DEPARTMENT OF CIVIL ENGINEERING

Course Details				
Code		**Academic Year**		**Semester**
BAU 351		3		**W.S-S.S**
Title		**T**	**A**	**L**	**ECTS**
System Technology		2	2	0	6

Language	German					
Level	**Undergraduate**	*	**Graduate**		**Postgraduate**	
Department / Program	Civil Engineering					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**		**Elective**	*		
Objectives	This course aims to provide a systematic understanding of the physical, logical, and cyber-physical components required for planning, constructing, and sustainably operating functional structures. The course intends to equip students with fundamental knowledge of model-based system philosophy and stochastic system analysis, enabling them to apply these concepts effectively in civil engineering practice. Additionally, the course aims to develop students' competence in analyzing structural components using computer-aided simulation methods.					
Content	- Random events in construction, random variables, random vectors, distributions - Descriptive statistics - Deciding on construction problems with certainty, uncertainty and risk - Systems theory - Classification of technical systems: structure, building technology, facade, expansion, etc. - Control of technical systems - Characteristic values for assessing technical systems - Interaction and dependencies of technical systems - Life cycle considerations of technical systems					
Prerequisites	-					
Coordinator	Prof.Dr. Murat Hamderi					
Lecturer(s)	Dr.-Ing. Timo Hartmann					
Assistant(s)						
Work Placement	-					

Recommended or Required Reading	
Books / Lecture Notes	
Other Sources	Engineering systems : meeting human needs in a complex technological world De Weck, Olivier L. ; Roos, Daniel ; Magee, Christopher L Cambridge, Mass. : MIT Press 2011. Siebertz, K., & van Bebber, D. (2010). Statistische versuchsplanung. T. Hochkirchen (Ed.). Berlin: Springer Berlin Heidelberg. Böker, F., Sperlich, S., & Zucchini, W. (2013). Statistikübungen für Bachelor-und Masterstudenten: ein Arbeitsbuch mit einer Einführung in R. Springer-Verlag. Hedderich, J., & Sachs, L. (2016). Angewandte statistik. Springer Berlin Heidelberg.

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Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	25	%
Engineering	25	%
Engineering Design	25	%
Social Sciences		%
Educational Sciences	25	%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment		
Activity	Count	Percentage (%)
Midterm Exam	1	40
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
Final Exam	1	60
	Total	100

ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	12	9	108
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	168
		ECTS Points (Total Work Load / Hour)	6

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Learning Outcomes	
1	Students learn techniques for simulating systems in civil engineering and apply simulation-based analysis methods.
2	Students develop the ability to design simulation models and conduct structured experiments using these models.
3	Students gain competency in developing and analyzing simulation models in R as part of a simulation project.
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Weekly Content	
1	Introduction
2	Philosophical foundations; Models in system design
3	Systematic design process
4	Computer Laboratory – Project Assignment 1
5	Model-based system development
6	Model-based system development
7	Stochastic and theoretical modeling in construction
8	Midterm Exam
9	Probabilities in civil engineering / Stochastic models
10	Data and distributions
11	Correlation and regression
12	Correlation and regression
13	Parameter spaces and experimental design
14	Parameter spaces and experimental design
15	Diversity and system design of civil engineering systems

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1	5	4	2	3	2	5	4

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2	5	5	2	3	3	5	4
3	5	4	2	3	2	5	5
4							
5							
6							
7							
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9							
10							
11							
12							
Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High						

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Date of Compilation:	28.02.2026