

Signals and Systems

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|--------------------------|--------------------------------------|---|--|------------------|------------------|-------------------|
| Course Name | Course type (credit/hours) | Required course(3/3) | | | Course code | C057 |
| | Target students Division/major/grade | Electrical and Computer Engineering/Sophomore | | | Opening semester | 2019 2ND SEMESTER |
| | Class time and classroom | Tue D(WH340)Thu C(WH340) | | | English Grade | A(100%English) |
| Reference to this course | Prerequisite courses | Circuit Analysis | | | | |
| | Related basic courses | Mathematics I, II, Engineering Mathematics | | | | |
| | Recommended concurrent courses | | | | | |
| | Related advanced courses | Commun. Syst., Digital Sig. Proc., Linear Syst. | | | | |
| Instructor | Name (title/division) | | Sangsin Na(Professor, Electrical and Computer Engineering) | | | |
| | Office Room Number | 원천관 406 | Office phone Number | 2366 | e-mail | |
| | Office hours | | | Homepage address | | |
| Teaching Assistant | Name (title/division) | | | | | |
| | Office Room Number | | Office phone Number | | e-mail | |

1. Introduction

<Course Overview>

As a sophomore-level course on signals and systems, this course is to introduce signals and analysis tools such as the Fourier and Laplace transforms, to develop basic understanding of time-domain signals and their spectra, and to foster understanding their applications. Topics include signals, spectra, the Fourier series, the Fourier transform, and the Laplace transform. Some software experiments using Matlab will be part of the course.

Also studied will be the z-transform, which is used to deal with analysis and description of discrete-time signals and systems.

This course is a prerequisite for system areas such as analog/digital communication systems and automatic control, and signal processing.

2. Course Objectives

<Course Objectives>

- (1) understand signals and its spectra
- (2) understand systems and their operations
- (3) design analog filters
- (4) implement systems through simulation with MATLAB

A student who finishes the course successfully will be able to analyze signals and many linear systems and design a basic type of analog filters.

3. Class types and activities

1. <Lecture>

The lecture will be given in a combination of the computer-based classnotes and blackboard writing.

2. <Worksheets>

Worksheets will be assigned regularly and are recommended to go over in detail. Solutions or their drafts will be web-posted.

3. <Exams>

All the exams are closed-book. But one sheet of A4-sized summary note is allowed in each exam. And the note(s) for the previous exam(s) can be brought in for the subsequent exams. (So, you are allowed to bring in the total of three sheets for the final exam, two of which are from the midterms.) Additional information and/or solutions will be web-posted.

4. Teaching Method

☒

lecture

☐

discussion and debate

☒

team project(presentation and case studies)

☐

experiments(role-playing,etc)

☐

designing and production

☐

on-site learning(on-site training)

☐

others

5. Support Systems in Use

☒

AjouBb

☐

automatic recording system

☐

web-based assignment

☐

cyber lecture

☐

online content

☐

class behavior analyzing system

☐

others

6. Teaching Tools

☐

PBL(Problem Based Learning)

☐

CBL(Case Based Learning)

☐

TBL(Team Based Learning)

☐

UR(Undergraduate Research)

☐

FL(Flipped Learning)

☐

DSAL(Data Science Active Learning)

☐

others

7. Knowledge and ability required for taking this course

You will be expected to have skill to deal with complex numbers, knowledge on differentiation, integration of ordinary functions and transcendental functions such as exponential and trigonometric functions.

Also required is knowledge on simple circuit analysis, which you would have acquired in circuit (analysis) theory.

Basic MATLAB programming skill is useful.

8. Method of Evaluation

| Evaluation Item | The Number of Times | Evaluation Proportion | Remarks |
|-----------------|---------------------|-----------------------|---|
| Attendance | | | |
| midterm exam | 1 | 25% | Midterm on school schedule |
| final exam | 1 | 25% | Final on Tues, Dec. 10, 2019, 7:00--9:00 pm |
| quiz | 6~10 | 50% | Quizzes and Assignments account for 50% and will be given in class or in evenings |
| presentation | | | |
| discussion | | | |
| homework | | * | |
| etc | | | |
| study hours | | | |

9. Textbook and supplementary material

| Main/Sub | Title (Web-site) | Writer | Publisher | Publication year |
|----------|--|-----------------------------|-------------------|------------------|
| Ref. | Signals and Systems: Continuous and Discrete, 4th Ed. | Ziemer, Tranter, and Fannin | Pearson Education | 2014 |
| Main | Signals and Systems: Download from http://ss2.eecs.umich.edu/ | Ulaby and Yagle | | 2018 |

10. Class system and Class shedule

Signals and Systems are introduced.

Signals and spectra are considered and analyzed with the Fourier series/transform.

The Laplace tranform is introduced.

System analysis is discussed with the Laplace transform.

Discrete-time signals and systems are introduced.

The z-tranform is introduced as a tool for discrete-time signals and systems.

< Class Schedule >

* language : K-korean, E-English

| Week s | Topics | lang uag e | Instructor | Teaching Method | Evaluation Method | Matter to be prepared |
|-----------|-------------------------------------|------------------|------------|--------------------|----------------------|--------------------------|
| 1 | Introduction to Signals and Systems | | Sangsin Na | | | |
| 2 | Signal Properties | | Sangsin Na | | | |
| 3 | Convolution Integral | | Sangsin Na | | | |
| 4 | Fourier Series of Periodic Signals | | Sangsin Na | | | |
| 5 | Fourier Transform | | Sangsin Na | | | |
| 6 | Fourier Transform | | Sangsin Na | | | |
| 7 | Applications of Fourier Transforms | | Sangsin Na | | | |
| 8 | Midterm Review | | Sangsin Na | | Midterm Exam | |
| 9 | Laplace Transforms | | Sangsin Na | | | |
| 10 | Laplace Transforms | | Sangsin Na | | | |
| 11 | Discrete-Time Signals and Systems | | Sangsin Na | | | |
| 12 | z Transforms | | Sangsin Na | | | |
| 13 | z Transforms | | Sangsin Na | | | |
| 14 | Digital Filters | | Sangsin Na | | | |
| 15 | Digital Filters | | Sangsin Na | | | |
| 16 | Final Exam | | Sangsin Na | | Final Exam | |

11. Other items of notification