DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
BAU547	1			1
Title	**T**	**A**	**L**	**ECTS**
Whole Life Cycle Systems Analysis	3	-	-	6

Language	English					
Level	**Undergraduate**		**Graduate**	✓	**Postgraduate**	
Department / Program	Civil Engineering					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**		**Elective**	✓		
Objectives	To design civil systems, engineers need to satisfy a number of technical conditions, but also need to optimize the use of economic and environmental resources over the system's lifetime. During this module students will learn methods for designing civil systems under consideration of their life-cycle resource usage and environmental impact. To this end, students will get familiar with selected mathematical-analytical methods for engineering cost, risk, and multi-criteria comparison. Further, students will acquire in-depth knowledge about advanced risk management methods to understand possible system failures that may occur during the life of a product as well as how to capture systems deterioration during the lifetime. Students will also learn how to apply these methods in interdisciplinary engineering efforts by exploring the applicability of the methods for supporting collective decision making towards minimizing lifecycle costs and more importantly the environmental impact. Moreover, they will learn to think on various scales and consider various aspects related to systems integration within the environment and the existing built assets. To ground the theoretical part of the module, students will gain practical hands-on experiences modelling complex civil systems with the discussed techniques and methods using a rich practical case study project.					
Content	- Life-cycle assessment - Life-cycle maintenance planning - Multi-objective optimization - Economic and environmental resource estimation - Risk assessment and risk modelling - Collective Decision Making - Integrated life-cycle assessment					
Prerequisites	-					
Coordinator						
Lecturer(s)	dr. Lucian-Constantin Ungureanu					
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	-

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Other Sources	-
Additional Course Material	
Documents	-
Assignments	-
Exams	-

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

Assessment		
Activity	**Count**	**Percentage (%)**
Midterm Exam		
Quiz		
Assignments	10 reading assignments	30
Attendance		
Recitations		
Projects	3	70
Final Exam		
	Total	**100**

ECTS Points and Work Load			
Activity	**Count**	**Duration**	**Work Load (Hours)**
Lectures	14	2	28
Self-Study			
Assignments	10	4	40
Presentation / Seminar Preparation			
Midterm Exam			
Recitations			
Laboratory			
Projects	14	8	112
Final Exam			
		Total Work Load	**180**

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ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes	
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Weekly Content	
1	Introduction and Logistics, The ilities of Lifecycle
2	Markov Chain Modelling
3	Product Components and System Decomposition
4	Failure Probabilities and Fault Trees
5	Information Gathering
6	Value of Information
7	Life-Cycle Assessment
8	Maintenance Planing
9	Multi-Criteria Decision Making
10	Deterioration Modeling
11	Constraint Optimization
12	Multi-Criteria Optimization
13	
14	
15	

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

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1							

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Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	