The course: The course deals first with integral equations, their origin, properties and solutions, both approximate and numerical. The second part of the course is concerned with integral transforms, their properties and applications. The course is viewed as a service course for advanced students in science and engineering and places a heavy emphasis on relevant applications. It is not a rigorous $\epsilon-\delta$ course, but it IS a course in mathematics, striving to convey comprehension and insight instead of cookbook technique. In some sense integral equations may be thought of as the continuation of linear algebra, so not surprisingly, the language and concepts of linear algebra constitute the essential prerequisite for this course.

Some of the concepts and methods arising in integral transforms make use of the theory of complex variables, which is not a formal prerequisite for the course. Whatever is needed we shall derive or at least discuss qualitatively.

Prerequisites: Calculus, differential equations, and especially: LINEAR ALGEBRA.

ISBN 0 521 33742 9 (paperback).

The text will be augmented with selected material on integral transforms. Relevant reference material will be put on reserve in the library.

Course outline: Connection between ordinary and partial differential equations and integral equations.
Solution of Volterra and Fredholm integral equations, including nonlinear equations, via iteration.
Eigenvalues and eigenfunctions of integral operators associated with Sturm Liouville problems.
Boundary integral techniques.
Approximate and numerical solution of integral equations with regular and singular kernels.
Laplace, Fourier, Hilbert and Mellin transforms, properties and inversion formulas.
Application to ordinary and partial differential equations.

Grading: Two hourly exams 25% each
Final 50%
Exams will be scheduled at least one week in advance and tend to be open book.
Homework will be assigned and discussed regularly but is not a formal part of the grade. Doing the homework will be essential for success on the exams.

Computers: You are expressly asked to use the computer whenever it can make your job easier. Often symbolic manipulation with Maple, Mathematica, Matlab, etc. can be a great shortcut. However, the course does not presume familiarity with the computer.