**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 |
| Environmental Engineering Department | 2. University Department/Centre |
| Engineering Analysis | 3. Course title/code |
| Environmental Engineering Department | 4. Programme(s) to which it contributes |
| Course 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 |
| year | 6. Semester/Year |
| 90 hr/3 hrs per week | 7. Number of hours tuition (total) |
| March 1 sun, 2015 | 8. Date of production/revision of this specification |
| 9. Aims of the Course | |
| -Recognize the general mathematical and/or the physical significance of differential equations.  -Classify the differential equations according to type, order, degree, and linearity.  -Categorize 1st and/or 2nd order ordinary differential equations according to method of solution. Practice various methods of solutions.  -Formulate and solve 1st and/or 2nd order ordinary differential equations related to engineering applications with examples from fluid mechanics, heat and/or mass transfer in addition to microbiology and chemical kinetics.  -Recognize some important mathematical functions and their significance.  - Recognize partial differential equations and learn a method of solution. | |
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| 10· Learning Outcomes, Teaching ,Learning and Assessment Methode |
| 1. Knowledge and Understanding   A1.  A2.  A3.  A4.  A5.  A6 . |
| B. Subject-specific skills  B1.  B2.  B3. |
| Teaching and Learning Methods |
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| Assessment methods |
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| C. Thinking Skills  C1.  C2.  C3.  C4. |
| Teaching and Learning Methods |
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| Assessment methods |
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| D. General and Transferable Skills (other skills relevant to employability and personal development)  D1.  D2.  D3.  D4. |

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| 11. Course Structure | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | ILOs | Hours | Week |
|  |  | Introduction to differential equations. |  | 2 (Theo.) +1 (Tutorial | **1** |
|  |  | Classification of differential equations. |  | 2 (Theo.) +1 (Tutor | **2** |
|  |  | Solution approach to ordinary differential equations. |  | 2 (Theo.) +1 (Tutor | **3** |
|  |  | Categorization of first order differential equations. |  | 2 (Theo.) +1 (Tutor | **4** |
|  |  | Solution methods of a first order differential equations. |  | 2 (Theo.) +1 (Tutor | **5** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **6** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **7** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **8** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **9** |
|  |  | Special types of second order differential equations reducible to first order ones |  | 2 (Theo.) +1 (Tutor | **10** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **11** |
|  |  | Formulation and engineering applications of ordinary first order differential equations. |  | 2 (Theo.) +1 (Tutor | **12** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **13** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **14** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **15** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **16** |
|  |  | Categorization of second order differential equations. |  | 2 (Theo.) +1 (Tutor | **17** |
|  |  | Linear second order differential equations. |  | 2 (Theo.) +1 (Tutor | **18** |
|  |  | Solution of homogenous second order differential equations. |  | 2 (Theo.) +1 (Tutor | **19** |
|  |  | Solution of non-homogenous second order differential equations. |  | 2 (Theo.) +1 (Tutor | **20** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **21** |
|  |  | Laplace transformations and applications to solution of differential equations. |  | 2 (Theo.) +1 (Tutor | **22** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **23** |
|  |  | Formulation and engineering applications of ordinary second order differential equations. |  | 2 (Theo.) +1 (Tutor | **24** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **25** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **26** |
|  |  | D-operator and solution of simultaneous differential equations. |  | 2 (Theo.) +1 (Tutor | **27** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **28** |
|  |  | Series solution of ordinary differential equations. |  | 2 (Theo.) +1 (Tutor | **29** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **30** |
|  |  | Introduction to partial differential equations and their solution |  | 2 (Theo.) +1 (Tutor | **31** |
|  |  | **=** |  | 2 (Theo.) +1 (Tutor | **32** |

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| 12. Infrastructure | |
| 1. Elementary Differential equations ; 6th edition ; by C.Henry Edwards & David E.Perrey ; Pearson-Prentice Hall, 2008 2. Differential Equations ; 3rd. Ed.; Goode & Annin ; Pearson , 2007. 3. Advanced Engineering Mathematics; 5th Ed.; Wylie & Barrett ; McGraw-Hill , 1982 | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER |
|  | 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 |
| 25 | Maximum number of students |