# SYLLABUS

1. **Course name: SI**gnals and **SY**stems **Course code:** SISY330164
2. **Credits:** 3 (3/0/6) (3 theory credits, 0 practice credit)
   *Duration*: 15 weeks (3 main periods and 6 self-study periods) /week
3. **Lecturers:**
   1/ Main lecturer: MSc. Le Minh Thanh
   2/ Teaching Lecturers:
   MSc. Đang Phuoc Hai Trang
   MSc. Huynh Thi Thu Hien
4. **Required course**

Prerequisites: N/A.

Corequisites:: Electrical Engineering

5. **Course Description**

This course provides fundamental knowledge and application about the continuous time signasl and systems and applications. Topics include communication, continuous -time LTI signals and systems, difference equations, The Laplace Transform and convolution to Continuous-Time System Analysis, Continuous Time Fourier Series(CTFS), Continuous Time Fourier Transform (CTFT), modulation and demodulation system classification and filter system.

6. **Course Goals**

| **Progamme Objectives** | **Course Objectives** *(The content of the course includes the academic knowledge:)* | **ELOs** |
|---|---|---|
| **G1** | An ability to apply knowledge of mathematics, science, computer fundamentals, and engineering to analysis signal and system | 01 (H) |
| **G2** | An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice | 03 (M) |
| **G3** | A recognition of the need for continuous learning, and an ability to engage in life-long learning | 07 (M)<br>02 (L) |

*Note: H: **H**igh; M: **M**edium; L: **L**ow*

7. **Course Learning Outcomes - CLOs:**

| **Progamme Objectives** | | **Description** *(After studying this course, student will be able:)* | **ELOs** |
|---|---|---|---|
| **G1** | **G1.1** | An ability to classify continuous time signal and system | 01 |
| | **G1.2** | An ability to analyze signal in time doman: the correlation, convolution Theorem | 01 |

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| | **G1.3** | An ability to identify and explain the frequency response continuous time signal and systems | 01 |
| | **G1.4** | An ability to apply the properties of continuous time systems: linearity, invariant and stablization | 01 |
| | **G1.5** | An ability to calculate Fourier Transform for the continuos time signals | 01 |
| **G2** | **G2.1** | An ability to apply the properties of Fourier Transform : shifting, convolution, differential integral | 03 |
| | **G2.2** | An ability to use basic function Matlab to simulate signal and system | 03 |
| **G3** | **G3.1** | An ability to apply fundamental knowledge about signal and systems to solve problems about telecommunications, control, electrical circuits and power systems. | 07<br>02 |

**8. Texbooks**

[1] Richard Baraniuk, *Signals & Systems*, Richard Baraniuk, 2008.

[2] Hwei P. Hsu, *Schaum's Outlines of Signals & Systems*, The McGraw-Hill Companies, 2009.

[3] Pham L. Phillips, J. Parr and E. Riskin, *Signals, Systems and Transforms*, (Fourth Edition) Prentice Hall, 2007, ISBN-13: 978-0131989238, ISBN- 10: 0131989235

**9. Assessment:**

***a.*** - Grading Scale: **10**

*b.* - *Planning for students assessment is followed:*

| Assesement method | Content | Week | Assessment tool | ELOs | Percent (%) |
|---|---|---|---|---|---|
| ***P**articipation* | | | | | **10** |
| Q.1 | Knowledge of all chapters. | Week 2-15 | Individual paper test in class or online | G1.1, G1.3, G1.2, G1.4 | 10 |
| ***M**idterm Exam* | | | | | **40** |
| M.1 | Content includes chapter 1,2 | 4 | Individual paper test in class or online | G1.2, G1.4, G2.1 | 20 |
| M.2 | Content includes chapter 3,4 | 10 | Individual paper test in class or online | G1.2, G1.4, G2.2 | 20 |
| ***F**inal Exam* | | | | | **50** |
| F | Content includes all output standards of the course. | | Individual paper | G1, G2, G3,G4 | 50 |

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| | | | assessment in class | | |

** Note: P: **P**articipation; M: **M**idterm Exam; F: **F**inal Exam;*

**10. Course content:**

| Week | Content | ELOs |
|---|---|---|
| 1 | ***Chapter 1: Introduction of the continuous time signal and system*** *(3/0/6)* | |
| | **Teaching contents:** *(3)*<br>1.1 Introduction of course .<br>1.2 Introduction of continuous time signals.<br>1.3 Introduction of continuous time systems.<br>1.4 Examples of system applied in practice.<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.1 |
| | **Self-study contents**: *(6)*<br>+ Analyze the parity of the signal<br>+ Homework. | G1.1, G3.1 |
| 2 | ***Chapter 2: Time domain analysis of continuous time signal****(3/0/6)* | |
| | **Teaching contents:** *(3)*<br>2.1 Characteristics of continuous time signal.<br>2.2 Continuous time signal classications and Properties.<br>2.3 The Impulse Function.<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.2, G3.2 |
| | **Self-study contents**: *(6)*<br>+ Calculating the energy and power of signal .<br>+ Using Matlab to simulate and plot some signals. | G2.2,G3.1, G3.2 |
| 3 | ***Chapter 2:*** **Time domain analysis of continuous time signal***(3/0/6)* | |
| | **Teaching contents:** *(3)*<br>2.4 Time Shifting.<br>2.5 Time Reversal, Time scaling.<br>2.6 The correlation Theorem.<br>**Teaching methods**:<br>Theoretical lectures **Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation | G2.1 |

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| | + Questions and discussion | |
| | **Self-study contents**: *(6)*<br>+ The correlation for periodic signal<br>+ Homework. | G2.1 |
| 4 | ***M****idterm Exam 1* | |
| 5 | ***Chapter 3:*** **The Laplace Transform and The convolution Theorem** *(3/0/6)* | |
| | **Teaching contents:** *(3)*<br>3.1 Laplace transform .<br>3.2 The properties of Laplace transform.<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.3 |
| | **Self-study contents**: *(6)*<br>+ Laplace transform of some continuous time signals.<br>+ Homework | G2.1,G3.1,G3.2 |
| 6 | ***Chapter 3:*** **The Laplace Transform and The convolution Theorem** *(3/0/6)* | |
| | **Teaching contents:** *(3)*<br>3.3 Inverse Laplace Transform.<br>3.4 The convolution Theorem<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.3, G2.2 |
| | **Self-study contents**: *(6)*<br>+ Using Matlab to simulate and analyze output response of LTI system in domain time.<br>+ Homework | G2.2, G3.1, G3.2 |
| 7 | **Chapter 4: Frequency Domain Analysis of continuous Time Systems***(3/0/6)* | |
| | ***A.*** **Teaching contents:** *(3)*<br>4.1 Continuous Time Fourier Series (CTFS).<br>4.2 Continuous-Time Fourier Transform (CTFT) of energy signal<br>4.3 Properties of Continuous-Time Fourier Transform of energy signal<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.4,G2.2 |
| | **Self-study contents**: *(6)*<br>+ Continuous-Time Fourier Transform (CTFT) of sawtooth signal.<br>+ Homework | |
| 8 | ***Chapter 4: Frequency Domain Analysis of continuous Time*** | |

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| | ***Systems**(3/0/6)* | |
| | **Teaching contents:** *(3)*<br>4.4 Continuous-Time Fourier Transform (CTFT) of aperiodic power signals<br>4.5 Continuous-Time Fourier Transform (CTFT) of periodic power signals<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.4 |
| | **Self-study contents**: *(6)*<br>+ Calculating the Fourier transform of the basic power signals.<br>+ Homework. | G1.4, G2.3 |
| 9 | ***Chapter 4: Frequency Domain Analysis of continuous Time Systems**(3/0/6)* | |
| | **Teaching contents:** *(3)*<br>4.6 The properties of Continuous-Time Fourier Transform of periodic power signals<br>4.7 Energy spectrum density (ESD) - Power spectrum density (PSD).<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.4, G2.3 |
| | **Self-study contents**: *(6)*<br>+ Homework solutions | G1.4, G2.3 |
| 10 | ***Midterm Exam 2*** | |
| 11 | ***Chapter 5: Continuous time system in time domain** (3/0/6)* | |
| | **Teaching contents:** *(3)*<br>5.1 Introduction of Continuous time System.<br>5.2 Linear Constant-Coefficient Difference Equations.<br>5.3 Continuous time System Classfications.<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.4,G2.3 |
| | **Self-study contents**: *(6)*<br>+ Using Matlab to simulate and analyze LTI system.<br>+ Homework | |
| 12 | ***Chapter 5: Continuous time system in time domain** (3/0/6)* | |
| | **Teaching contents:** *(3)*<br>5.4 Impulse Response of LTI Systems .<br>5.5 Frequency Response of Systems. | G1.4,G2.3 |

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| | 5.6 BIBO Stability<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | |
| | **Self-study contents**: *(6)*<br>+ Find step response of systems.<br>+ Homwork. | G2.3, G3.1 |
| 13 | ***Chapter 6: Modulation & Demodulation system*** *(3/0/6)* | |
| | ***A.*** **Teaching contents:** *(3)*<br>6.1 General model of Modulation & Demodulation system<br>6.2 Amplitude Modulation( AM).<br>6.3 Pulse Amplitude Modulation( PAM).<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G4.1 |
| | **Self-study contents**: *(6)*<br>+ Using Matlab to simulate modulation & demodulation system | G1.1,G4.1 |
| 14 | ***Chapter 7: The Filter system(3/0/6)*** | |
| | **Teaching contents:** *(3)*<br>7.1 Introduction of the filter system.<br>7.2 Lowpass filter.<br>7.3 Highpass filter.<br>7.4 Bandpass filter<br>7.5 Bandstop filter<br>**Teaching methods**:<br>+ Theoretical lectures<br>+ Presentation<br>+ Questions and discussion | G1.1,G4.1 |
| | **Self-study contents**: *(6)*<br>+ Using Matlab to simulate and plot impulse response of the filters<br>+ Homework solution | G3.1,G3.2, G4.1 |
| 15 | ***Review*** | |

**11. Classroom rules of conduct:**

Students must do problems, home works, and projects by themselves. Student will be received zero score if he (or she) violates study regulations or ethics.

**12. Approved date: 01/01/2012**

**13. Approvers:**

| **Dean** | **Head of department** | **Instructor** |
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**Dr. Nguyen Minh Tam** **MSc. Nguyen Ngo Lam** MSc. Huynh Thi Thu Hien

## 14. Syllabus update

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| **Time #1: Upgraded issues:** : 15/01/2014<br>**date/month/year** | **I**nstructor: MSc. Huynh Thi Thu Hien<br><br>Head of Department**:** Dr. Võ Minh Huân |
| **Time #2: Upgraded issues:** *:* 15/01/2016<br>**date/month/year**<br>*:* | **I**nstructor: MSc. Huynh Thi Thu Hien<br><br>Head of Department**:** Dr: TS. Phan Văn Ca |
| **Time #3: Upgraded issues:** 06/05/2017<br>**date/month/year** | **I**nstructor: MSc. Huynh Thi Thu Hien<br><br>Head of Department**: Dr**. Phan Văn Ca |