THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Design of Space Vehicles and Systems I

AEROENG 4517

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture
Lab

Course Description:
Feasibility study of a space mission,elements of mission design and design methodologies of spacecraft subsystems, and preliminary sizing.

Prerequisites and Co-requisites:
Prereq: 3521 and 3543 and 3570 and 3580, and Sr standing, and enrollment as AeroEng-BS student (No pre-majors can enroll in this course). Prereq or concur: 4550.

Course Goals / Objectives:
- Provide students with conceptual and preliminary spacecraft design experience
- Foster multidisciplinary thought processes and collaborations
- Train students in effective teamwork
- Refine students' technical communication skills through written reports and presentations

Course Topics:

- Form design teams, design project description, process of requirements definition and a requirements baseline development for a space mission. Introduction to Space Systems Engineering.
- Characteristics of satellite Com systems, baseband signals and service quality, types of signals and their qualities.
- Communication techniques: carrying the baseband signals at distance with constraints, analoque and digital signals, modulation and demodulation techniques, coding, bandwidth.
- Link performance, communication payload. 1st progress report and presentation
- Orbits and related issues. Planetary observations, pointing and and mapping geometry from space. Space propulsion systems and design.
- The platform: spacecraft subsystems, spacecraft Subsystems. Spacecraft preliminary design and sizing.
- Space vehicle power systems and design
- Spacecraft thermal systems and design
- Spacecraft attitude determination and control, disturbances modeling 2nd Progress report and presentation
- Spacecraft structural design: issues and topics of structural design for space systems, design elements and verification requirements
- Optimum Structural design: FEA with Hypermesh and Nastran.
- Limit Analysis and Design of Structures: FEA with Hypermesh and Nastran. FEA- truss, beam and frame structures; Optional: Geometric Modeling with primitives.
- Minimum Stress Design: fully stress design, FEA with Hypermesh and Nastran. FEA -truss, beam and frame structures.
- Structural design Project Proposal, final Semester Report.

Designation:
Required