SOFTWARE DEVELOPMENT

BACHELOR IN MANAGEMENT INFORMATION SYSTEMS

Professor: JOSÉ LUIS MARTÍN ROMERA
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Academic year: 18-19
Degree course: THIRD
Semester: 2º
Category: COMPULSORY
Number of credits: 6.0
Language: English

PREREQUISITES
This course focuses on techniques used during the life cycle of the software development, therefore using a laptop is fundamental in order to follow and practice the exercises proposed during the sessions.

Some JAVA foundations are also fundamental in order to keep up the pace of the explanations. Probably the student will want to refresh his/her programming and JAVA skills before the beginning of the semester.

SUBJECT DESCRIPTION
Software Development is the process of ideating, designing, coding, testing and releasing applications in a formal way. This course focuses on the different techniques, methodologies and tools that developers and managers use on a daily basis in order to release the best possible software.

In previous courses, the student learnt how to code and to build programs that can solve a variety of problems. In the real world developers don't play solo, they usually work on teams, are guided by a manager and need to solve other's problems: the customer's problems. Software engineering or Software Development theory bring us a set of tools that can help us overcome the problems that arise when different forces collide during the development of software. A good manager needs to deliver good and solid software leveraging the team of developers and dealing with constraints as time or money in a way that fulfills the customer. This course provides the foundations to accomplish all this at the same time.

This course ranges from Software cycle models to Refactoring going through Continuous Integration or Design Patterns. The material covers the techniques that are used in the industry nowadays, so the day of tomorrow, the student will face these problems with the confidence of having dealt already with them.

OBJECTIVES AND SKILLS
The main objective of this course is to get the foundations to build good and solid software. Therefore, the student will learn:
- What are the different life cycle models and which one to use in each occasion.
- How Agile methodologies can improve the performance of the team.
- How Version Control Systems help us tidy up our code and feel secure.
- Why testing is so important and how to do it.
- How Continuous integration help us release good software, more frequently and in a secure way.
- Which are the coding principles and good practices that every developer should know.
- How Design Patterns help us solve frequent problems without reinventing the wheel.
- To represent the code in a more graphical way using UML.
- How to detect poor implementations and solve them through refactoring.
- How to encrypt code and how to apply reverse engineering in other's code.

The subject will, also, help the students to solidify and enhance their knowledge of JAVA and their coding skills with this language.

The analysis of the problems proposed will increase the analytical capabilities of the students. At the same time, thinking how to use the techniques learnt when tackling the problems will enhance their creative skills.

**METHODOLOGY**

This course is mainly based on exercises and laboratories that will need to be completed both inside and outside the classroom. Therefore using a laptop with JAVA and a IDE installed on it is a must.

The programming language used on this course will be JAVA with the goal of using a language that the student already know. This will ease the building of new concepts on top of those already learnt.

The sessions are structured as two following sessions or double sessions providing an appropriate schema to complete the exercises on time.

All the exercises will be uploaded and shared with the teacher using a Git repository, for this reason a couple of sessions will be dedicated to this tool to ensure that everybody dominate it.

<table>
<thead>
<tr>
<th>Teaching methodology</th>
<th>Weighting</th>
<th>Estimated time a student should dedicate to prepare for and participate in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>10.0 %</td>
<td>15 hours</td>
</tr>
<tr>
<td>Discussions</td>
<td>13.33 %</td>
<td>20 hours</td>
</tr>
<tr>
<td>Exercises</td>
<td>50.0 %</td>
<td>75 hours</td>
</tr>
<tr>
<td>Group work</td>
<td>13.33 %</td>
<td>20 hours</td>
</tr>
<tr>
<td>Other individual studying</td>
<td>13.33 %</td>
<td>20 hours</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0 %</td>
<td>150 hours</td>
</tr>
</tbody>
</table>

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PROGRAM

SESSIONS 1 - 2
Introduction to Software development.
Life cycle models.
Software process models: Waterfall, Agile...

SESSIONS 3 - 4
Agile Methodologies: Lean, Kanban, Scrum.
Elements and techniques: Iterations, Velocity, Burn down graph, Milestones, User stories / tasks, Planning Poker.

SESSIONS 5 - 6
Version Control Systems and defensive development.
Elements of VCS. Systems: CVS, Subversion, Git...
Platforms of VCS: Github, Gitlab, BitBucket...
Introductory lab to Git.

SESSIONS 7 - 8
Advanced Git laboratory.

SESSIONS 9 - 10
Testing: Motivation, types and frameworks.
Testing laboratory.

SESSIONS 11 - 12
TDD (Test Driven Development) Laboratory.

SESSIONS 13 - 14
Continuous integrations: automating builds.
Code coverage report
Tools: ANT, Gradle,...

SESSIONS 15 - 16
Coding principles and good practices.
CLEAN, SOLID, DRY, KISS, YAGNI.

SESSIONS 17 - 20
Design Patterns: Motivation, Categories, Gang of four.

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Patterns laboratories.

SESSIONS 21 - 22
UML

SESSIONS 23 - 26
Code refactoring: refactoring techniques and bad smells.
Laboratories.

SESSION 27
Frameworks: Android

SESSION 28
Obfuscating code and reverse engineering.

SESSIONS 29 - 30
Final exam.
BIBLIOGRAPHY

Lecture slides, exercises, documentation and any reads needed to follow this subject will be posted on Campus Online throughout the semester.

Besides, there are some core books that can be used to follow the subject or expand the information if the student wants it. Their lecture is highly recommended, even though, none of them are mandatory.

- **The Mythical Man-Month**  
  Frederick P. Brooks  
  Prentice Hall; Edición: Nachdr. 20th Anniversary (1995)  
  ISBN: 978-0201835953

- **Clean Code**  
  Robert C. Martin  
  ISBN: 978-0132350884

- **Design Patterns**  
  Erich Gamma, Richard Helm, Ralph Johnson, Joshn Vlissides  
  Addison Wesley; (1994)  
  ISBN: 978-0201633610

- **Refactoring**  
  Martin Fowler  
  Addison Wesley; (1999)  
  ISBN: 978-0201485677

- **Test-Driven Development**  
  Kent Beck  
  Addison Wesley; (2002)  
  ISBN: 978-0321146533

BUY YOUR BOOKS HERE

EVALUATION CRITERIA

Your final grade will be based on the next characteristics weighted in the following way:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Percentage</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>15 %</td>
<td></td>
</tr>
<tr>
<td>Individual Work</td>
<td>40 %</td>
<td></td>
</tr>
<tr>
<td>Workgroups</td>
<td>25 %</td>
<td></td>
</tr>
<tr>
<td>Final Exam</td>
<td>20 %</td>
<td></td>
</tr>
</tbody>
</table>

Class participation will be evaluated based on the quality (not quantity) of your participation in class. Individual work has an important weight in this course. Evidence of presenting non original work will be sanctioned following the policies of the school.

PROFESSOR BIO

Professor: **JOSÉ LUIS MARTÍN ROMERA**

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José Luis Martin is a Software and Hardware engineer with experience across a broad spectrum of information technologies. He had participated both in electronics and Software projects including hardware design for drones, mobile apps development and embedded software coding among others.

For his trajectory he was accepted in Singularity University in their Global Solutions Program in 2016. His performance during that program granted him a position in the Launchpad, a new program for entrepreneurs in this institution.

His passion is the development of new projects, mainly coding, from the prototyping to the start up, specially in the health sector and HHRR field.

Nowadays José Luis Martin is the Head of Tech Lab at IE Business School. He is also the CTO of Quizit Mobile S.L. which has developed the most rated app for physicians residents in the Spanish market. And on the side José Luis also does recruiting for tech companies that face problems to find talented and qualified developers when using standard recruiting agencies.

José Luis holds a Bachelor in Telecommunication Systems from the University of Granada and a Master in Advanced Electronic Systems from Alcalá de Henares.

OTHER INFORMATION
Contact information: joseluism@faculty.ie.edu

INTEGRITY & ETHICS
In this course I strictly enforce the university's policies on scholarship and grades. Implicit in handing in homework, assignments, papers, and exams is that they represent your own work (or the result of sanctioned collaboration).

CODE OF CONDUCT IN CLASS

1. **Be on time:** Students arriving more than 5 minutes late will be marked as “Absent”.

   Only students that notify in advance in writing that they will be late for a specific session may be granted an exception (at the discretion of the professor).

2. **If applicable, bring your name card and strictly follow the seating chart.** It helps faculty members and fellow students learn your names.

3. **Do not leave the room during the lecture:** Students are not allowed to leave the room during lectures. If a student leaves the room during lectures, he/she will not be allowed to re-enter and, therefore, will be marked as “Absent”.

   Only students that notify that they have a special reason to leave the session early will be granted an exception (at the discretion of the professor).

4. **Do not engage in side conversation.** As a sign of respect toward the person presenting the lecture (the teacher as well as fellow students), side conversations are not allowed. If you have a question, raise your hand and ask it. If you do not want to ask it during the lecture, feel free to approach your teacher after class.

   If a student is disrupting the flow of the lecture, he/she will be asked to leave the classroom and, consequently, will be marked as “Absent”.

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5. **Use your laptop for course-related purposes only.** The use of laptops during lectures must be authorized by the professor. The use of Social Media or accessing any type of content not related to the lecture is penalized. The student will be asked to leave the room and, consequently, will be marked as “Absent”.

6. **No cellular phones:** IE University implements a “Phone-free Classroom” policy and, therefore, the use of phones, tablets, etc. is forbidden inside the classroom. Failing to abide by this rule entails expulsion from the room and will be counted as one absence.

7. **Escalation policy: 1/3/5.** Items 4, 5, and 6 above entail expulsion from the classroom and the consequent marking of the student as “Absent.” IE University implements an “escalation policy”: The first time a student is asked to leave the room for disciplinary reasons (as per items 4, 5, and 6 above), the student will incur one absence, the second time it will count as three absences, and from the third time onward, any expulsion from the classroom due to disciplinary issues will entail 5 absences.