# Department of Mathematics Faculty of Science

**MATH 746 (206746) THE FOURIER TRANSFORM AND ITS APPLICATIONS**  **3(3-0-6)
Prerequisite** Consent of the instructor

**Course Descriptions :**

 The Fourier transform. Convolution. Some useful functions and impulse symbol. The basic theorems and the two domains. Electrical wave forms, spectra and filters. Laplace transformation. Applications

**Course Contents** **No. of Lecture Hours**

1. The Fourier transform, convolution 6

 - Conditions for the existence of Fourier transforms

 - Significance of oddness and evenness

 - Cosine and sine transform

 - Convolution

 - Serial product

 - The autocorrelation function

2. Some useful functions and impulse symbol 9

 - Rectangle and triangle functions.

 - Exponentials, Gaussian and Rayleigh curves

 - Heaviside's unit step function

 - The sign function

 - The impulse symbol and derivatives of the impulse symbol

3. The basic theorems and the two domains 9

 - Some basic theorems such as similarity, addition,

 shift power, convolution and derivative.

 - The two domains and applications to various problems.

4. Electrical wave forms, spectra and filters 6

 - Electrical wave forms, spectra

 - Filters

 - Interpretation of theorems

 - Linearity and time variance

5. Laplace transform 6

 - Convergence of the Laplace integral

 - Theorems for the Laplace transform

 - Impulse response and transfer function

 - Initial - value problems

 - Some linear transforms which have a direct connection with either

 the Fourier or the Laplace transform

6. Application to two or more fields from the followings: 9

 - Antennas

 - Television image formation

 - Noise wave form

 - Heat induction and diffusion