**COURSE SPECIFICATION**

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| This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification. . |

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| College of Engineering/ University of Baghdad | 1. Teaching Institution |
| Chemical Engineering | 2. University Department/Centre |
| Material Science and Corrosion | 3. Course title/code |
| This programme contributes the graduated chemical engineers to get knowledge in the material science and corrosion. | 4. Programme(s) to which it contributes |
| Annual System ; There is only one  mode of delivery, which is a “Day  Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. | 5. Modes of Attendance offered |
| 1st & 2nd / Academic Year 2017 – 2018 | 6. Semester/Year |
| 60 hrs. / 2 hrs. per week | 7. Number of hours tuition (total) |
| 14-10-2017 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| The student will recognize uses of the common engineering alloys and other materials such as polymer, ceramic, etc. by depending on their properties (i.e. mechanical, physical properties, and their reactivity towered the surrounding). He also will know the basic concept of metals degradation (corrosion). | |
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| 10· Learning Outcomes, Teaching ,Learning and Assessment Methods |
| 1. Knowledge and Understanding   A1. Understand the basic of material selection during designing the unit  operation.  A2. Understand the theory of corrosion  A3. Understanding the kinetics of corrosion  A4. Understand methods of metal protection  A5. Studying the basic of polymers.  A6. Studying the basic of ceramic and glass. |
| B. Subject-specific skills  B1. Select proper materials during designing equipments of the unit  operation .  B2. Able to predict the corrosion of metals.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  C. Thinking Skills  C1. Developing critical and creative thinking skills related to corrosion  C2. Using mathematical models.  C3. Analysis assumptions.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  D. General and Transferable Skills (other skills relevant to employability and personal development)  D1. Communitiy effectivity.  D2. Work individually and team members in international and multidicplinary   1. calculate the corrosion rate of the equipment alloys.   teams. |
| Teaching and Learning Methods |
| 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Field Trips. 8. Seminars. 9. Case studies. |
| Assessment methods |
| 1. Examinations, Tests, and Quizzes. 2. Cases studies. 3. Student Engagement during Lectures. 4. Responses Obtained from Students |
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| 11. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| 1 – 4 of article (10) | 1-9 of  article (10) | Introduction to the materials | A1 | 2 theo. | 1 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Types of materials | A1 | 2 theo. | 2 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Atomic Structure | A1 | 2 theo. | 3 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Atomic bonding in solid materials | A1 | 2 theo. | 4 |
| 1 – 4 of article (10) | 1-9 of  article (10) | The structure of crystalline solids | A1 | 2 theo. | 5 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Metals and alloys | A1 | 2 theo. | 6 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Metallic structure and alloying | A1 | 2 theo. | 7 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Crystal defects | A1 | 2 theo. | 8 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Direction in unit cells | A1 | 2 theo. | 9 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Crystal structure analysis | A1 | 2 theo. | 10 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Mechanical properties of materials | A1 | 2 theo. | 11 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Phase diagram | A1 | 2 theo. | 12 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Plain carbon steel | A1 | 2 theo. | 13 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Heat-treatment of steel | A1 | 2 theo. | 14 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Metals processing and joining | A1 | 2 theo. | 15 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Metallic materials | A1 | 2 theo. | 16 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Introduction to the Corrosion of metals | A2 | 2 theo. | 17 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Thermodynamic of corrosion | A2 | 2 theo. | 18 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Types of corrosion | A2 | 2 theo. | 19 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Kinetic of Corrosion Reaction | A4 | 2 theo. | 20 |
| 1 – 4 of article (10) | 1-9 of  article (10) | Methods of corrosion protection | A4 | 2 theo. | 21 |
| 1 – 4 of article (10) | 1-9 of | Polymers | A5 | 2 theo. | 22 |
| 1 – 4 of article (10) | article (10) | Ceramic and Glass | A6 | 2 theo. | 23 |
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| 12. Infrastructure | |
| ***Textboo***  Material Science  ***References***  1. Materials Science and Engineering by William D. Callister.   1. Engineering Metallurgy by Higgins. 2. Mechanical Properties of Metals II. 3. Mechanical Testing and Properties. 4. Principles of corrosion Engineering and Corrosion Control by Zaki Ahmed.   ***Others***  Notebook prepared by the instructor of the course. | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER |
| Available websites related to the subject | Special requirements (include for example workshops, periodicals, IT software, websites) |
|  | Community-based facilities  (include for example, guest  Lectures , internship , field studies) |

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| 13. Admissions | |
|  | Pre-requisites |
| / | Minimum number of students |
| 60 | Maximum number of students |

***Instructor:***

**Asst. teacher. Hassan Abdulkadhim Alwan**

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