# 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