

# TOROS ÜNİVERSİTESİ

Faculty Of Engineering  
Industrial Engineering (English)

## Course Information

| MATERIALS SCIENCE |          |             |          |                 |             |
|-------------------|----------|-------------|----------|-----------------|-------------|
| Code              | Semester | Theoretical | Practice | National Credit | ECTS Credit |
|                   |          | Hour / Week |          |                 |             |
| INE102            | Spring   | 3           | 0        | 3               | 4           |

|                                             |                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Prerequisites and co-requisites</b>      | none                                                                                                                                                                                                                                                                                                             |
| <b>Language of instruction</b>              | English                                                                                                                                                                                                                                                                                                          |
| <b>Type</b>                                 | Required                                                                                                                                                                                                                                                                                                         |
| <b>Level of Course</b>                      | Bachelor's                                                                                                                                                                                                                                                                                                       |
| <b>Lecturer</b>                             | Assit. Prof. Dr. Fikri EGE                                                                                                                                                                                                                                                                                       |
| <b>Mode of Delivery</b>                     | Face to Face                                                                                                                                                                                                                                                                                                     |
| <b>Suggested Subject</b>                    | none                                                                                                                                                                                                                                                                                                             |
| <b>Professional practise ( internship )</b> | None                                                                                                                                                                                                                                                                                                             |
| <b>Objectives of the Course</b>             | The aim of Material Science is to introduce the micro structure of materials by using physics, chemistry and mathematics disciplines, to explain the relation between micro structure and properties and to classify the materials according to the basic principles and concepts.                               |
| <b>Contents of the Course</b>               | Atomic Structure, Atomic Order, Crystalline Structures, Microstructure Defects: Amorphous structure, Solid solutions, Atomic diffusion, Grain boundary, Dislocations, Mechanical Properties: Stress, Deformation, Elasticity, Elastic and plastic behaviour, Creep, Relaxation, Hardness, Toughness, Resilience, |

## Learning Outcomes of Course

| # | Learning Outcomes                                                                             |
|---|-----------------------------------------------------------------------------------------------|
| 1 | Students use the knowledge on material structures in production systems.                      |
| 2 | Students use the important knowledge on materials science in production systems.              |
| 3 | Students use the knowledge about basic concepts of material structures in production systems. |
| 4 |                                                                                               |

## Course Syllabus

| #  | Subjects                                                                                                        | Teaching Methods and Technics |
|----|-----------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1  | Introduction, Definition, Benefits of Material Knowledge, Classification of Materials, Standard, Sustainability | Lecturing                     |
| 2  | Micro Structure of Materials, Interatomic Bonds                                                                 | Lecturing                     |
| 3  | Atomic Order, Crystal Structure, Amorphous Structure                                                            | Lecturing                     |
| 4  | Interatomic Distances, The relation between Interatomic Bonds and Properties                                    | Lecturing                     |
| 5  | Mechanical Properties of Materials, Stress-Strain Relation, Behaviour under Tensile Stress                      | Lecturing                     |
| 6  | Behaviour of Materials under Compression, Shear and Flexure                                                     | Lecturing                     |
| 7  | Midterm Exam                                                                                                    | Exam                          |
| 8  | Technological Properties: Hardness, Abrasion, Fatigue, Creep, Relaxation                                        | Lecturing                     |
| 9  | Material Types                                                                                                  | Lecturing                     |
| 10 | Material Types                                                                                                  | Lecturing                     |

|    |                       |           |
|----|-----------------------|-----------|
| 11 | Optical properties    | Lecturing |
| 12 | Electrical properties | Lecturing |
| 13 | Thermal properties    | Lecturing |
| 14 | Material choices      | Lecturing |
| 15 | Material choices      | Lecturing |
| 16 | Final Exam            | Exam      |

## Course Syllabus

| # | Material / Resources                                         | Information About Resources | Reference / Recommended Resources |
|---|--------------------------------------------------------------|-----------------------------|-----------------------------------|
| 1 | Materials Science and Engineering Properties Charles Gilmore |                             |                                   |

## Method of Assessment

| # | Weight | Work Type     | Work Title    |
|---|--------|---------------|---------------|
| 1 | 40%    | Mid-Term Exam | Mid-Term Exam |
| 2 | 60%    | Final Exam    | Final Exam    |

## Relationship between Learning Outcomes of Course and Program Outcomes

| # | Learning Outcomes                                                                             | Program Outcomes | Method of Assessment |
|---|-----------------------------------------------------------------------------------------------|------------------|----------------------|
| 1 | Students use the knowledge on material structures in production systems.                      | 9                | 1,2                  |
| 2 | Students use the important knowledge on materials science in production systems.              | 9                | 1,2                  |
| 3 | Students use the knowledge about basic concepts of material structures in production systems. | 9                | 1,2                  |
| 4 |                                                                                               |                  |                      |

PS. The numbers, which are shown in the column Method of Assessment, presents the methods shown in the previous table, titled as Method of Assessment.

## Work Load Details

| #  | Type of Work                                                  | Quantity | Time (Hour) | Work Load |
|----|---------------------------------------------------------------|----------|-------------|-----------|
| 1  | Course Duration                                               | 14       | 3           | 42        |
| 2  | Course Duration Except Class (Preliminary Study, Enhancement) | 14       | 2           | 28        |
| 3  | Presentation and Seminar Preparation                          | 0        | 0           | 0         |
| 4  | Web Research, Library and Archival Work                       | 0        | 0           | 0         |
| 5  | Document/Information Listing                                  | 0        | 0           | 0         |
| 6  | Workshop                                                      | 0        | 0           | 0         |
| 7  | Preparation for Midterm Exam                                  | 1        | 12          | 12        |
| 8  | Midterm Exam                                                  | 1        | 3           | 3         |
| 9  | Quiz                                                          | 0        | 0           | 0         |
| 10 | Homework                                                      | 3        | 4           | 12        |
| 11 | Midterm Project                                               | 0        | 0           | 0         |
| 12 | Midterm Exercise                                              | 0        | 0           | 0         |
| 13 | Final Project                                                 | 0        | 0           | 0         |
| 14 | Final Exercise                                                | 0        | 0           | 0         |

|    |                            |   |    |            |
|----|----------------------------|---|----|------------|
| 15 | Preparation for Final Exam | 1 | 15 | 15         |
| 16 | Final Exam                 | 1 | 3  | 3          |
|    |                            |   |    | <b>115</b> |