E220620 Engineering Mathematics (1)
Fall 2012

Instructor: Kuang-Hao Liu, EE Room 92A15, x62424
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Lectures: 10:10am-12:00am Tuesdays
9:10am-10:00am Thursdays

Location: EE 92283

Office Hour: 11:10am-12:00am Thursdays

Materials: Lectures notes available on MOODLE (enrollment required)

Prerequisites: Calculus I


TA: Will be announced in class.

Grading: Midterm Examination=35%, Final examination=35%, Quiz: 20%,
Attendance=10%.

This course aims to develop skills of the undergraduate students in the
areas of ordinary differential equations, transform techniques, and series ex-
pansions. These topics are necessary for effective studies in a large number of
engineering subjects like heat conduction, communication systems, electro-
optics and electromagnetic theory. The course will also serve as a prerequisite
for graduate students toward advanced research.

The course will be offered in English. Lectures will be based on the
textbook and supplemental handouts. Registered students can access their
MOODLE account to download the course materials. Also, course-related
regulations and announcements will be posted on the course website in a
weekly basis.

Course Outline:

- First Order Differential Equation
  - Separable Equations
  - Linear Differential Equation
  - Exact Differential Equation
  - Homogeneous, Bernoulli and Riccati Equation
  - Additional Application of Electrical circuits
  - Existence and Uniqueness for solution of Initial Value Problem
• Second Order Differential Equation
  – The linear second-order Equation
  – The Constant Coefficient Homogeneous Linear DE
  – The Nonhomogeneous Equation
  – Spring Motion
  – Euler’ Differential Equation

• The Laplace Transform
  – Definition and Notation
  – Solution of IVPs Using the Laplace Transform
  – Shifting Theorems and the Heaviside Function
  – Convolution
  – Impulses and the Delta function
  – Laplace Transform Solution of Systems
  – Polynomial Coefficients

• Series Solution
  – Power Series Solution of IVP
  – Power Series Solution Using Recurrence Relations

• Fourier Series
  – The Fourier Series of a Function
  – Fourier Sine and Cosine Series