

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