Chapter 0

DSP課程說明

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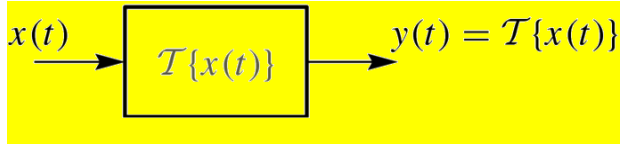
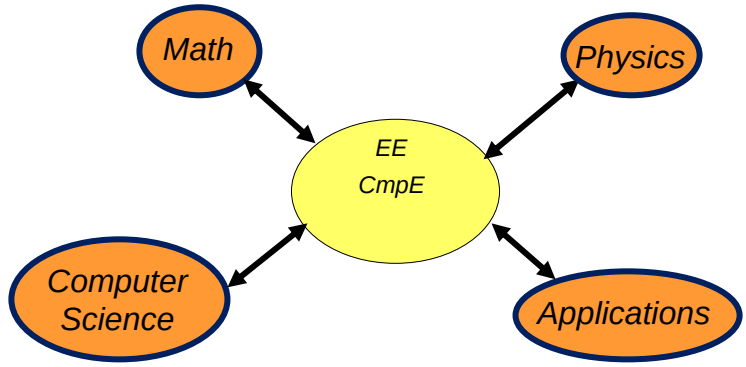
Signal & Signal Processing

- Signal: quantity that carries information
- Signal Processing is to study how to represent, convert, interpret, and manipulate a signal and the information contained in the signal
- DSP: signal processing in the digital domain



Covering Fields



Who Should Take this Course?

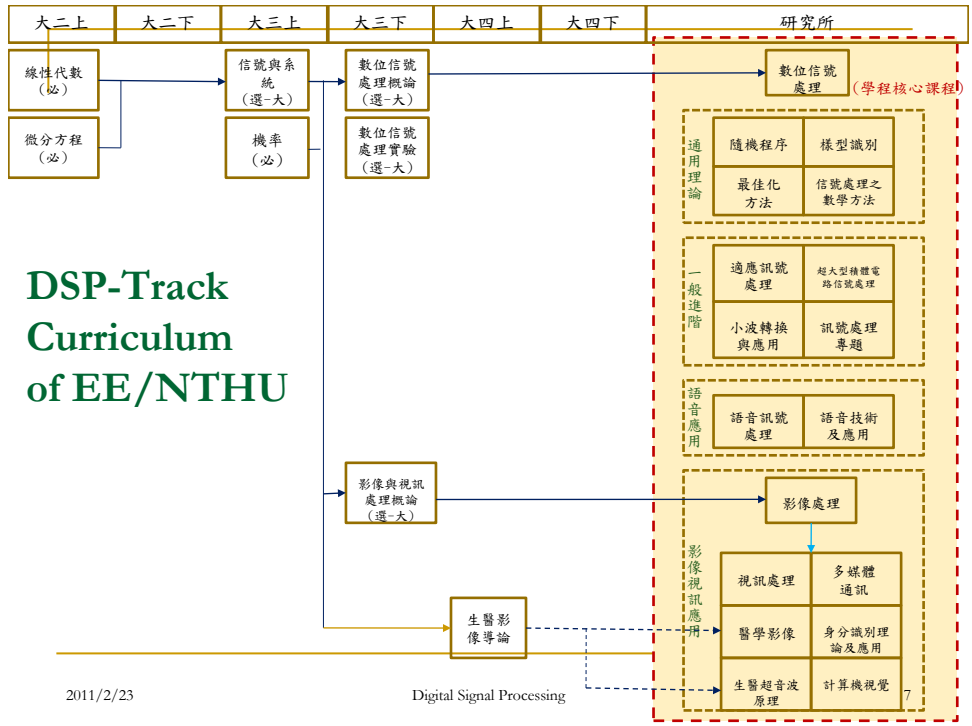
- Applications of DSP
  - Multimedia (audio, speech, image, and video) signal processing
  - Communication and networking
  - Biomedical applications
  - Radar
  - Seismic wave analysis
  - SOC for signal processing and communication
  - Time series analysis (e.g., power load forecasting, Stock market trend analysis, etc.)

Where to Use DSP?

- Telecommunications
- Sound & Music
  - CDROM, Digital Video
- Fourier Optics
- X-ray Crystallography
  - Protein Structure & DNA
- Computerized Tomography
- Nuclear Magnetic Resonance: MRI
- Radioastronomy
- …

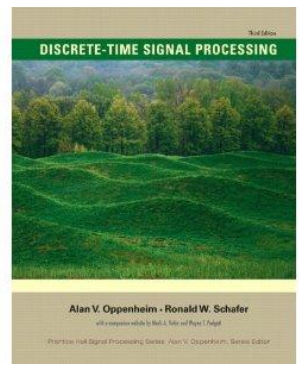
Math Background

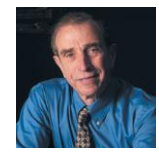
- Calculus
- Engineering Math
  - Laplace Transform
  - Fourier analysis
  - Complex variables
- Linear Algebra
  - Vector space
  - Basis functions
  - Linear transformations
- Probability/Random Process
  - Important for Adaptive/Statistical Signal Processing



Textbook

- *Discrete-Time Signal Processing,* A. V. Oppenheim and R. W. Schafer, *3rd Ed.,* Pearson Prentice Hall, US, 2010





A. V. Oppenheim

R. W. Schafer

Textbook

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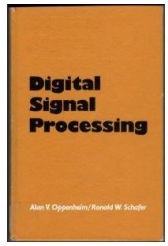

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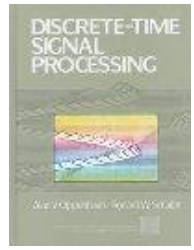

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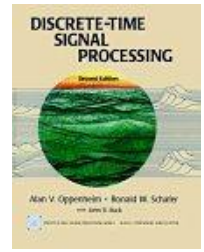

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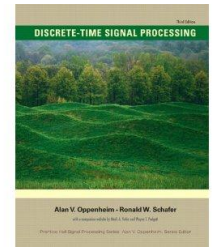
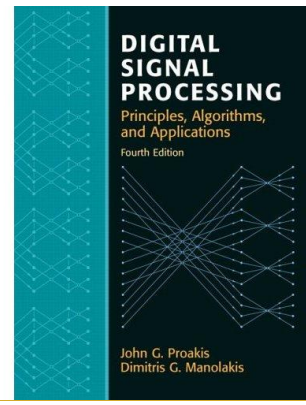


2010

Reference

- *Digital Signal Processing: Principles, Algorithms, and Applications*. J. G. Proakis and D. G. Manolakis, 4th Ed., Pearson Prentice Hall, 2007.



Course Outline

- Introduction
- Discrete-Time Signals and Systems
- z-Transforms
- Sampling of Continuous-Time Signals
- Transform Analysis of LTI Systems
- Structures for Discrete-Time Systems
- Filter Design Techniques
- Discrete Fourier Transform
- Computation of the DFT

Grading

- Homework (15~20%)
- 10~15-min Quiz (one quiz per chapter) (10%)
- Midterm & Final Exams (3 times, Chaps. 1~4, Chaps. 5~6, Chaps. 7~9) (70~75%)
  - Can bring a note of double-sided A4 size
  - An exam will be given on May 25
- Extra Bonus (course attendance rate & In-class Q&A) (5%)