# EE229: Signal Processing – I

## (The theory of signals and linear systems)

**Instructor**: Jayakrishnan Nair (jayakrishnan.nair@ee.iitb.ac.in)

**Office hours:** 4.00—5.00 pm, Wednesdays, Instructor office (237-D, EE main building).

**Course contents:** Continuous-time and discrete-time signals and systems, and their examples; Linear systems, linear time/shift invariant systems; Impulse response, convolution, and filtering; The Fourier transform; Fourier representations of continuous-time and discrete-time signals; Lowpass, bandpass, and highpass systems; Stability and pole zero properties of linear shift invariant systems; Z-transform and Laplace transform; Sampling and reconstruction of bandlimited signals; Approximate reconstruction methods (zero-order hold); discrete Fourier transform and the fast Fourier transform (FFT) algorithm; Implementation of discrete-time systems using FFT; Introduction to contemporary practice and examples.

**Text**: The recommended text for this course is "Signals and Systems" by Oppenheim, Willsky and Nawab. (An affordable Indian edition is available.)

**Attendance:** Compulsory. Will play a role in the grade (details below).

**Effort**: You are expected to spend at least 6 hours a week outside of class on this course. This includes reviewing the material covered in the previous class, reading the corresponding sections from the text, and solving practice problems.

**Homeworks**: One will be assigned every two weeks or so. Your graded submissions will be returned to you. You are free to discuss homework problems with one another, but **you have to write your own solutions**. Copying will result in severe penalty.

**Quizzes**: There will be six in-class quizzes over the semester. These will mainly be *unannounced*, and will take place in the first 20 mins of a lecture. Grading will be based on the best 4 scores; this also provides robustness against quizzes missed due to health issues, or Institute commitments. There will be no compensation for missed quizzes.

**Grading policy**:

Class participation (including attendance): 5%

Quizzes: 15%

Homeworks: 10%

Mid-sem: 30%

End-sem: 40%

Quizzes and exams will often have homework problems as is, or with minor variations. This is to encourage you to take the homeworks seriously and solve the problems yourself.