Content beyond the Syllabus

- Advanced noise cancellation and cell phone network technology uses Fourier series where digital filtering is used to minimize noise and bandwidth demands respectively.

- **Signal Processing**. It may be the best application of Fourier analysis.
- **Approximation Theory**. We use Fourier series to write a function as a trigonometric polynomial.
- **Control Theory**. The Fourier series of functions in the differential equation often gives some prediction about the behavior of the solution of differential equation. They are useful to find out the dynamics of the solution.
- **Partial Differential equation**. We use it to solve higher order partial differential equations by the method of separation of variables.
- Fourier series is broadly used in telecommunications system, for modulation and demodulation of voice signals, also the input, output and calculation of pulse and their sine or cosine graph

- One of the big problems in bioinformatics/computational biology is "lining up" DNA sequences to reveal mutations, additions, and deletions between them. This becomes an astronomical task when dealing with a large number of long sequences. To date, the fastest and most accurate program for this task is MAFFT (which stands for Multiple Alignment by Fast Fourier Transform):

- Most audio and image CODECs (including JPEG and mp3) actually use DCTs, which are a subset of generalized Fourier transforms.

- Z-transform is an alternative representation of a discrete signal.
- Z-Transform is important in the analysis and characterization of LTI systems

- Z-Transform play the same role in the analysis of discrete time signal and LTI systems as Laplace transform does in the analysis of continuous time signal and LTI systems.

- Z-transform provides us with a mean of characterizing an LTI system and its response to various signals by its pole-zero locations

- The z transform is an essential part of a structured control system design. This paper describes the basics of using the z transform to develop control systems, using the sort of math that is familiar to the accomplished embedded system designer.
- Z-transform technique has been applied to the effect of lateral lens displacements on the propagation of Paraxial rays in a lens guide. The Z transform of the ray displacement from the guide axis is obtained and techniques for obtaining the ray displacement from its Z transform are outlined. The property of the transform that determines the stability of

the ray in the guide is given. To illustrate its use, the trans- form is used to obtain the response of the ray to the following types of lens displacements:

1) any arbitrary sequence of displacements,
2) sinusoidal lens displacements of arbitrary frequency,
3) sinusoidal lens displacements at the ray position resonant frequency, and
4) lens displacements that form a bend in the guide.

Also an analogy is shown to exist between the response of linear circuits to amplitude modulated pulse trains, which is a function of time, and the response of the light ray to lateral Lens displacements, which is a function of the distance of propagation down the guide.

- Z Transform is used in the Analysis of Linear Discrete Systems, Simulation of Continuous Systems, Analysis of Digital Filters, Analysis of Discrete Signals, Analysis of Digital Filters.

- Z transform is used for the digital signals and Laplace is generally used of the continuous signals.

- Z transform is related to discrete time signal while Fourier series is related to continuous time signal. Where Z-SOURCE inverter is applicable presently? its being used in all energy conversion applications like fuel cells, wind energy conversions, Adjustable speed drives and in inverter applications like HVDC systems.