# AERO 211 STATICS

| Course Code | Course Name | Semester | |
|---|---|---|---|
| AERO 211 | STATICS | Fall ☒ Spring ☐ Summer ☐ | |
| **Hours** | | **Credit** | **ECTS** |
| **Theory** | **Practice** / **Lab** | 3 | 5 |
| 3 | 0 / 0 | | |

| **Course Details** | |
|---|---|
| **Department** | Aerospace Engineering |
| **Course Language** | English |
| **Course Level** | Undergraduate ☒ Graduate ☐ |
| **Mode of Delivery** | Face to Face ☒ Online ☐ Hybrid ☐ |
| **Course Type** | Compulsory ☒ Elective ☐ |
| **Course Objectives** | • To learn the concepts of force and moment.<br>• To understand the concept of static equilibrium.<br>• To gain the ability to analyse structural systems.<br>• To learn the concept of internal force.<br>• To understand the concept of friction.<br>• To learn the concepts of geometric centre and moment of inertia. |
| **Course Content** | • General definitions<br>• Force vectors<br>• Equilibrium of particles<br>• Moment<br>• Equilibrium of rigid bodies<br>• Truss systems<br>• Frames and machines<br>• Internal forces<br>• Friction<br>• Geometric center<br>• Moment of inertia. |
| **Course Method/ Techniques** | Lecture ☒ Question & Answer ☐ Presentation ☐ Discussion ☐ |
| **Prerequisites/ Corequisites** | None |
| **Work Placement(s)** | |

**Textbook/References/Materials**


- Beer, F. P., Johnston, E. R., Mazurek, D. F., Cornwell, P. J., & Eisenberg, E. R. (2019). *Vector mechanics for engineers: Statics* (12th ed.). McGraw-Hill Education
- Hibbeler, R. C. (2016). *Engineering mechanics: Statics* (14th ed.). Prentice Hall.


| **Course Category** | | | | |
|---|---|---|---|---|
| Mathematics and Basic Sciences | ☐ | | Education | ☐ |
| Engineering | ☒ | | Science | ☐ |
| Engineering Design | ☐ | | Health | ☐ |
| Social Sciences | ☐ | | Profession | ☐ |

**Weekly Schedule**

| No | Topics | Materials/Notes |
|---|---|---|
| 1 | GENERAL PRINCIPLES: fundamental concepts, unit systems | |
| 2 | FORCE VECTORS: vector operations, Cartesian vectors, addition of Cartesian vectors | |
| 3 | FORCE VECTORS: force vectors along a line; EQUILIBRIUM OF A PARTICLE: conditions for equilibrium, free body diagrams | |
| 4 | EQUILIBRIUM OF A PARTICLE: planar and three-dimensional force systems | |
| 5 | FORCE SYSTEM RESULTANTS: vector product, moment of a force, moment about an axis | |
| 6 | FORCE SYSTEM RESULTANTS: couple moment, reduction of a force and couple system | |
| 7 | EQUILIBRIUM OF A RIGID BODY: equilibrium equations for two and three-dimensional force systems, elements carrying two or three forces | |
| **8** | **Midterm Exam** | |
| 9 | EQUILIBRIUM OF A RIGID BODY: equilibrium equations for two and three-dimensional force systems, elements carrying two or three forces | |
| 10 | ANALYSIS OF STRUCTURAL SYSTEMS: simple truss systems, frames and machines | |
| 11 | INTERNAL FORCES: internal forces in structural members, shear force and bending moment diagrams | |
| 12 | INTERNAL FORCES: internal forces in structural members, shear force and bending moment diagrams | |
| 13 | FRICTION: properties of dry friction, problems involving dry friction | |
| 14 | CENTER OF GRAVITY AND CENTROID: center of gravity, centroid of a body, composite bodies | |
| 15 | MOMENTS OF INERTIA: area and mass moments of inertia, parallel axis theorem | |
| **16** | **Final Exam** | |

| **Assessment Methods and Criteria** | | |
|---|---|---|
| **In-term studies** | **Quantity** | **Percentage** |
| Attendance | | |
| Lab | | |
| Practice | | |
| Fieldwork | | |
| Course-specific internship | | |
| Quiz/Studio/Criticize | | |
| Homework | 4 | 20% |
| Presentation / Seminar | | |
| Project | | |
| Report | | |
| Seminar | | |
| Midterm Exam | 1 | 30% |
| Final Exam | 1 | 50% |
| | **Total** | **100%** |
| **Contribution of Midterm Studies to Success Grade** | | 50% |
| **Contribution of End of Semester Studies to Success Grade** | | 50% |
| | **Total** | **100%** |

| **ECTS Allocated Based on Student Workload** | | | |
|---|---|---|---|
| **Activities** | **Quantity** | **Duration (Hrs)** | **Total Workload** |
| Course Hours | 14 | 3 | 42 |
| Lab | | | |
| Practice | | | |
| Fieldwork | | | |
| Course-specific Work Placement | | | |
| Out-of-class study time | 14 | 2 | 28 |
| Quiz/Studio/Criticize | | | |
| Homework | 4 | 6 | 24 |
| Presentation / Seminar | | | |
| Project | | | |
| Report | | | |
| Midterm Exam and Preparation for Midterm | 1 | 15 | 15 |
| Final Exam and Preparation for Final Exam | 1 | 15 | 15 |
| **Total Workload** | | | **124** |
| **Total Workload / 25** | | | **124/25** |
| **ECTS Credit** | | | **5** |

| **Course Learning Outcomes** | |
|---|---|
| **No** | **Outcome** |
| **L1** | Gain the ability to draw Free Body Diagrams and perform force analysis in mechanical system designs. |
| **L2** | Perform internal force analysis for solving strength of materials problems. |
| **L3** | Understand the theory and application of engineering mechanics for rigid bodies under planar force systems. |
| **L4** | Understand the theory and application of engineering mechanics for rigid bodies under three-dimensional force systems. |
| **L5** | Calculate geometric properties of sections for solving strength of materials problems. |

**Contribution of Course Learning Outcomes to Program Competencies/Outcomes**

*Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant*

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** | **P8** | **P9** | **P10** | **P11** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **L1** | 5 | 5 | | | | 5 | | | | | |
| **L2** | 5 | 5 | | | | 5 | | | | | |
| **L3** | 5 | 5 | | | | 5 | | | | | |
| **L4** | 5 | 5 | | | | 5 | | | | | |
| **L5** | 5 | 5 | | | | 5 | | | | | |