ABET Course Syllabus

ENAE 404 Space Flight Dynamics

Credits & Contact Hours:	3 credits (3 hours of lecture)
Course Status:	Required
Schedule:	Offered every Spring semester
Course Description:	Three-dimensional motion under central fields. Solutions to orbital motion, orbital elements, time elements. Kepler's laws. Orbital maneuvering, rendezvous and station-keeping. Rigid-body attitude dynamics, spacecraft attitude dynamics.
Pre-Requisites:	ENAE 301
Co-Requisites:	None
Textbooks:	(1) H. Curtis. Orbital Mechanics for Engineering Students. Butterworth-Heinemann, second edition, 2009 (2) O. Montenbruck. & G. Eberhard. Satellite Orbits. Springer, first edition, 2000
Other Required Material:	Course lecture notes and handouts
Course Oversight:	Dynamics and Control Committee
Syllabus Prepared By/Date:	Dr. Liam Healy, May 2011

Course Objectives/Student Learning Outcomes:
1. Show an understanding of celestial and orbital mechanics and be able to apply this understanding to realistic satellite orbits
2. Display a full understanding of conic sections and fundamental orbit equations of motion, such as those of Kepler and Newton
3. Determine the r and v vectors of a satellite from the classical orbital elements of vice-versa
4. Understand Kepler's equation and two-body orbit propagation and the effects of perturbations
5. Show an understanding of the fundamentals of spacecraft attitude dynamics

Topics Covered:
1. Physics of orbital motion and orbital elements
2. Coordinate systems and transformations
3. Kepler's equation and two-body propagation
4. Orbital maneuvering
5. Attitude dynamics
6. Perturbations
7. Applications

Relationship of Course Objectives to Program Outcomes
This course addresses program outcomes: 1, 2, 3, 5