



Software Metrics

Learning Guide – Information for Students

1. Description

| | |
|-------------------------------|---|
| Grade | European Master on Software Engineering |
| Module | Support Processes |
| Area | |
| Subject | Software Metrics |
| Type | Compulsory |
| ECTS credits | 4 |
| Responsible department | Lenguajes y Sistemas Informáticos e Ingeniería del Software |
| Major/Section/ | |

| | |
|----------------------|-----------|
| Academic year | 2012/2013 |
| Term | 1st term |
| Language | English |
| Web site | |



2. Faculty

| NAME and SURNAME | OFFICE | email |
|--------------------------|---------------|---------------|
| Tomas San Feliu (Coord.) | 5106 | tsanfe@upm.es |
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| | | |
| | | |

3. Prior knowledge required to take the subject

| | |
|---|--|
| Passed subjects | <ul style="list-style-type: none"> |
| Other required learning outcomes | <ul style="list-style-type: none"> |



4. Learning goals

| SUBJECT-SPECIFIC COMPETENCES AND PROFICIENCY LEVEL | | |
|---|--|--------------|
| Code | Competence | Level |
| SC10 | To evaluate objectively processes and products versus standards and applicable norms | A |
| | | |
| | | |
| | | |

Proficiency level: knowledge (K), comprehension (C), application (A), and analysis and synthesis (S)



| SUBJECT LEARNING OUTCOMES | | | |
|----------------------------------|--|----------------------------|--------------------------|
| Code | Learning outcome | Related competences | Proficiency level |
| LR1 | To be able to lead and implement measurement plans for process and product assessment | SC10 | A |
| LR2 | To be able to analyze data for project estimation, planning and quality control in software projects | SC10 | A |
| LR3 | | | |
| ... | | | |



5. Subject assessment system

| ACHIEVEMENT INDICATORS | | |
|------------------------|---|---------------|
| Ref | Indicator | Related to LR |
| I1 | Software metrics definition developed | LR1 |
| I2 | An analysis of a measurement database performed | LR2 |
| I3 | | |
| ... | | |

(Optionally, use rubric table instead)

| CONTINUOUS ASSESSMENT | | | |
|--|-----------|-------|-----------------|
| Brief description of assessable activities | Time | Place | Weight in grade |
| Paper | Week 5 | Class | 15 |
| Definition Report | Week 9 | Class | 20 |
| Analysis Report | Week 15 | Class | 30 |
| Exam | Week 16 | Class | 25 |
| Class activities | Week 1-13 | Class | 10 |
| | | | |



GRADING CRITERIA

The final evaluation of the students is based on the evaluation of a paper(15%), a measurement definition report exam(20%), an analysis report(30%) and an individual written exam(25%).

Class participation and additional activities in the classroom are performed. These additional activities represent a 10% of the final scoring.



POLITÉCNICA



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6. Contents and learning activities

| SPECIFIC CONTENTS | | |
|--|---|---------------------------|
| Unit / Topic / Chapter | Section | Related indicators |
| Chapter 1: Introduction to quality control and planning needs | 1.1 Measurement Concepts | I1 |
| | 1.2 Measurement as a support process | I1 |
| | 1.3 Review Metrics Models and Standards | I1 |
| Chapter 2: Measurement goals | 2.1 Formulating problem and goal statement | I1 |
| | 2.2 Prioritize information needs and objectives | I1 |
| | 2.3 Formalize measurement goals | I1 |
| Chapter 3: Specify Measures | Identify questions and indicators | I1, I2 |
| | Identify data elements | I1 |
| | Operational definitions for measures | I1,I2 |
| Chapter 4: Specify Data Collection and Storage Procedures | Sources of data | I1, I2 |
| | Specify how to collect and store the measurement data | I1,I2 |
| Chapter 5: Specify Analysis Procedures | Potential data analyses | I2 |
| | Methods and tools | I2 |
| Chapter 6: Communicate Results | Develop a Reporting | I2 |
| | Contextual information | I2 |



7. Brief description of organizational modalities and teaching methods

| TEACHING ORGANIZATION | | |
|------------------------------|--------------------------------|---|
| Scenario | Organizational Modality | Purpose |
| X | Theory Classes | <i>Talk to students</i> |
| | Seminars/Workshops | <i>Construct knowledge through student interaction and activity</i> |
| | Practical Classes | <i>Show students what to do</i> |
| | Placements | <i>Round out student training in a professional setting</i> |
| X | Personal Tutoring | <i>Give students personalized attention</i> |
| X | Group Work | <i>Get students to learn from each other</i> |
| X | Independent Work | <i>Develop self-learning ability</i> |



| TEACHING METHODS | | |
|-------------------------|--|--|
| | Method | Purpose |
| X | Explanation/Lecture | <i>Transfer information and activate student cognitive processes</i> |
| | Case Studies | <i>Learning by analyzing real or simulated case studies</i> |
| | Exercises and Problem Solving | <i>Exercise, test and practice prior knowledge</i> |
| | Problem-Based Learning (PBL) | <i>Develop active learning through problem solving</i> |
| | Project-Oriented Learning (POL) | <i>Complete a problem-solving project applying acquired skills and knowledge</i> |
| X | Cooperative Learning | <i>Develop active and meaningful learning through cooperation</i> |
| | Learning Contract | <i>Develop independent learning</i> |

Known as explanation, this teaching method involves the “*presentation of a logically structured topic with the aim of providing information organized according to criteria suited for the purpose*”. This methodology, also known as *lecture*, mainly focuses on the verbal exposition by the teacher of contents on the subject under study. The term *master class* is often used to refer to a special type of lecture taught by a professor on special occasions

Intensive and exhaustive analysis of a real fact, problem or event for the purpose of understanding, interpreting or solving the problem, generating hypotheses, comparing data, thinking, learning or diagnosis and, sometimes, training in possible alternative problem-solving procedures.

Situations where students are asked to develop the suitable or correct solutions by exercising routines, applying formulae or running algorithms, applying information processing procedures and interpreting the results. It is often used to supplement lectures.

Teaching and learning method whose starting point is a problem, designed by the teacher, that the student has to solve to develop a number of previously defined competences.

Teaching and learning method where have a set time to develop a project to solve a problem or perform a task by planning, designing and completing a series of activities. The whole thing is based on developing and applying what they have learned and making effective use of resources.

Interactive approach to the organization of classroom work where students are responsible for their own and their peers’ learning as part of a co-responsibility strategy for achieving group goals and incentives.

This is both one of a number of methods for use and an overall teaching approach, or philosophy.

An agreement between the teacher and student on the achievement of learning outcomes through an independent work proposal, supervised by the teacher, and to be accomplished within a set period. The essential points of a learning contract are that it is a written agreement, stating required work and reward, requiring personal involvement and having a time frame for accomplishment.



| BRIEF DESCRIPTION OF THE ORGANIZATIONAL MODALITIES AND TEACHING METHODS | |
|--|--|
| THEORY CLASSES | During a theory class, teacher explains verbally the contents of the chapter. In this way, he provides students basic information from different sources. |
| PROBLEM-SOLVING CLASSES | ... |
| PRACTICAL WORK | ... |
| INDIVIDUAL WORK | Student will learn to work individually in order to prepare oral presentations and written documents. In this method, the student will have to collect information from internet and the bibliography |
| GROUP WORK | This work is complementary to the individual work. The objective is to encourage the cooperative learning, in order to divide the research work, the written document and the oral presentation, and put all of it together. |
| PERSONAL TUTORING | Students could ask, individually or in groups, for tutoring sessions in order to solve of the issues they have. |



8. Teaching resources

| TEACHING RESOURCES | |
|----------------------------|--|
| RECOMMENDED READING | Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison Wesley, 2003 |
| | Anita Carleton, William A. Florac, Measuring the Software Process, Addison-Wesley 1999 |
| | Chris Chen and Hadley Roth, The big book of Six Sigma training games, McGraw-Hill, 2005 |
| | |
| WEB RESOURCES | Subject web site (http://www.sei.cmu.edu/measurement/) |
| | Subject Moodle site (http://) |
| EQUIPMENT | Laboratory |
| | Room XXXX |
| | Group work room |



9. Subject schedule

| Week | Classroom activities | Lab activities | Individual work | Group work | Assessment activities | Others |
|---------------------|----------------------|----------------|-----------------------------|---------------------------|------------------------------|--------|
| Week 1 (3 hours) | • Chapter 1(2 hours) | • (hours) | • Individual study(1 hours) | • (hours) | • | • |
| Week 2 (4 hours) | • Chapter 2(2 hours) | • (hours) | • Individual study(2 hours) | • (hours) | • | • |
| Week 3 (7 hours) | • Chapter 2(2 hours) | • (hours) | • Individual study(2 hours) | • Research work (3 hours) | • | • |
| Week 4 (7 hours) | • Chapter 2(2 hours) | • (hours) | • Individual study(2 hours) | • Research work (3 hours) | • | • |
| Week 5 (4 hours) | • | • (hours) | • Individual study(2 hours) | • Research work(3 hours) | • Paper presentation(1 hour) | • |
| Week 6 (8hours) | • Chapter 3(2 hours) | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |
| Week 7 (8hours) | • Chapter 3(2 hours) | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |
| Week 8 (8hours) | • Chapter 3(2 hours) | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |



| | | | | | | |
|----------------------|----------------------|-----------|-----------------------------|--------------------------|----------------------------|---|
| Week 9 (8hours) | • | • (hours) | • Individual study(2 hours) | • Research work(5 hours) | • Definition report(1hour) | • |
| Week 10 (8hours) | • Chapter 4(2 hours) | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |
| Week 11 (8hours) | • Chapter 5(2 hours) | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |
| Week 12 (8hours) | • Chapter 5(2 hours) | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |
| Week 13 (8hours) | • Chapter 6(2 hours) | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |
| Week 14 (6hours) | • | • (hours) | • Individual study(2 hours) | • Research work(4 hours) | • | • |
| Week 15 (6 hours) | • | • (hours) | • Individual study(2 hours) | • Research work(2 hours) | • Analysis Report (2hour) | • |
| Week 16 (3 hours) | • Final Test | • (hours) | • Individual study(2 hours) | • (hours) | • Final Test(1hours) | • |

Note: Student workload specified for each activity in hours