



*Course syllabus*

# Risikanalys inom brandteknik Risk Assessment in Fire Protection Engineering

**VBRN45, 7,5 credits, A (Second Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED BI/RH

**Date of Decision:** 2023-04-12

## General Information

**Compulsory for:** BI2

**Language of instruction:** The course will be given in English on demand

## Aim

The aim of the course is that, in combination with earlier courses, the students gain the capability of utilizing tools for risk assessment and how they can support decisions in the area of risk management and especially in the area of fire safety engineering. Furthermore, the course is aimed at providing a foundation for continuing studies in the risk management field.

## Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- be able to describe different perspectives of the concept of risk and be aware of the implications of adopting the different perspectives in a risk management context.
- be able to describe risk assessment methods, their areas of applicability, especially in the area of fire safety engineering and their strengths and weaknesses.
- be able to describe relevant risk measures, their limitations and strengths and how they can be applied to evaluate risks.
- be able to describe different types of uncertainty and how they can be addressed and handled in a risk assessment context.

- be able to describe how input from risk assessments can be utilised as a basis for decision-making and emergency preparedness planning.
- demonstrate an understanding of various sources of information that can be used and the challenges in using them as input to risk assessments.

#### *Competences and skills*

For a passing grade the student must

- be able to utilize, the concepts, methods and tools used in risk assessment, in new situations and in situations related to fire safety.
- be able to evaluate the contents of existing risk assessments.
- be able to report, both orally and in writing, and discuss the implications of a performed risk assessment in a way understandable to persons with different knowledge backgrounds.
- be able to utilise material in scientific publications relevant for risk assessment
- be able to utilise methods and tools for basic decision problems concerning risks.

#### *Judgement and approach*

For a passing grade the student must

- be able to critically reflect on the benefits and limitations of risk assessments as an input to decision making.
- be able to reflect upon ethical and subjective dimensions of risk assessments.

## Contents

The overriding elements in the course consist of: Introduction to the field of risk assessment and management, the concept of risk, risk assessment methodology within the field of fire safety engineering, uncertainty analysis, risk measures and risk evaluation.

During the course, a number of home assignments, are to be completed. The assignments are to be reported in written form and also in some cases orally.

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** The examination represents a combination of results of a written examination and home assignments. The home assignments will primarily focus on demonstration of understanding the theory. The written exam covers both questions of problem solving nature and those focusing more on understanding the theory.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

### **Parts**

**Code:** 0117. **Name:** Risk Assessment.

**Credits:** 4,5. **Grading scale:** TH. **Assessment:** Written examination. **Contents:** The aim of the course is that, in combination with earlier courses, the students gain the capability of utilizing tools for risk assessment and how they can support decisions in the area of risk management. Furthermore, the course is aimed at providing a foundation for continuing studies in the risk management field.

**Code:** 0217. **Name:** Project Assignments.

**Credits:** 3. **Grading scale:** UG. **Assessment:** Successfully completed home and project assignments (individual and group). **Contents:** During the course a number of home or project assignments are to be completed. The assignments are to be reported in written and for one assignment in oral form.

## Admission

**Assumed prior knowledge:** FMA430 Calculus in Several Variables or FMAB30 Calculus in Several Variables and TNX071 Statistics with Decision Theory or equivalent e.g. EXTA60 Statistics and VBRA06 Introduktion to Fire Safety Engineering

**The number of participants is limited to:** No

**The course overlaps following course/s:** VBR180, VRSN05, VBRN01

## Reading list

- Granger Morgan, M. and Henrion, M.: Uncertainty: A Guide to Dealing with Uncertainty in Quantitative Risk and Policy analysis. Cambridge, Cambridge University Press., 1990.
- Kaplan, S. & Garrick, B. J.: On the Quantitative Definition of Risk. 1981. Risk Analysis 1(1): 11-27.
- Paté-Cornell, M. E.: Uncertainties in Risk Analysis: Six Levels of Uncertainty Treatment. 1996. Reliability Engineering & System Safety 54: 95-111.
- Nilsson J: Introduktion till riskanalysmetoder, Rapport 3124. Brandteknik, Lund, 2000.
- Nystedt, F: Riskanalysmetoder. Brandteknik, LTH, 2000.
- Plan- och bygglagen , SFS 2010:900. 2010.
- Plan- och byggförordningen, SFS 2011:338. 2011.
- Boverkets allmänna råd om analytisk dimensionering av byggnaders brandskydd, BFS 2011:27 BBRAD3. Boverket, 2011.
- Boverkets byggregler. BBR.
- Davidsson G, Lindgren M, Mett : Värdering av risk. SRV Rapport P21-182/97. Karlstad, 1997.
- Fire safety engineering — General principles. 2017. ISO 23932, Utkast till teknisk specifikation 2017-03-24.
- Hurley M & Rosenbaum E : SFPE Handbook of Fire Protection Engineering., Performance-based design. 2016. Performance-based design, ch 37.
- Hadjisophocleous G & Mehaffey J : SFPE Handbook of Fire Protection Engineering., Fire scenarios. 2016. Fire scenarios, ch 38.
- Nilsson D & Fahy R : SFPE Handbook of Fire Protection Engineering, Selecting scenarios for deterministic fire safety engineering analysis: life safety for occupants. 2016. Selecting scenarios for deterministic fire safety engineering analysis: life safety for occupants. ch 57.
- Frantzich H : SFPE Handbook of Fire Protection Engineering, Health care application of quantitative fire risk analysis. 2016. Health care application of quantitative fire risk analysis. ch 85.
- Handbok för riskanalys. Räddningsverket , 2003.
- Wolski A, Dembsey N, Meacham B : Accomodating perceptions of risk in performance-based building fire safety code development. 2000. Fire Safety J, Vol 34, pp 297-309.
- Evans, A. W. and Verlander, N. Q.: What is Wrong with Criterion FN-Lines for Judging the Tolerability of risk. 1997. Risk Analysis. 1997. Risk Analysis 17(2): 157-168.

## Contact and other information

**Course coordinator:** Håkan Frantzich, hakan.frantzich@brand.lth.se

**Further information:** Active participation in group work is required. Each group member must be able to report and be responsible for the content individually. If a group member does not fulfill the requirements for active participation, or disregards his/her commitments, she/he can be reassigned by the examiner to another group or get a fail result.