Course Policies

Degree Program:

■ECE-Electrical & Computer Engineering

□ME -Mechanical Engineering

□General Courses for Both ECE & ME Degree Programs

Course Name: Introduction to Signals and Systems

Course Code: VE216

Course Credits: 4

Course Category: ■ Required □ Elective

Terms Offered:

□Fall □Spring ■Summer 2020

Course Pre/Co-requisites:

Vv156 Applied Calculus II

Ve215 Electric Circuits

Textbook:

Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, “Signals and Systems”, Second Edition, 1997, Prentice Hall (Portions of Chapters 1-10)

Other References:

1) Online resources: You are encouraged to view the course “Signals and Systems” of the MIT Open Courseware at http://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/, which includes the video lectures taught by Oppenheim.
2) Charles L.Phillips, John M.Parr and Eve A.Riskin, “Signals, Systems, and Transforms”, Fifth Edition (November 3, 2013), Prentice Hall

Instructors:

Yong Long, yong.long@sjtu.edu.cn Office, Rm. 402, Long Bin Building

Lectures:

Tuesday, Thursday and Friday (odd week), 16:00–17:40, Zoom

Labs:

TBD

Office Hours:

Tuesday, Thursday and Friday (odd week), 17:40–18:00, Zoom
Wednesday, 11:00-12:00, Zoom

Teaching Assistants:

Zhipeng Li, zhipengli@sjtu.edu.cn , Cell 158-9590-2029, Monday 19:00-21:00, Zoom
Ling Chen, chen_ling@sjtu.edu.cn , Cell 199-2187-1093, Tuesday 19:00-21:00, Zoom
Shuai Yuan, shuaiyuan@sjtu.edu.cn , Cell 188-1789-2670, Wednesday 19:00-21:00, Zoom

Yilun Zhu, allanzhu@sjtu.edu.cn, Cell 158-0036-4328

Recitation Classes: TBD, Zoom

RC	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Date										

Grading Policy:

Your final grade will be determined as a weighted combination of your homework, labs, quizzes and final exam.

- Homework: 15%
- Quizzes: 30%
- Labs: 15%
- Final Exam: 40%

Requests for re-grades of exams must be submitted in writing within one week of exam return. All questions may be re-graded. Letter grades will be assigned using a curve following past practice in the recent 3 years. **The median grade will be B or B+** (depending on overall performance).

Academic Integrity:

1) Homework: There will be six Homework sets. Homework and solutions will be posted on Canvas only. Solutions will be provided for all problems. All homework sets are required to submit to Canvas. **ABSOLUTELY NO LATE HOMEWORK ASSIGNMENTS WILL BE ACCEPTED. The lowest homework score will be automatically dropped.**

HW	#1	#2	#3	#4	#5	#6
Chap. (slides)	1	2	3	4	6、7、8	9
Due date	May 26	June 9	June 16	June 30	July 21	July 30

2) Quiz: **You are responsible for establishing a study group of 3 to 5 students at the beginning of the semester.** Each study group completes each quiz collaboratively and submits one solution set with the group number, IDs, names of each student to Canvas. Based on SJTU's academic regulations, attendance will be randomly taken at least 5 times. There are at least 5 quizzes, and the quiz time will be random and not announced in advance. **ABSOLUTELY NO LATE QUIZ ASSIGNMENTS WILL BE ACCEPTED. The lowest quiz score will be automatically dropped.**

3) Exam: All students must take the final exams during the scheduled time. Exceptions must be approved by Prof. Long, in writing stating why you could not attend (severe disease, for example). **The exams will be closed book. Electronic media with wireless capability are not allowed. You may use calculators without wireless capability.** You must solve all exam problems by yourself. Copying exam solutions from another student or from solutions from previous semesters will be considered violations of the JI honor code. Tentative schedules of exam:
   a) Final Exam, Time: TBD. Venue: TBD
      You are permitted to use **three** A4 sheets of notes (both sides), all of which must be your own handwriting.

4) Labs: **ABSOLUTELY NO LATE LAB REPORTS WILL BE ACCEPTED.** The labs will help you develop engineering skills. Unexcused absence will result in a grade of zero. Students have the responsibility of contacting the instructor or teaching assistant to make up the missed lab. The labs will be online using software.

5) Collaboration: You must attempt to solve all homework problems by yourself. Copying homework solutions from another student or from solutions from previous semesters will be considered violations of the **JI honor code** (http://umji.sjtu.edu.cn/academics/academic-integrity/honor-code/ and **"Addendum to the Honor Code for Online Courses in Spring 2020"** on Canvas). However, after making a genuine attempt to solve the homework problems, you are encouraged to discuss the answers with other students currently enrolled in 216 to check the answers and compare solution approaches. After such a discussion, you may rewrite your answer as long as you do so individually, without referring to the solutions of other students or to solutions from previous terms. Basically, the

answers you turn in should reflect your own level of understanding, not someone else's. This also applies to the Matlab coding portion of the course; these are to be done individually.

6) MATLAB: Knowledge of the MATLAB software environment will be a required part of this course. MATLAB will be required for solving some weekly homework assignments. If you are not familiar with MATLAB, you are strongly encouraged to study the MATLAB tutorial on Canvas. Remember that you will be responsible for knowing MATLAB in exams, so you are encouraged to work as independently as possible.
7) Dialogue: Classes this large can seem impersonal, and using email makes it more so. I will read emails sent to me, but I will only reply (to the entire class) for matters that affect the whole class such as typos in a HW problem. Please come to my office hours, tell me your name, and ask questions, and there I will gladly reply in person!

Course Description:

This course introduces students to basic concepts in continuous-time linear system theory. The analysis of continuous-time systems is considered in both the time and frequency domains. Topics include linearity, impulse response, convolution, frequency response, filtering, Fourier series, Fourier transforms, sampling theorem, relationship between continuous-time and discrete-time systems (as time perm its), Laplace transforms, system transfer function, poles and zeros, stability. Applications of these techniques will be discussed using examples from circuits, signal processing, communication and control. Weekly recitations and hardware laboratories will also be included in this course.

Teaching Schedules: (Tentative: subject to adjustment.)

Lecture slides will be posted on Canvas.

Week	No.	Date	Lectures and Exams
1	1	May 12	• course policies • overview • signal and system definition • classifications of signals
	2	May 14	• signal notation • transforms of CT signals (time and amplitude transforms, more signal operations, operations with two signals) • signal characteristics (even and odd symmetry)
	3	May 15	• signal characteristics (average value and energy, energy and power signals)

			• Exponential signals • Singularity functions (unit step signal, rect function, unit impulse function)
2	4	May 19	• Input-output description of systems • Block diagrams • Interconnection of systems • System classes
	5	May 21	• Amplitude properties (linearity, stability) • Amplitude properties (inevitability) • Time properties (causality, memory, time-invariance)
3	6	May 26	• Summary of chap. 1 • impulse response • Impulse representation of CT signals • Convolution for CT LTI systems • Properties of convolution and LTI systems • LTI system properties via impulse response
	7	May 28	• Step response • diffeq systems (important class of LTI systems) • Summary of Chap. 2
	8	May 29	Recitation Class
4	9	Jun. 2	• Introduction to Chap. 3 • LTI system response for complex-exponential input signals • Preview • Fourier series
	10	Jun. 4	• Convergence of Fourier series • Properties of Fourier series (one signal properties, two signal properties, Parseval's relation)
5	11	Jun. 9	• Power density spectrum • Fourier series and LTI systems • Filtering and applications
	12	Jun. 11	• Filters described by diffeqs • Summary of Chapter 3
	13	Jun. 12	• Fourier transform (FT) definition • FT Existence • FT Examples

6	14	Jun. 16	• FT of periodic signals • FT Properties • convolution property and LTI systems
	15	Jun. 18	• Parseval's relation / energy density spectrum • Time-domain multiplication • Partial fraction expansion (PFE)
	16	Jun. 23	• Application of FT to RLC and diffeq systems • Summary of Chapter 4 ideal filters • Application of FT to RLC and diffeq systems • Summary of Chapter 4 ideal filters
7		Jun. 25	Holiday for Dragon Boat Festival
		Jun. 26	Holiday for Dragon Boat Festival
	17	Jun. 28	Substitute Class for June 26 • ideal filters • real filters • Bode Plots • Summary of Chap. 6
8	18	Jun. 30	• Introduction to sampling • FT of impulse-train sampled signals • sampling theorem
	19	Jul. 2	• aliasing
9	20	Jul. 7	• Reconstruction via interpolation
	21	Jul. 9	• Realistic non-impulse sampling • Discrete-time Fourier transform (DTFT) • Summary of Chap. 7
	22	Jul. 10	• Introduction to communications • Sinusoidal amplitude modulation • Demodulation
10	23	Jul. 14	• Frequency-division multiplexing (8.3) • Summary of Chap. 8
	24	Jul. 16	• Laplace transform (LT) definition / computation by integration • ROC of Laplace transform • Rational Laplace transforms • Pole-zero plot
11	25	Jul. 21	• Laplace transform properties • System functions and block diagram representations

	26	Jul. 23	• Feedback control • summary of Chapter 9
	27	Jul. 24	• Recitation Class
12	28	Jul. 28	Introduction of Lab 1, 2 and 3 by TAs
	29	Jul. 30	• Introduction to discrete-time signals and systems • Z-transform
13			Final Exam