

| Department of Mechanical Engineering | | | |
|---|--|--------------------------------|---------------------|
| Properties and Mechanics of Materials Laboratory (67331) | | | |
| Total Credits | 1 | | |
| major compulsory | | | |
| Prerequisites | P1 : Engineering Materials (67330) OR Engineering Materials (67314) P2 : Mechanics of Materials (61207) OR Mechanics of Materials (1) (67311) OR Engineering Materials (67314) | | |
| Course Contents | | | |
| Hardness, tensile, compression, impact, torsion, creep and fatigue tests. Macro-and micro-examination of metals. Experiments in casting, forming, machining, welding, heat treatment and plastic manufacturing. | | | |
| Intended Learning Outcomes (ILO's) | | Student Outcomes (SO's) | Contribution |
| 1 | Ability to conduct experiments ,analyze and interpret data related to properties and mechanics of materials | B | 50 % |
| 2 | Be able to use the devices of the lab. Properly. And write scientific report | K | 40 % |
| 3 | Ability to work in teams | D | 10 % |
| Textbook and/ or References | | | |
| Laboratory handouts. William D. Callister, David G. Rethwisch, Materials Science and Engineering. | | | |
| Assessment Criteria | | Percent (%) | |
| Mid. Term Exam | | 20 % | |
| Quizzes | | 10 % | |
| Laboratory Work | | 40 % | |
| Final Exam | | 30 % | |
| Course Plan | | | |
| Week | Topic | | |
| 1 | Introduction | | |
| 2 | Material identification +failure identification. | | |
| 3 | Tensile test+ Rubber in shear test. | | |
| 4 | Impact test. | | |
| 5,6 | Specimen preparation for metallographic study (grinding, polishing and etching, Microstructure examination for ferrous and non-ferrous alloys) | | |
| 7 | Hardness test. | | |
| 8 | Midterm Exam (Theoretical) | | |
| 9 | Torsion test. | | |
| 10 | Surface hardening of steel (carburizing). | | |
| 11 | Hardenability (jominy test) | | |
| 12 | Heat treatment of plain carbon steel (hardening , normalizing and annealing). | | |
| 13 | Precipitation hardening. | | |
| 14 | General corrosion test. | | |
| 15 | Final Exam (Theoretical) | | |