



SPCC/01/2022/01to65

# Indian Institute of Space Science and Technology

Declared as Deemed to be University under Section 3 of the UGC Act, 1956

An autonomous institute under Department of Space, Govt. of India

Valiamala, Thiruvananthapuram - 695 547, Kerala

## Course Certificate

This is to Certify that Shri/Smt. Shri Aditya Deevi .....has  
successfully completed the course on **Integrated Design of Space Vehicles** offered by **Dr. B. N. Suresh, Chancellor, IIST** which was held from October  
2021 to February 2022 at **Indian Institute of Space Science and Technology** as per the details appended.

**Dr. Kuruvilla Joseph**  
Dean of Student Activities / Course Coordinator,  
IIST

**Dr. D Sam Dayala Dev**  
Director, IIST

**Dr. B. N. Suresh**  
Chancellor, IIST

**Dr. Y V N Krishna Murthy**  
Registrar, IIST

### Course Description

#### Integrated Design of Launch Vehicles

Duration: 24 hrs

This course spread over one full year with 22 contact hours, is designed to address the several aspects of integrated design of a space vehicle, which are quite complex and multidisciplinary.

The importance of the intricacies involved in designing such a vehicle which positions a spacecraft of defined size and mass into a predetermined orbit precisely, has been emphasized.

The technologies in building a space vehicle involve several subsystems such as propulsion, structures, aerodynamics, flight mechanics, navigation, guidance and control systems, stage mechanisms and thermal systems which are explained with practical examples. The orbital mechanics of satellites addressing different coordinate frames, orbital perturbations and orbital transfers are briefly described. A detailed procedure for designing the trajectory for meeting specific mission requirements and several design constraints are highlighted. The selection methodology for the launch vehicle configuration, optimum staging and their influence on the vehicle performance are also discussed. The influence of external, internal and dynamic operating environments experienced by the vehicle subsystems and the remedial measures needed are taught. Their design aspects considering the challenges in understanding the interdependencies, interactions and interfaces between disciplines are highlighted.

The conflicting requirements between the elements of a multidisciplinary system demands an integrated design involving the systems approach. Hence, it is essential that the designer has to deal with trade off analysis, selection of a robust design, the system lifecycle, risk assessment, generation of test methodologies and suitable validation methods. The lecture series subsequently covers in detail the influence of mission design strategies on the vehicle design process and the design options of various subsystems.

The purpose of the course is to expose the students to system engineering aspects to carry out the design of a complex system and enable them to take up any such complex design in future.