**TEMPLATE FOR COURSE SPECIFICATION**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW |

**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 programmer specification. |

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| College of Engineering  University of Baghdad | ***1. Teaching Institution*** |
| Mechanical Engineering Department (MED) | ***2. University Department/Centre*** |
| Eng. Metallurgy / ME205  The course aims to provide an introduction to the field of Physical metallurgy. The course covers crystal structure of metals, equilibrium phase diagrams, transformation diagram, , deformation, recovery, recrystallization, and heat treatment of steel. | ***3. Course title/code & Description*** |
| Mechanical Engineering ( ME ) | ***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  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 2016 – 2017 | ***6. Semester/Year*** |
| 60 hrs. / 2 hrs. per week | ***7. Number of hours tuition (total)*** |
| April – 5 / 2017 | ***8. Date of production/revision of this specification*** |
| ***9. Aims of the Course:*** | |
| 1. The relationship between a metal’s properties and its microscopic structure. 2. Solidification of metallic alloys and the formation of microstructure through various types of phase diagrams. 3. The various types of heat treatment applied to steel.   4-The microstructure and property changes that occur in cold worked and recrystallizations of metals | |

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| ***10·*** ***Learning Outcomes:*** |
| 1. Understand the relation between crystal structure and grain size on the mechanical properties of the metals. 2. Understand the behavior of different alloys solidification and the product microstructure. 3. Student should be able to choose the appropriate heat treatment for the steel. 4. Understand the effect of deformation and recrystallization on the structure and properties of the metals. |
| ***11.*** ***Teaching and Learning Methods*** |
| 1- Lectures.  2- Lab. Experiments.  3-Tests and Exams.  4- In-Class Questions and Discussions.  5- Connection between Theory and Application.  6-Field Trips.  7- Extracurricular Activities.  8-In- and Out-Class oral conservations.  9-Reports and Posters. |
| ***12. Assessment Methods*** |
| 1-Examinations, Tests, and Quizzes.  2- Extracurricular Activities.  3-Student Engagement during Lectures.  4 -Responses Obtained from Students, Questionnaire about  Curriculum and Faculty Member (Instructor). |
| ***13. Grading Policy***  1. Quizzes:  - There will be a ten closed books and notes quizzes during the academic semester. The quizzes will count 10% of the total course grade.  2. Exams:  - There will be two closed books and notes exam during the academic year. The mid-term exam will count 20% of the total course grade.  4. Final Exam:  - The final exam will be comprehensive, closed books and notes,  The final exam will count 70% of the total course grade. |

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| ***14. Course Structure*** | | | | | |
| Assessment  Method | Teaching  Method | Unit/Module or  Topic Title | LOs  (Article  10 ) | Hours | Week |
|  |  | CRYSTAL STRUCTURE OF METALS |  | 2 | 1 |
|  |  | CRYSTAL PLANES AND DIRECTIONS |  | 2 | 2 |
|  |  | SOLIDIFICATION OF METALS AND CRYSTALS FORMATION |  | 2 | 3 |
|  |  | CRYSTAL DEFECTS |  | 2 | 4 |
|  |  | CASTINSG DEFFECTS |  | 2 | 5 |
|  |  | THE FORMATION OF ALLOYS |  | 2 | 6 |
|  |  | COOLING CURVES OFPURE METALS AND ALLOYS |  | 2 | 7 |
|  |  | EQUILIBIRIUM PHASE DIAGRAMS FOR BINARY ALLOYS |  | 2 | 8 |
|  |  | COMPLETE SOLUBILITY AND COMPLETE MISSIBILITY IN SOLID STATE |  | 2 | 9 |
|  |  | PARTIAL SOLUBILITY OF EUTECTIC REACTION |  | 2 | 10 |
|  |  | PARTIAL SOLUBILITY OF PERITECTIC REACTION |  | 2 | 11 |
|  |  | INTERMETALIC COPOUND |  | 2 | 12 |
|  |  | IRON-CARBON PHASE DIAGRAM |  | 2 | 13 |
|  |  | PHYSICAL REACTIONS AND PHASES FORMATION |  | 2 | 14 |
|  |  | MICROSTRUCTURES OF IRON CARBON ALLOYS |  | 2 | 15 |
|  |  | HEAT TREATMENT OF CARBON STEEL: –HOMOGNISING AND FULL ANNEALIING |  | 2 | 16 |
|  |  | NORMALIZING AND SPEAROIDISING |  | 2 | 17 |
|  |  | STRESS RELIEVING |  | 2 | 18 |
|  |  | QUENCH HARDENING AND MARTISITE FORMATION |  | 2 | 19 |
|  |  | TEMPERING OF HARDENED STEEL |  | 2 | 20 |
|  |  | TIME TEPERATURE TRASFORMATION OF THE AUSTENITE |  | 2 | 21 |
|  |  | EFFECT OF VARIABLES ON THE SHAPE AND POSITION OF T.T.T DIAGRAM |  | 2 | 22 |
|  |  | THE AUSTEMPER AND MARTEMPER TREATMENT AND ITS APPLICATIONS |  | 2 | 23 |
|  |  | HARDENABILITY OF STEEL |  | 2 | 24 |
|  |  | DISLOCATIONS AND METALS DEFORMATION |  | 2 | 25 |
|  |  | EFFECT OF DEFORMATION ON SRCTURE AND PROPERIES OF METALS |  | 2 | 26 |
|  |  | RECRYSTALLISATION |  | 2 | 27 |
|  |  | PRESIPITATION HARDENING |  | 2 | 28 |
|  |  | SURFACE HARDENING BY FLAME AND INDUCTION |  | 2 | 29 |
|  |  | CARBURISING AND NITRIDING |  | 2 | 30 |

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| ***15. Infrastructure*** | | |
| Textbook  1-Engineering metallurgy, R. A. HIGGINS (2006 Edition)  2- اسس هندسة المعادن, تاليف كايسر, ترجمة د-شاكر السامرائى, د-قحطان الخزرجى  -3المعاملات الحرارية للمعادن والسبائك الحديدية و اللاحديدية. تاليف د-قحطان الخزرجى - | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | |
| 1-Laboratory experiments in the Metallurgical Lab.) of the department.  2-Available websites related to the subject.  3- Extracurricular activities | Special requirements (include for example workshops, periodicals, IT software, websites) | |
| 1-Field and scientific visits.  2-Extra lectures by guest lecturers. | Community-based facilities  (include for example, guest  Lectures , internship , field studies) | |
| ***16. Admissions*** | | |
| ME 205 | | Pre-requisites |
| ------- | | Minimum number of students |
| 65 | | Maximum number of students |
|  | | ***17. Course Instructors*** |

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