**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 Department | 2. University Department/Centre |
| Computer Applications in Chemical Engineering/CHE | 3. Course title/code |
| Chemical Engineering Department | 4. Programme(s) to which it contributes |
| Annual system. The academic year is composed of 26- week regular subjects. 5-hour each week. | 5. Modes of Attendance offered |
| 1st & 2nd / Academic Year 2017 – 2018 | 6. Semester/Year |
| 130 hrs./ 5hrs. per week | 7. Number of hours tuition (total) |
| 14\10\2017 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| Introducing the student to apply his knowledge in mathematics and numerical methods and learns new methods and techniques to solve chemical engineering problems using MATLAB & HYSYS. These problems covers a wide range of topics that the student takes during his previous and current study level in chemical engineering. | |

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| 10· Learning Outcomes, Teaching ,Learning and Assessment Methods |
| 1. Knowledge and Understanding: By the end of the course the student should be able to   A1- Work in groups and solving different problems.  A2- Understand professional social and ethical responsibilities  A3- Communicate effectively |
| B. Subject-specific skills  B1.Know the importance of computer facilities in most of the chemical engineering problems.  B2.Understand the different concepts.  B3.Select appropriate programs for intended problem.  B4. Identify formulate and solve chemical engineering problems. |
| Teaching and Learning Methods |
| 1. lectures 2. Tutorials 3. Homework 4. Tests and exams 5. In class questions and discussions |
| Assessment methods |
| 1. Examinations, tests and quizzes. 2. Homework's. 3. Student engagement during lectures. |

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| 11. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
| 1-3 | 1-5 | Introduction to Matlab | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 1 |
| 1-3 | 1-5 | Arrays, Arrays transpose operation | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 2 |
| 1-3 | 1-5 | Matrix operations | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 3 |
| 1-3 | 1-5 | Interpolation | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 4 |
| 1-3 | 1-5 | Integration | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 5 |
| 1-3 | 1-5 | Function Discovery | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 6 |
| 1-3 | 1-5 | MATLAB m-files | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 7 |
| 1-3 | 1-5 | Solution of equation of state: I | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 8 |
| 1-3 | 1-5 | Solution of equation of state II | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 9 |
| 1-3 | 1-5 | Activity coefficients models:I | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 10 |
| 1-3 | 1-5 | Activity coefficients models:II | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 11 |
| 1-3 | 1-5 | Flash vaporization I | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 12 |
| 1-3 | 1-5 | Flash vaporization II | A1-A2-A3-B1-B2-B4-B3 | 5  2 theo.  3 tut. | 13 |
| 1-3 | 1-5 | chemical process with recycle streams: part I | A1-A2-A3-B1-B2-B4-B3 | 5  2 theo.  3 tut. | 14 |
| 1-3 | 1-5 | chemical process with recycle streams: part I | A1-A2-A3-B1-B2-B4-B3 | 5  2 theo.  3 tut. | 15 |
| 1-3 | 1-5 | Calculation of the adiabatic flame temperature: Part I | A1-A2-A3-B1-B2-B4-B3 | 5  2 theo.  3 tut. | 16 |
| 1-3 | 1-5 | Calculation of the adiabatic flame temperature: Part II | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 17 |
| 1-3 | 1-5 | Calculation of the adiabatic flame temperature: Part III | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 18 |
| 1-3 | 1-5 | Reactor design | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 19 |
| 1-3 | 1-5 | Symbolic processing with MATLAB, | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 20 |
| 1-3 | 1-5 |  | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 21 |
| 1-3 | 1-5 | Transport Processes in One Dimension | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 22 |
| 1-3 | 1-5 | **Hysys**: Introduction, Start with HYSYS, Components, Fluid package, Streams, Material stream, Energy stream, Simulation tools, Utilities, boiling point curve, critical properties, tray sizing, Hydrate formation, Equation of state. | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 23 |
| 1-3 | 1-5 | Heat transfer Equipment, Cooler/Heater, Heat Exchanger, Pipe Equipment, Mixer, Pipe Segment, Tee, Valve, Relief Valve. | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 24 |
| 1-3 | 1-5 | Rotating Equipment, Compressor, Turbine, Pump, Separation, Operation, flash separator, Examples on separation process, Reactors, conversion reactors, Equilibrium reactor. | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 25 |
| 1-3 | 1-5 | Examples on the reactors, plug flow reactor, Columns, tray column, packed column, Absorption, Distillation Tower, Dynamic State, Control process, Applications of Hysys, Gas Processing, Biodiesel plant, Process of Ammonia, Crude Oil Refinery, Removal of Propane, Ethylene oxidation. | A1-A2-A3-B1-B2-B4 | 5  2 theo.  3 tut. | 26 |

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| 12. Infrastructure | |
| References:   1. MATLAB, Programming Fundamentals, The MathWorks, Inc, 2015. 2. INTRODUCTION TO MATLAB FOR   ENGINEERING STUDENTS, Northwestern University, 2005.   1. INTRODUCTION TO MATLAB, the School of Mathematics and Statistics,2015 | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER |
| 1. Available websites related to the subject. 2. Excel or similar software for the solution of lengthy problems. | Special requirements (include for example workshops, periodicals, IT software, websites) |
| 1. Field and scientific visits. 2. Extra lectures by foreign guest lecturers. | Community-based facilities  (include for example, guest  Lectures , internship , field studies) |

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

Lecturer: Dr. Mahmood Khazzal Hummadi

Chemical Engineering Department

College of Engineering

University of Baghdad