

**Syllabus****1. Introduction (1 week)**

- Why are we studying this subject?
- Methods and engineering tools (Matlab and Simulink).
- Superposition principle of linear systems.
- Operations on “nonsmooth” signals.

**2. Time-domain analysis of continuous-time systems. (2 weeks)**

- Differentiation and integration of signals with discontinuities
- Steps, pulses, impulses.
- Step and impulse response.
- Convolution integrals.
- Numerical convolution
- Stability

**3. Frequency-domain analysis of periodic signals: Fourier series (3 weeks)**

- What’s special about sinusoids?
- Fourier series
- Calculation of Fourier coefficients
- Properties of Fourier series
  - Time shifting, differentiation, integration
  - Parseval’s Theorem.
- Response of linear systems to periodic inputs
- Numerical calculation of Fourier coefficients (DFT)

**4. Frequency-domain analysis of non-periodic signals (3 weeks)**

- Fourier transform as limiting form of Fourier series.
- Properties of Fourier transform.
  - Time shifting, differentiation, integration
  - Parseval’s Theorem.
- Response of linear systems.
- Bandwidth and time relations.
- Laplace transform.

**5. Discrete-time systems. (4 weeks)**

- The Nyquist Sampling Theorem and Aliasing

- Definitions of Z-transform.
- Properties of Z-transform.
- Analysis of linear, time-invariant systems by Z-transform.
- Stability

## 6. Applications (1 week)

### Course Material

- Lecture Notes: B. Friedland, *Lecture Notes for EE333, Revised August 2001*. (Available for purchase in NJIT bookstore.)
- Text: C.L. Phillips and J.M. Parr, *Signals, Systems, and Transforms* Prentice-Hall, Upper Saddle River, NJ, Latest edition (Recommended, but not mandatory)
- Supplement: H.P. Hsu, *Schaum's Outline of Signals and Systems*, McGraw-Hill, 1995. (This paperback costs \$14.95 and has a number of drill problems with solutions. You may find it useful.)
- Software: *Matlab* See Web page for up-to-date information.

### Course Policies

- **Web Home Page**

A web page containing information relating to this course can be found at:

`web.njit.edu/~bf/courses`

Solutions to homework problems, corrections, announcements, and other information will be posted there. Consult this page for the latest news.

- **Examinations**

There will be two (2) examinations, each approximately 1.5 hours in duration, given during the term (at about one month intervals), and a final exam, approximately 3 hours in duration, given during the final exam period. Exams will be closed book, each will emphasize material taught since last exam, but may contain material from earlier lectures.

In the evening section, the exam will be given during the first half of the class period. After a break, the class will reassemble for a regular session.

- **Homework**

Homework will be assigned each week and will be graded and returned. In general, homework will be due one week after it is assigned, but will be accepted until solution is posted. **It is your responsibility to make sure your homework is received by the instructor before solution is posted.**

Homework format:

## **READ CAREFULLY**

- Paper must be 8.5” by 11”. (Pages torn from a notebook are not acceptable.)
- First page must include the following:
  - \* Your name, legibly printed.
  - \* Class ECE333 and **Section** (Day or Evening)
  - \* Assignment Number (**not problem number; some assignments have more than one problem**)
- Each problem must begin on a new page.
- All pages of assignment must be **stapled** in the upper left-hand corner. (Bent-down corners, paper clips, etc. are not acceptable. Invest in a stapler.)

***Homework that does not conform to these specifications will not be graded.***

Some of the homework may entail use of MATLAB, and each student is expected to have access to a computer with the appropriate software. If problem entails use of MATLAB, homework must include the “.m file” that produced the results, together with the graphical or numerical output.

Students are encouraged to discuss homework and collaborate, but homework submission must be student’s individual work.

- **Grading**

Each of the first 2 exams will each count for approximately 22 % of the grade. The final exam will count for approximately 44 %. The homework will count for the remaining 12 %.

- **Project**

Students will have the opportunity to improve their grades by submitting a project consisting of an investigation, simulation study, application, etc. based on use of the theory and methods discussed in this course. Projects can be completed after grades are submitted; if warranted, a grade change form will be submitted to registrar. If you plan to do a project, you should submit a project description to the instructor to determine whether it will be appropriate.

- **Instructor**

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