Specification for the book of courses

Study program	Electrical Engineering and Computer Science		
Module	Common		
Type and level of studies	Doctoral studies		
The name of the course	Reliability Modeling of MOS Devices		
Lecturer (for lectures)	Danković M. Danijel		
Lecturer/associate (for exercises)			
Lecturer/associate (for OFE)			
Number of ECTS	10	**Course status (obligatory/elective)**	Elective

Prerequisites	
Course	Introduction to basic accelerated testing for lifetime estimation in MOS transistors.
Course outcomes	Theoretical knowledge. The ability to estimate the lifetime of MOS devices under normal operating conditions.
Course outline	
Theoretical teaching	Accelerated tests for lifetime estimation in MOS transistor. Methods of designing experiments. Bias temperature stressing of MOS transistor. The influence of bias temperature stressing on the electrical characteristics of the transistor. Modeling of electrical parameters of MOS transistors. Voltage (classical model based on linear extrapolation, VG model, 1/VG model, power-law model E-n) and temperature models for lifetime estimation of MOS transistors under normal operating conditions. Determination of the experimental lifetime values. Lifetime estimation - extrapolation to normal operating conditions. Analysis of the influence of the selection of the electrical parameter, the failure criteria, the range of selected voltages and temperatures, and the chosen model for lifetime estimation.
Practical teaching (exercises, OFE, study and research	
Textbooks/references	
1	Danijel Danković, „Nestabilnosti p-kanalnog VDMOS tranzistora snage usled naponsko temperaturnih naprezanja sa negativnom polarizacijom gejta“, Elektronski fakultet u Nišu, magistarska teza, 2006.
2	Danijel Danković, „Nestabilnosti komercijalnih VDMOS tranzistora snage usled naponsko temperaturnih naprezanja oksida gejta“, Elektronski fakultet u Nišu, doktorska disertacija, 2009.
3	Tibor Grasser, Editor, „Bias Temperature Instability for Devices and Circuits“, Springer, 2014, ISBN 978-1-4614-7909-3.
4	J.W. McPherson, Editor, „Reliability Physics and Engineering – Time-To-Failure Modeling“, Springer, 2014, ISBN 978-1-4419-6348-2.
5	M. Tahori, Editor, „Microelectronics Reliability, Special Section: Modelling the Negative Bias Temperature Instability“, Elsevier, 2018, ISSN 0026-2714.

Number of classes of active education per week during semester/trimester/year

Lectures	Exercises	OFE	Study and research work	Other classes
3	0	0	0	0

Teaching methods	Theoretical teaching, active role in the scientific-research projects, seminars and projects.

Grade (maximum number of points 100)

Pre-exam duties	Points	Final exam	Points
Activity during lectures		**Written exam**	
Exercises		**Oral exam**	50
Colloquia			
Projects	50		