

TEACHING SEMINAR

Orbital Odyssey: Exploring Orbital Mechanics with Newton's Laws

FRIDAY, MARCH 8TH, 2:30 PM - 3:20 PM
HAMP 1252

MADHUSUDAN VIJAYAKUMAR

Lecturer Candidate

ABSTRACT

The ancient fields of astronomy and celestial mechanics have captivated humans for millennia. From ancient civilizations' observations of the stars to modern celestial mechanics, we'll trace the evolution of our understanding of orbital dynamics. Equipped with the theoretical foundation laid by Newton and others, we will dwell on the fundamental definition of an orbit. We will also explore the different types of orbits and derive the equations of motion governing the trajectories of objects in space. To solidify our understanding, we'll embark on a hands-on exploration through a coding example, where we'll implement these equations to simulate the motion of a spacecraft in low Earth orbit using Matlab.

BIOGRAPHY

Madhusudan Vijayakumar is an Aerospace Engineer whose research interests lie in Astronautics. He obtained his bachelor's degree in Electronics Engineering in India and his master's and Ph.D. in Aerospace Engineering from Iowa State University. During his Ph.D., he closely collaborated with NASA Goddard for about three years, working on designing low-thrust space trajectories. Following his Ph.D., he joined SpaceNav LLC as a Flight Dynamics Engineer, where he is involved in Mission Design, Spacecraft Conjunction Prediction, and Space Situational Awareness. His expertise lies in Space Mission Design and Trajectory Optimization. His passion for teaching and commitment to education bring him to Purdue, where he hopes to empower the next generation of space engineers.