IT6303
Advances in Digital Signal Processing
Dept. of Computer Eng. & Information Technology
City University of Hong Kong

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**Objectives**

- Study selected topics in advanced digital signal processing (DSP), including theories and applications
- Get hands-on DSP experience via MATLAB exercises
- Stimulate critical and creative thinking via discussions

**Expectation**

- Understand the studied DSP topics
- Know basic DSP simulation/programming techniques
- Know how to read research papers
Syllabus

- Review of DSP and Random Processes
- Simulation Techniques via MATLAB
  - Signal Generation, Digital Filtering
- Optimal Filter Theory & Applications
  - Least Squares Filters, Wiener Filters, Examples
- Adaptive Filter Theory & Applications
  - Least Mean Square (LMS) Algorithm, Recursive Least Squares Algorithm, Examples
- Estimation Theory & Applications
  - Performance Measures, Methods, Examples
Teaching Pattern

- Lecture
- Tutorial
- Laboratory
- Discussion

Proposed Assessment

- Assignment : 12%
- Laboratory : 51%
- Open-Book Test : 22%
- Research Paper Review: 15%
# Proposed Schedule

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<th>Week</th>
<th>Lecture/Discussion/Tutorial</th>
<th>Test</th>
<th>Laboratory</th>
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Guidelines for the Research Paper Review:

- About the research paper:
  - research papers are mainly divided into two categories: journals and conferences
  - you should select a journal paper in the area of signal processing

- The journals related to signal processing include
  - IEEE Transactions on Signal Processing
  - IEEE Transactions on Speech and Audio Processing
  - IEEE Transactions on Image Processing
  - IEEE Transactions on Circuits & Systems - Part II
  - IEEE Transactions on Multimedia
  - IEEE Transactions on Communications
  - IEE Proceedings - Vision, Image and Signal Processing
  - IEE Proceedings - Radar, Sonar and Navigation
  - Digital Signal Processing
- Signal Processing
- Signal Processing: Speech Communications
- Signal Processing: Image Communication

- electronic versions can be found at [http://www.cityu.edu.hk/lib/eres/index.htm](http://www.cityu.edu.hk/lib/eres/index.htm)

- selected papers should be *recently published* (≥1998)

- selected papers should not be too short (e.g. ≥4 pages for 2-column papers)

- you should select a paper and get approval by **Week 6**

- each student should give a review report for a different paper

- **Assessment of review report:**
  - clearness and correctness of the presentation
a review of the paper should include

- background and/or motivation of the reviewed paper
- advantages/weaknesses and disadvantages/strengths of the reviewed paper
- other potential applications derived from the reviewed paper?
- new research ideas derived from the reviewed paper?
- if possible, justification of your critical review (e.g., computer simulation results)

should be submitted on or before Week 13