

## SYLLABUS

## ME452: Dynamics of Space Flight

Text (required): *Orbital Mechanics for Engineering Students*, H. D. Curtis (Elsevier, 2010) 2<sup>nd</sup> Edition

References: Additional materials will be e-mailed during the semester

Office Hours: By appointment. Send e-mail request to [rosato@njit.edu](mailto:rosato@njit.edu).

Course Grade: Based on Mid-Term exams and Final Exam.

Homework: Solutions will be e-mailed to the class at the beginning of the semester.

Week	Topic	Reading	Problems
1	Introduction and Review: Kinematics, Newton's Laws, Time derivative of moving vectors, relative motion	Chapter 1	1.1 – 1.10 1.12, 1.13, 1.15
2	Two Body Problem: Motion equations in an Inertial Frame; Relative Motion	2.1 - 2.3	
3	Angular Momentum, Orbital Energy	2.4,	
4	Orbital Trajectories: Circular, Parabolic, Elliptic Hyperbolic Trajectories	2.6 – 2.9	2.1-2.3, 2.6, 2.7, 2.8, 2.11, 2.13, 2.15-2.18, 2.21, 2.22, 2.24, 2.30, 2.32 2.37, 2.38
5	<b>Exam 1</b>	2.10	
6	Perifocal Frame Restricted Three-Body Problem	2.10 2.11	2.26, 2.32, 2.35, 2.36 2.44, 2.45
7	Orbital Position as a Time Function: Time since Periapsis- Circular Elliptical Trajectories	3.1, 3.2 3.5	3.1, 3.4 - 3.10 3.14
8	Hyperbolic Trajectories Kepler Universal Variables Formulation	3.6 3.7	3.16 3.19
9	<b>Exam 2</b>		
10	Orbits in 3 Dimensions: State vector & Geocentric Frame Orbital Elements and State Vector	4.1 – 4.3 4.4	4.1, 4.2 4.4, 4.5
11	Coordinate Transformations Transformation: Geocentric Equatorial to Perifocal Frames	4.5 4.6	4.8 – 4.11 4.14 – 4.16, 4.19,
12	Effects of Earth's Oblateness <b>Exam 3</b>	4.7	4.25, 4.26
13	Preliminary Orbit Determination: Gibbs' Method	5.1, 5.2	5.1, 5.2
14	Lambert's Problem	5.3	5.4, 5.5
15	<b>Final Exam</b>		Comprehensive

Formulas will be provided on all exams. Note that additional Homework Problems may be assigned in class.

**All violations of the Honor Code will be referred to the Dean of Students without exception.**