**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 EngineeringUniversity of Baghdad | 1. Teaching Institution |
| Electrical Department (COED) | 2. University Department/Centre |
| Mathematics II  | 3. Course title/code |
| Electrical Engineering ( COE ) | 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 2016 – 2017 | 6. Semester/Year |
| 120 hrs. / 4 hrs. per week . | 7. Number of hours tuition (total) |
| March –4 / 2017 | 8. Date of production/revision of this specification |
| 9. Aims of the Course: As a brief description for the Goals and objectives, by the completion of the course the goals are: |

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| 1. How to relate the skills and concepts learned from mathematics I to understand Mathematics II
2. How to use the learned skills to understand, derive, and solve the equations in various objects (e.g. electrical circuits II , Engineering Analysis, electronics II, Electronics II, etc)
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| 1. Representation of an Introduction to advanced calculus.
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| 10· Learning Outcomes, Teaching ,Learning and Assessment Methode |
| 1. Knowledge and Understanding
2. A1.Writing Vectors in plane and space, and performing Dot and Cross product on it
3. Drawing 3-D Surface.
4. Knowing what are the equations for the path, velocity and acceleration of a moving object (e.g. projectiles) as a vector function of time.
5. The Limit and continuity of functions with several variables and their derivatives, and how to find their extreme values.
6. How to change a function written in Cartesian coordinates into cylindrical and coordinates
7. How to integrate functions with two variables over a plane (in Cartesian and polar form), and functions with three variables over a region in space, both in Cartesian, cylindrical and spherical coordinates.
8. Partial differentiation for functions of more than one variable using chain rule diagram
9. Integrating in vector fields, to find the work done by a force field using line integral, the rate that a fluid flows a cross a surface using surface integral, and how to relate the conservative force field and Green's theorem to simplify those integrals.
10. Techniques for solving first order (linear or non-linear) differential equations, how to solve second and higher order (homogenous and non-homogenous) differential equations for determined and undetermined coefficients.
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|  B. Subject-specific skillsB1.How to related the skills and concepts learned from mathematic I to understand Mathematic c II B2.How to use the learned skills to understand ,derived, and solve the equations in various objects(e.g. electrical circuitsII,EngineeringAnalysis,etc)B3.Repesentation of an introduction to advanced calculus. |
|  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. Extracurricular Activities.
9. Seminars.
10. In- and Out-Class oral conservations.
11. Reports,Presetations,and Posters.
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|  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) |
| C. Thinking Skills C1.An ability to read and comprehend mathematical literature at an appropriate levelC2.An ability both to follow and correctly to construct mathematical proofs of appropriatedegrees of complexity.C3.An appreciation of the importance of proof,ggeneralization and abstraction in the logical development of formal theories.C4.  |
|  Teaching and Learning Methods  |
| 1-Lectures.2- Tutorials.3- Homework and Assignments.4- Tests and Exams |
|  Assessment methods |
| 1. Examinations, Tests, and Quizzes.2. Extracurricular Activities.3. Student Engagement during Lectures.4. Responses Obtained from Students, Questionnaire aboutCurriculum and Faculty Member ( Instructor ) |

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| D. General and Transferable Skills (other skills relevant to employability and personal development) D1. Relying on online lectures using data show.D2.Making the lecture more interactive by inclusion techniques. |

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| 11. Course Structure |
| Assessment Method | TeachingMethod | Unit/Module or Topic Title | ILOs | Hours | Week |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Vectors in plane and space in Cartesian coordinates | Item 1,2 of section 10 | 3 the.1 tut. | 1 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Dot and cross product, lines and planes in space | From 1 to 3 section 10 | 3 the.1 tut. | 2 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Quadric and cylindrical surfaces, cylindrical and spherical coordinates | From 1 to 3 section 10 | 3 the.1 tut. | 3 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Vector valued functions and curves in space, modeling of a projectile motion | From 1 to 3 section 10 | 3 the.1 tut. | 4 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Arc length and the unit tangent vector T, curvature | From 1 to 3 section 10 | 3 the.1 tut. | 5 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Torsion and TNB frame | From 1 to 3 section 10 | 3 the.1 tut. | 6 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Functions of several variables, Limits and continuity | Item 4,5 of section 10 | 3 the.1 tut. | 7 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Partial derivatives, differentiability | Item 7 of section 10 | 3 the.1 tut. | 8 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Chain Rule | Item 7 of section 10 | 3 the.1 tut. | 9 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | First Tem Exam | Item 1 to 5& 7 of section 10 | 3 the.1 tut. | 10 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Partial derivatives with constrained variables, Directional derivatives | Item 7 of section 10 | 3 the.1 tut. | 11 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Gradient vectors, extreme values and saddle points | Item 7 of section 10 | 3 the.1 tut. | 12 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Lagrange multipliers | Item 6,7 of section 10 | 3 the.1 tut. | 13 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Double integration, Areas | Item 5 of section 10 | 3 the.1 tut. | 14 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Double integration in polar coordinates, triple Integration in Cartesian coordinates | Item 5,6,8 of section 10 | 3 the.1 tut. | 15 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Triple integration in cylindrical and spherical coordinates | Item 5,6,8 of section 10 | 3 the.1 tut. | 16 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Line integrals, Vector fields, work | Item 5,6,8 of section 10 | 3 the.1 tut. | 17 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Circulation, Flux | Item 5,6,8 of section 10 | 3 the.1 tut. | 18 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Path Independence, Potential functions | Item 5,6,8 of section 10 | 3 the.1 tut. | 19 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Conservative fields, Green's theorem | Item 5,6,8 of section 10 | 3 the.1 tut. | 20 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Second Term Exam | Item 5,6 & 8 of section 10 | 3 the.1 tut. | 21 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Surface area and surface Integrals, Parameterized surfaces | Item 6,8 of section 10 | 3 the.1 tut. | 22 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Stoke's theorem, Divergence Theorem | Item 6,8 of section 10 | 3 the.1 tut. | 23 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | First order differential equations, variable separable, homogeneous, linear differential equation, exact | Item 9 of section 10 | 3 the.1 tut. | 24 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Second order differential equations, homogenous, non-homogenous with constant coefficients | Item 9 of section 10 | 3 the.1 tut. | 25 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Euler-Cauchy differential equations | Item 6 of section 10 | 3 the.1 tut. | 26 |
| From 1 to 4 of section 12 | From 1 to 12 of section 11 | Reduction order | Item 9 of section 10 | 3 the.1 tut. | 27 |

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| 12. Infrastructure |
| 1. Thomas Calculus, George B.Thomas, 11th Edition, 2005, Pearson Education Inc.

2-CALCULUSWilliam L.Brigges Lyle CochranInternational Edition 20113-Thoma's CALCULUSGeorg B. Thoma's Maurice D.WeirGlobal Edition 2010.4-MathmaticsFor Elementary Teachers Eight Edition 2008 5- CALCULUSEarly TranscedentalFunctions Third Edition 2007 6-Thoma's CALCULUSInternational Edition 2005Eleventh Edition.7-CALCULUSHowardAnton /IRL BIVENS/STEPHEN DAVISSeventh Edition 2002.8-Calculus, Robert T. Smith& Ronald B. Minton, 3rd edition, 2007, McGraw-Hill.9-Fundamentals of differential equations, R. Kent Nagle& Edward B. Saff, 7th Edition, 2008, Pearson Education Inc. | Required reading:· CORE TEXTS· COURSE MATERIALS· OTHER |
| Periodicals | Special requirements (include for example workshops, periodicals, IT software, websites) |
|  / | Community-based facilities(include for example, guestLectures , internship, field studies) |
| ***16. Admissions*** |
| Math I | Pre-requisites |
| / | Minimum number of students |
| 90 | Maximum number of students |