## COURSE SPECIFICATION

### 1- Course Data

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|---|---|
| **Course Title** | Engineering Mathematics (4)          Code: EMP 202 |
| **Academic year / Semester** | 2014 / 2015, Second semester |
| **Program on which the course is given** | Energy and Sustainable Energy |
| **Major or Minor element of program** | Major |
| **Prerequisites** | EMP 201 |
| **Credit hours** | 3 |
| **Contact hours per week** | Lecture: 2 Hours          Tutorials: 2 Hours |

### 2- Course Aims

- To provide the students essential information and fundamentals of Differential Equation and Numerical Analysis and their applications in engineering.
- To apply mathematical techniques for modeling, solving and analyzing real problems.

### 3- Intended Learning Outcome (ILOs)

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|---|---|
| **a- Knowledge and understanding** | a1- Identify theories and fundamentals of mathematics.<br>a2- Define mathematical methods for solving problems.<br>a3- Outline mathematical techniques for modeling real problems. |
| **b- Intellectual Skills** | b1- Analyze mathematical problems and categorize them.<br>b2- Solve practical problems using mathematical methods.<br>b3- Make mathematical models to real problems in the light of available data and information. |
| **c- Professional and Practical Skills** | c1- Apply mathematical logic and techniques for solving real life problems<br>c2- Diagnose solutions to real life problems.<br>c3- Prepare professional reports via mathematical logic. |
| **d- General and Transferable Skills** | d1- Communicate effectively using different means.<br>d2- Use information technology for obtaining information.<br>d3- Work in a group and lead a team.<br>d4- Manage time effectively and conduct self learning . |

### 4- Contents

| Topic | No. of Lectures |
|---|---|
| **First order ordinary Differential Equations**, Separable equations, Exact equations. | 1 |
| Homogenous equations, Linear equations, Orthogonal trajectories. | 1 |
| Higher order equations, D-Operator method, Variation of parameters method | 2 |
| System of differential equations | 1 |
| Laplace Transformations | 1 |
| Inverse Laplace Transformations | 1 |
| Solving differential equations by Laplace transformations | 1 |
| Numerical analysis, Curve fitting, Interpolation. | 1 |

| Numerical integration and differentiation | 1 |
|---|---|
| Numerical methods for solving differential equations | 1 |
| Introduction to statistics and probability | 2 |
| Software applications: Excel-SPSS | 1 |

**5- Teaching and Learning Methods for Students with Special Needs**
    White board, Prepared notes, Data Show.

## 6- Learning and Teaching Activities

| Tools | Intended Learning Outcomes Achieved |
|---|---|
| Interactive Lectures | ILOs:  a1, a2, a3, b1, b2, b3, c1, c2, c3. |
| Tutorials | ILOs:  b1, b2, b3, c1, c2, c3. |
| Assignments and Homework | ILOs:  d1, d2, d3, d4. |

## 7- Student Assessment

▪ **Assessment Strategy**

| Tools | Intended Learning Outcomes Achieved |
|---|---|
| Quizzes | ILOs: a1, a2, b1, b2, c1, c2. |
| Written Exams | ILOs: a1, a2, a3, b1, b2, b3, c1, c2, c3. |
| Assignments and Homework | ILOs: d1, d2, d3, d4. |

▪ **Assessment Details**

| Methods of Assessment | Grading Mode | Weighting % | Minimum Pass Mark | Outline Details |
|---|---|---|---|---|
| Quizzes | 5 | 5 % | | Weeks:  4, 10 |
| Assignments | 5 | 5 % | | Weeks:  3, 5, 11, 13 |
| Mid-Term Exam | 50 | 50 % | | Weeks: 7,  8:     1  hour |
| Final Exam | 40 | 40 % | | Week 15:  2  hours |

## 8- List of References

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|---|---|
| a-  Course Notes | • Lectures In Mathematic, Differential Calculus, Mohamed H. Eid, Benha Univeristy, 2011.<br>• Numerical Analysis, Fathi Abdsallam, 2013. |
| b-  Required Books (text books) | • Advanced Engineering Mathematics, E. Kreyszig, John Wiley and Sons, Inc., New York, 2006. |
| c-  Recommended Books | • Numerical Methods For Engineers and Scientists, 2nd Edition, Joe, D. Hoffman, Marcel Dekker, Inc., New York, 2001.<br>• Advanced Calculus With Applications In Statistics, 2nd Edition, A.I. Khuri, John Wiley and Sons, Inc., New Jersey, 2003. |
| d-  Periodicals, web sites**,…** | www.intmath.com<br>www.dekker.com |

Course Instructor:    Dr. Mohamed Husien Eid        Date:  10 / 2 / 2015
 Head of Department: