Introduction to Launch Vehicle Analysis and Design

Dr. Ashok Joshi

Department of Aerospace Engineering

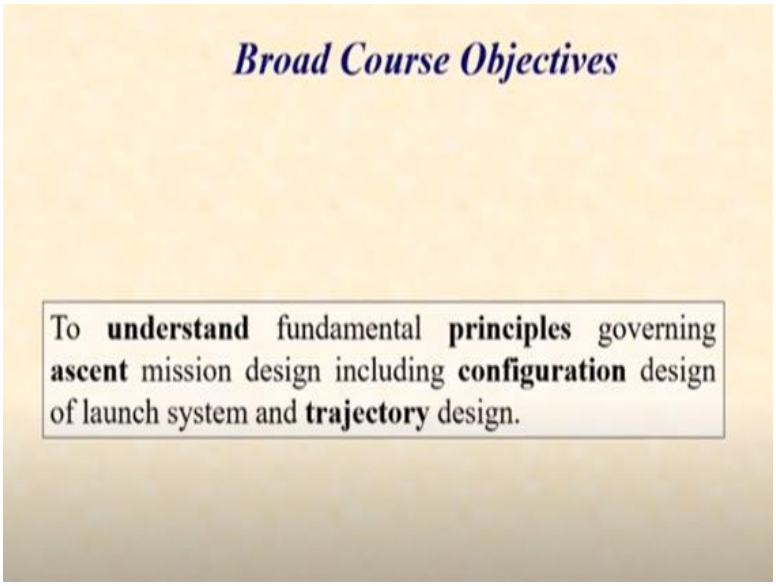
Indian Institute of Technology-Bombay

Lecture - 02

Course Plan

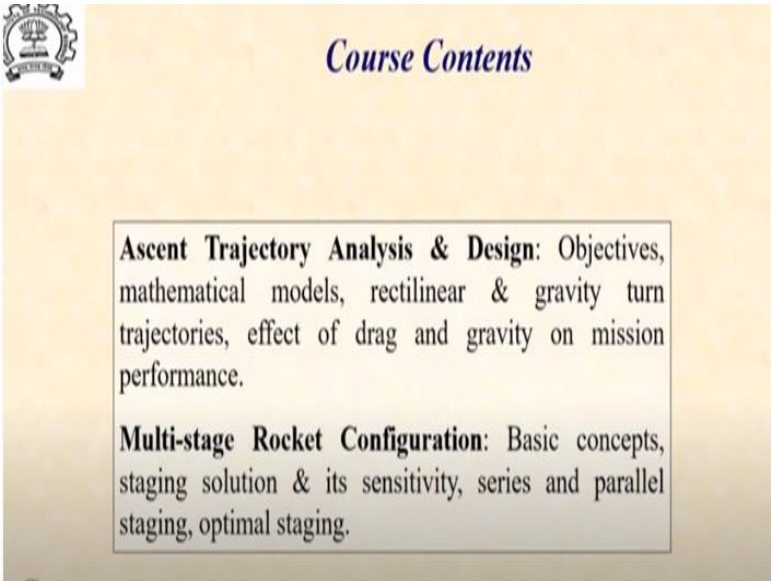
Hello, in this lecture, we will briefly look at the plan for the course that we intend to follow.

(Refer Slide Time: 00:37)



So broadly the objectives of this course are to understand fundamental principles governing ascent mission design, including configuration design of launch system and the trajectory design.

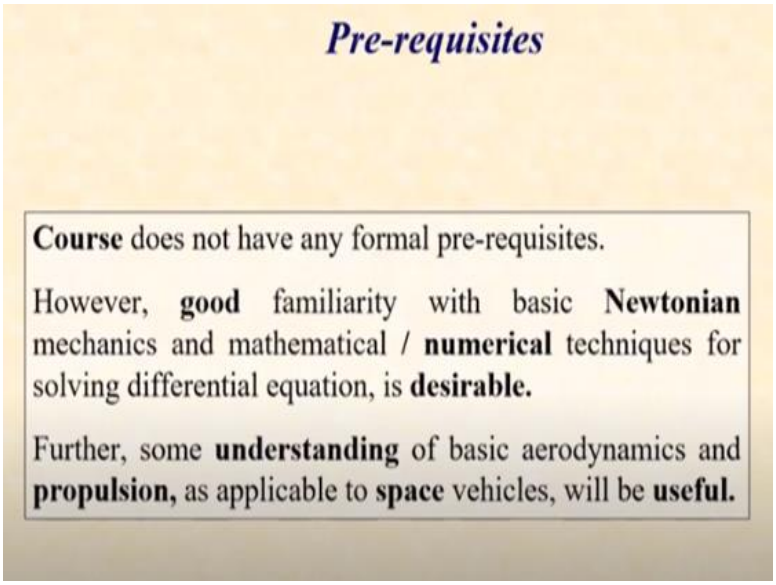
(Refer Slide Time: 00:58)



If we look at the contents in the segment titled ascent trajectory analysis and design, we will set up the overall objectives, we will look at the mathematical models which are applicable and then carry out some of the simplified analysis on rectilinear and gravity turned trajectories. After which we will introduce the strategies for including the effect of drag and gravity on the overall mission performance of a typical launch vehicle.

In the second segment, titled multistage rocket configuration, we will introduce the idea of a rocket configuration. We will also understand some of the details of the staging solution including its sensitivity to parameter changes and understand the philosophies of series and parallel staging. And close this idea with also looking at some of the optimization philosophies that are commonly employed in configuring a launch vehicle or a rocket.

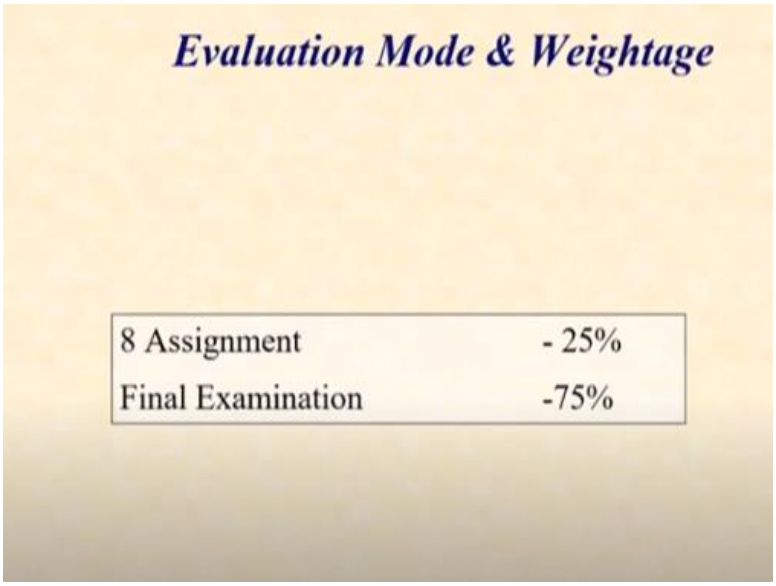
(Refer Slide Time: 02:34)



It is important to understand what are going to be the prerequisites for going through this course. So, course does not have any formal pre-requisites. So, anybody with interest is welcome to attend the course. However, there are certain basic familiarities that would be useful in understanding the concepts that we are going to discuss.

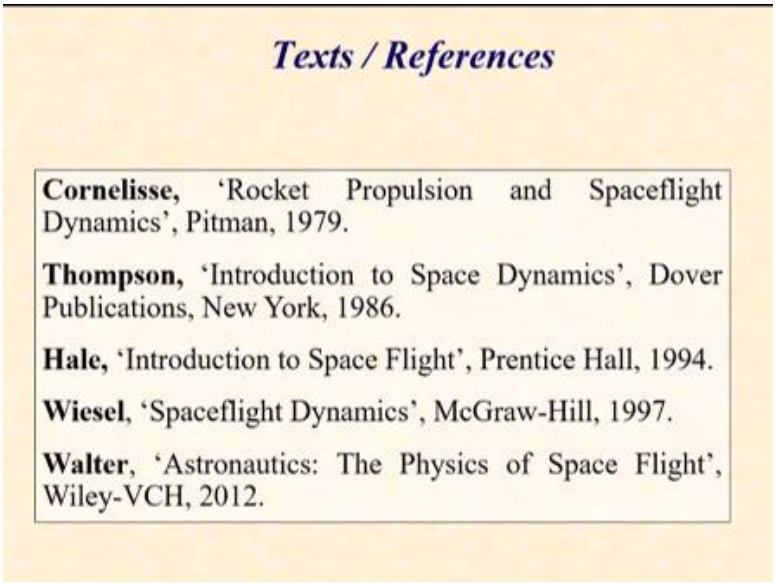
First of them being the Newtonian mechanics, mathematical/ numerical techniques that are used in solving differential equations, which needs some understanding of calculus is definitely desirable. Of course, while this is not essential, it should also be useful if some ideas of fluid mechanics, aerodynamics, thermodynamics, propulsion, etc., would be useful as we might be making use of some of these ideas to explain the philosophies.

(Refer Slide Time: 03:57)



The evaluation is under the standard NPTEL format. So as there are eight weeks there will be eight assignments with total of 25% weightage. And a final examination with 75% weightage.

(Refer Slide Time: 04:21)



Of course, you are going to watch the videos which will become the main content of the course. But in this you would like to read additional material. The following five books are found to be fairly easy to read and follow and also quite exhaustive in terms of the discussion and the material provided. The Cornelisse book is an old, about 40 years old. Thompson also is an old book.

But of course, there are also the recent books which have come up which talk about the ideas that we are going to discuss as part of this course. So, with that, we come to the end of the course plan. What we are going to look at in the next lecture is to establish some of the foundation material for defining an ascent mission and carrying out the analysis. So, thank you and see you in the next lecture.