1. **Basic Information:**

|  |  |
| --- | --- |
| **Program Title** | Civil Engineering |
| **Department Offering the Program** | Civil Engineering |
| **Department Responsible for the Course** | Basic Science and Engineering |
| **Course Title** | Mathematics 3 |
| **Course Code** | MTH 201 |
| **Year/Level** | Level: 2 |
| **Specialization** | Major |
| **Authorization Date of Course Specification** | - |

|  |  |  |  |
| --- | --- | --- | --- |
| **Teaching hours** | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. **Course Aims:**

|  |  |
| --- | --- |
| **No.** | **Aims** |
| 1 | Apply knowledge of concepts ordinary differential equations and multivariable calculus to solve engineering problems to analysis engineering systems |

1. **Intended Learning Outcomes (ILO’S):**
2. **Knowledge and understanding:**

|  |  |
| --- | --- |
| **No.** | **Knowledge and understanding** |
| A1 | Define concepts and theories of ordinary differential equations and multivariable calculus necessary for engineering system analysis |

1. **Intellectual Skills:**

|  |  |
| --- | --- |
| **No.** | **Intellectual Skills** |
| B1 | Select appropriate mathematical and computer-based methods for system modelling |

1. **Professional Skills:**

|  |  |
| --- | --- |
| **No.** | **Professional Skills** |
| C1 | Apply knowledge of mathematics, to solve engineering problems. |

1. **General Skills:**

|  |  |
| --- | --- |
| **No.** | **General Skills** |
| D2 | Work in stressful environment and within constraints. |

**4. Course Contents:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **Lecture**s | **Tutorial** | **Practical** |
| * Basic concepts Formation of the   differential equations   * Separable differential equations | **4** | **4** | **-** |
| * Homogenous differential equations | **4** | **4** | **-** |
| * Exact differential equation * linear differential equation | **4** | **4** | **-** |
| * Bernoulli’s equation   the linear differential operator | **2** | **2** | **-** |
| * Second order homogeneous differential equations with constant coefficients * Non-homogeneous linear differential equations | **4** | **4** | **-** |
| * Convergence of la-place transform * Important properties of la-place transform * Laplace transform of derivatives * Inverse la-place transform | **4** | **4** | **-** |
| * Functions of several variables * Limits of functions of several variables. * Continuity in multivariable functions | **4** | **4** | **-** |
| * Partial derivatives of higher order   extreme for functions of two variables | **2** | **2** | **-** |
| * Double integral * Triple integral Line integral in space, Green’s theorem | **2** | **2** | **-** |
| Total | **28** | **28** | **0** |

**5. Teaching and learning methods:**

|  |  |
| --- | --- |
| **No.** | **Teaching Methods** |
| 1 | Lectures |
| 2 | Discussion sessions |
| 3 | Information collection from different sources |
| 4 | Research assignment |

**6. Teaching and learning methods for disable students:**

|  |  |  |
| --- | --- | --- |
| **No.** | **Teaching Methods** | **Reason** |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

7**. Student evaluation:**

**7.1 Student evaluation method**:

|  |  |  |
| --- | --- | --- |
| **No.** | **Evaluation Method** | **ILO’s** |
| 1 | Midterm examination | A1,B1 |
| 2 | Semester work | C1, D2 |
| 3 | Final term examination | A1,B1,C1 |

**7.2 Evaluation Schedule:**

|  |  |  |
| --- | --- | --- |
| **No.** | **Evaluation Method** | **Weeks** |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 14th |
| 3 | Final term examination | 15th |

**7.3 weighting of Evaluation:**

|  |  |  |
| --- | --- | --- |
| **No.** | **evaluation method** | **Weights** |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 4 | Final term examination | 60% |

**8. List of References:**

|  |  |
| --- | --- |
| **No.** | **Reference List** |
| 1 | Peter V.O.Neil, Advanced Engineering Mathematics, Chirrs Carson Publishing, UK, 2007. |
| 2 | Swokowski, E , Olinick ,M and Pence, D., Calculus, PWS Publishing Company - Boston, 1994. |
| 3 | Mary Attenborough, Engineering Mathematics, McGraw - HILL Book Company Europe, 1994. |

**9. Facilities required for teaching and learning:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Facility** | | | |
| 1 | Lecture classroom | 3 | White board |
| 2 | Seminar | 4 | Data Show system |

**10. Matrix of knowledge and skills of the course:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Topic** | **Aims** | **Knowledge and understanding** | **Intellectual Skills** | **Professional Skills** | **General Skills** |
| 1 | **Partial differentiation applications**: maximum and minimum values in more than one variable – directional analysis - the directional differential effects - the multi integrations and its applications (the curved and the orthogonal axis) – Gauss- Stokes theory - the endless series and function expansion – basic concepts for the convergence and divergence | 1 | A1 | B1 | C1 | D2 |
| 2 | **Ordinary differential equations:** The first order (the equations which can be separated, homogeneous, exact and linear) - the ordinary differential equations from the second order and higher orders (with constant and variable coefficients), systems from the ordinary differential equations– Laplace transfer and its applications in the solution of differential equations | 1 | A1 | B1 | C1 | D2 |

**Course Coordinator: Dr. Ibrahim El shamy**

**Head of Department: Prof.Dr.Mohammed Saad Elkady**

**Date of Approval:**