

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	电路与系统 Circuit and System
2.	<b>授课院系 Originating Department</b>	深港微电子学院 School of Microelectronics
3.	<b>课程编号 Course Code</b>	SME206
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	专业基础课 Major Foundational Courses
6.	<b>授课学期 Semester</b>	秋季 Fall
7.	<b>授课语言 Teaching Language</b>	中英双语 English & Chinese
8.	<b>授课教师、所属学系、联系方式 Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	李嘉敏, 深港微电子学院, lijm3@sustech.edu.cn
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	待公布 To be announced
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	32		32		64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	MA117 高等数学 (上) Calculus I				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite					
14. 其它要求修读本课程的学系 Cross-listing Dept.					

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

本课程将介绍:

- 1) 信号与系统的基本概念、特性及数学表示
- 2) 离散时间和连续时间线性时不变 (LTI) 系统的卷积及表示
- 3) 离散时间和连续时间的傅里叶分析方法, 包括离散时间和连续时间周期信号的傅里叶级数、傅里叶变换
- 4) 信号与系统的时域和频域特性
- 5) 采样定理及相关概念
- 6) 信号调制与解调的基本原理

This course will introduce:

- 1) Fundamental concepts of signals and systems, the basic properties and the mathematical representation
- 2) Discrete-time and continuous-time linear time-invariant (LTI) system fundamentals, convolution and representation
- 3) Discrete-time and continuous-time Fourier analysis methodology, including the discrete-time and continuous-time Fourier series representation of periodic signals and Fourier transform
- 4) Time and frequency characterization of signals and systems
- 5) Sampling theorem and related concepts
- 6) Signal modulation and demodulation fundamentals

16. 预达学习成果 Learning Outcomes

通过本课程，学生将：

- 1) 理解连续时间和离散时间信号与系统的数学描述和表示
- 2) 熟悉常用信号，如单位阶跃信号、单位冲激信号、斜坡信号、正弦信号和复指数
- 3) 建立线性时不变系统的输入输出关系，理解离散时间和连续时间系统的卷积计算，理解冲激响应
- 4) 掌握使用傅里叶级数和傅里叶变换对给定信号的分析方法
- 5) 理解频域信号的分析 and 处理
- 6) 理解采样原理及重构连续时间信号的过程
- 7) 理解调制和解调原理，理解幅度调制和频率调制
- 8) 使用 matlab 进行信号与系统分析

Upon completion of the course, students will be able to:

- 1) Understand the mathematical description and representation of the continuous-time and discrete-time signals and systems
- 2) Be familiar with commonly-used signals, including unit step, unit impulse, ramp, sinusoidal signals and complex exponentials
- 3) Establish the input-output relationship of the linear time-invariant system, understand the discrete-time and continuous-time signal and system, the convolution, and the impulse response
- 4) Understand the signal analysis method using Fourier series and Fourier transforms
- 5) Understand the signal analysis and processing in frequency domain
- 6) Understand the sampling theorem and reconstruction of the continuous-time signal from its samples
- 7) Understand the modulation and demodulation principles, understand the amplitude and frequency modulation.
- 8) Utilize Matlab for signal and system analysis

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

### 理论课 Lecture

第 1 周: 信号与系统 – 基本概念 I

Week 1: Signals and systems – the fundamental concepts I

第 2 周: 信号与系统 – 基本概念 II

Week 2: Signals and systems – the fundamental concepts II

第 3 周: 线性时不变系统 I

Week 3: Linear time-invariant systems I

第 4 周: 线性时不变系统 II

Week 4: Linear time-invariant systems II

第 5 周: 周期信号的傅里叶级数表示 I

Week 5: Fourier series representation of periodic signals I

第 6 周: 周期信号的傅里叶级数表示 II

Week 6: Fourier series representation of periodic signals II

第 7 周: 连续时间傅里叶变换 I

Week 7: The continuous-time Fourier transform I

第 8 周: 连续时间傅里叶变换 II

Week 8: The continuous-time Fourier transform II

第 9 周: 离散时间傅里叶变换 I

Week 9: The discrete-time Fourier transform I

第 10 周: 离散时间傅里叶变换 II

Week 10: The discrete-time Fourier transform II

第 11 周: 信号与系统的时域和频域特性 I

Week 11: Time and frequency characterization of signals and systems I

第 12 周: 信号与系统的时域和频域特性 II

Week 12: Time and frequency characterization of signals and systems II

第 13 周: 采样 I

Week 13: Sampling I

第 14 周: 采样 II

Week 14: Sampling II

第 15 周: 通信系统 I

Week 15: Communication systems I

第 16 周: 通信系统 II

Week 16: Communication systems II

### 实验课 Lab

第 1-2 周: 信号与系统 Matlab 实践介绍

Week 1-2: Matlab basics for signals and systems

第 3-4 周: 线性时不变系统

Week 3-4: Linear time-invariant system

第 5-6 周: 周期信号的傅里叶级数表示

Week 5-6: Fourier series representation of periodic signals

第 7-8 周: 连续时间傅里叶变换

Week 7-8: The continuous-time Fourier transform

第 9-10 周: 离散时间傅里叶变换

Week 9-10: The discrete-time Fourier transform

第 11-12 周: 学生项目 I

Week 11-12: Student project I

第 13-14 周: 采样

Week 13-14: Sampling

第 15-16 周: 学生项目 II

Week 15-16: Student project II

18. 教材及其它参考资料 Textbook and Supplementary Readings

Alan V. Oppenheim, Alan S. Willsky, and S. Hamid Nawab. 1996. Signals & systems (2nd ed.). Prentice-Hall, Inc., USA.

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects		20		
平时作业 Assignments		20		
期中考试 Mid-Term Test		20		
期末考试 Final Exam		40		
期末报告 Final Presentation				
其它 (可根据需要 改写以上评估方 式) Others (The above may be				

modified as  
necessary)

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20. 记分方式 **GRADING SYSTEM**

- A. 十三级等级制 **Letter Grading**  
 B. 二级记分制 (通过/不通过) **Pass/Fail Grading**

**课程审批 REVIEW AND APPROVAL**

21. 本课程设置已经过以下责任人/委员会审议通过  
**This Course has been approved by the following person or committee of authority**

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