|   | <u> </u>   |  | D 4 4 3 6   | 1 . 1  | -  |   |  |
|---|--|--|---|--|--|---|--|
| Course name: MEC 20   | 3 Materials Scie   | ence   | Department: M   | echanical Engine   | ering  | Creatit   |  |
| Year/Semester   | Methods of Education   |  |   |  |  | (FCTS)  |  |
|   | Lecture Ouiz   |  | Project/  | Mid-Term   | Final Exam   | (EC15)  |  |
|   | (h/week)   | (#/semester)   | Field Study   | Fxam   | Final Exam   |   |  |
| 2021-2022/  | (II/ WEEK)   | ( <i>msemester)</i>  | I lold Study  | Exum   |  | 5   |  |
| Fall Semester   | 3  | 2  | 1   | 1  | 1  |   |  |
|   | English  |  |   | 1  |  |   |  |
| Compulsory (C)  | C  |  |   |  |  |   |  |
| /Elective (E)   | C  |  |   |  |  |   |  |
| Prerequisites   | None   |  |   |  |  |   |  |
| Course Contents   | Introdu  | ction to materials   | science and engin   | neering  |  |   |  |
| Course Contents   | Atomic structure and interatomic bonding   |  |   |  |  |   |  |
|   | The structure of crystalline solids  |  |   |  |  |   |  |
|   | Imperfections in solids  |  |   |  |  |   |  |
|   | Mechai   | <ul> <li>Imperfections in solids.</li> <li>Machanical properties of metals.</li> </ul>   |   |  |  |   |  |
|   | Disloca  | ation and strength   | ning mechanism  |  |  |   |  |
|   | <ul> <li>Dislocation</li> </ul>  | Dislocation and strengthening mechanism.     Dislocation and strengthening mechanism.  |   |  |  |   |  |
|   | Fallule  | • Failure.   |   |  |  |   |  |
|   | • Properties and applications of metals.   |  |   |  |  |   |  |
|   | Phase diagrams.  |  |   |  |  |   |  |
|   | Phase transformations.   |  |   |  |  |   |  |
| Course Objectives   | Fabrica  | tion and processi  | ng of metals.   |  |  |   |  |
|   | • Provide basics in materials science and nanotechnology; crystal structures, imperfections in   |  |   |  |  |   |  |
|   | solid structures, mechanical properties of materials, failure mechanism, diagrams, and phase   |  |   |  |  |   |  |
|   | transfor   | rmations.  |   |  |  |   |  |
| Learning Outcomes   | • Compute the relation between properties, micro-structure, and processing of ferrous and non  |  |   |  |  |   |  |
|   |  | ferrous materials.   |   |  |  |   |  |
| and Competences   | ferrous  | materials.   |   |  |  |   |  |
| and Competences   | ferrous <ul> <li>Demon</li> </ul>  | materials.<br>strate ability to co   | ompose a paper (te  | erm project).  |  |   |  |
| and Competences Textbook and /or  | ferrous <ul> <li>Demon</li> <li>Course Boo</li> </ul>  | materials.<br>strate ability to co<br>k:   | ompose a paper (te  | erm project).  |  |   |  |
| and Competences<br>Textbook and /or<br>References   | ferrous     Demon     Course Boo     Willian   | materials.<br><u>strate ability to co</u><br>k:<br>n D. Callister, Da  | ompose a paper (te<br>vid G. Rethwisch,   | erm project).<br>Material Science  | e and Engineering,   | 9 <sup>th</sup> Edition, SI   |  |
| and Competences<br>Textbook and /or<br>References   | ferrous<br>• Demon<br>Course Boo<br>• William<br>Version   | materials.<br><u>strate ability to co</u><br>k:<br>n D. Callister, Da<br>n, Wiley, 2016.   | ompose a paper (te  | erm project).<br>Material Science  | e and Engineering,   | 9 <sup>th</sup> Edition, SI   |  |
| and Competences<br>Textbook and /or<br>References   | ferrous     Demon     Course Boo     Willian     Version     Other Boo   | materials.<br><u>strate ability to co</u><br>k:<br>n D. Callister, Da<br>n, Wiley, 2016.<br>bks:   | ompose a paper (te  | erm project).<br>Material Science  | e and Engineering,   | 9 <sup>th</sup> Edition, SI   |  |
| and Competences<br>Textbook and /or<br>References   | ferrous     Demon     Course Boo     William     Version     Other Boo     James I   | materials.<br><u>strate ability to co</u><br>k:<br>n D. Callister, Da<br>n, Wiley, 2016.<br>oks:<br>F. Shackelford, In   | ompose a paper (te<br>vid G. Rethwisch,<br>troduction to Mate   | erm project).<br>Material Science<br>erials Science for  | e and Engineering,<br>r Engineers, Global  | 9 <sup>th</sup> Edition, SI<br>Edition, 8/E,  |  |
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| and Competences<br>Textbook and /or<br>References   | ferrous     e Demon     Course Boo     • William     Version     Other Boo     • James I     Pearson     • Donald  | materials.<br>strate ability to co<br>k:<br>n D. Callister, Da<br>n, Wiley, 2016.<br>oks:<br>F. Shackelford, In<br>n, 2015.<br>R. Askeland, The  | ompose a paper (te<br>vid G. Rethwisch,<br>troduction to Mate<br>e Science and Eng  | erm project).<br>Material Science<br>erials Science for<br>ineering of Mate  | e and Engineering,<br>r Engineers, Global<br>rials, 7 <sup>th</sup> Edition, C                 | 9 <sup>th</sup> Edition, SI<br>Edition, 8/E,<br>engage  |  |
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| Assessment Criteria Instructor Week 1 2-3 4 6   | <ul> <li>ferrous</li> <li>Demon</li> <li>Course Boo</li> <li>Willian</li> <li>Version</li> <li>Other Boo</li> <li>James I</li> <li>Pearson</li> <li>Donald</li> <li>Learnin</li> <li>Midterm Ex</li> <li>Quiz</li> <li>Homework</li> <li>Projects</li> <li>Laboratory</li> <li>Final Exam</li> <li>Assist. Prof</li> <li>Subject</li> <li>Introduction</li> <li>Atomic strutting</li> <li>Machanic</li> </ul>  | materials.<br>strate ability to co<br>k:<br>n D. Callister, Da<br>h, Wiley, 2016.<br>oks:<br>F. Shackelford, In<br>h, 2015.<br>R. Askeland, The<br>hg, 2015.<br>tams<br>work<br>Dr. Hande YAV<br>on to materials sci-<br>ucture and interature of crystalline so<br>ons in solids.   | ompose a paper (te<br>vid G. Rethwisch,<br>troduction to Mate<br>e Science and Eng<br>If any, m<br>If any, m<br>UZ<br>UZ<br>ence and engineer<br>omic bonding.<br>olids.  | erm project).<br>Material Science<br>erials Science for<br>ineering of Mate<br>ark as (X)<br>(X)<br>(X)<br>(X)<br>(X)<br>(X)<br>(X)<br>(X)   | e and Engineering,<br>r Engineers, Global<br>rials, 7 <sup>th</sup> Edition, C<br>Percentage ( | 9 <sup>th</sup> Edition, SI<br>Edition, 8/E,<br>Gengage<br>%)<br>30<br>10<br>10<br>50   |  |
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| And Competences  Fextbook and /or References  Assessment Criteria  Instructor Week  1 2-3 4-6 7 8           | <ul> <li>ferrous</li> <li>Demon</li> <li>Course Boo</li> <li>Willian</li> <li>Versior</li> <li>Other Boo</li> <li>James I</li> <li>Pearsor</li> <li>Donald</li> <li>Learnin</li> <li>Midterm Ex</li> <li>Quiz</li> <li>Homework</li> <li>Projects</li> <li>Laboratory</li> <li>Final Exam</li> <li>Assist. Prof</li> <li>Subject</li> <li>Introductio</li> <li>Atomic struth</li> <li>The structue</li> <li>Imperfection</li> <li>Mechanica</li> <li>deformation</li> <li>Dislocation</li> </ul>   | materials.<br>strate ability to co<br>k:<br>n D. Callister, Da<br>h, Wiley, 2016.<br>oks:<br>F. Shackelford, In<br>h, 2015.<br>R. Askeland, The<br>hg, 2015.<br>Common<br>work<br>Dr. Hande YAV<br>on to materials sci-<br>ucture and interat-<br>tre of crystalline so<br>ons in solids.<br>I properties of me<br>n, hardness.<br>n and strengthenir  | ompose a paper (te<br>vid G. Rethwisch,<br>troduction to Mate<br>e Science and Eng<br>If any, m<br>If any, m<br>UZ<br>UZ<br>ence and engineer<br>omic bonding.<br>olids.<br>etals: concepts of s  | erm project).<br>Material Science<br>erials Science for<br>ineering of Mate<br>ark as (X)<br>(X)<br>(X)<br>(X)<br>(X)<br>ing.<br>etress-strain, elast  | e and Engineering,<br>r Engineers, Global<br>rials, 7 <sup>th</sup> Edition, C<br>Percentage ( | 9 <sup>th</sup> Edition, SI<br>Edition, 8/E,<br>lengage<br>%)<br>30<br>10<br>10<br>50   |  |
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