1.	Title of the course	Attitude Estimation and Control
2.	Course number	ME529L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To ME5036/21
6.	To be offered by	Department of Mechanical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	CoT for UG
9.	**Course Objective(s):** To mathematically model rigid body attitude geometry and kinematics using common representations. To estimate rigid body attitude using direction measurements and an optional angular velocity measurement. To control the attitude using local linear methods and global nonlinear methods.	
10.	**Course Content:** Euler's rotation theorem; Standard representations of attitude including Euler angles, orthogonal matrices, axis-angle representation, and quaternions; Geometric attitude estimation using Davenport's q-method, and Schuster's Quest algorithm; Geometro-kinematic attitude estimation using extended Kalman filter and nonlinear complementary filters; Linear attitude control using Proportional-Integal-Derivative (PID) controllers for local stability and tracking; Nonlinear attitude control using Lyapunov method for global stability and tracking.	
11.	**Textbook(s):** 1. Markley F L and Crassidis J L, *Fundamentals of Spacecraft Attitude Determination and Control*, 1st Edition, Springer (2014).	
12.	**Reference(s):** 1. Choukroun D, Oshman Y,Thienel J and Idan M, *Advances in Estimation, Navigation, and Spacecraft Control*, 1st Edition, Springer (2015). 2. Yang Y, *Spacecraft Modeling, Attitude Determination, and Control*, 1st Edition, CRC Press (2019).	