SYLLABUS

<table>
<tr><td colspan="3">Course name: MEC 203 Materials Science</td><td colspan="4">Department: Mechanical Engineering</td></tr>
<tr><td rowspan="2">Year/Semester</td><td colspan="5">Methods of Education</td><td>Credit (ECTS)</td></tr>
<tr><td>Lecture (h/week)</td><td>Quiz (#/semester)</td><td>Project/ Field Study</td><td>Mid-Term Exam</td><td>Final Exam</td><td rowspan="2">5</td></tr>
<tr><td>2021-2022/ Fall Semester</td><td>3</td><td>2</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>Language</td><td colspan="6">English</td></tr>
<tr><td>Compulsory (C) /Elective (E)</td><td colspan="6">C</td></tr>
<tr><td>Prerequisites</td><td colspan="6">None</td></tr>
<tr><td>Course Contents</td><td colspan="6">• Introduction to materials science and engineering.
• Atomic structure and interatomic bonding.
• The structure of crystalline solids.
• Imperfections in solids.
• Mechanical properties of metals.
• Dislocation and strengthening mechanism.
• Failure.
• Properties and applications of metals.
• Phase diagrams.
• Phase transformations.
• Fabrication and processing of metals.</td></tr>
<tr><td>Course Objectives</td><td colspan="6">• Provide basics in materials science and nanotechnology; crystal structures, imperfections in solid structures, mechanical properties of materials, failure mechanism, diagrams, and phase transformations.</td></tr>
<tr><td>Learning Outcomes and Competences</td><td colspan="6">• Compute the relation between properties, micro-structure, and processing of ferrous and non-ferrous materials.
• Demonstrate ability to compose a paper (term project).</td></tr>
<tr><td>Textbook and /or References</td><td colspan="6">Course Book:
• William D. Callister, David G. Rethwisch, Material Science and Engineering, 9th Edition, SI Version, Wiley, 2016.
Other Books:
• James F. Shackelford, Introduction to Materials Science for Engineers, Global Edition, 8/E, Pearson, 2015.
• Donald R. Askeland, The Science and Engineering of Materials, 7th Edition, Cengage Learning, 2015.</td></tr>
<tr><td rowspan="7">Assessment Criteria</td><td colspan="2"></td><td>If any, mark as (X)</td><td colspan="2">Percentage (%)</td></tr>
<tr><td colspan="2">Midterm Exams</td><td>(X)</td><td colspan="2">30</td></tr>
<tr><td colspan="2">Quiz</td><td>(X)</td><td colspan="2">10</td></tr>
<tr><td colspan="2">Homework</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="2">Projects</td><td>(X)</td><td colspan="2">10</td></tr>
<tr><td colspan="2">Laboratory work</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="2">Final Exam</td><td>(X)</td><td colspan="2">50</td></tr>
<tr><td>Instructor</td><td colspan="6">Assist. Prof. Dr. Hande YAVUZ</td></tr>
<tr><td>Week</td><td colspan="6">Subject</td></tr>
<tr><td>1</td><td colspan="6">Introduction to materials science and engineering.</td></tr>
<tr><td>2-3</td><td colspan="6">Atomic structure and interatomic bonding.
The structure of crystalline solids.
Imperfections in solids.</td></tr>
<tr><td>4-6</td><td colspan="6">Mechanical properties of metals: concepts of stress-strain, elastic deformation, plastic deformation, hardness.</td></tr>
<tr><td>7</td><td colspan="6">Dislocation and strengthening mechanism.</td></tr>
<tr><td>8</td><td colspan="6">MT Exam</td></tr>
<tr><td>9-12</td><td colspan="6">Failure: fracture, fatigue, creep.</td></tr>
<tr><td>13</td><td colspan="6">Phase diagrams: Definitions and basic concepts, binary phase diagrams, the iron-carbon system.</td></tr>
<tr><td>14</td><td colspan="6">Phase transformations: Basic concepts, isothermal transformation diagrams, continuous cooling transformation diagrams, mechanical behavior of iron-carbon alloys.</td></tr>
<tr><td>15</td><td colspan="6">Properties and applications of materials.
Materials used in aeronautical field.</td></tr>
<tr><td>16</td><td colspan="6">Final Exam</td></tr>
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