



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Fundamental Astronautics

AEROENG 3522

Credit Hours:

3.00 - 3.00

Course Levels:

Undergraduate (1000-5000 level)

Course Components:

Lecture

Course Description:

This course will present a conceptual understanding of different types of orbits in space that arise under the laws of gravitational motion, basics of preliminary orbit determination, design of maneuvers among orbits of different types, a preliminary understanding of perturbations in space, preliminary space propulsion and the patched conics approach for interplanetary mission design.

Prerequisites and Co-requisites:

Prereq: 3520. Concur: 2405.

Course Goals / Objectives:

- Conceptually understand and distinguish between different types of orbits in space that arise under the laws of gravitational motion.
 - Design maneuvers for transferring spacecraft from one orbit to another
 - Perform preliminary orbit determination
 - Understand the causes and consequences of perturbations in space
 - Perform preliminary design of interplanetary missions
 - Understand principles of propulsion in the space environment and integration of the propulsive system into mission and vehicle design
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Course Topics:

- Newtonian particle mechanics, law of gravitation
 - Keplerian motion (two body problem), geometry of conics, integrals of motion, Kepler's laws
 - Orbital elements
 - r v/s t , Kepler's equation
 - Numerical solution for two body problem
 - F-G solution, Universal variables for the two body problem
 - Orbit in 3 dimensions
 - Orbital maneuvers: Hohmann/bielliptic maneuvers, phase/apse/plane change
 - Orbital perturbations: oblateness, drag, third-body effects, solar radiation pressure
 - Preliminary orbit determination, Gibbs method and the Lambert's problem
 - Interplanetary trajectories: spheres of influence, patched conics
 - Thrusters for various missions
 - Low thrust maneuvers: climbs and plane change
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Designation:

Required