schafer, Mark A. Yoder, Pearson Education, 2003.</i>
<b>Lecture Hours</b>	: Tuesday 8:40-11:30, Wednesday 11:40-14:30
<b>Recitation Hours</b>	: Thursday 8:40-11:30
<b>Office Hours</b>	: Mohaned Chraiti: Wednesday 14:40-15:40 Ömer Rasim Kınacı: In recitations or appointment by e-mail. Vahit Alp Hıdıroğlu: In recitations or appointment by e-mail.
<b>Course Objectives</b>	: Major objectives of this course are 1) to provide a broad introduction to signals and systems which is one of the best starting points for the study of electrical engineering, and computer science and 2) to introduce the use of mathematics as an appropriate language for thinking about engineering problems broadly and for describing and understanding signals and systems in particular.
<b>Prerequisite</b>	: MATH 101
<b>Grading Policy</b>	: Midterm, 30%; Final, 30%; Assignments, 40%. [Note that your attendance in lectures/recitations and your overall level of participation in the course will certainly have a consequence, particularly if your preliminary grade falls near a borderline.]
<b>Midterm Dates</b>	: Midterm — Week 4 Final — Week 8

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### Recitations

Attendance and participation in recitations are necessary for you to do well in the course, and are critical to mastering the material.

### Exams

There will be one midterm and a final. All the exams will be closed-book, but you will be allowed to bring notes on Trig Table, and Fourier/Z-transform table for basic/common functions.

### MATLAB

We will gradually introduce MATLAB as a tool for seeing/hearing/plotting some of the signals we will learn about in class as well as for performing various computations and transformations on signals. Recitations will provide the necessary tutorial and guidance on MATLAB when needed.

### Assignments

There will be seven assignments. It is recommended to submit the assignments electronically through SU- Course (exceptions may apply). We encourage students to discuss and collaborate to solve assignments. However, collaborations are not risk/cost-free. The scoring policy may change with the number of collaborators: for a given exercise, a wrong answer will result in  $-z$  points, if the solution is provided by one student, plus an extra  $-20\%(\#collaborators-1)z$ , in the case of collaboration (right answers come with no penalty). The penalty could go up to the exercise's total score (the latter scoring policy does not apply for the 4<sup>th</sup> and 7<sup>th</sup> assignments). The adopted policy will only encourage fruitful collaborations, given that the right answers come with no penalty. Moreover, it prevents passive collaboration such as copying a colleague's solution, given that it comes with a risk of penalty for both. You must write your solutions **independently**, and, at the top of your assignments paper, you must **write the names of the individuals you have collaborated with**. We also encourage discussion with the staff about the assignment problems during recitations/office hours. We will not accept any late submissions (except for the most compelling reasons), because we believe that the habit of late

submissions can make it difficult for the students to keep up with the course and cause them to fall behind. We will make solutions available soon after you submit your solutions. Please make sure to compare the solutions and your answers soon after the solutions are available, and do not wait until the night before an exam!

### **Make-up Policy**

There will only be one make-up exam at the end of the semester. Only health or other personal emergencies will be accepted as valid reasons to qualify you for a make-up exam.

### **SUCourse**

We will use SUCourse to distribute assignments and their solutions, and as a communication medium between you and the staff. If you have any problems accessing the course material on SUCourse, please let us know as soon as possible so we can have such problems fixed.

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### **Topics and (Rough) Weekly Schedule:**

- Course Overview, Basics of signals (*Chapter 1*) [**W1**]
- Sinusoids, Complex Exponentials, Phasors (*Chapter 2*) [**W1**]
- Spectrum Representation (*Chapter 3*) [**W2**]
- Introduction to Systems, LTI systems (*Chapter 4*) [**W2**]
- LTI Systems, Impulse response, Convolution (*Chapter 4*) [**W3**]
- Laplace Transform, continuous signals convolution (*Chapter 5*) [**W3**]
- MIDTERM [**W4**]
- Z-Transform, discrete signals convolution (*Chapter 6*) [**W4-W5**]
- Continuous-time Fourier Transform (*Chapter 7*) [**W5**]
- Discrete-Time Fourier Transform (*Chapter 8*) [**W6**]
- Filtering, Modulation, and Sampling (*Chapter 9*) [**W7**]
- FINAL EXAM