Course Unit Descriptor

Study Programme: Information Technologies

Course Unit Title: Formal Methods in Engineering

Course Unit Code: IT612

Name of Lecturer(s): Gordana Rakić

Type and Level of Studies: Bachelor Academic Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Winter

Language of instruction: Serbian (primary), English (secondary)

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 7

Prerequisites: None

Course Aims:

The course will enable to students a deep understanding and critical evaluation of formal methods and to give fundamental details of certain techniques based on automata theory and software tools based on industry-strength tools like “Statemate”, “IAR Visual State” or “Yakindu”.

Learning Outcomes:

Minimal

At the end of the course it is expected that successful student will be able to critically evaluate the need to establish reliability in large-scale computer systems and to appreciate fundamentals of formal methods. It is also expected that the student will accept basic conclusions on using formal techniques in the life-time cycle of the system, especially in requirements and architecture design phases.

Desirable

At the end of the course it is expected that successful student shows capability to critically evaluate different kinds of large-scale systems and different kinds (transforming to hybrid) of systems. Also he/she will appreciate the role of tools and methods for the formal methods engineering.

Syllabus:

Theory

Theoretical foundations of large-scale systems, classification of formal methods, transforming, reactive and hybrid systems, automata theory, state-oriented development methods, state diagrams, activity diagrams, real-time aspects.

Practice

Introduction to semantics and tools. Development of real-time system/ Analysis and development of several case studies.

Required Reading:

1. Gerard O'Regan, “Concise Guide to Formal Methods: Theory, Fundamentals and Industry Applications”, Springer 2017.
2. Wolfgang Reisig, “Understanding Petri Nets: Modeling Techniques, Analysis Methods, Case Studies”, Springer 2013.

Recommended

1. Nissim Francez, 'Program Verification', Addison-Wesley, 1992
2. S. Hassoun and T Sasao, 'Logic Synthesis and Verification', 2002

Weekly Contact Hours: 5	**Lectures:** 2	**Practical work:** 3

Teaching Methods:

During lecture classes, the classical methods are used. Exercises are mostly consisting of case study analyses. Assignments are mostly practical, whose aim is to practically apply principles covered during lectures and exercises, using appropriate tools

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation	0	written exam	30
Practical work	70	oral exam	0
Preliminary exam(s)	0	…….	
Seminar(s)	0		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.