

**Completed Registration form should be sent to
Course coordinator:**

Prof. Ashok Joshi
Course Coordinator
Department of Aerospace Engineering
Indian Institute of Technology Bombay
Powai, Mumbai – 400 076
Phone: (022) – 25767113
Fax: (022) – 25722602
Email: ashokj@aero.iitb.ac.in

***For information on other Quality
Improvement Programmes at IITB, contact:***
PROF-IN-CHARGE (CE & QIP),
OFFICE OF CONTINUING EDUCATION & QUALITY
IMPROVEMENT PROGRAMMES
INDIAN INSTITUTE OF TECHNOLOGY BOMBAY,
POWAI, MUMBAI 400 076
Tel. No. : 2572 6199 (D), **2576 7048**.
Email : qip@iitb.ac.in

**For latest information on QIP,
Please visit our home page at: <http://www.qip.iitb.ac.in>**

**Deadline for submitting application: Friday May
26th, 2017
Notification of acceptance: Friday June 02nd,
2017**

- Incomplete application forms will not be entertained.
- For additional copies of the registration form, use a photocopy of this brochure or type in the format given. For further details:
<http://www.iitb.ac.in/~qip/>

FACULTY

The teaching faculty in this course consists of Prof. Ashok Joshi, who is also the course coordinator.

VENUE FOR CLASSES

Classes will be held in the Seminar Hall of Jalvihar Guest House, IIT Bombay.

LECTURE NOTES

In order to help the participants to understand the concepts better, the lecture notes along with a summary of the contents will be provided at the beginning of each lecture.

PRE-REQUISITES

The course does not have any formal pre-requisites. However, familiarity with basic calculus (differential & integral) and numerical analysis techniques will be useful.

QIP Short Term Course On

Introduction to Space Flight Mechanics (SpaceMech_17)

JUNE 19 – 23, 2017



Office of
Continuing Education &
Quality Improvement Programmes



Department of Aerospace Engineering



INTRODUCTION

In the last two decades, space systems e.g. launch vehicles, satellites, space probes and space stations etc., are increasingly being employed for various types of missions that include communication, navigation, entertainment, resource mapping, surveillance, as well as exploration of our planetary system for future human habitat. The design of such systems for carrying out these tasks requires understanding of the basic mechanics of launch vehicles and spacecraft. The present course provides basic background on launch vehicle trajectories, their design, satellite orbital motion, interplanetary & return missions etc., in order to help the beginners in this field understand implication of various concepts and methodologies applicable to mechanics of space systems as well as to help develop simple analytical tools for predicting the overall mission profile of such objects.

BROAD OBJECTIVES

The present course is an introductory course in the area of mechanics of space systems and thus aims to provide beginners with fundamental concepts and methodologies to understand and also setup typical space missions.

COURSE CONTENTS

Introduction to space missions, role of ascent, orbital and return missions, Mathematical model for general ascent mission, Rectilinear and gravity turn trajectories, Single and multi-stage launch vehicle systems and their configuration design. Introduction to basic orbital problem, Two-body problem formulation and Kepler's laws, Classical orbital elements, Orbit determination from initial conditions, Position & velocity prediction from orbital elements, Different types of orbits, Perturbation due to Earth oblateness, Solar radiation pressure effect on orbits, Non-Keplerian formulation including elements of restricted 3-body problem, Sphere of activity and Roche limit. Introduction to orbital manoeuvres e.g. Orbit raising manoeuvres, Hohmann & low thrust transfer manoeuvres, Orbit inclination change manoeuvre, Orbit perigee argument change manoeuvre,. Introduction to inter-planetary missions, departure and arrival concepts including planetary capture manoeuvre, Launch to orbit (SSTO, TSTO missions), Rendezvous and docking manoeuvres, Launch window concept and reentry trajectories.

ELIGIBILITY

Faculty members of degree level engineering colleges recognized by AICTE are eligible to attend the course.

TRANSPORT, BOARDING & LODGING

Participants are entitled for II class or III AC railway fare to and fro by the shortest route from college to IIT Bombay. All participants will be given auto rickshaw fare from Kanjurmarg/ Andheri to IIT on the dates of arrival and departure. Local participants will be paid second class railway fare or BEST Bus fare.

Boarding and lodging will also be provided free of cost. Accommodation will be provided in the students Hostels or Guest House on sharing basis. Since accommodation is limited, family members of the participants cannot be accommodated.

REGISTRATION

There is no registration fee for the course. All short-listed candidates are required to confirm their participation by sending a Demand Draft of ₹.2000/- in the name of "Registrar IIT Bombay".

The above amount will be refunded to the participant if he / she attends the course. In case a participant does not attend the course, the above amount will be forfeited.

COURSE SCHEDULE & EVALUATION

The programme is scheduled to be held during June 19-23, 2017. Successful participants would be awarded 'Course Completion Certificate'.

QIP Short Term Course
on
**Introduction to Space Flight Mechanics
(SpaceMech_17)**

JUNE 19 – 23, 2017

Registration Form

Name (in block letters) : _____

Designation : _____

Organization : _____

Mailing Address : _____

Age : _____ Sex (M/F): _____

Mobile : _____

Email : _____

Prior Exposure to State-Space: Yes / No

Accommodation in Campus: YES / NO

Signature of Applicant:

Sponsorship & signature of Head of the College /
Institute (with date & seal).

**(IMPORTANT: BY SIGNING ABOVE HEAD OF THE
COLLEGE/INSTITUTE CERTIFIES THAT APPLICANT IS A
FACULTY MEMBER OF DEGREE LEVEL ENGINEERING
COLLEGE RECOGNIZED BY AICTE)**

QIP Short Term Course
on
**Introduction to Space Flight Mechanics
(SpaceMech_17)**

JUNE 19 – 23, 2017

Registration Form

Name (in block letters) : _____

Designation : _____

Organization : _____

Mailing Address : _____

Age : _____ Sex (M/F): _____

Mobile : _____

Email : _____

Prior Exposure to State-Space: Yes / No

Accommodation in Campus: YES / NO

Signature of Applicant:

Sponsorship & signature of Head of the College /
Institute (with date & seal).

**(IMPORTANT: BY SIGNING ABOVE HEAD OF THE
COLLEGE/INSTITUTE CERTIFIES THAT APPLICANT IS A
FACULTY MEMBER OF DEGREE LEVEL ENGINEERING
COLLEGE RECOGNIZED BY AICTE)**

QIP Short Term Course
on
**Introduction to Space Flight Mechanics
(SpaceMech_17)**

JUNE 19 – 23, 2017

Registration Form

Name (in block letters) : _____

Designation : _____

Organization : _____

Mailing Address : _____

Age : _____ Sex (M/F): _____

Mobile : _____

Email : _____

Prior Exposure to State-Space: Yes / No

Accommodation in Campus: YES / NO

Signature of Applicant:

Sponsorship & signature of Head of the College /
Institute (with date & seal).

**(IMPORTANT: BY SIGNING ABOVE HEAD OF THE
COLLEGE/INSTITUTE CERTIFIES THAT APPLICANT IS A
FACULTY MEMBER OF DEGREE LEVEL ENGINEERING
COLLEGE RECOGNIZED BY AICTE)**

