Space Technology - Web course

COURSE OUTLINE

Part (i):

Rocket propulsion fundamentals, rocket dynamics and ascent flight mechanics, chemical rockets, multi-staging and optimization,Electrical rockets. Fundamentals of orbital mechanics (two body motion, circular and escape velocity, motion in elliptic, hyperbolic and parabolic orbits), basic orbital maneuvers.

Near earth missions (satellites to GEO/MEO/Geosynchronous, human flight), deep space missions. Space environment (atmosphere, radiation and magnetic fields).

Atmospheric entry flight mechanics, entry heating.

Part (ii):

Space environment, spherical (attitude) geometry, attitude determination and control, review of rotational dynamics, rigid body dynamics, disturbance torques, passive attitude control, active control, spacecraft subsystems, attitude sensors.

COURSE DETAIL

A Web course shall contain 40 or more 1 hour lecture equivalents.

S.No	Topics	No.of Hours
1	**Part (i):**	
	LM1:Rocket propulsion fundamentals.	2
	LM2: Rocket dynamics and ascent flight mechanics.	3
	LM3: Chemical rockets , multiple staging and optimization	4
	LM4: Electrical rockets.	2
	LM5: Fundamentals of orbital mechanics.	4

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Aerospace Engineering

Hyperlinks:

Satellite engineering:

1. http://ocw.mit.edu/OcwWeb/Aeronautics-and Astronautics/16-851Fall2003/CourseHome/index.htm

Space propulsion:

1. http://ocw.mit.edu/OcwWeb/Aeronautics-and-Astronautics/16522Spring2004/CourseHome/index.htm
2. http://www.aoe.vt.edu/~cdhall/courses/aoe4140/

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	LM6: Basic orbital maneuvers and missions.	3
	LM7: Space environment (atmosphere, radiation & magnetic fields).	1
	LM8: Atmospheric entry flight mechanics, entry heating.	3
2	**Part(ii):**	
	LM1:Introduction to spacecraft attitude dynamics,space environment.	1
	LM2: Spherical Geometry.	2
	LM3: Different axes system.	2
	LM4: Review of attitude (rotational) dynamics of rigid bodies.	5
	LM5:Attitude determination, sensors.	2
	LM6: Disturbance torques, Correction torques.	2
	LM7: Spacecraft attitude dynamics.	2
	LM8: Passive spacecraft attitude control techniques.	2
	LM9: Active spacecraft attitude control techniques.	2
	LM10: Introduction to flexibility/nonlinear effects on spacecraft attitude dynamics and control.	2
	LM11: Spacecraft subsystems.	1

References:

Part(i):

1. "Mechanics and Thermodynamics of Propulsion", (ISBN 020152483, 1992, 2nd Edition) by Philip G Hill and Carl R Peterson, Addison Wesley.

2. "Space Flight Dynamics", by William E. Wiesel, Mc-Graw Hill.

3. "Introduction to Space Flight", by Francis J Hale, Prentice Hall.

4. "Fundamentals of Astrodynamics", Roger R. Bate, Donald D Mueller, Jerry E White, Dover.

Part(ii):

1. "Modern Spacecraft Dynamics and Control", by Marshall H. Kaplan, Wiley Publications, 1976 .

2. "Spacecraft Attitude Determination and Control", Edited by Jame R Wertz, D. Reidel Publications, 1978.

3. "Spacecraft Dynamics and Control: A Practical Engineering Approach", Michael. J. Sidi, Cambridge University Press Publication, 1997.