***Course Specifications of:***

***Engineering Software*(*MEP 509*)**

**Program(s) on which the course is given:** Diploma in Industrial Processes Control

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

**Department offering the program:** Mechanical Engineering

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

**Date of specification approval:**2012

1. **Basic Information**

**Title: Engineering Software Code: MEP 509**

**Credit Hours:3 Lecture: 3**

**Tutorial: Practical: Total:3**

**B- Professional Information**

1. **Overall aims of course**

This course helps students to:-

* Support students to upgrade their knowledge in the field of computer programming.
* develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain
* Utilize the available engineering software in the field of different engineering application.
* Recognize the physical principles and the most important techniques in engineering software.
* Develop software exclusively for control theoretic problems.

1. **Intended learning outcomes of course (ILOs)**

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

* 1. **Knowledge and understanding**

2.1.1 Identify theories, fundamentals and specialized knowledge in the industrial processes control and categorize sciences related to professional practice.

2.1.3 Describe principles and fundamentals of quality in professional practice in the area of industrial processes control.

* 1. **Intellectual skills**

2.2.2 Solve industrial processes control problems in his/her profession.

2.2.3 Critically and analytically read research papers and topics related to his/her area of industrial processes control.

2.2.4 Assess the risks and hazards in professional practices.

* 1. **Professional and practical skills**

2.3.1 Apply professional skills in the area of industrial processes control.

* 1. **General and transferable skills**

2.4.1 Communicate effectively using different means.

2.4.2 Use information technology in order to serve the development of professional practice.

2.4.4 Use different sources for obtaining information and knowledge.

2.4.6 Lead a team in familiar professional contexts.

1. **Contents**

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| --- | --- | --- | --- | --- |
| **No of weeks** | **Topic** | **No. of hours** | **Teaching / learning methods and strategies** | **Assessment method** |
| 1 | Introduction to software engineering, Software design and development methods | 3 | Lecture,Class activity | - |
| 2 | Review of linear algebra, vector spaces, orthogonality, matrices, vector and matrix norms | 3 | Lecture./Assign, case study | Assignment 1 |
| 3 | Numerical linear algebra , Floating point numbers and errors in computations,  Conditioning, efficiency, stability, and accuracy. | 3 | Lecture, Class activity | Assignment 1 |
| 4 | LU factorization, numericalsolution of the Linear system Ax = b,Orthogonal projections, Leastsquares problem, singular value decomposition, Canonical forms obtained viaorthogonaltransformations. | 3 | Lecture,Class activity | Assignment 2 |
| 5 | Analysis, design and implementation of large software systems | 3 | Lecture/Assign. | Assignment 2, Quiz |
| 6 | Design methods fragmented and assembled to larger programs | 3 | Lecture,Class activity | Assignment 3 |
| 7 | Programming team management – Software testing and evaluation - Maintenance and documentation of software | 3 | Lecture,Class activity | Assignment 3, Quiz |
| 8 | **Midterm exam** | | | |
| 9 | Programs for systems of linear equations and ‎non-linear equation | 3 | Lecture/Assign. | Assignment 4 |
| 10 | Applications to design compilers - methodology and methods of compilers, linguistic analysis and ‎methods of expressing top-down ‎and bottom to top. | 3 | Lecture, Class activity | Assignment 4, , Quiz |
| 11 | Software for supervisory control and data acquisition. Datamanipulation,omparisons, Alarm handling, Special functions | 3 | Lecture/Assign. | Assignment 5 |
| 12 | Methods of generating optimal code, design of a ‎simple compiler. | 3 | Lecture, Class activity | Assignment 5 |
| 13 | Heat transfer software | 3 | Lecture, Class activity | Quiz |
| 14 | Pipe networks software- | 3 | Lecture, Case Study | Oral Exam |
| 15 | **Final exam** | | | |

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| --- | --- | --- | --- |
| Topic No. | Topic | No. of weeks | Total no. of hours |
| 1 | Software design and development methods – Analysis, design and implementation of large software systems | 1 | 3 |
| 2 | Design methods fragmented and assembled to larger programs | 2 | 6 |
| 3 | Programming team management – Software testing and evaluation - Maintenance and documentation of software | 3 | 9 |
| 4 | Applications to design compilers - methodology and methods of compilers, linguistic analysis and ‎methods of expressing top-down ‎and bottom to top. | 2 | 6 |
| 5 | Methods of generating optimal code, design of a ‎simple compiler. | 2 | 6 |
| 6 | Steam properties software | 2 | 6 |
| 7 | Heat transfer software - pipe networks software- programs for systems of linear equations and ‎non-linear equation | 2 | 6 |
| 8 | Exam | 1 | 3 |
|  | Total | 15 | 45 |

1. **Course Matrix**

|  |  |  |
| --- | --- | --- |
| **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. Midterm 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. |
| 2.4.2  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 |

1. **Teaching and Learning Methods**

* Lectures

Practical training / laboratory

Seminar / workshop

* Class activity
* Case study
* Assignments / homework

Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Student Assessment Methods**

* Assignments to assess knowledge and intellectual skills.
* Quiz to assess knowledge, intellectual and professional skills.
* Mid-term exam to assess knowledge, intellectual, professional and general skills.
* Oral exam to assess knowledge and intellectual skills.
* Final exam to assess knowledge, intellectual, professional and general skills.
* Other: Practical exam to assess knowledge, intellectual, professional and general skills.

1. **Assessment schedule**

Assessment 1 Assignments on weeks 2, 3, 4, 5 , 6, 7 ,9, 10, 11, and 12

Assessment 2 Quizzes on weeks 5, 7, 10, and 13

Assessment 3 Mid-term exam on weeks 8

Assessment 3 Oral exam on week 14

Assessment 4 Final exam on week 15

1. **Weighting of Assessments**

Mid-Term Examination 20%

Final-TermExamination 60%

Oral Examination 05%

Practical Examination 05%

Semester Work 10%

Other 00%

Total 100%

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

* Course notes prepared by instructor
* PowerPoint slides.
  1. **Essential books** (Text books)
* Course notes Prepared by the instructor
* Hans van Vliet, “Software Engineering: Principles and Practice (Second Edition)”. Wiley
* Mary Shaw and David Garlan, “Software Architectures: Perspectives on an Emerging Discipline”. Prentice Hall
  1. **Recommended books**;
* [Numerical Methods](http://www.amazon.com/Numerical-Methods-J-Douglas-Faires/dp/0534407617/ref=sr_1_2?s=books&ie=UTF8&qid=1300441121&sr=1-2) by J. Douglas(Douglas Faires) Faires and [Richard L. Burden](http://www.amazon.com/Richard-L.-Burden/e/B001IQZIR0/ref=sr_ntt_srch_lnk_2?qid=1300441117&sr=1-2) (Jun 18, 2002)
* [Numerical Methods for Engineers, Sixth Edition](http://www.amazon.com/Numerical-Methods-Engineers-Steven-Chapra/dp/0073401064/ref=sr_1_3?s=books&ie=UTF8&qid=1300441121&sr=1-3) by Steven Chapra and Raymond Canale (Apr 20, 2009)
  1. **Periodicals Web sites, etc**

[http://www.cs.fsu.edu/~baker/sweng/](http://www.cs.fsu.edu/~baker/sweng/syllabus.html)

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

* Lecture room with computer and data show
* Computer Laboratory.

**Course coordinator:** Prof. Dr. HossamZakria

**Course instructor:** 10.10.2015

**Head of department:** Prof. Dr. Osama EzzatAbdellatif