6.3000: Signal Processing

Wrap Up

- 6.3000 Retrospective
- What Comes After 6.3000?
- Tell Us How To Improve 6.3000

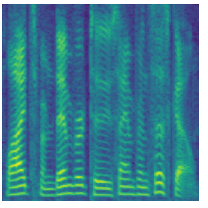
May 13, 2025

6.3000: Signal Processing – Content Retrospective

Signals are functions that contain and convey information.

Examples:

- the MP3 representation of a sound
- the JPEG representation of a picture
- an MRI image of a brain



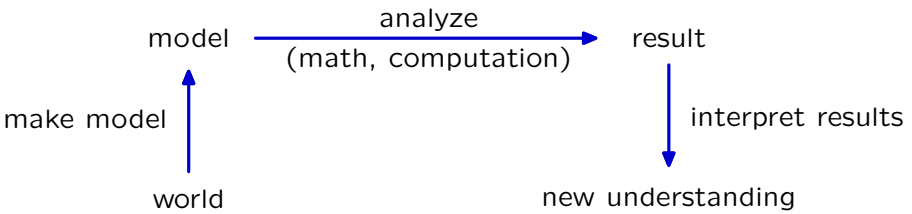
Signal Processing develops the use of signals as abstractions:

- **identifying** signals in physical, mathematical, computation contexts,
- **analyzing** signals to understand the information they contain, and
- **manipulating** signals to modify or emphasize information.

6.3000: Signal Processing – Content Retrospective

Our approach is the same as that in many technical disciplines.

- **model** some aspect of the world,
- **analyze** the model, and
- **interpret** results to gain a new or better understanding.



We tried to include examples of **all three** of these steps:

- develop math/computation skills to **analyze** signal processing problems
- recognize real-world **applications** and apply skills to solve them

Brief Summary of 6.3000 Content

Technical Topics	Applications	Labs
Fourier Series and Transforms	Musical Instruments	$5
Sampling and Aliasing	Speech (and Singing)	Synthesizing Music
Linearity and Time-Invariance	Communications/Modulation	Echo Removal
Convolution and Freq Response	Deconvolution/Deblurring	Separating Harmonies
DFT and FFT	JPEG and DCT	Identifying Chords
Short-Time Fourier Transforms	MRI	MIT Logo
2D Transforms	Fourier Optics	

What Might Come Next?

6.3010 (6.011) Signals, Systems, and Inference (Zheng, Hagelstein)
6.3020 (6.187) Fundamentals of Music Processing (Egozy)
6.3100 (6.302) Dynamic System Modeling and Control Design (White, Liu, Monardo)
6.C27 (6.S045) Comp Imaging: Physics and Algorithms (George Barthasthis, Rajeev Ram, Sixian You)

6.2060 (6.115) Microcomputer Project Laboratory (Leeb)
6.2300 (6.013) Electromagnetics, Waves, and Applications (Daniel, Assouly)
6.2370 (6.161) Modern Optics Project Laboratory (Warde)

6.4800 Biomedical Imaging with MRI (Adalsteinsson, Heldt, Lewis, Stulz, White)
6.4810 (6.021) Cellular Neurophysiology and Computing (Heldt)
6.4812 Cellular Neurophysiology and Computing (Heldt, Han)
6.5931 (6.812) Hardware Architecture for Deep Learning (Sze)
6.6300 (6.630) Electromagnetics (Hu)
6.6370 (6.637) Optical Imaging Devices and Systems (Warde)

6.7000 (6.341) Discrete-time Signal Processing (Ward)
6.7010 (6.344) Digital Image Processing (Rachlin, Lim)
6.7411 (6.450) Principles of Digital Communication (Chan)

6.8300 (6.819) Advances in Computer Vision (Sitzmann)
6.8371 (6.815) Digital and Computational Photography (Durand)
6.8620 [6.345] Spoken Language Processing (Glass)
6.8801 (6.026) Biomedical Signal and Image Processing (Alam)
6.8810 (6.556) Data Acquisition/Image Reconstruction in MRI (Adelsteinsson)

18.103 Fourier Analysis
18.104 Seminar in Analysis (CI-M)
18.085 Computational Science and Engineering I

Please Tell Us How To Improve 6.3000

We want to present course material in a way that encourages a deep **technical understanding** while also being **fun and engaging.**

We need your help and your feedback in order to make that happen.

Please use the next **15 minutes** to fill out the Registrar's Subject Evaluation and the 6.3000 End-of-Semester Survey.

- Fill out the MIT Subject Evaluation:
  `http://registrar.mit.edu/subjectevaluation`
- Provide specific feedback on 6.3000:
  go to "Survey" tab on 6.3000 website

> **Remember to Submit your responses**

After you have finished, we will have an open discussion.