ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000587 - Analysis of concurrent systems

DEGREE PROGRAMME

10AK - Master Universitario en Software y Sistemas

ACADEMIC YEAR & SEMESTER

2017/18 - Semester 2

Index

Learning guide

1. Description

1.1. Subjet details

Name of the subject	103000587 - Analysis of concurrent systems
No of credits	4 ECTS
Type	Optional
Academic year ot the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	10AK - Master Universitario en Software y Sistemas
Centre	Escuela Tecnica Superior de Ingenieros Informaticos
Academic year	2017-18

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Lars-ake Fredlund (Subject coordinator)	2309	larsake.fredlund@upm.es	Sin horario.
Clara Benac Earle	2308	clara.benac@upm.es	Sin horario.

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

El plan de estudios Master Universitario en Software y Sistemas no tiene definidas asignaturas previas recomendadas para esta asignatura.

3.2. Other recommended learning outcomes

- Basic finite autom aton theory. Acquaintance with concurrent executions and its peculiar characteristics. General acquaintance with programming and programming languages is required.

- All students wishing to take this course are required to get in touch with one of the inst ructors prior to enrollment in order to verify whether the above requirements are met

- Introductory courses on concurrency and concurrent programming.

4. Skills and learning outcomes *

4.1. Skills to be learned

CEM5 - Aportar soluciones a aquellos problemas abiertos relacionados con el ámbito de aplicación y los métodos, técnicas y herramientas de Verificación y Validación de Software

4.2. Learning outcomes

RA26 - SA-NSDS-7: Conocer principales protocolos de coordinación y recuperación

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

Obetivo: entender los protocolos de concurrencia básicos y sus problemas relacionados con la ejecución concurrente.

Programa:

Sistemas concurrentes y reactivos Propiedades de corrección para sistemas concurrentes: breve introducción a lógicas tipo LTL, CTL, autómatas de Büchi, etc. Verificación de los sistemas concurrentes Comprobación de modelos en sistemas concurrentes Técnicas de comprobación de modelos y comprobación de modelos simbólica Introducción a los sistemas híbridos y de tiempo real Herramientas (según disponibilidad de tiempo y necesidades del curso): QuickCheck/PropEr, SPIN, Uppaal, McErlang/Java Pathfinder, nuSMV, etc?

5.2. Syllabus

1. Concurrent and reactive systems in general

2. Correctness properties for concurrent systems: short intro to logics like LTL, CTL, Buchi automata, etc

3. Testing of concurrent systems.

4. Model checking of concurrent systems

5. Bounded model checking techniques, and symbolic model checking in general.

6. Intro to hybrid and real - time systems

7. Tools (depending on time an d needs during the course): QuickCheck/PropEr, SPIN, Uppaal, McErl ang/Java Pathfinder, nuSMV, etc

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Other face-to-face activities	Assessment activities
1	**Theory and practical work** Duration: 04:00 Lecture		**Self study and implementation work** Duration: 06:30 Additional activities	
2	**Theory and practical work** Duration: 04:00 Lecture		**Self study and implementation work** Duration: 06:30 Additional activities	
3	**Theory and practical work** Duration: 04:00 Lecture		**Self study and implementation work** Duration: 06:30 Additional activities	**Exercises with model checker, and with property-based testing tools** Individual work Continuous assessment Duration: 00:00
4	**Theory and practical work** Duration: 04:00 Lecture		**Self study and implementation work** Duration: 06:30 Additional activities	**Exercises with model checker, and with property-based testing tools** Individual work Continuous assessment Duration: 00:00
5	**Theory and practical work** Duration: 04:00 Lecture		**Self study and implementation work** Duration: 06:30 Additional activities	**Exercises with model checker, and with property-based testing tools** Individual work Continuous assessment Duration: 00:00 **Oral presentation** Individual presentation Continuous assessment Duration: 00:00
6	**Theory and practical work** Duration: 04:00 Lecture			**Exercises with model checker, and with property-based testing tools** Individual work Continuous assessment Duration: 00:00 **Oral presentation** Individual presentation Continuous assessment Duration: 00:00
7	**Theory and practical work** Duration: 04:00 Lecture		**Self study and implementation work** Duration: 06:30 Additional activities	**Exercises with model checker, and with property-based testing tools** Individual work Continuous assessment Duration: 00:00 **Oral presentation** Individual presentation Continuous assessment Duration: 00:00

8	**Theory and practical work** Duration: 04:00 Lecture		**Self study and implementation work** Duration: 06:30 Additional activities	**Exercises with model checker, and with property-based testing tools** Individual work Continuous assessment Duration: 00:00 **Oral presentation** Individual presentation Continuous assessment Duration: 00:00
9				
10				
11				
12				
13				
14				
15				
16				**Prueba final** Written test Final examination Duration: 04:00
17				

The independent study hours are training activities during which students should spend time on individual study or individual assignments.

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The subject schedule is based on a previous theorical planning of the subject plan and might go to through experience some unexpected changes along throughout the academic year.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
3	Exercises with model checker, and with property-based testing tools	Individual work	No Presential	00:00	50%	/ 10	
4	Exercises with model checker, and with property-based testing tools	Individual work	No Presential	00:00	50%	/ 10	
5	Exercises with model checker, and with property-based testing tools	Individual work	No Presential	00:00	50%	/ 10	
5	Oral presentation	Individual presentation	Face-to-face	00:00	50%	/ 10	
6	Exercises with model checker, and with property-based testing tools	Individual work	No Presential	00:00	50%	/ 10	
6	Oral presentation	Individual presentation	Face-to-face	00:00	50%	/ 10	
7	Exercises with model checker, and with property-based testing tools	Individual work	No Presential	00:00	50%	/ 10	
7	Oral presentation	Individual presentation	Face-to-face	00:00	50%	/ 10	
8	Exercises with model checker, and with property-based testing tools	Individual work	No Presential	00:00	50%	/ 10	CEM5
8	Oral presentation	Individual presentation	Face-to-face	00:00	50%	/ 10	

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
16	Prueba final	Written test	Face-to-face	04:00	100%	10 / 10	

7.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

7.2. Assessment criteria

The grades of the students will be based on the quality and depth of the presentationsgiven by the students and the results of the exercises using a model checker and aproperty-based testing tool.

8. Other information

8.1. Other information about the subject

All students wishing to take this course are required toget in touch with one of the instructors prior toenrollment in order to verify whether the requirements on prior knowledge are met.