Subject Description Form

Subject Code	AP20003
Subject Title	Mechanics
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	AP10008
Objectives	The objectives of this subject are to (i) further develop the fundamental theories of mechanics taught in AP10005 Physics I; (ii) introduce topics at intermediate level of mechanics which are considered to be the foundation for pursuing higher degree studies or performing related engineering analyses; and (iii) introduce elemental concepts of special relativity based on a non-electromagnetic approach.
Intended Learning Outcomes	On completing the subject, students will be able to: (a) select an appropriate coordinate system and apply Newton's laws of motion (with the concepts of linear/angular momentum and energy) to solve problems of motion of a particle; (b) solve problems of damped and forced oscillation of a particle by solving equation of motions; (c) solving the problem of the motion of a many-particle system, with emphasis put on a system of variable mass and rotation of a rigid body about an axis; (d) perform transformation of kinematic/kinetic parameters of a particle observed from two relatively moving coordinate systems, and describe the motion of a particle under the influence of Coriolis effect; and (e) perform Lorentz transformation to correlate the kinematic/kinetic parameters observed from two relatively moving inertial frames; and explain the phenomena, e.g. dilation of time and contraction of length, based on the theory of special relativity.
Subject Synopsis/ Indicative Syllabus	**Kinematics of particles**: Cartesian; polar; cylindrical and spherical coordinate systems. **Kinetics of a particle**: Newton's laws of motion; linear and angular momentum; potential energy; kinetic energy; central force motion; damped and forced harmonic oscillation. **Many-particle system**: Center of gravity; linear and angular momentum; potential and kinetic energy; variable mass systems; coupled harmonic oscillators; motion of rigid body. **Moving coordinate systems**: Transformation of kinematic/kinetic parameters of a particle observed from two relatively moving coordinate systems; motion of a particle observed from a reference frame on the earth's surface; Coriolis effect. **Special relativity**: Fundamental postulations; the Lorentz transformation; time dilation; length contraction; linear momentum, energy and force in relativity.

Teaching/Learning Methodology

Lecture: Delivery of lectures interactively to enable students to participate actively in acquiring knowledge, and to raise questions and discuss for clarifying their doubts generated in their learning process.
Examples in relation to real life and engineering practices are given to enable the student to alert applications of the subject contents to real life problems.

Tutorial: To be run in small groups for the students to consolidate the contents of lectures. Students are properly guided to participate actively in solving problems, raising questions and discussion.

e-learning: Electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc. in order to enhance the effectiveness of teaching and learning processes.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
(1) Continuous assessment	40	✓	✓	✓	✓	✓
(2) Examination	60	✓	✓	✓	✓	✓
Total	100					

Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.

Student Study Effort Expected

Class contact:	
• Lecture	33 h
• Tutorial	6 h
Other student study effort:	
• Self-study	81 h
Total student study effort	120 h