

Subject Description Form

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| Subject Code | AP10005 |
| Subject Title | Physics I |
| Credit Value | 3 |
| Level | 1 |
| Pre-requisite/ Co-requisite/ Exclusion | Nil |
| Objectives | This course provides a broad foundation in mechanics and thermal physics to those students who are going to study science, engineering, or related programmes. |
| Intended Learning Outcomes | <p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. Solve simple problems in single-particle mechanics using calculus and vectors; b. Solve problems in mechanics of many-particle systems using calculus and vectors; c. Understand simple harmonic motion and solve simple problems; d. Solve problems related to acoustic standing waves; e. Calculate changes in frequency received due to Doppler's effect; f. Apply ideal gas laws to solve problems; g. Apply the first law of thermodynamics to simple processes; and h. Solve simple problems related to the cyclic processes. |
| Contribution to Programme Outcomes (Refer to Part I Section 10) | <ul style="list-style-type: none"> ▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach) |
| Subject Synopsis/ Indicative Syllabus | <p>Mechanics: calculus-based kinematics, dynamics and Newton's laws; calculus-based Newtonian mechanics, involving the application of impulse, momentum, work and energy, etc.; conservation law; gravitational force; systems of particles; collisions; rigid body rotation; angular momentum; oscillations and simple harmonic motion; pendulum; statics; longitudinal and transverse waves; travelling wave and standing wave; Doppler effect; sound waves and beats.</p> <p>Thermal physics: conduction, convection and radiation; black body radiation;</p> |

| | ideal gas and kinetic theory; work, heat and internal energy; first law of thermodynamics; entropy and the second law of thermodynamics; Carnot cycle; heat engine and refrigerators. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Teaching/Learning Methodology | <p>Lecture: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given.</p> <p>Student-centered Tutorial: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience.</p> <p>e-learning: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Assessment Methods in Alignment with Intended Learning Outcomes | <table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="8">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> <th>g</th> <th>h</th> </tr> </thead> <tbody> <tr> <td>(1) Continuous assessment</td> <td>40</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>(2) Examination</td> <td>60</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100</td> <td colspan="8"></td> </tr> </tbody> </table> <p>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.</p> <p>Examination: This is a major assessment component of the subject. It would</p> | | | | | | | | | | Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed (Please tick as appropriate) | | | | | | | | a | b | c | d | e | f | g | h | (1) Continuous assessment | 40 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | (2) Examination | 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Total | 100 | | | | | | | | |
| Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed (Please tick as appropriate) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | a | b | c | d | e | f | g | h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (1) Continuous assessment | 40 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (2) Examination | 60 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | 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 Hrs. |
| | ▪ Tutorial | 6 Hrs. |
| | Other student study effort: | |
| | ▪ Self-study | 81 Hrs. |
| | Total student study effort: | 120 Hrs. |
| Reading List and References | <ul style="list-style-type: none"> ▪ John W. Jewett and Raymond A. Serway, “Physics for Scientists and Engineers”, 2014, 9th edition, Brooks/Cole Cengage Learning. ▪ Hafez A. Radi, John O. Rasmussen, “Principles of physics: for scientists and engineers”, 2013, Springer. ▪ W. Bauer and G.D. Westfall, “University Physics with Modern Physics”, 2011, McGraw-Hill. | |
| Date of Last Revision | 19 June 2018 | |