

Institute of Space Technology

Islamabad

GUIDANCE, NAVIGATION AND CONTROL OF SPACECRAFT

Professional Development Short Course

August 14-19, 2006

Course Plan

Date	August 14	August 15	August 16	August 17	August 18	August 19
<i>Day</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>	<i>Saturday</i>
1500-1545	Introductory Session	Lecture 02	Lecture 04	Lecture 06	Lecture 08	Lecture 10 (1000-1045)
1545-1630	Lecture 01	Lecture 03	Lecture 05	Lecture 07	Lecture 09	Concluding Session (1045-1130)
1630-1645	TEA BREAK					Certificate Distribution (1130-1215)
1645-1730	Problem-Solving Techniques	Problem Discussion/Software Demonstration				Tea (1215-1230)

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Course Outline

Topics

- 1 Projectile Dynamics, Orbital and Escape Velocities, Geostationary and Polar Satellites, Satellite-Launch Vehicle (SLV), Satellite and. SLV Orbits
Problem-Solving Techniques
 - 2 Down-Range and Cross-Range Error for Short-Range Projectiles
 - 3 Mathematics of Inertial-Navigation and Telemetry Systems
 - 4 Review of Lagrangian and Hamiltonian Dynamics
 - 5 Two-Body Problem in the Plane-Polar-Coördinate Mesh
 - 6 Two-Body Problem in the Elliptic-Astrodynamical-Coördinate Mesh
 - 7 The Hohmann-Transfer Orbit
 - 8 Control Laws (the Cross-Product, the Extended-Cross-Product, the Normal-Component-Cross-Product, the Dot-Product, the Normal-Component-Dot-Product and the Ellipse-Orientation Steering)
 - 9 Explicit Guidance Schemes (the Delta, the Lambert and the Inverse-Lambert Scheme, the Q, the Inverse-Q and the Multi-Stage-Q System)
 - 10 Three-Body Problem and Stability of Satellites
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Course Objectives

- Learn the basic concepts of navigation, guidance and control of spacecraft
- Visualize the type of mathematics needed in this discipline
- Acquire skills to formulate a problem
- Get hands-on experience to analyze orbit problems