Course memo
HN2022 - System Safety and Risk Management
2025 – Study period 1

Welcome to the course System Safety and Risk Management!

During this course, we review central terms and concepts related to system safety and risk management, and discuss how various risks in socio-technical systems can cause safety failure and workplace accidents. Furthermore, we study different risk management methods and tools for analysis, assessment, and evaluation of risks. The course also includes a group project where you are expected to identify and describe system safety risks and suggest actions for improved safety.

Overview of the Course
Start Date: August 26th, 2025
Duration: 9 weeks (weeks 35-43)
Location: Campus weeks (35, 38, and 41) & online/hybrid weeks
Learning Activities: Lectures, 8 seminars, group project, 4 reflection assignments.
Time Commitment: 7.5 credits, corresponding to 200 hours (20-22 hours/week).

Malin Håkansson, PhD, is responsible for the course in close collaboration with the safety specialist Josué Maia Franca and professor Mats Ericson. You are welcome to make contact via email, but you are encouraged to use a discussion forum in Canvas for general questions regarding the course, literature, or assignments where the answer may be of interest for all students.

You can find time, place and content for lectures and seminars in the *Detailed schedule* in Canvas. Please make it a habit to check in to Canvas regularly to stay informed of any changes. Notifications about important updates will also be sent through 'Announcements' in Canvas. Make sure to have set up your notifications to suit your needs. Here is a [KTH guide](#) on how to do that.

We look forward to the course and we hope that you will enjoy, learn, and have many new insights during the course.

Kind regards,
Malin Håkansson, Course coordinator, on behalf of the Teaching Team

The Teaching Team

Course Coordinator & Examiner
Malin Håkansson, PhD, Lecturer
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Teachers & Guest Teachers

Mats Ericson, Professor KTH
Josué Maia Franca, PhD, Safety specialist
Pernilla Ulfvengren, Associate Professor
Jimmy Estenberg, Specialist in risk communication and electromagnetic radiation.
Teaching assistants

Course Literature
A list of the mandatory course literature is attached as an appendix in this course memo. All material
is available online either as links or as files on the learnings platform Canvas. Some of the course
material is connected to the online course *Work and Technology on HumanTerms.* Detailed advice and
requirements about how to prepare for each learning activity are provided in the detailed schedule in Canvas.

Venue
The schedule is divided into **Campus weeks** (weeks 35, 38, and 41) and **Online/Hybrid weeks**. The
lectures and seminars on campus weeks will mostly be "live" at Campus Flemingsberg, Hälsovägen
11C, in Huddinge (Google Maps). Learning activities in the non-campus week will be offered online or as hybrid
teaching, see the detailed schedule in Canvas for more information. You can look up where the room/facility is
located through the KTH Facility Location tool.

When there is an opportunity to join online it will show up as '*Digital*' in the scheduling program TimeEdit and
as '*Zoom*' in the detailed schedule.

For the online seminars you need to log in using your KTH-id, by signing in via **SSO**. Instructions about how to log
in with your KTH account be found in the KTH online guide "Log in to Zoom". The Zoom link and tips about
Zoom are published in the first module in Canvas.

Intended Learning Outcomes (ILOs)

The overall course aim is that the student will reach an advanced understanding of system safety and risk management based upon system theory applied to safety and socio-technical systems. After the course, each student shall be able to:

1. Describe, exemplify and reflect about the system perspective and on human, technological and organizational aspects of the concept MTO.

2. Argue for and identify risks in socio-technical systems (MTO), both risk that contribute to the system safety failure as well as workplace accidents and events.

3. Describe, exemplify and reflect about risk management from an organizational perspective like safety management systems.

4. Analyse identified weaknesses in risk management processes and suggest improvements.

5. Analyse identified weaknesses in safety in a workplace, and suggest actions for mitigating risk and improvements.

6. Read, understand, and discuss international scientific publications in the area of system safety and risk management.

Examination and Completion

Examinations

The course is assessed with the grades A, B, C, D, E, FX, F and is based on written and oral presentation of a the project work (**PRO1**, 2.5 credits, A-F), active participation in exercises (**ÖVN2**, 2.0 credits, P/F), written assignments (**INL1**, 1.5 credits, P/F) and written examination (**TEN2**, 1.5 credits, A-F), see the Course Syllabus. In summary:

- **INL1** - Hand-ins, 1.5 credits, grading scale: P, F
- **PRO1** - Project, 2.5 credits, grading scale: A, B, C, D, E, FX, F
- **TEN2** - Exam, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- **ÖVN2** - Exercises, 2.0 credits, grading scale: P, F

Project Work Purpose and Procedures (PRO1, 2.5 credits)

The course includes a project work (*PRO1, 2.5 credits*) in which a domain of your own choice is investigated and reported upon. Your investigation should include a brief review of how key trends and developments within the field of system safety and risk management have evolved in the domain over time. Further, it should include common themes of accidents and current methods or interventions to make the domain safer.

The purpose of the project work is to provide a deeper understanding of system safety and risk management and how risks in complex socio-technical systems can be identified, analyzed, eliminated, and mitigated. The project work also aims at practicing your skills in analyzing and synthesizing scientific literature, disseminate your knowledge in a convincing manner and argue for relevant measures to improve system safety in an occupational setting.

The project work is done in groups of 3-4 students. The groups will be formed based on student interests expressed in the first mandatory project session during the second study week. In a discussion forum in Canvas, you are encouraged to search for project partners who share your interest in a certain domain in a discussion. Domains are, for example, the construction industry, aviation, maritime, rail, healthcare/patient safety, mining, petroleum, mining, or process industry. The final decision on groups and domains is taken by the examiner.

The work is presented in a written report, maximum of **12 A4 pages** including cover sheet, table of contents and references. The work is also presented as an *online lecture* presented to the other groups via Canvas with an accompanying online quiz. An overall disposition of your project work process in described in **Appendix 1.**

Detailed instructions for the project work, report design and presentation are available on the Canvas course page.
After completing the project, you are required to do individual evaluation of your project work, your collaboration, and what you have learned during the project.

The PRO1 (project work) module is intended to measure the progression of the student with regard to all six learning objectives and is judged based on how the student has completed the project assignment they have been assigned. The grading scale is A, B, C, D, E, Fx, F. All project works will be checked for plagiarism, see more under the heading *Referencing & Academic Integrity.*

Literature Seminars (ÖVN2, 2 credits)

Full attendance is required in the seminars, and active participation throughout each seminar is expected. The seminars (**ÖVN2 - 2 credits**) are graded *Pass/Fail*. Due to the purpose and nature of a seminar – to study and discuss a certain topic – a missed seminar cannot be substituted with a written assignment. If you for any reason should miss a seminar, you will be offered an opportunity to take a "re-seminar" at the end of the course. If the student misses more than one seminar the student needs to wait until the following year when the seminar is offered again.
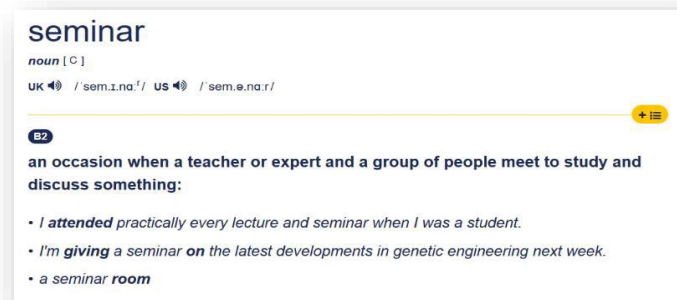

Figure 1. Definition of seminar, according to Cambridge Dictionary 2020.

It is important that you come prepared to the seminars to be able to take an active part. You are expected to read the literature and do any preparatory work before the seminar, so that our discussions are based on a solid understanding of concepts and theory. You can make the preparation in groups, but the hand-ins are individual.

Here is some advice to help you approach seminars:

- Check the *detailed schedule* and on Canvas to see if you are expected to do any preparatory work before the seminar, such as completing a specific task, reading a text or noting down questions on a topic. Also check the *submission dates* for the coursework.

- In the room, pick a seat that enables you to contribute to the discussion. We want to sit together. Unfortunately, the room are not always very suitable for round-table discussion but together we can make the most of it.

- *Be prepared to talk*. Seminars are places where questions are explored, topics are debated and analysed. You are expected to actively contribute to the discussion.

- *Be prepared to listen*. Pay attention to and respect the views of other students. You do not have to agree with your teacher and fellow students but listen first, then you are encouraged to clarify any points that need clarification and articulate your view.

- I addition to what is stated above: To be able to actively participate in online seminars it is your responsibility to **secure a quiet space** with a good internet connection. We expect that you have your camera on to promote interaction, that you are audible, that you monitor the chat, and that you take part in polls in Zoom. See tips about how to use Zoom in Canvas.

For the online seminars you need to log in using your KTH-account via SSO to get attendance, see more information about how to do that under the heading **Venue.**

Written Exam (TEN2, 1.5 credits)

The written exam in the course is an open-book exam (***TEN2 – 1.5 credits***) performed on a computer at campus where you have access to the mandatory course literature. The exam consists of about 4 to 5 open-ended essay questions. The exam is to be written individually. In your answers, justify your arguments by referring to literature, e.g. the articles you have read.

For the articles included in the mandatory course literature, you only have to mention the author(s) and publishing year, for instance (Aven, 2016). You are free to use all course literature when answering the exam questions. When you write direct quotes, use " " around the quotation and state the reference including page number.

Hand-ins (Assignments – ÖVN2, 1.5 credits)

The Hand-ins (*INL1 - 1.5 credits*) consists of written assignments with reflections related to the literature and learning activities. The grading scale is *Pass/Fail*. The assignments are published and submitted in Canvas.

Tips about Reflection Assignments

To help you learn and prepare for the reflection assignments, we encourage you to take notes and write down your reflections throughout the course and then synthesize your key learnings for this assignment (concerning the topic).

Examples of Guides to Reflective Writing

Critical Reflections - University of Waterloo.
Study Skills - University of Cambridge

Requirements for passing:
•Covering the basic areas related to the given task.
•Using literature and references to support their description and discussion of the given task.
•Giving the assignment a structure that makes it easy to follow and that the assignment has a concluding summary and conclusion*.

Referencing & Academic Integrity

The hand-ins, the project report and the exam in the course should be written in the student's own words with support from the mandatory course literature and relevant sources. To pass the students must, where required, relate to concepts/models/theories described in the mandatory course literature, supported by references in the text and in a reference list at the end according to an accepted reference system. In this course, we recommend you use APA 7th as a reference system (an author–date citation system). Learn more how to cite different type of source in this comprehensive and user-friendly online APA guide from Lund University.

All hand-ins and the exam will be checked for plagiarism. Failure to cite references in a correct manner can be interpreted as plagiarism and lead to negative consequences for you as a student. To learn more about how to steer away from plagiarism we recommend that you watch the film *Avoid plagiarism and cheating* [<4 min] about how to make a reference to your sources and avoid plagiarism from the KTH Centre for Academic Writing web page "Write references". There you can also find general tips about writing and referencing. More tips are found in the KTH handbook Guiding students away from plagiarism on how to avoid plagiarism. [Note that the English version of the PDF book starts on Adobe page 86].

Writing Resources

You are welcome to attend our voluntary workshops in the introduction course (CH2013) that we hope will help reinforce your skills for academic writing, reading, and learning (dates are found in the HN2022 schedule).

In the KTH Guide (online) to scientific writing in English you can find a collection of useful writing tips. The reference and writing guide Refero from Linnaeus University in Sweden can also be helpful for you.

If you want to start to refresh your academic writing skills this PDF-book about Academic Writing for Second Language Writers from Lund University can be a good start.

We also recommend that you check the KTH *Main Library calendar* to find lectures and workshops that can help you in your studies.

Coaching: If you struggle with academic writing or want to improve your writing, we suggest you make an appointment with a writing tutor at KTH's Centre for Academic Writing & Rhetoric (individually or as a group). Learn more about how to set up an appointment on this page.

Generative AI: In this course generative AI tools may be used in all examinations and graded assignments as long as the use follows the course guidelines, unless otherwise explicitly stated. More information is presented in **Appendix 3** and Canvas. **Note** that students must honestly disclose the use of any assistance, tools, resources, and references. If you are in doubt about what type of AI tool s are allowed, please ask your teachers.

Support for Students with Disabilities

If you have a disability, you can apply for compensatory support through KTH's Funka office. To learn more about how to apply visit the FUNKA website.

We hope that you will enjoy the course and learn a lot!

Best regards,
Malin Håkansson on behalf of the Teaching Team

Appendix 1 – Course Project Process

Disposition of your Course Project Work
Choose a domain you are interested in, and later a high-profile accident in that domain (not accidents that are extensively described in the course literature). The domain can be for instance aviation, health care, road traffic, rail, nuclear power plants, maritime, construction, or process industry. We want to have a good distribution of domains, so it will be first come, first served, if more than one group is interested in the same domain.

Literature review: Search for relevant scientific literature related to the field of safety and risk management in the domain.

Introduce the domain. Describe the current key trends and developments and how they have evolved over time. Naturally, aviation is a significantly younger domain than for example the maritime, so you must balance your information and decide what to describe and to which level of detail. Give examples of typical risks from an HTO perspective within the domain.

CAST accident analysis. Perform a CAST analysis (Leveson, 2011, 2019) on a high-profile accident. [One of the seminars is dedicated to CAST.]

Moving forward. Describe in your report: What are the current methods, tools or interventions that are applied to make the domain safer? Are these generic or specifically tailor-made to fit the domain? Examples of leading safety indicators. What can we learn from this domain that may be useful also for other sectors? Do you have any ideas about how system safety can be improved in the domain? The course literature can be of help here when presenting and discussing your findings.

Prepare an online lecture: The lecture should summarize your key findings and be supplemented with three 'test questions'. If you find a YouTube film that in a few minutes describes the accident you are analysing, you are welcome to include it in your lecture.

Resources: Visit KTH Flemingsberg's guide to booking group rooms. Links for group room bookings on KTH's other campuses are found at the bottom of the page.

Appendix 2 – Mandatory Course Literature

Akselsson, R. (2015). Safety and risk. In M. Bohgard et al. (Eds.), *Work and Technology on Human Terms*. Prevent.

Aven, T. (2016). Risk assessment and risk management: Review of recent advances on their foundation. *European Journal of Operational Research*, *253*(1), 1-13. https://doi.org/10.1016/j.ejor.2015.12.023

Berglund, M., Karltun, A., Karltun, J. & Eklund, J. (2015). HTO – A Concept on Humans, Technology, and Organisation in Interaction. In M. Bohgard et al. (Eds.), *Work and technology on human terms (pp. 1-22).*

Cook, R., & Rasmussen, J. (2005). "Going solid": A model of system dynamics and consequences for patient safety. *Quality & Safety in Health Care, 14*(2), 130-134. http://dx.doi.org/10.1136/qshc.2003.009530

Grote, G. (2015). Promoting safety by increasing uncertainty–Implications for risk management. *Safety science*, *71*, 71-79. https://doi.org/10.1016/j.ssci.2014.02.010

Harms-Ringdahl, L. (2013). *Guide to safety analysis for accident prevention*. IRS Riskhantering.

Hollnagel, E. (2014). Is safety a subject for science? *Safety Science*, *67*, 21-24. https://doi.org/10.1016/j.ssci.2013.07.025

Hollnagel, E., Wears, R. L., & Braithwaite, J. (2015). *From Safety-I to Safety-II: a white paper*. The Resilient Health Care Net.

ISO. (2018). *Health and safety at work - Are you ready for ISO 45001?* ISO focus March-April 2018. ISSN 2226-1095.

Leveson, N. (2011). *Engineering a safer world: Systems thinking applied to safety*. MIT Press.

Leveson, N. (2019). *CAST Handbook - How to Learn More from Incidents and Accident*s.

Pęciłło, M. (2016). The concept of resilience in OSH management: a review of approaches. *International journal of occupational safety and ergonomics*, *22*(2), 291-300. https://doi.org/10.1080/10803548.2015.1126142

Swedish Institute for Standards. (2023). *Occupational health and safety management systems - Requirements with guidance for use. (SS-EN ISO 45001:2018, IDT).* https://www.sis.se/en/produkter/environment-health-protection-safety/occupational-safety-industrial-hygiene/ss-en-iso-450012023/

WHO (2002). *Establishing a dialogue on risks from electromagnetic fields. World Health Organization.* https://www.who.int/publications/i/item/9241545712

Suggested further reading can be found in the course Library in Canvas. You are further expected to search for and read additional scientific articles related to your project work. Suggested databases to search in are *Web of Science, Pubmed, Ergonomics Abstracts, and Scopus* (list of databases KTH Library).

Appendix 3 – Course specific information about the use of generative AI

Generative AI tools may be used in all examinations and graded assignments as long as the use follows the course guidelines, unless otherwise explicitly stated. You are also advised to follow the course guidelines for non-graded assignments. The guidelines for the use of generative AI are designed to promote learning and the fulfillment of the course learning objectives.

In this course, students are expected to demonstrate professional credibility and ethics, which means taking responsibility as the author of risk assessments - it is important for the public and your clients that you are accountable for true and accurate work.

Guidelines for the use of Generative AI

Generative AI may be used in the course's examination and graded assignments as long as you use it in a manner that is:

- responsible
- ethical
- academically honest

We expect you to take responsibility as a professional and stand as the true author who can guarantee the quality of your work. One example of how to fulfill these guidelines is to be transparent with your use of generative AI, which means that your use must be disclosed. You will find more course-specific examples under the heading "Examples of permitted use".

Note that the guidelines must be followed for examination and graded assignments, but you are advised to also follow them outside of examinations and for non-graded assignments.
Further information about the ethical use of AI can be found in this Student Course on Generative AI.

Examples of Permitted Use

Below are examples of permitted use of generative AI in this course. Consult your teacher if you are considering other areas of use.

- **Text editing and translation**: We encourage you to use generative AI to improve the quality of your writing, correct errors, and increase readability. It is good to get practice using tools in this way, since you will likely use tools like this in your professional life.
  - *Restrictions:* You may only translate sentences or words, not entire paragraphs. You must work further with the idea suggestions; you cannot use the generated answer directly.

- **Coaching:** Ask an AI tool to generate study questions, or ask it to give a summary of writing errors you make and should work on.

- **Idea generation:** Use AI to get inspiration, structure thoughts, or formulate questions to research further. However, it is always good to think independently first, so that the AI tool does not limit your perspective

Note! Remember to critically review material created by generative AI. **You, as a student, are fully responsible** for all material you submit and *must be able to defend and explain it completely* without support from generative AI.

Examples of Prohibited Use

Below is a description of the use of generative AI in examination and graded assignments that is considered unauthorized assistance, attempted deception, or cheating. This is **not** a complete list, always consult your teacher if you are unsure whether your use is permitted.

- **Complete assignment solution:** AI may not be used to generate entire assignments, reports, or other text.

- **Translation without review:** entering translated text into a report without first reviewing it to ensure its correctness is not acceptable.

Disclosure of AI use

To ensure academic transparency, you must disclose whether and how generative AI has been used in your work. Please include the following disclosure statement at the end of your submitted assignments. Even if you have not used AI tools, you still need to include it, but you can simply state that no tools were used.

To better understand which tools involve generative AI, please see the Student course on generative AI. If you are in doubt whether an app involves AI, it is best to disclose its use and how you used it.

The following structure is recommended for declaring what AI tools you have used and for what purpose:

Tool name: (for example, ChatGPT, Canva, Grammarly)

Purpose and Contribution: (e.g., brainstorming, drafting, data analysis, generating an initial draft, providing data insights).

(Add more lines as necessary for additional tools used.)

I hereby declare that the above information is accurate and that I have disclosed all AI-generated content that directly influenced or contributed to this academic work. I understand that failure to disclose AI tool usage accurately may be considered a violation of academic integrity policies. This assignment submission represents my own original work.

Student signature

Disciplinary Action for Unauthorized Use of AI

Everything you submit must be your own work – even if generative AI is used as support, the thinking and conclusions must be your own. You must therefore understand the rationale and logic behind the text, and must be able to both answer questions about it or write an outline of it if asked to do so.

Using generative AI in an unauthorized way for examination and graded assignments is considered an attempt to mislead and **may lead to disciplinary action**. Therefore, be sure to follow the information on this page and disclose your use of generative AI.

Questions or concerns?

Contact the course coordinator for guidance and clarification of this information, or if you are wrongly accused of unauthorized use of generative AI in the course's examination and graded assignments.

Disclosure

This information is based on a KTH template and adapted to this course.