信号处理
Signal Processing

Course No.8695001

2022-23秋季学期

School of Computer Engineering and Science

Shanghai University

Instructor: Shengyu DUAN（段圣宇）

Lecture 0

Syllabus
(课程概要)

Lecturers

Jianjia WANG（王健嘉）
Ph.D

Class A

Shanghai University

School of CSE

Ph.D degree from University of York, UK

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Shengyu DUAN（段圣宇）
Ph.D

Class B

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School of CSE

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Office：CS Room 407

Timetable

- **Lecture:**

➤ Every Monday 18:00-20:45,

Sept. 5th – Nov. 7th

Location: 东区材J201

- **Practical Section**:

➤ Every Wednesday 10:00-11:40,

Sept. 8th – Nov. 9th

Agenda

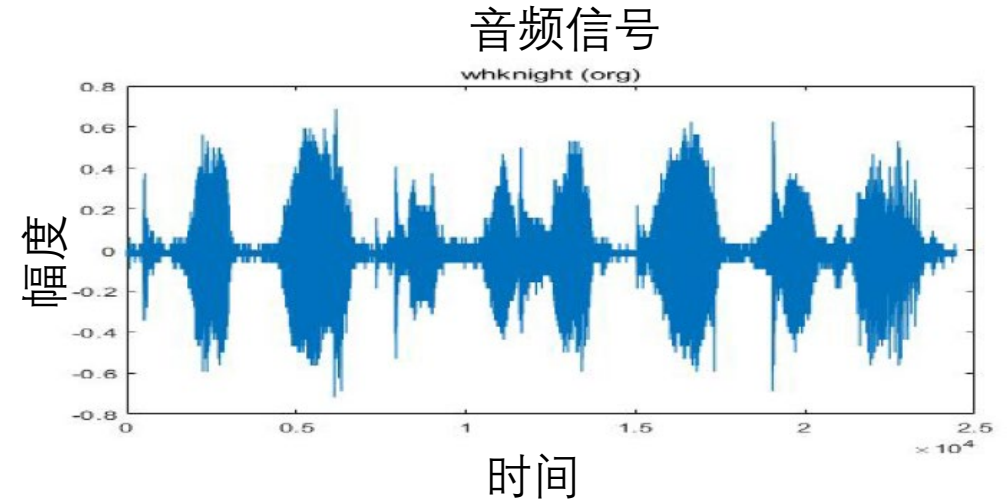## Section 1: Signals Processing in the Time Domain
• Fundamental concepts in signal processing
• Signals and systems
• Types of Signals
• Complex numbers
• Convolution （卷积）

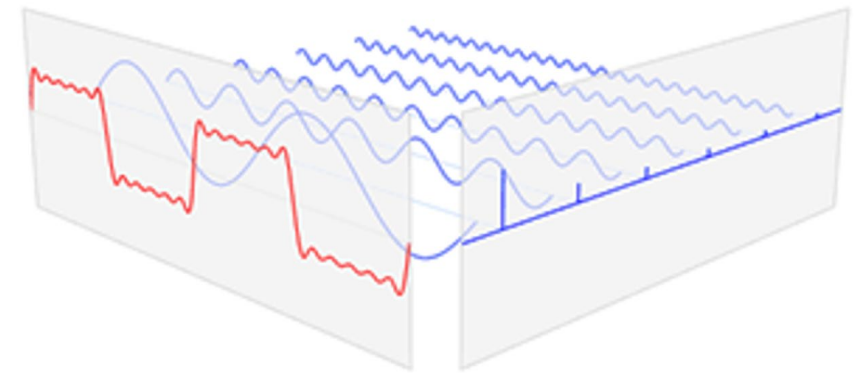## Section 2: Continuous Time Signals in the Frequency Domain
• Fourier Series （傅里叶级数）
• Fourier Transform （傅里叶变换）
• Signal Sampling and Reconstruction

Section 3: Discrete Time Signals in the Frequency Domain
• Discrete Time Fourier Series
• Discrete Time Fourier Transform (DTFT)

音频信号

幅度

时间

信号的频域表示

Agenda

Section 1: Signals Processing in the Time Domain
• Fundamental concepts in signal processing
• Signals and systems
• Types of Signals
• Complex numbers
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Section 2: Continuous Time Signals in the Frequency Domain
•Fourier Series （傅里叶级数）
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Section 3: Discrete Time Signals in the Frequency Domain
•Discrete Time Fourier Series
•Discrete Time Fourier Transform (DTFT)

两种空间域
四种信号类型

Lecture

Practical Section/Labs

Section 1: Basic in Matlab
Practice 1: Reorientation to Matlab
Practice 2: Representing Signals in Matlab

Section 2: Fundamental in Signal Processing
Practice 3: Complex Signals
Practice 4: Convolution, Correlation, and Finding Signals
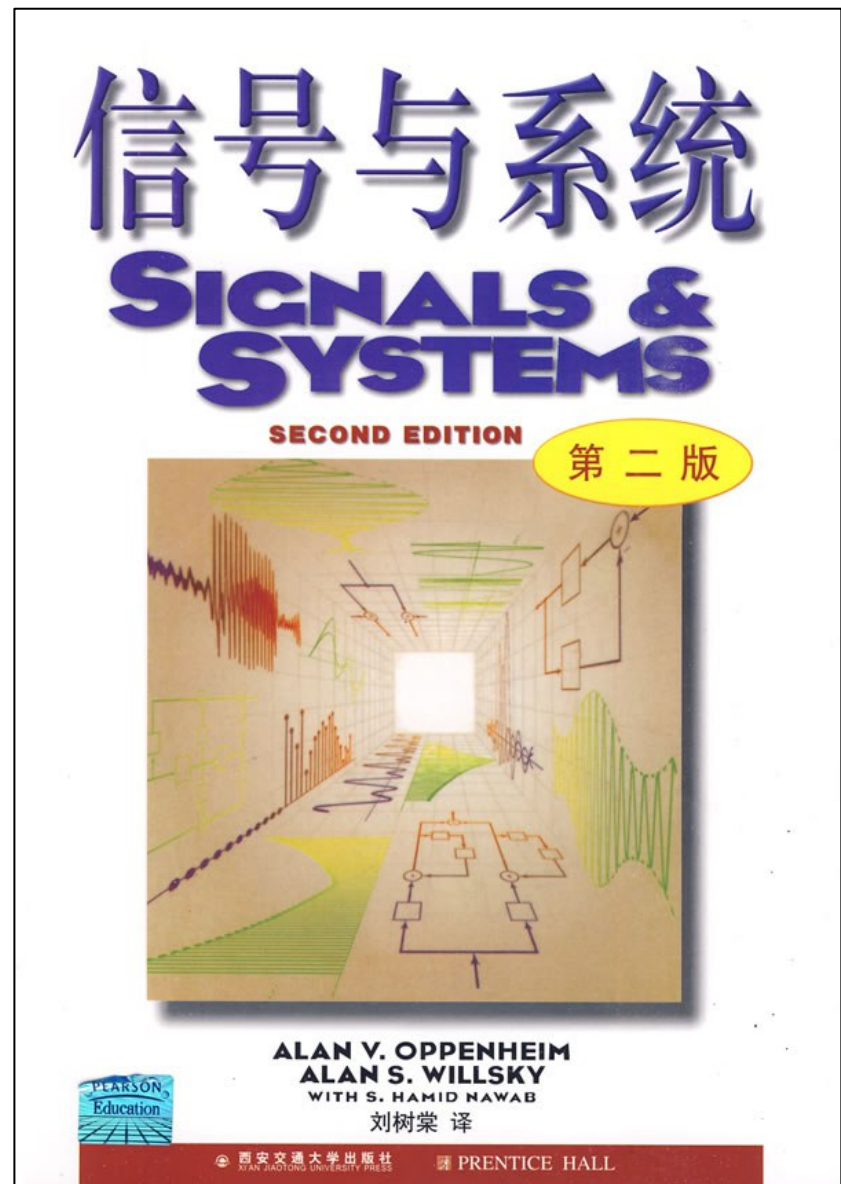
Section 3: Applications using Frequency Domain
Practice 5: Filters
Practice 6: Discrete Fourier Transform (DFT)
Practice 7: Development for a Shazam-like Music Identification Tool

Textbook

《信号与系统》（第二版），Alan V. Oppenheim, Alan S. Willsky, with S. Hamid, 刘树棠（译），西安交通大学出版社
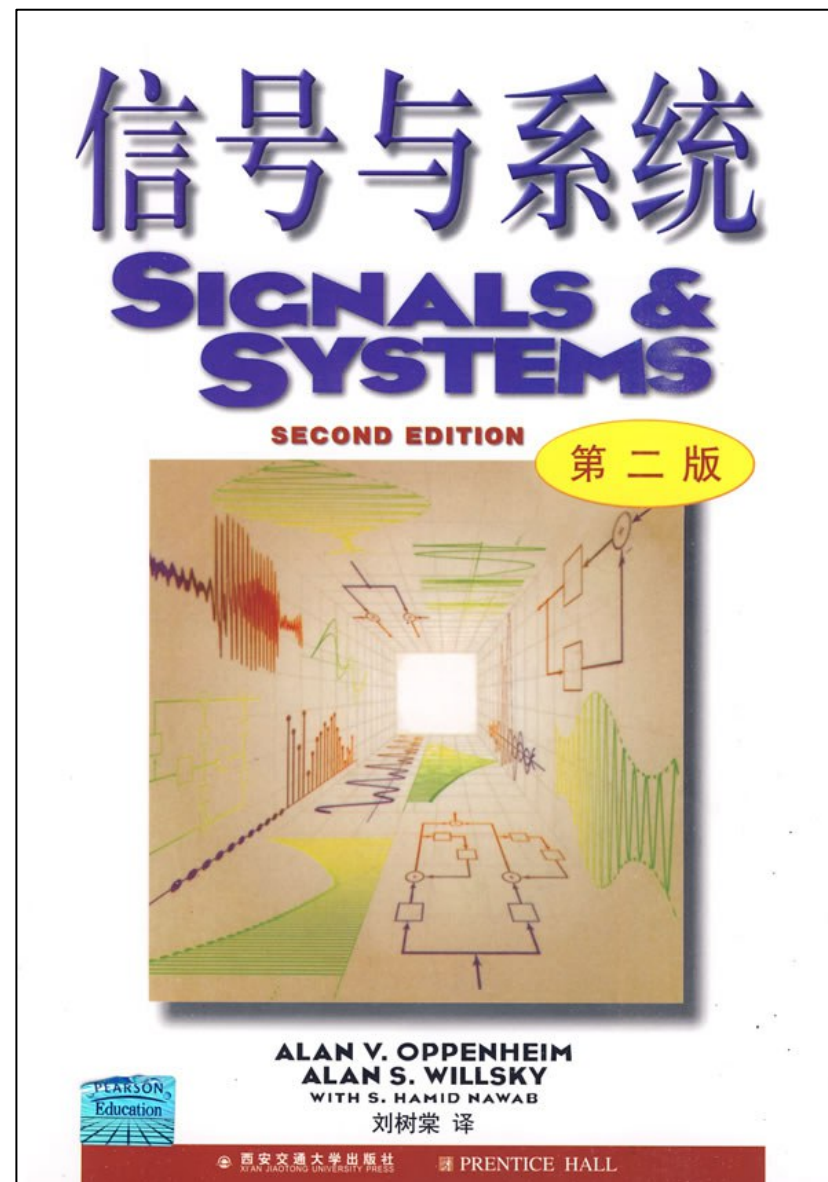
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Assessment

- Attendance + Homework (10%)
- Labs (10%)
- Project Report (10%)
- Final Exam (70%)

Project Report and Demonstration

- The project requires you to develop a practical application related to signal processing;

- You can choose a specific application (e.g., image processing, acoustic recognition, broadcasting, etc.) that you are interested, as long as it is related to signal processing;

- You can further develop a application, based on the labs that you finish during this course.

- Each student will submit:
  - A written report (max. 6-pages, with bonus if written in English) – **Nov. 13st (Week 10)**
  - A 5-10min demonstration – **Nov. 2nd and Nov. 9th (Week 9-10)**

欢迎来到
信号处理的世界!

Welcome to
Signal Processing!