# Course Specification
## (Bachelor)

| | |
|---|---|
| **Course Title:** | Engineering Graphics |
| **Course Code:** | ME2131 |
| **Program:** | Mechanical Engineering |
| **Department:** | Mechanical Engineering |
| **College:** | Engineering and Architecture |
| **Institution:** | Umm Al-Qura University |
| **Version:** | 1 |
| **Last Revision Date:** | 14 January 2025 |

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## A. General information about the course:

### 1. Course Identification

| 1. Credit hours: ( 2 ) | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| **2. Course type** | | | | | |
| **A.** | ☐University | ☐College | ☒ Department | ☐Track | ☐Others |
| **B.** | ☒ Required | | ☐Elective | | |
| **3. Level/year at which this course is offered: ( 3 )** | | | | | |
| **4. Course General Description:** | | | | | |
| The course provides the undergraduate engineering student with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation, and computer-aided engineering graphics. Point line and plane relationships in projection; multi-view engineering drawings; auxiliary and section views; basic dimensioning and annotation. | | | | | |
| **5. Pre-requirements for this course** (if any)**:** | | | | | |
| | | | | | |
| **6. Co-requisites for this course** (if any)**:** | | | | | |
| | | | | | |
| **7. Course Main Objective(s):** | | | | | |
| On successful completion of this course, students will be able to use the engineering drawing manual tools in addition to the free hand sketching, draw all views and the isometric view, extract the missed views and sections, and have a brief idea on using the engineering drawing software. | | | | | |

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 90 | 100 |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom | | |

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| | • E-learning | | |
| 4 | Distance learning | | |

## 3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | |
| 2. | **Laboratory/Studio** | 90 |
| 3. | **Field** | |
| 4. | **Tutorial** | |
| 5. | **Others (specify)** | |
| **Total** | | 90 |

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | **Explain projection theory and orthographic projection** | **K1** | **Interactive Lectures, Group Discussions, Hands-on Studio Practice** | **Studio Practices, Assignments, Exams** |
| 1.2 | **Demonstrate understanding of dimensioning, annotation, and standards in engineering graphics** | **K1** | **Case Studies, Hands-on Studio Practice** | **Assignments, Studio Practices, Exams** |
| ... | | | | |
| **2.0** | **Skills** | | | |
| 2.1 | **Use engineering drawing tools and software effectively** | **S2** | **Studio Exercises and Demonstrations** | **Lab Assessments** |

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| 2.2 | Interpret complex engineering drawings and visualize missing views | S3 | Studio Exercises and Demonstrations | Lab Assessments |
| ... | | | | |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| 3.1 | Collaborate effectively in teams for engineering drawing projects | V2 | Group Work, Peer Reviews | Lab Assessments |
| 3.2 | Demonstrate ethical considerations in sustainable engineering design | V1 | Case Studies, Group Discussions | Lab Assessments, Peer Feedback |
| ... | | | | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | Introduction to Engineering Graphics: Principles, Standards, Line Types, and Scales<br>• Definition of engineering drawing<br>• Method of use<br>  ○ Line types<br>  ○ Title blocks<br>  ○ Drawing scales<br>Geometric construction<br>• Geometric construction on lines, arcs and circles | 6 |
| 2. | Multi-view projection<br>• First and third angle projections<br>• Projection – Views of point, line and surface<br>• Views of solids<br>• Lay-out of views<br>Pictorial projection<br>• Pictorial presentation of point, line and surface<br>Pictorial presentation of solids | 12 |
| 3. | • Isometric and sketching of solids | 12 |

| | | |
|---|---|---|
| | • Oblique sketching of solids | |
| 4. | Dimensioning<br>• Rules and concepts<br>• Linear dimensioning<br>• Curved dimensioning | 6 |
| 5. | Intersections<br>• Cutting planes<br>• Intersecting of surfaces<br>• Intersecting of solids | 6 |
| 6. | Sectioning and section views from Isometric drawing<br>• Sections and section types (Full, half and partial sections)<br>• Special sections<br>• Hatching | 6 |
| 7. | Extracting the missing third view from given views<br>• Extracting side view from front and top views | 6 |
| 8. | Extracting the isometric by knowing all views<br>• Simple isometric from knowing views<br>• Advanced isometric from knowing views | 12 |
| 9. | Free hand sketching<br>• Free hand sketching of lines, rings, circles and conic sections<br>• Isometric and oblique free hand sketching of solids<br>• Free hand sketching of views and sections | 12 |
| 10. | Introduction to computer graphics<br>Learning the basic principles of 2D sketch<br>• Line- SP-line - circle- ellipse- arc- rectangle -fillet- chamfer- polygon – mirror - rectangular pattern- circular pattern –offset – dimensions<br>Basic concept of 3D modeling<br>• Revolve – extrude – hole –coil – thread –fillet<br>Learning and creation of Drawing sheets<br>• Views – sections - breakout view – Auxiliary view | 12 |
| Total | | 90 |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | Exercises | Weekly | 40 |
| 2. | Mid-term Exam | 7 | 20 |

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 3. | Final Exam | 16 | 40 |

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

| | |
|---|---|
| Essential References | • Geometric and Engineering Drawing, By Ken Morling, Stéphane Danjou, Routledge - Taylor & Francis, 4th Edition, 2022<br>• Engineering Drawing and Design; by Cecil Howard Jensen, Jay D. Helsel Glencoe McGraw Hill, 5th edition, 1997 |
| Supportive References | • Engineering Drawing and Graphic Technology; by Thomas E. French, et al McGraw-Hill Higher Education, 14th edition, 1993.<br>• Principles of Engineering Drawing; by Louis Gary Lamit, Kathleen L. Kitto Delmar Learning, 1st edition, 1994 |
| Electronic Materials | |
| Other Learning Materials | |

### 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | **Studio** |
| **Technology equipment**<br>(projector, smart board, software) | **Data show, Smart Board** |
| **Other equipment**<br>(depending on the nature of the specialty) | **Inventor software** |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | Students, Faculty | Surveys, Peer Reviews |
| Effectiveness of Students assessment | Students, Faculty | Feedback, Analysis of CLOs |
| Quality of learning resources | Program Leaders | Resource Utilization Reports |

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| The extent to which CLOs have been achieved | Program Leaders, Peers | Direct and Indirect Assessments |
| Other | | |

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

## G. Specification Approval

| | |
|---|---|
| COUNCIL /COMMITTEE | |
| REFERENCE NO. | |
| DATE | |