What is digital signal processing?

Basic DSP system:

Advantages:
- DSP hardware is flexible and programmable
- DSP chips are relatively cheap (easily mass-produced)
- Digital storage is cheap
- Digital information can be encrypted, coded, and compressed

Disadvantages:
- Sampling leads to loss of information
- High-resolution ultra-fast A/D and D/A may be expensive
- Digital processing cannot always be done in real-time
## Applications of DSP

- **Digital Audio and Video**
  - compact discs
  - Dolby recording
  - HDTV
  - JPEG, MPEG

- **Speech systems**
  - recognition
  - synthesis

- **Industrial**
  - noise cancellation
  - manufacturing control

- **Biomedical**
  - ultrasound
  - hearing aids

- **Telecommunications**
  - wireless phones
  - DSL, cable modems

- **Science**
  - speech pathology
  - gene research

- **Sonar and radar**
  - surveillance systems
  - oceanography
DSP is a multi-billion dollar business

DSP is a major driver for the semiconductor industry

Chip market was 11.1 billion worldwide in 1999 (just for hardware!)

- 1.0% DSP building blocks
- 2.9% media processors
- 39.5% programmable DSP’s
- 56.6% function-specific DSP’s

Examples of function-specific DSP chips:
- Cable modem chips
- Digital camera chips
- Digital hearing aids
- DVD decoders
- MP3 player chips

Foundations of DSP

What do you have to know to start working on DSP?

- Fluent in mathematics
- Thorough understanding of sampling and its consequences
- Knowledge and appreciation of signal transforms
- Basic spectral analysis tools: DFT/FFT
- Ability to implement simulations in software such as Matlab
- Understanding of the science, mathematics, and/or engineering behind a particular application

What will ECE 535 cover? ⇒
ECE 535

- Syllabus
  - Review of DT signals & systems
  - DT processing of CT signals
  - Discrete Fourier series & discrete Fourier transform
  - Filter design
  - Implementation issues
  - Advanced topics

- Course information sheet
  - Website
  - Required textbooks and software
  - Grading and policies
  - Office hours

- Makeup classes

⇒ Questions?