



## Teaching Guide

Identifying Data					2024/25
Subject (*)	Software Verification and Validation	Code	614G01225		
Study programme	Grao en Enxeñaría Informática				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	2nd four-month period	Fourth	Obligatory	6	
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Computación				
Coordinador		E-mail			
Lecturers		E-mail			
Web	<a href="http://guiadocente.udc.es/guia_docent/index.php?centre=614&amp;ensenyament=614G01&amp;assignatura=614G01053&amp;any_academic=2017_18&amp;">guiadocente.udc.es/guia_docent/index.php?centre=614&amp;ensenyament=614G01&amp;assignatura=614G01053&amp;any_academic=2017_18&amp;</a>				
General description	<p>This subject is intended to master the current solutions in Software Engineering for software validation and verification. These include:</p> <ul style="list-style-type: none"> <li>- knowledge on functional and non-functional testing techniques and tools, applicable to different levels (unit, integration, system);</li> <li>- knowledge on techniques and tools for automatic reasoning; and</li> <li>- knowledge on techniques and tools for formal verification.</li> </ul>				

## Study programme competences / results

Code	Study programme competences / results
A28	Capacidade de identificar e analizar problemas, e deseñar, desenvolver, implementar, verificar e documentar solucións software sobre a base dun coñecemento adecuado das teorías, modelos e técnicas actuais.
B1	Capacidade de resolución de problemas
B3	Capacidade de análise e síntese
C2	Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

## Learning outcomes

Learning outcomes	Study programme competences / results		
Ability to identify and analyse problems, and design, develop, implement, validate and document software solutions on the basis of a deep and broad knowledge of modern theories, models, and techniques.	A28	B1 B3	C2 C3 C6 C7 C8

## Contents

Topic	Sub-topic



Part I: Software Testing	<p>I.1 Test specification, design, and execution</p> <p>I1.1. Levels and types of tests</p> <p>I1.2. Properties and traceability of requirements</p> <p>I.2 Test management: planning, assessment, metrics and reviews</p>
Part II: Formal methods and automatic reasoning	<p>II.1 Introduction: natural deduction and calculus of sequences</p> <p>II.2 Automatic proof using PVS</p> <p>II.3 What is a theorem prover and what is it used for?</p> <p>II.4 PVS specification language: types, expressions, theories, subtyping</p> <p>II.5 PVS prover: tactics, recursion, equational reasoning</p>
Part III: Model checking	<p>III.1 Introduction to modal temporal logic</p> <p>III.2 Properties specification: deadlocks, safety, liveness, fairness</p> <p>III.3 How a model checker works</p> <p>III.4 Introduction to the use of a model checking tool</p>

### Planning

Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Guest lecture / keynote speech	B3 C2 C7 C8	21	26.25	47.25
Laboratory practice	A28 B1 B3 C2 C3 C6	14	35	49
Supervised projects	A28 B1 B3 C2 C3 C6	7	7	14
Objective test	B1 B3 C6	3	31.5	34.5
Personalized attention		5.25	0	5.25

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

### Methodologies

Methodologies	Description
Guest lecture / keynote speech	Master class where the theoretical aspects of the subject are presented.
Laboratory practice	Hands-on student assignment in the lab.
Supervised projects	Student assignments during reduced-group classes.
Objective test	Written test.

### Personalized attention

Methodologies	Description
Guest lecture / keynote speech Laboratory practice Supervised projects Objective test	Questions/answers sessions about theoretical/practical aspects, student assignments, etc. during the office hours of each teacher.

### Assessment

Methodologies	Competencies / Results	Description	Qualification
Laboratory practice	A28 B1 B3 C2 C3 C6	Hand in and presentation of student assignments, up to a maximum of 4 points in the final score. These are not compulsory to pass.	40
Supervised projects	A28 B1 B3 C2 C3 C6	Student assignments presented during reduced-group classes, up to a maximum of 2 points in the final score. These are not compulsory to pass.	20
Objective test	B1 B3 C6	Written test, up to a maximum of 4 points in the final score. A minimum of 2 points is required to pass.	40



## Assessment comments

Those students who do not reach the minimum in the objective test, will be qualified with the qualification they obtain in that objective test.

In the second opportunity, the objective test may include a specific evaluation of the laboratory practice.

In compliance with the academic rules at UDC that apply to part-time students, physical presence in the classroom/laboratory will not be regarded as qualification element. That is to say, students may officially apply to be dismissed from attending lectures and laboratory practices. All in all, part-time students will still need to comply with deadlines established for supervised projects and laboratory projects.

## Sources of information

<b>Basic</b>	<ul style="list-style-type: none"><li>- Mordechai Ben-Ari (2012). Mathematical Logic for Computer Science. Springer</li><li>- Ron Patton (2001). Software testing. Sams</li><li>- Peter Farrell-Vinay (2008). Manage software testing. Auerbach</li><li>- Kent Beck (2002). Test Driven Development (By Example). Addison-Wesley</li><li>- Gerard J. Holzmann (2003). The SPIN model checker: primer and reference manual. Addison-Wesley</li><li>- Mordechai Ben-Ari (2001). Mathematical Logic for Computer Science. Springer</li><li>- Zohar Manna and Amir Pnueli (1991). The Temporal Logic of Reactive and Concurrent Systems. Specification. Springer</li><li>- Zohar Manna and Amir Pnueli (1995). The Temporal Logic of Reactive and Concurrent Systems. Safety. Springer</li></ul>
<b>Complementary</b>	

## Recommendations

### Subjects that it is recommended to have taken before

Software Design/614G01015

Concurrency and Parallelism/614G01018

Software Process/614G01019

Software Architecture/614G01221

Requirements Engineering/614G01222

Quality Assurance/614G01223

### Subjects that are recommended to be taken simultaneously

Knowledge Representation and Automatic Reasoning/614G01036

Theoretical Computer Science/614G01039

Development Methodologies/614G01051

### Subjects that continue the syllabus

Software Development Projects/614G01226

### Other comments

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.