

# SCHEDULE: Risk Assessment and Decision Support in Engineering (BOM125) – 2021

Sp 3, 7.5 hec

v. 2021-01-17

## Lecturers/supervisors

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Week 1 (3)						
Date	Time	Room	Activity	Description	Literature	Teachers
Tue 19/1	13:15-17:00	Zoom	<b>Lecture: Introduction to risk</b>	Basic concepts of risk and uncertainty	Handouts	AL
			<b>Introduction to course and project work, hand out of project work, presentation of teachers</b>	Learning outcomes, course content and structure	Handouts	AL
			<b>Sign up for project work groups</b>			
			<b>Lecture: The risk management framework and decision-making concerning risks</b>	Background and rationale of the risk management framework	Handouts, Rosén et al. 2007, ISO & IEC standards	AL
			<b>Lecture: Road safety and risk control</b>	The problem of traffic accidents and transports of hazardous goods	Handouts	LR
Thu 21/1	13:15-15:00	Zoom	<b>Lecture: Hydrogeological risks</b>	The problem of groundwater flow and transport of contaminants in groundwater. How to calculate the probability of a too short retention time in groundwater.	Handouts	LR
	15:15-17:00	Zoom	<b>Lecture: Stability risks in soil</b>	The problem of stability risks next to a river and water supply. How to calculate the probability of a landslide.	Handouts	MK
Fri 22/1	13:15-15:00	Zoom	<b>Lecture: Risk assessment of technical systems</b>	The problem, approaches for risk estimation in drinking water systems	Rausand & Hoyland	AL

Week 2 (4)						
Date	Time	Room	Activity	Description	Literature	Teachers
Tue 26/1	13:15-15:00	Zoom, SB-D080	Lecture and exercise: Fault tree and event tree analysis	Introduction to fault tree and event tree analysis. Basic exercises.	Rausand & Hoyland	AL
	15:15-17:00	Zoom, SB-D080	Computer-based exercise: Risk estimation of threats to a drinking water system	Software: Set up of basic fault tree and event tree models in Excel for the project work		AL, JN
Thu 28/1	13:15-15:00	Zoom	Lecture: Basic statistic inference	Hypothesis test, etc.	Handouts	JN
	15:15-17:00	Zoom, SB-D080	Project work and consultation: <ul style="list-style-type: none"><li>Calculations of risk levels using risk models</li><li>Descriptions of possible options for risk reduction</li></ul>	Project work on risk models and possibilities for consulting with teachers  Work on the models for risk calculation and identify possible mitigation alternatives to reduce the risks		AL, JN
Fri 29/1	13:15-14:00	Zoom, SB-D080	Lecture: Estimation of risk reduction using quantitative risk models	An overview of modelling risk reduction in technical systems. Examples of drinking water supply and transports of hazardous goods.	Handouts Lindhe et al. (2011)	AL
	14:15-15:00	Zoom, SB-D080	Project work and consultation	Finalise risk models		AL
Week 3 (5)						
Date	Time	Room	Activity	Description	Literature	Teachers
Tue 2/2	23:55		Hand-in of risk models [Assignment 1a]	To other group		
Thu 4/2	13:15-15:00	Zoom	Lecture: Overview of Decision Analysis, including CBA and MCA	A general description of decision analysis principles as well as Cost-Benefit Analysis and Multi-Criteria Analysis for comparing actions to reduce risks	Burgman Ch 12, MCA manual (2009)	YV
	15:15-17:00	Zoom	Lecture: Foundation of Cost-Benefit Analysis (CBA)	CBA framework	Burgman Ch 12, papers	NN
	23:55		Hand-in of review [Assignment 1b]	To other group		
Fri 5/2	13:15-15:00	Zoom, SB-D080	Exercise: Creating your own CBA model for the project work	Project work and consultation		AL, JN, YV

Week 4 (6)						
Date	Time	Room	Activity	Description	Literature	Teachers
Tue 9/2	13:15-14:00	Zoom, SB-D080	Lecture and discussion: Reflections on project work and uncertainties	Identification of uncertain parameters in the used models	Handouts	AL
	14:15-17:00	Zoom, SB-D080	Lecture and exercise: Introduction to Monte Carlo simulations	Software: @Risk + Excel + all models	Handouts	AL
			Lecture and exercise: Uncertainty and sensitivity analysis (part 1)	How to analyse uncertainty and sensitivity using @Risk	Handouts	AL
	23:55		Hand-in of updated risk models and draft outline of report (first draft) [ <i>Assignment 2</i> ]	To teachers		
Fri 12/2	13:15-15:00	Zoom, SB-D080	Feedback on hand-ins			AL, JN, YV
			Lecture and exercise: Uncertainty and sensitivity analysis (part 2) & Examples of applications	How to analyse uncertainty and sensitivity using @Risk	Handouts	AL
Week 5 (7)						
Date	Time	Room	Activity	Description	Literature	Teachers
Tue 16/2	13:15-17:00	Zoom, SB-D080	Project work consultation focused on uncertainty and sensitivity analysis	Project work and consultation		AL
Thu 18/2	13:15-17:00	Zoom, SB-D080	Individual/project work: Read risk assessment and uncertainty analysis papers	Papers to be discussed Tuesday 23 <sup>rd</sup>	Scientific articles	
Week 6 (8)						
Date	Time	Room	Activity	Description	Literature	Teachers
Tue 23/2	13:15-15:00	Zoom, SB-D080	Seminar 1: uncertainty and sensitivity analysis	<b>Compulsory!!</b> Discussion on uncertainty and sensitivity analysis	Scientific paper: Bergion et al (2020)	AL
	15:15-17:00	SB-D080	Project work: Finalise draft final report			
Wed 24/2	23:55		Hand in of report (draft final report) [ <i>Assignment 3a</i> ]	To other group		
Thu 25/2	13:15-15:00	Zoom, SB-D080	Lecture: Multi-Criteria Analysis (MCA)	MCA modelling and demonstration of Web-HIPRE	Burgman Ch 12, UK Treasury report	JN

Week 6 (8)						
Date	Time	Room	Activity	Description	Literature	Teachers
	15:15-17:00	Zoom, SB-D080	Exercise: MCA-modelling	Software: Web-HIPRE		JN, AL
Fri 26/2	13:15-15:00	SB-D309 SB-D409	Project work: Review of work by others			
Sun 28/2			Exam: Last day to sign up!			

Week 7 (9)						
Date	Time	Room	Activity	Description	Literature	Teachers
Mon 1/3	23:55		Hand in of review [ <i>Assignment 3b</i> ]	To other group		
Tue 2/3	13:15-17:00	Zoom, SB-D080	MCA workshop	Compulsory!!		JN, AL
Thu 4/3	13:15-17:00	Zoom, SB-D080	Project work: Update of report, preparation of presentation and opposition	Teachers available 13:15-14:15		AL, JN
Fri 5/3	13:15-15:00	Zoom	Seminar 2: discussion on the concept of risk	Compulsory!! Discussion on the concept of risk	Scientific paper: Aven (2010)	AL, JN
	23:55		Hand-in of reflections on MCA-modelling [ <i>Assignment 4</i> ]	To teachers		

Week 8 (10)						
Date	Time	Room	Activity	Description	Literature	Teachers
Tue 9/3	13:15-17:00	Zoom	Presentations and oppositions	Compulsory!!!		AL, JN, LR, YV
Fri 12/3	13:15-14:00	Zoom	Questions and examination preparations			AL
	14:15-15:00	-	Project work: Update and finalise project report			
	23:55		Hand-in of final report [ <i>Assignment 5a</i> ]	To teachers		

#### Additional important dates:

Examination 19/3, 14:00-18:00 (Sign-up no later than the 28<sup>th</sup> of February!)

Written feedback on project work from teachers 24/3

Hand-in of revised report (if needed to pass or for higher grade) 3/4 at the latest [*Assignment 5b*]