1. **Basic Information**

**Course Title**: Modern Topics in Engineering Mathematics and Computers **Code**: **EMM 705 Units: 3**

**Lecture**: 3 **Tutorial**: - **Practical**: - **Total:** 3

**Program on which the course is given:**  Doctor of Philosophy in Engineering Mathematics

**Major or minor element of program:** Major

**Department offering the program:** Department of Engineering Mathematics and Physics

**Department offering the course:** Department of Engineering Mathematics and Physics

**Academic year / level:** Academic year2014 / 2015 Second Semester

**Date of specifications approval:**  December 2015

1. **Professional Information**
2. **Overall aims of course**

By the end of the course the students will be able to:

* Understand the finite element theory and be able to apply it to practical problems
* Apply finite method to heat conduction problems (1D, 2D, 3D and axi-symmetric)

1. **Intended Learning outcomes of Course (ILOs)**
2. **Knowledge and Understanding**

2.1.1 Identify theories, fundamentals of engineering mathematics and Computers.

1. **Intellectual Skills**

2.2.2 Solve problems based on discrete mathematics.

2.2.3 Use research studies related to formal logic notation and proof methods.

2.2.6 Apply for performance to develop the applications which based on discrete mathematics studies

1. **Professional and Practical Skills**

2.3.1 Apply professional skills in using discrete mathematics.

2.3.2 Write professional reports about applications of computer science branch

1. **General and Transferable Skills**

2.4.1 Communicate effectively with continuous researches to the topics related with the subject

2.4.5 Use formal logic notation, proof methods; induction, well-ordering related to applications in our life.

2.4.7 Manage scientific meetings and time effectively including exchange of knowledge and self learning,

1. **Contents**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Topic** | **No. of hours** | **Teaching / learning methods and strategies** | **Assessment method** |
| 1 | Finite element method: Introduction – 1D linear and quadratic elements | 3 | Lectures |  |
| 2 | 2D linear and quadratic triangular element – 2D quadrilateral element | 3 | Lectures |  |
| 3 | Iso-parametric element – 3D element | 3 | Lectures |  |
| 4 | Formulation of the heat conduction equation using Galerkin method | 3 | Lectures |  |
| 5 | Steady state heat conduction in 1D: Plane wall – radial heat flow in a cylinder – conduction convection systems | 12 | Lectures |  |
| 6 |  |
| 7 |  |
| 8 |  |
| 9 | Steady state heat conduction in multi dimensions: 2D plane problems (triangular and quadrilateral elements) – Plate with variable thickness – 3D problems – axi-symmetric problems | 18 | Lectures |  |
| 10 |  |
| 11 |  |
| 12 |  |
| 13 |  |
| 14 |  |
| 15 | Final Exam | 3 |  |  |

1. **Teaching and Learning Methods**
   1. Lectures
   2. Class activity
   3. Self study
   4. Research assignments and the use of internet.
2. **Student Assessment Methods**
   1. Homework assignments and others
   2. Quiz to assess student’s creativity and problem assessments.
   3. Final exam to assess understanding and scientific knowledge. 
3. **Assessment schedule**

Assessment 1 All weeks 

Assessment 2 Quizzes

Assessment 3 Final exam on the 15thweek

1. **Weighting of Assessments**

Final- Term Examination 67 %

Oral Examination 00 %

Practical Examination 00 %

Year Work 33 %

Other 00 %

Total 100 %

1. **List of References**
   1. Course Notes

* Lecture material and training sheets
  1. Essential Books (Text Books)
  2. Recommended Books
  3. Periodicals Web sites, etc
* [www.Google.com](http://www.Google.com)

1. **Facilities Required for Teaching and learning**

White board, prepared notes, Sheets and solving problems.

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| **Course coordinator:** Prof. Dr. Abd EL Rahmann Saad |
| **Course instructor:** Prof. Dr. Abd EL Rahmann Saad |

**Head of department:** Prof. Dr.Said AbdAllah **Date: 28 / 7 / 2015**