

Multi Variables & Vector Calculus (MVC)

Main Topics

Multi Variables Calculus



Why to go in higher dimensions?

Geometry and Coordinate Systems

Calculus in 3D

Integration in 3D

Vector Calculus



Vector Fields

Gradient, Divergence & Curl

Green, Gauss and Stokes Theorems

Mathematics of Applications

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Main Topics

Multi Variables Calculus

Vector Calculus

Mathematics of Applications

Instead of looking for applications of mathematics we develop *mathematics of applications* as the former serves no purpose in nurturing students abilities to solve problems. Though it is necessary but **not sufficient**. Therefore we include applications that may come from daily life experiences, physics, chemistry and other branches of science and develop their mathematics.

Multi Variables & Vector Calculus (MVC)

The course of multi variables and vector calculus is a course that is very much related to our daily-life experiences and observations. A solid object carries a *representation* of a multivariable function. Motions of these objects under the influence of gravitational, electromagnetic, wind and pressure fields are primary examples of vector calculus.

It would be crucial to have clear and better understanding of the concepts in MVC before one could apply them to *set-up an engineering design* which is a combination of 3D objects. Needless to say research at advanced level also *rely* on the understanding of basic concepts in MVC.

In the subsequent slides a list of advanced courses (elective and non-elective) is given where MVC is a pre-requisite. Although MVC is *only* a pre-requisite of CVT at SEECS but at MIT and elsewhere it is a pre-requisite of many advanced courses. In short MVC is a pre-requisite of all courses for which CVT is a pre-requisite.

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Flow Chart



Non-Electives



Electives

Electromagnetic Field Theory



Microwave Engineering

Transmission Lines & Waveguides

Communication Systems



Communication Systems II

Mobile Communication Systems

Electrical Network Analysis



Electrical Machines

MVC is a pre-requisite of several advanced courses at MIT and Stanford

Multi Variables & Vector Calculus (MVC)



Complex Variables and Transform



Non-Electives

You may directly follow up CVT chain to see the use of MVC topics in advanced courses. This can be viewed at the page (<http://sali.seecs.nust.edu.pk/wp-content/uploads/CVT-Chain1.pdf>).