***Course Specifications of: Computer Application in Material Engineering MED514***

**Program(s) on which the course is given:** Post Graduate Diploma in Production Engineering

**(Materials Engineering)**

**Compulsory or Elective element of program**: **Elective**

**Department offering the program: Mechanical Engineering/ Production**

**Academic year / Level:** year/ 2014/2015

**Date of specification approval: 2012**

1. **Basic Information**

**Title: Computer Application in Materials Engineering Code: *MED514***

**Credit Hours: 3 Lecture: 3**

**Tutorial: Practical: Total: 3**

**B- Professional Information**

**1- Overall aims of course**:

This course introduces students to:

* Use effectively the Abaqus FEA commercial Software.
* Simulate the solidification process of metals and alloy.
* Simulate the fracture of machine components.
* Simulate the fatigue of machine members.

**2- Intended learning outcomes of course (ILOs)**

By completion of the course, the student should be able to:

**a. Knowledge and understanding**

a1. Identify theories, fundamentals and specialized knowledge in the computer application in materials engineering and categorize sciences related to professional practice.( 2.1.1)

a2. Describe principles and fundamentals of quality in professional practice in the area of computer application in materials engineering. (2.1.3)

**b. Intellectual skills**

b1. Solve computer numerical control machines problems in computer application in materials engineering. (2.2.2)

b2. Critically and analytically read research papers and topics related computer application in materials engineering. (2.2.3)

b3. Assess the risks and hazards in professional practices. (2.2.4)

**c. Professional and practical skills**

c1. Prepare professional reports. (2.3.2)

**d. General and transferable skills**

d1. Communicate effectively using different means. (2.4.1)

d2. Use different sources for obtaining information and knowledge. (2.4.4)

d3. Lead a team in familiar professional contexts. (2.4.6)

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| Topic No. | Topic | No. of weeks | Total no. of hours |
| 1 | Finite element method - system design casting with the assistance of computer | 3 | 9 |
| 2 | Computer aided design and manufacturing in extrusion (to identify the forces and pressures - system design and manufacture of Die Computer Aided) | 3 | 9 |
| 3 | Computer Aided in hammering and forging processes | 3 | 9 |
| 4 | Design and manufacture of dies blacksmith with the assistance of Computer Science | 3 | 9 |
| 5 | Computer Applications in sheet metal forming processes | 3 | 9 |
| 6 | Exam | 1 | 3 |
|  | Total | 15 | 45 |

**4- Course Matrix**

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| **ILO’s code number** | **Teaching/learning methods and strategies** | **Assessment methods and strategies** |
| 2.1.1  2.1.3 | Formal lectures | Individual coursework assignments, quizzes, oral discussions and reports. Mid year and /or final written examination is given. |
| 2.2.2  2.2.3  2.2.4 | Analysis and problem‐solving skills are developed through tutorial/problem sheets and small group exercises.  Research skills are developed through a small subject oriented research project. | Analysis and problem‐solving skills are assessed through oral and written examinations.  Design and research skills are assessed through project write-ups, coursework and project reports. |
| 2.3.1  2.3.2 | Experiments demonstrations, practical work, laboratory visits. | Practical skills are assessed through laboratory experimental write-ups, coursework exercises and reports, project reports and presentations. |
| 2.4.1  2.4.4  2.4.6 | Those skills are not explicitly taught; however, along the course of study the student will acquire those skills to be able to perform his obligations. Attendance of seminars, workshops or conferences will help the student in developing those skills. Presentation by students (either group or individual) will train students for those skills. | Project presentation |

**5-Assessment schedule**

Assessment 1 Assignments on weeks 1, 3, 6

Assessment 2 Quizzes on weeks 2, 4, 9, and 13

Assessment 3 Mid-term exam on weeks 8

Assessment 3 Oral exam on week 14

Assessment 4 Final exam on week 15

**6- Weighting of assessments**

20% (60 marks) Home assignments, Quizzes, and reports

20% (60 marks) Mid-term examination and Oral examination

60% (180 marks) Final-term examination

100% (300 marks) Total

**7- List of References**

**7.1 Essential books (Text books)**

* Amar Khennane, "Introduction toFinite Element AnalysisUsing MATLAB andAbaqus",CRC Press, Taylor & Francis Group, 2013.
* Abaqus user manual.

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**7.2 Recommended books;  Periodicals& Websites.**

* \* Abaqus.com.

**8- Facilities required for teaching and learning**

Lecture room equipped with overhead projector

Presentation board, computer and data show

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