Course Unit Descriptor

Study Programme: Ph.D. in Computer Science

Course Unit Title: Software Engineering in Critical Systems

Course Unit Code: ID104

Name of Lecturer(s): Zoran Budimac

Type and Level of Studies: Doctoral Academic Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

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:

Critical systems are systems whose functioning produces a risk for human lives, health, economy or environment. Typically such systems are large and complex industrial systems or products that are constructed by multi-disciplinary teams. Designing and evaluation of such systems is therefore complex and multi-disciplinary task as well and often includes mechanics engineers, psychologists, structural, electrical, and software engineers.
The goal of the course is to analyze critical systems, their requirements and ways to implement those requirements.

Learning Outcomes:

- Critically evaluate contemporary types of critical systems, including international standards
- Critically evaluate the usefulness of formal methods in life-cycle of critical systems

Syllabus:

Theory
An overview of research in theoretical foundation of critical systems; classification and analysis f critical systems; time-critical systems; the role of formal approaches in development and analysis of critical systems, software in real-time critical systems, typical model of a critical system. Contemporary directions of research in the field; formal correctness proofs of software, formal machines for decision support, software tools for overall analysis and design of critical systems

Practice
Work with software tools to model a characteristic critical system.

Required Reading:

1. Ian Sommerville, 'Software Engineering, 9th edition', 2010 (chapters 16, 17, 18 and 21)
2. Ben Moszkowski , Executing Temporal Logic Programs, Cambridge Univ. Press (http://www.cse.dmu.ac.uk/~cau/papers/tempura-book.pdf)
3. Michael Huth and Mark Ryan, Logic in Computer Science: Modelling and Reasoning about Systems, Cambridge University Press, 2000
4. Anderson, Ross , Security Engineering, Wiley, 2001
5. Boyd, Colin and Mathuriam, Anish, Protocols for Authentication and Key Establishment, Springer, 2003

Weekly Contact Hours: 2	**Lectures:** 2	**Practical work:** 0

Teaching Methods:
During lectures classical educational methods are used with the use of projector. Students independently deal with some research topics, present and discuss results to other students and to a teacher. Results are finally described formally in the form of seminar paper.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	Points 50	**Final exam**	Points 50
Active class participation		written exam	

Practical work		oral exam	
Preliminary exam(s)		…….	
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			