**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 program specification. |

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| College of Engineering  University of Baghdad | 1. Teaching Institution |
| Chemical Engineering Department(CHED) | 2. University Department/Centre |
| Mathematics/CHE221 | 3. Course title/code |
| Chemical Engineering Department(CHED) | 4. Program (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. Each graduating student has to successfully complete 151 credits . Each subject credit is one 50-minute lecture a week or 3-hour lab a week . There is no on-line subject which may be used as supplementary material for the class room instructions. | 5. Modes of Attendance offered |
| 1st & 2nd Semesters/Academic Year 2017-2018 | 6. Semester/Year |
| 120hrs./4hrs. per week | 7. Number of hours tuition (total) |
| October-10/2017 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| 1.To develop an understanding of the mathematical treatment and methodology. | |
| 2.To present the basic solution of differential equations and to apply these equations to practical problems and process. | |
| 3.To build the capacity in the mathematical modeling. | |
| 4.To develop an understanding of the practical processes of chemical engineering. | |

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| 10· Learning Outcomes, Teaching ,Learning and Assessment Method |
| 1. Knowledge and Understanding. By the end of the course, the student should be able to :   A1.Work in groups and function on solving different problems.  A2.Understand professional , social and ethical responsibilities.  A3.Communicate effectively. |
| B. Subject-specific skills  B1. Know the importance of mathematics in most of the chemical engineering problems.  B2.Recognize the analogy between Cartesian and polar coordinates systems.  B3.Understand the vectors and their applications in modern mathematics.  B4.Be familiar with 3-dimension mathematics.  B5. Understand the differentiation concepts.  B6 .Understand double and triple integrals and be able to extend them to higher integrals.  B7.Know series and their important applications in solving mathematical problems.  B8.Select appropriate technique for intended problem.  B9.Identify various types of equations and their particular solution.  B10.Understand finite differences and their applications in interpolation and extrapolation.  B11.Identify , formulate and solve chemical engineering problems.  B12.Use the techniques , skills and modern mathematical tools necessary for engineering practice in chemical engineering applications.  B13.Be familiar with the differential equations and able to use the relevant equations in solving the problems. |
| 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 |
| Assessment methods |
| 1.Examinations,Tests and Quizzes.  2.Homeworks.  3.Student engagement during lectures. |

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| 11. Course Structure | | | | | | |
| Assessment Method (Article 12) | Teaching  Method (Article 11) | Unit/Module or Topic Title | ILOs (Article l0) | Hours | Week | |
| 1-3 | 1-6 | Polar Coordinate | A1,A3,B1,B2,B8,B9,B12 | 4  2 theo.  2 tut. | 1 | |
| 1-3 | 1-6 | Polar Coordinate | A1,A3,B1,B2,B8,B9,B12 | 4  2 theo.  2 tut. | 2 | |
| 1-3 | 1-6 | Vectors | A1,A3,B1,B2,B8,B9,B12 | 4  2 theo.  2 tut. | 3 | |
| 1-3 | 1-6 | Vectors | A1,A3,B1,B2,B8,B9,B12 | 4  2 theo.  2 tut. | 4 | |
| 1-3 | 1-6 | Lines and Planes in 3-Space | A1,A3,B1,B4,B8,B9 | 4  2 theo.  2 tut. | 5 | |
| 1-3 | 1-6 | Lines and Planes in 3-Space | A1,A3,B1,B4,B8,B9 | 4  2 theo.  2 tut. | 6 | |
| 1-3 | 1-6 | Partial Derivatives | A1,A3,B1,B3,B4,B5,B8,B9, B11 | 4  2 theo.  2 tut. | 7 | |
| 1-3 | 1-6 | Partial Derivatives | A1,A3,B1,B3,B4,B5,B8,B9, B11 | 4  2 theo.  2 tut. | 8 | |
| 1-3 | 1-6 | Partial Derivatives | A1,A3,B1,B3,B4,B5,B8,B9, B11 | 4  2 theo.  2 tut. | 9 | |
| 1-3 | 1-6 | Partial Derivatives | A1,A3,B1,B3,B4,B5,B8,B9, B11 | 4  2 theo.  2 tut. | 10 | |
| 1-3 | 1-6 | Multiple Integrals | A1,A3,B1,B2,B4,B6,B8,B9, B11,B12 | 4  2 theo.  2 tut. | 11 | |
| 1-3 | 1-6 | Multiple Integrals | A1,A3,B1,B2,B4,B6,B8,B9, B11,B12 | 4  2 theo.  2 tut. | 12 | |
| 1-3 | 1-6 | Multiple Integrals | A1,A3,B1,B2,B4,B6,B8,B9, B11,B12 | 4  2 theo.  2 tut. | 13 | |
| 1-3 | 1-6 | Multiple Integrals | A1,A3,B1,B2,B4,B6,B8,B9, B11,B12 | 4  2 theo.  2 tut. | 14 | |
| 1-3 | 1-6 | Changing Double Integrals to Polar Coordinates | A1,A3,B1,B2,B4,B6,B8,B9,B11,B12 | 4  2 theo.  2 tut. | 15 | |
| 1-3 | 1-6 | Changing Double Integrals to Polar Coordinates | A1,A3,B1,B2,B4,B6,B8,B9, B11,B12 | 4  2 theo.  2 tut. | 16 | |
| 1-3 | 1-6 | Series | A1,A2,A3,B1,B5,B7,B8,B9, B12 | 4  2 theo.  2 tut. | 17 | |
| 1-3 | 1-6 | Series | A1,A2,A3,B1,B5,B7,B8,B9, B12 | 4  2 theo.  2 tut. | 18 | |
| 1-3 | 1-6 | Series | A1,A2,A3,B1,B5,B7,B8,B9, B12 | 4  2 theo.  2 tut. | 19 | |
| 1-3 | 1-6 | Series | A1,A2,A3,B1,B5,B7,B8,B9, B12 | 4  2 theo.  2 tut. | 20 | |
| 1-3 | 1-6 | Series | A1,A2,A3,B1,B5,B7,B8,B9, B12 | 4  2 theo.  2 tut. | 21 | |
| 1-3 | 1-6 | Second-Order ODE | A1,A2,A3,B1,B5,B7,B8,B9, B11,B12,B13 | 4  2 theo.  2 tut. | 22 | |
| 1-3 | 1-6 | Second-Order ODE | A1,A2,A3,B1,B5,B7,B8,B9, B11,B12,B13 | 4  2 theo.  2 tut. | 23 | |
| 1-3 | 1-6 | Second-Order ODE | A1,A2,A3,B1,B5,B7,B8,B9, B11,B12,B13 | 4  2 theo.  2 tut. | 24 | |
| 1-3 | 1-6 | Second-Order ODE | A1,A2,A3,B1,B5,B7,B8,B9, B11,B12,B13 | 4  2 theo.  2 tut. | 25 | |
| 1-3 | 1-6 | Second-Order ODE | A1,A2,A3,B1,B5,B7,B8,B9, B11,B12,B13 | 4  2 theo.  2 tut. | 26 | |
| 1-3 | 1-6 | Second-Order ODE | A1,A2,A3,B1,B5,B7,B8,B9, B11,B12,B13 | 4  2 theo.  2 tut. | 27 | |
| 1-3 | 1-6 | Second-Order ODE | A1,A2,A3,B1,B5,B7,B8,B9, B11,B12,B13 | 4  2 theo.  2 tut. | 28 | |
| 1-3 | 1-6 | Finite Differences | A1,A2,A3,B1,B8,B9,B10,B11,B12 | 4  2 theo.  2 tut. | 29 | |
| 1-3 | 1-6 | Finite Differences | A1,A2,A3,B1,B8,B9,B10,B11,B12 | 4  2 theo.  2 tut. | 30 | |

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| 12. Infrastructure | |
| Text Books:  1.Calculus , G.B. Thomas , Eleventh Edition , Pearson , 2005.  2.Calculus , R.A. Adams and C. Essex , Seventh Edition , Pearson , 2010.  References:  3.Fundamentals of differential Equations , R. K. Nagle , E. B. Saff and A. D. Snider , Seventh Edition , Pearson , 2008.  4. التحليلات الهندسية في الهندسة الكيمياوية , د. عادل احمد عوض و د. ودود طاهر محمد , الطبعة الاولى ,الدار العربية للطباعة والنشر, 2014.  Others:  .Notebook prepared by the instructor of the course.  .Collection of sheets of solved and unsolved problems and Exams sheets | 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 | |
| CE221 , CE121 | Pre-requisites |
| - | Minimum number of students |
| 40 | Maximum number of students |
| 14. Course Instructors | |
| **Hassanain Abbas Hassan**  Assistant Lecturer  Chemical Engineering Department  College of Engineering  University of Baghdad | |