Obuda University John von Neumann Faculty of Informatics			*Institute of Biomatics and Applied Artificial Intelligence*	
Name and code: SW Validation in the Automotive Industry **Credits*: 3*** *NBWSW1HBNE* *Computer Science Engineering BSc* *2022/23 year II. semester*				
Responsible person of subject: Dr Ákos Csilling (Robert Bosch Kft)				
Subject lecturers: Imre Mészáros, Ádám Jezsoviczki				
Prerequisites (with code):	Comprehensive examination (NIXSS1EBNE)			
Weekly hours:	Lecture: 2	Seminar.: 0	Lab. hours: 0	Consultation: 0
Way of assessment (exam or midterm grade):	Midterm grade based on homework and written test.			

Course description:

Goal:
The rapid advancement in the automotive industry includes the increasing reliance on SW functions. Traditional functions are implemented in SW, and new functions are constantly added with increasing SW complexity. Autonomous driving will definitely need AI-based solutions, while the importance of safety and security are also growing.
The goal of the course is to introduce the audience to the SW and system validation and verification methodology used in the automotive industry, with insights from the daily work of engineers. The learnings from the course can be directly used in any other safety-critical, embedded, or large-scale development environment, where SW quality is important.

Course description:

In addition to an introduction to the systematic validation and verification processes used in the automotive industry, we will also discuss the new challenges and methods to tackle them.
The course will include plenty of real-life examples from the daily life of V&V engineers. Practical experience will be gained by the students through the homework assignments.

Lecture schedule	
Education week	*Topic*
1.	Introduction. Specific challenges of the automotive industry, the growing role of SW. Lifecycle of products, importance of testing. Typical automotive products.
2.	Personal aspects of testing, testing career paths. Project structure, actors. RASIC diagram.
3.	Automotive requirement systems, standards. Automotive development processes, ASPICE, v-model, model phases. The role of agility in automotive. Release process.
4.	Concepts, tasks, role of validation and verification (V&V). Test planning, tracking, documentation. Defect handling. Shift left.
5.	Static test methods in automotive, requirement verification, coding rules, and their verification. The value-add of review.
6.	Dynamic test methods. Requirement-based testing, delta testing. Selection of test methods. Levels of testing.
7.	Testing non-functional requirements: performance, stability, usability. Environmental tests.

8.	Test automation, virtual test environments, MiL, SiL, HiL, ViL, open-loop, closed-loop. Continuous integration and testing. Developing test environments.
9.	Functional Safety, ISO 26262, and its impact on testing.
10.	Cybersecurity requirements and their testing.
11.	Test metrics, coverage measurement, definition of done. Interpretation and use of test results. Acceptance testing, production (end-of-line) testing.
12.	Future of automotive testing, new trends, challenges. Testing of artificial intelligence-based systems.
13.	Test
14.	Test (spare)

Midterm requirements

Student participation in the lectures is required.
All homework and the classroom test are required to complete during the midterm.

Assessments schedule	
Education week	*Topic*
2	Homework: Choice of a SW development project, high-level description.
4	Homework: Definition of a test strategy for the project.
6	Homework: Review of the project requirements.
8	Homework: Test plan for the project, list of test cases.
10	Homework: Implementation of sample test cases.
12	Homework: Test report for the project.
13, 14	Multiple-choice test and spare date for retake.

Final grade calculation methods

Achieved result	Grade
89%-100%	excellent (5)
76%-88<%	good (4)
63%-75<%	average (3)
51%-62<%	satisfactory (2)
0%-50<%	failed (1)

Final grade = 0.5*theoretical test + 0.5*homework assignments
A minimum of 50% must be achieved in each part.

Type of exam

Type of replacement

References

Obligatory:
https://istqb-main-web-prod.s3.amazonaws.com/media/documents/ISTQB-CTFL_Syllabus_2018_v3.1.1.pdf

Recommended: -