Steinbeis Transfer Institute
Advanced Risk Technologies (R-Tech)
Steinbeis University Berlin, Germany

European Master and Certification Program in

Risk Engineering and Management

www.sti.risk-technologies.com - www.stw.de - www.steinbeis-hochschule.de

Steinbeis Transfer Institute
Advanced Risk Technologies

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Steinbeis University Berlin SHB

Founded in 1998, Steinbeis University Berlin (SHB) is a state-approved private university that offers students and companies practice-oriented, extra-occupational higher education based on the project competence concept, leading to nationally recognized qualifications. The research carried out by SHB focuses on issues with practical applications. The SHB portfolio of courses ranges from certification courses to degrees and doctoral programs. During the competence developing Steinbeis degrees students manage and implement projects in the company sponsoring their studies.

SHB is an enterprise in the Steinbeis Network, an international service provider in entrepreneurial knowledge and technology transfer. Specialized in chosen areas, Steinbeis Enterprises' portfolio of services covers consulting; research and development; training and employee development as well as evaluation and expert reports for every sector of technology and management.

www.steinbeis-hochschule.de

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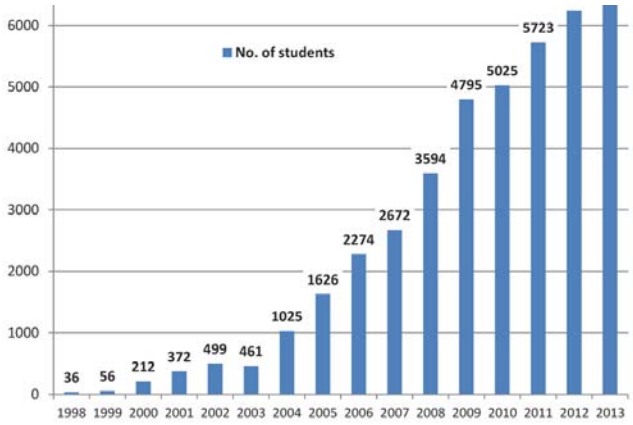
ABOUT THE MASTER & CERTIFICATION PROGRAM

An education program that will boost in your academic development and professional career

The education and certification carried out by the SHB (Steinbeis University Berlin - Steinbeis Hochschule Berlin) focuses on issues with practical applications. The SHB portfolio of courses ranges from professional certification courses to degrees and doctoral programs. Today more than 6,000 people follow the "study and work concept" at SHB. So far, the university has educated over 7,000 competent graduates.



Total number of students enrolled at SHB institutes

SHB strongly believes in the concept of Project Competence. The key priority is the constant focus on business needs underpinned by a solid establishment of academic knowledge and scientific theory. In line with that, the program is designed for and dedicated to people in full time employment ("study & work" concept), to graduates, interns and young professionals. The student is working on a project at the sponsoring company and together with that the professional and academic educational tracks are well-aligned and going hand-in-hand.

The MASTER and CERTIFICATION Program in Risk Engineering and Management of Steinbeis University Berlin (SHB) is envisaged to match the current needs of industry, Research & Development and regulators in the areas of safety of complex industrial systems, asset/plant and health/hazard oriented risk management, European and international regulation/standards and risk governance as well as many other topics covering risk communication, risk analysis and management techniques.

The MASTER und CERTIFICATION program in Risk Engineering and Management has been based on several international as well as European industrial projects whereby the curriculum design is compatible with the needs of the respective projects. These projects have involved a number of companies such as ESKOM, NIS, Gazprom, INERIS and Universities, for example, of Stuttgart, Bologna, Magdeburg, Pisa, Padua, the Norwegian University of Science and Technology and other education institutions.

Interested in studying-while-working?

If yes, our PKS (Project Competence Concept) is the right solution for you: you will study not only after work but also during the work.

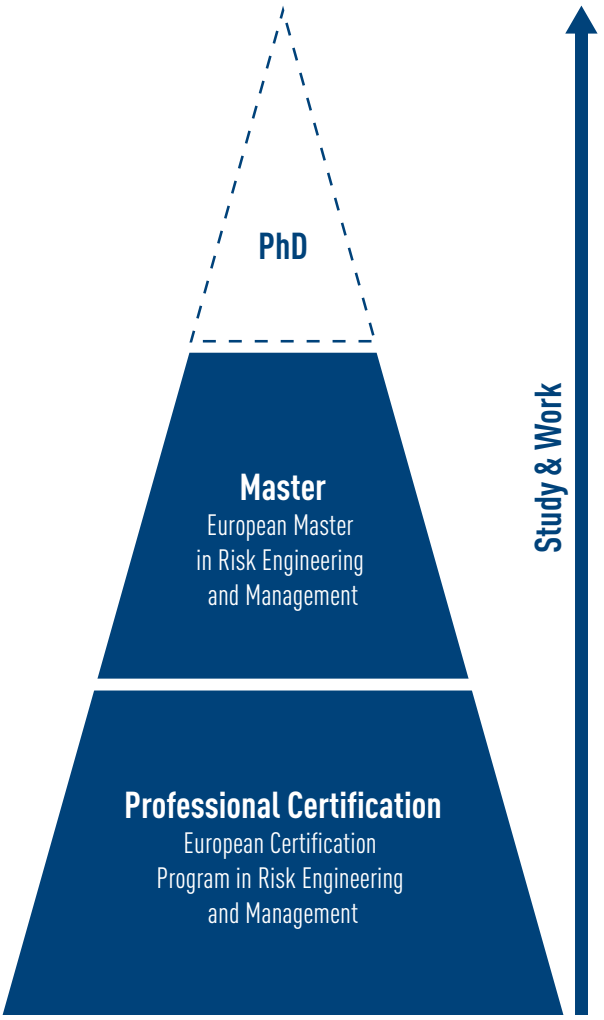
How?

Your work provides the topics for your study papers and your master thesis. You analyze problems appearing in the company you work for and you deal with anyway – and you embed this into your study. So you work for your company and for your master thesis at the same time.

What do you get?

You receive support continuously: Both in form of lectures and in personal talks with your professors. With this support you move towards your master title smoothly.
Our conception involves:

- *Highest possible flexibility*
- *Knowledge transfer at the highest level*
- *Committed and best-rated professors*
- *Practice transfer and innovative learning methods*



From Certification to the Master

Both MASTER and CERTIFICATION programs are state-acknowledged in Germany. The whole activity is accompanied by on-the-job training which reiterates the Steinbeis educational model, based on the principle of the German "dual/integrated education" ("study & work").

Within the curriculum, the currently offered programs are:

1. **MASTER in Risk Engineering and Management (M.Eng.):**
   Approx. 40 courses in 6 main Modules (120 ECTS) covering:
   - **Introduction to Risk** – general concepts, emphasis on the petrochemical and power industry
   - **Assets Risks** – plants, systems and equipment orientation, emphasis on petrochemical and power industry
   - **HSSE Risks** – Health, Safety, Security, Environment; hazard oriented risk management
   - **Business/governance Risks** – concepts and practical application of business and governance oriented risk management
   - **Speciel (specific) Risk Topics** – additional risk related optional courses
   - **Master thesis** and **projects** aligned with on-the-job training
2. **Professional CERTIFICATION programs**
   Seven tracks providing certificates for the titles of:
   - **Risk Professional** - any module of the curriculum
   - **Risk Examiner – HSSE** – Health, Safety, Security and Environment (HSSE) specialization
   - **Risk Examiner – Plant/Asset/Equipment** – Plant, asset and equipment oriented risk management specialization
   - **Senior Risk Assessor – HSSE** – Health, Safety, Security and Environment (HSSE) specialization
   - **Senior Risk Assessor – Plant/Asset/Equipment** – Plant, asset and equipment oriented risk management specialization
   - **Risk Professional RBI** – basics concepts of Risk Based Inspection
   - **Risk Examiner RBI** – advanced methods and tools of Risk Based Inspection

The courses in the curriculum are also offered to single companies and individuals interested in specific topics and in earning certificate in the above topics.

The MASTER and CERTIFICATION Program by **Steinbeis Transfer Institute Advanced Risk Technologies** (STI R-Tech) is a part of SHB. STI R-Tech runs most of the courses offered, coordinates activities with participating universities and is responsible to ensure compliance with the Study and Examination Regulations of SHB. STI R-Tech is based in Stuttgart, Germany.

The language of study is English.

The program welcomes students from all over the world, that creates a unique international atmosphere and benefits for the students.

EUROPEAN MASTER IN RISK ENGINEERING AND MANAGEMENT

Degree: **Master of Engineering (M.Eng.)**
Field: **Advanced Risk Technologies**
Specialization: **Risk Engineering and Management**

The Concept

If you are looking for a program which gives you a competitive advantage in your career by combining theoretical with practical, the Master in Risk Engineering and Management at STI R-Tech is the best-fit for you! Risk issues in a modern, fast developing industrial world are main topics of the theoretical part of study, while the other half is based on work in real projects within companies.

The program is designed for graduates, interns and young professionals who wish to develop their knowledge, skills and competences in the fields of modeling, formulation, analysis and implementation of simulation for advanced risk problems as well as skills for understanding these approaches in the broader context of engineering science. Students will benefit from a leading group of academics and an exciting international environment. Students may take the Master as a distinctive step in their professional career or in preparation for a Ph.D. degree.

Lecturers of courses are selected from leading experts in corresponding fields. They possess both academic and practical background which provides the genuineness of the study program. This combination allows students to absorb working theory fast and to gain skills for practical implementation. During the project work selected coaches and a supervisor will guide the student in order to correctly transfer methodological knowledge acquired from courses to solve practical challenges in the company.

In terms of curriculum and organization the Project Competence concept goes way beyond conventional degrees. The projects are set to facilitate integrated technology transfer, whereby the students gain new skills as a part of their studies and apply their new knowledge in everyday risk issues by supplying deliberate, pertinent and theoretically sound solutions to business problems. At the same time the projects allow the students to specialize in specific areas during their degree. This in turn promotes individual goals and motivation of the students throughout their entire degree program.

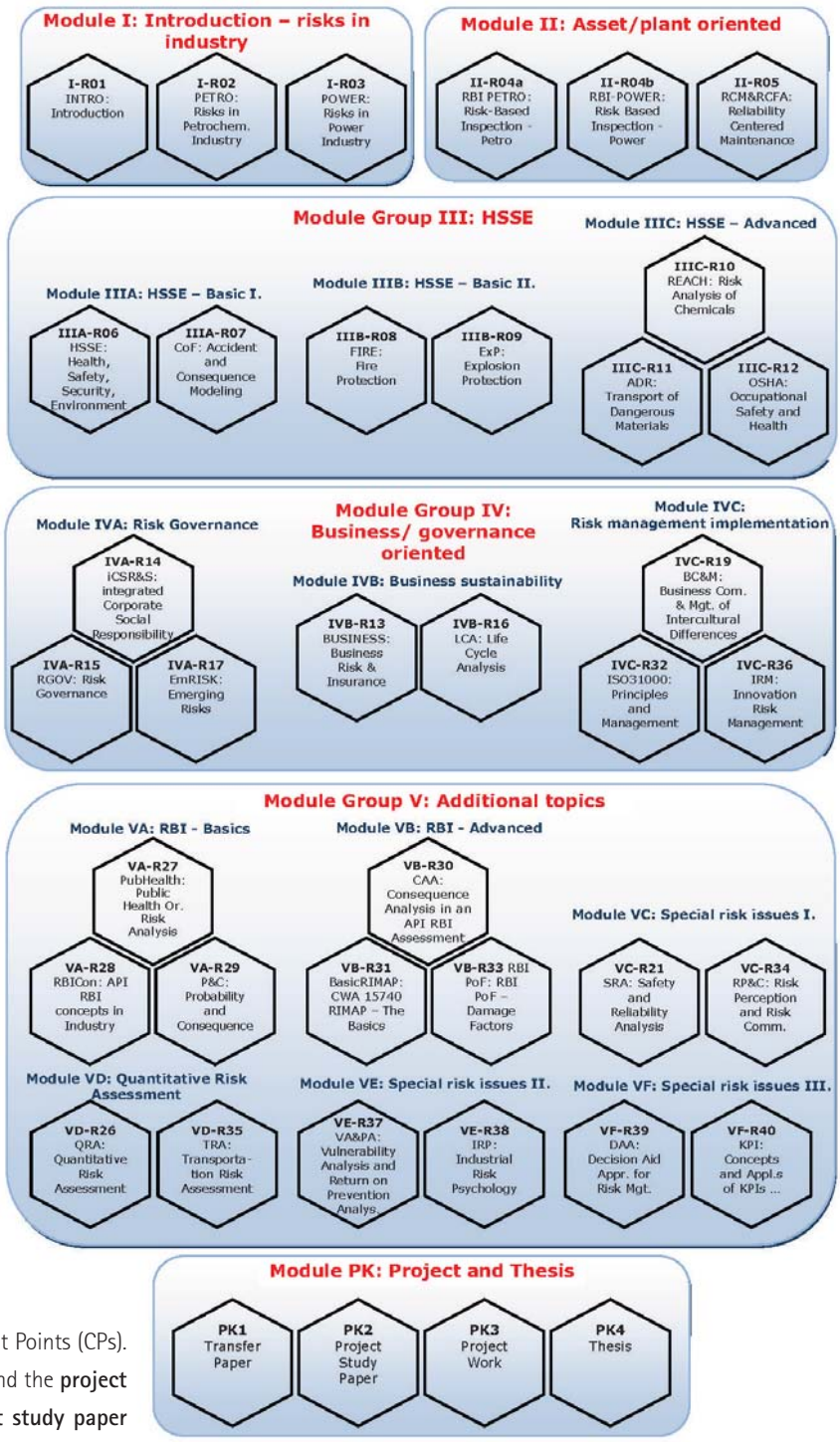
The career prospects for graduates of the Master in Risk Engineering and Management program are exceptionally good because of the great and increasing need on the market for risk professionals with technical and managerial skills, combined with past working experience. Upon completion of the program, graduates can start/continue their career as risk managers, engineers, inspectors, legislators, project managers, IT managers, safety and risk assessors in the fields of industrial engineering, process engineering, financial risks, risk psychology, etc.

By enrolling their best employees, companies invest into the future development of their personnel, resulting in innovation of new ideas and success.

Courses and CPs

The **modular structure** of the study enables the student to schedule her/his timetable according to obligations at work. Besides compulsory courses there is a great variety of optional modules. The 2-year program includes five comprehensive thematic modules with **compulsory and optional courses** worth 60 Credit Points (CPs). These courses are combined within six major modules and the **project work** (to be performed in the second year). The **project study paper** and the **Master Thesis** are the final and tangible product of the project work. After the admission to the program each student receives a personalized study schedule where the optional courses are defined. The whole program of the courses as well as the thesis and project work are aligned with the project and the student's academic and company supervisors.

In general most of the courses in the curriculum last five days. The exams are usually scheduled on the fifth day and cover all specific topics of risks which were reviewed throughout the course. Learning methods include lectures, review of literature, interactive problem-solving, individual and group exercises, as well as in some cases web-based self-learning support.



Master Study Modules & Courses

Examination

The examination may involve:

1. Written examination: up to 120 minutes written paper with 4 kinds of questions (true/false, multiple/single choice, short answers, essay/calculation, examples)
2. Oral examination: up tp 60 minutes verbal discussion, optional presentation included
3. Presentation: up to 20 minutes with visuals
4. Publishables papers
5. Case studies

6. Project Study Paper: up to 20 pages, topic specified by the project and student's supervisors
7. Transfer Paper: 1 page, applying theory studied in a course onto the company's situation, to be written after each completed course

Degree

On a successful completion of the program, Steinbeis University Berlin will award the degree **Master of Engineering (M.Eng.)** with the specialization in **Risk Engineering and Management**. The degree is issued by Steinbeis University Berlin which is approved and acknowledged by the state since 1998.

Fees

The tuition fee covers the full study period of 4 semesters, is paid per semester and covers the costs of all courses, course materials, consultations and individual coaching. Travel and lodging costs are not included in this tuition fee (full tuition fee 2013 was 18,800 €). For further information regarding fees, please contact STI R-Tech directly.

Admission

The admission process involves 5 steps:

Step 1: Expression of interest by the student (incl. CV, letter of motivation and e-copy of main certificates: university degree certificate, transcript, secondary school diploma)

Step 2: Preliminary eligibility check by STI R-Tech

Step 3: Full application (application forms filled out, certified copies of certificates, and, if needed, an interview)

Step 4: Aptitude test (e-based) and/or approval test (oral)

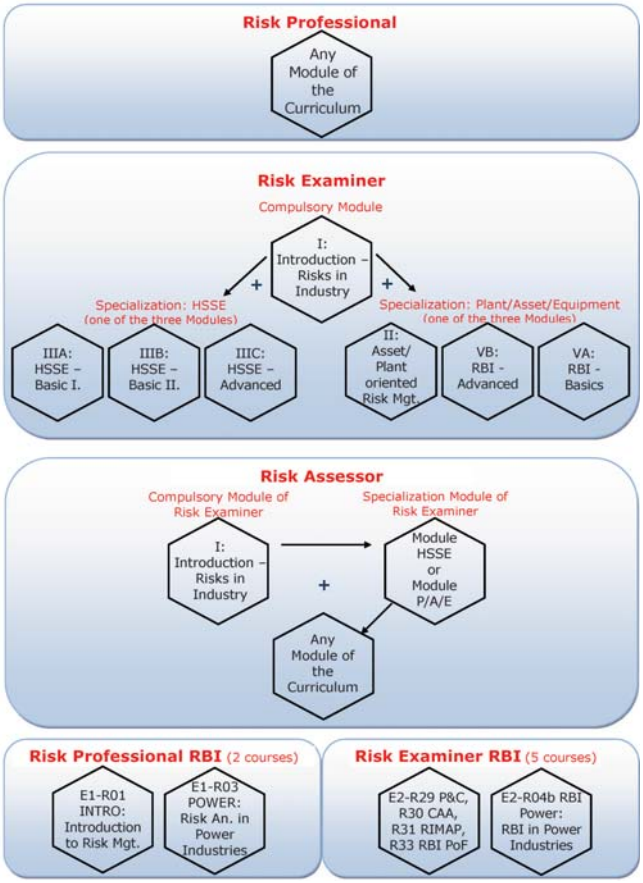
Step 5: Enrollment (project specification form and study admission form)

Admission requirements

- Bachelor of Science or Engineering (with a minimum of 180 ECTS Credit Points) or an appropriate science degree recognized in Germany
- Above average grade in previous studies (≥2.4 in the German grading system)
- Good knowledge of English certified (C1 level or equivalent)
- Successfully passing the aptitude and approval test

EUROPEAN PROFESSIONAL CERTIFICATION PROGRAM IN RISK ENGINEERING AND MANAGEMENT

The professional certification program runs in parallel to the Master in Risk Engineering and Management, it is managed by STI R-Tech and supported by industry involvement in different industrial risk management projects. The program is envisaged as an unique professional qualification scheme which will allow building and setting up a standard for experts dealing with risk management and engineering in different fields on a global level.



Certification Study Modules & Courses

The certification program offers to students an opportunity to develop specific knowledge and skills for assessment and analysis of risks in their respective actual or future professional field (e.g. health and safety, Risk Based Inspection, environment, risk governance, industrial safety and law, etc).

The program includes seven certification schemes for the titles displayed below. For the title **Risk Professional** the candidate can choose any (single) module from the overall curriculum of courses. For the **Risk Examiner** as well as **Risk Assessor** titles, there are two tracks of specialization: Hazard Oriented Risk Engineering and Management in Industry (HSSE) and Plant Oriented Risk Engineering and Management in Industry (Plant/Asset/Equipment). To become a Risk Examiner one must complete the introductory module and one of the three specialization modules (2 modules in total). To further specialize and deepen knowledge the candidate may decide to have one additional module of the curriculum in order to receive the Risk Assessor title (in total 3 modules).

Additionally there are two modules available in the Certification Program, specialized in Risk Based Inspection (RBI). The **Risk Professional RBI** title consists of 2 basic courses related to introductory concepts and applications in power industries. Moreover the **Risk Examiner RBI** title is offered, too, and can be achieved by taking five more advanced RBI-related courses.

There is also an opportunity to align the completed certification tracks/ modules/courses with those of the Master program. If someone wishes

to enroll as Master student, it is possible to add the completed certification courses into the structure of the Master's. For additional information, please contact us directly.

Steinbeis University Berlin has officially approved this certification program in September 2011 under the title **Certification training program (ZLG)** in the area of **Advanced Risk Technologies, Engineering and Management (ARTEM)**.

ON-THE-JOB TRAINING IN PROJECTS ("STUDY & WORK")

Both besides and included in the Master and Certification Program, STI R-Tech launches professional training in the field of Risk Engineering and Management within the framework of numerous European and international industrial projects. In the confines of hands-on training participants get involved in on-site project work including professional training in companies assigning the project. Below you can find some of these projects, running and finished.

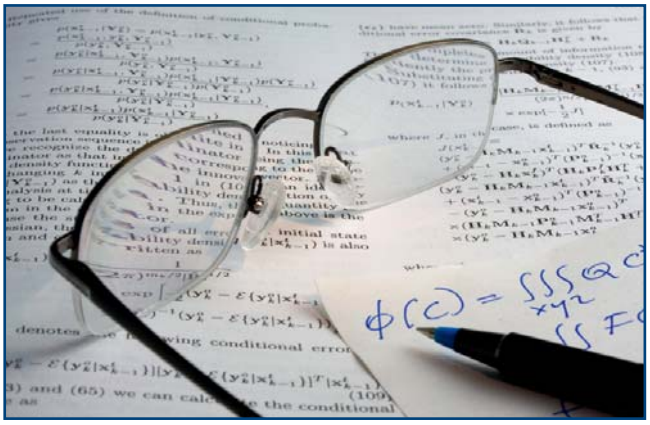
Example: RBI in Power Plants in South Africa

When the OHS Act Vessels Under Pressure (VuP) regulations were changed to Pressure Equipment Regulations (PER) in line with the European practice in July, 2009, the power companies familiarised themselves with the requirements of these regulations and started developing the appropriate compliance strategies for the company. This led to the initiation of the Risked Based Inspection programmes. As an alternative to the periodic pressure tests and inspection interval requirements, the PER offers an option of implementing a certified Risk Based Inspection (RBI) programme as part of a plant life cycle management strategy. The compliance will support the business in ensuring that legal, statutory and regulatory requirements are properly understood and best practice is applied in the management of safety and plant integrity risks.

Example: RBI in Petrochemical Industry

Risk management and use of risk-based approaches in inspection, maintenance and HSE analyses of petrochemical plants in Serbia.

The objective of the project is to establish and implement an up-to-date asset management system for fixed equipment which allows mastering a cost effective maintenance, is „auditable" to any regulatory inspections, and ensures life cycle safety and reliability operation of present static and rotating equipment, as well as safety systems. The diagnostic and monitoring system of the equipment is assigned to provide advices for safety operation and minimize unscheduled shutdowns or losses in production, i. e. the used methodologies as tools should supply an updated knowledge of the equipment conditions allowing a forecast of the expected life and an extension to the maintenance cycles, together complying with the national regulatory requirements and the EU legislative environment.



The courses, over 40 of them, are scheduled during the whole year. They are grouped in 5 tracks and lead the participant from introductory and basic risk issues to very specific risk topics. The participant can build his own professional profile by earning one of the certification titles as an addition to his/her professional experience.

Example: EU-poject PROMISLingua

PeRformance Operational and Multilingual Interactive Services to support Compliance for SMEs in Europe (finished) | **www.promislingua.eu**

The overall aim of the PROMISLingua Pilot project is the translation, localisation and implementation of the existing PROMIS® online service (at the moment available in English, German and Italian) in additional six languages and markets (Spanish, French, Portuguese, Greek, Romanian, Hungarian). The project aims at shortening the time-to-market of PROMIS® and delivering a cost-efficient and easy-to-use Internet based service for Safety, Health, Environment and Quality (SHE-Q) management via multilingual translation and innovative support services to SMEs.

Example: EU-project iNTeg-Risk

Early Recognition, Monitoring and Integrated Management of Emerging, New Technology related Risks | **www.integrisk.eu-vri.eu**

iNTeg-Risk is a large-scale integrating project aimed at improving the management of emerging risks, related to „new technologies" in European industry. This is being achieved by building new management paradigm for emerging risks as a set of principles supported by a common language, agreed tools & methods, and Key Performance Indicators, all integrated into a single framework. The project aim is to reduce time-to-market for the lead market EU technologies and promote safety, security, environmental friendliness and social responsibility as a trademark of the EU technologies. The project goal is to improve early recognition and monitoring of emerging risks and decrease reaction times if major accidents involving emerging risks happen.

Example: DEG-project SafeChina

Promoting the EU and German standards and practices of Environmental Protection and Industrial Safety in China (finished) | www.safechina.risk-technologies.com

The project aims to build a sustainable education service in China offering the engineers and relevant professions to learn about the EU HSE practices and regulation and qualify as Environmental- and Safety engineers according to EU criteria, guidelines and practice. It is financed by DEG - Deutsche Investitions- und Entwicklungsgesellschaft mbH (the German investment and development agency) and realized by the Steinbeis University Berlin represented by Steinbeis Transfer Institute Advanced Risk Technologies.

MAIN LECTURERS

Lecturers of the courses are leading experts in their corresponding fields. They possess both academic and practical background, which provides the genuineness of the study program. This combination allows students to absorb working knowledge fast and to gain skills for practical implementation and relevant problem-solving. Take a look to an excerpt from the lecturers list below.

Prof. Dr. Valerio Cozzani

Professor at the Faculty of Engineering and member of the Department of Chemical Engineering, University of Bologna. More than 10 years of research experience in the fields of safety of chemical plants and of environmental technologies. Several memberships, among others member of the Editorial Board of the Journal of Hazardous Materials.

Prof. Dr. Aleksandar Jovanovic

Full professor at University of Novi Sad, Director of R-Tech, CEO of European Virtual Institute for Integrated Risk Management (EU-VRi) and EU Project Director at ZIRIUS (Center for Interdisciplinary Risk and Innovation Studies, University of Stuttgart). He has a long-year professional experience in the area of innovation management, new technologies, business risk management, structured project management, etc.

Prof. Dr.-Ing. habil. Ulrich Krause

Full Professor and department director of Plant Design and Process Safety at the Otto von Guericke University Magdeburg, Germany. Member of the Int. Assoc. Fire Safety Science, Int. Forum of Fire Research Directors (2007 – 2011) and Head of Technical and Scientific Advisory Board at the German Fire Protection Assoc. His expertise is in plant safety and fire and explosion protection.

Prof. Dr. Dr. h.c. Dirk Linowski

Director of the Institute of International Business Studies and Full Professor at the Chair of Asset Management at Steinbeis University Berlin, Germany. In addition, permanent guest professor in Corporate Finance and Financial Economics at the Tongji University in Shanghai, in Financial Risk Management at the Shanghai Normal University, China, and in International Finance and Financial Risk Management at the Riga Graduate School of Law, Latvia. Among his expertise are topics such as applied mathemathics, financial economics, accounting and financial risk management.

Prof. Dr.-Ing. habil. Karl Maile

Acting director of the Material Testing Institute and full professor of the University of Stuttgart, Germany. Visiting Professor at the North China Electric Power University. His main research fields are material science, testing and quality assurance, life assessment of industrial plants; surface technologies. He has more than 300 publications in those topics. Prof. Maile is member and panelist of several organisations such as DGM, VdEh, VGB, national standardization bodies.

Prof. Dr. Dr. h.c. Ortwin Renn

Full professor and Chair of Environmental Sociology and Technology Assessment at Stuttgart University in Germany. He directs the Stuttgart Research Center for Interdisciplinary Risk and Innovation Studies (ZIRIUS) and the non-profit company DIALOGIK, a research institute for the investigation of communication and participation processes in environmental policy making. His research interests are risk governance, political participation and technology assessment.

Olivier Salvi, M.Sc. (Dipl. Eng.)

International Business Development Manager at INERIS in France, General Manager of EU-VRi in Germany. His professional working area is the development of RTD activities and cooperations at international level, as well as participation in European projects. His expertise is on the fields of risk analysis and risk assessment, including hazard identification methods, systemic approaches, modelling of accidents, risk regulations at EU level and international reference documents (OECD, UNEP).

Dr. Reto Schneider

Head of Emerging Risk Management at Swiss Reinsurance Company (Swiss Re). In this function he is responsible for collecting early notions of Emerging Risks and horizon scanning. His expertise is in assessing General Liability and Product Liability risks in various industry segments ranging from Life Science to Oil and Petrochemical companies. He holds a diploma in cell biology and a PhD in natural sciences of the Swiss Federal Institute of Technology in Zurich.

CURRICULUM

Define yourself the program of your study!

Select courses of your interest according to thematic modules and the course types. See the more detailed course profiles at www.sti-risk-technologies.com > Master study > The curriculum

Module PK: Project

Credit Points: 60 | Module type: compulsory

Throughout the course of the program, the students work on an admitted project (basis: project specification, project criteria, project work,) in their companies or organizations (project client), which is supervised by certified project coaches.

PK1: Transfer Papers (TA)

Transfer paper (TA) is an evidence of the students' ability to specifically transfer and utilize the knowledge obtained in a course attended in their projects or companies. The TA shall be prepared after the course and shall be presented in coordination with the responsible lecturer. The assessment of the TA is carried out by the responsible lecturer and further by a SHB examiner. It complements to the final grade.

PK2: Project Study Paper (PSA)

Credit Points: 9

In the Project Study Paper (PSA) the students transfer and utilize the methods and knowledge acquired within the scope of the programs. PSA has to have at least 20 pages in writing and it is submitted by a student as a rule. The PSA is presented and defended by the student in front of examiners.

PK3: Project Work (PA)

Credit Points: 33

During the study, a student works on a project (project work, PA) in his company or organization (project client). This work is a basis for master thesis which the student has to submit at the end of his study program.

PK4: Thesis

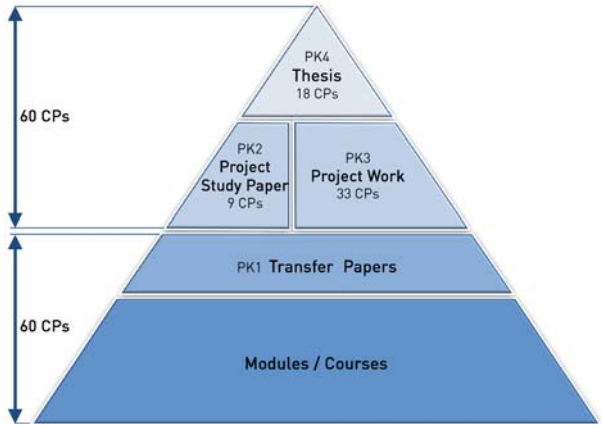
Credit Points: 18

The thesis is a practice-oriented, scientifically prepared document which reflects the knowledge and skills a student has acquired throughout the study program and applied to a project relevant for his occupational environment. The thesis shall prove the student's ability to solve the specific problem in his/her company in an autonomous and methodical manner. As a rule, the project is defined and specified together with the student, the project client and the coach of the SHB upon the start of the study program (project specification).

Module I: Introduction - Risks in industry

Credit Points: 9 | Course type: compulsory

The module includes three compulsory courses, covering risk management principles and risk analysis techniques in different industrial plants. The emphasis is on topics such as EU directives on industrial safety, major accident prevention, risk assessment methodologies applied to petrochemical and power industries, as well as environmental and human health hazards. The courses encompass the theoretical basics for rules and regulations, risk identification and analysis methods, on the other hand numerous examples demonstrate the milestones and recent events concerning industrial safety and security.



Where the CPs come from

I-R01 INTRO: Introduction to Risk Management

The course covers the main topics of industrial safety, starting with different aspects of risks and terminology used in the field. The main part of the course is dedicated to related EU directives. The course outlines goals, scope and required measures / obligations considering acute (accidents) and chronic (pollution) risks. Special focus is given to major accident prevention and related process safety risk assessment methodology.

I-R02 PETRO: Risk Analysis in Petrochemical Industry

The petroleum industry is changing rapidly, challenging many organizations and individuals to keep pace and distinguish opportunity from risk. This course presents current global and regional issues in petrochemical industries. Topics include risk aspects and methods for hazard identification applied in petrochemical industries, probability and consequences analysis, risk assessment and safety and environment issues related to petrochemical industries.

I-R03 POWER: Risk Analysis in Power Industries

Knowledge of risk analysis applied specifically in power industry, starting with advantages and effectiveness of its application. It presents the regulatory basis and requirements, and elaborate commonly used methods through number of examples.

Module II: Asset/plant oriented risks management

Credit Points: 8 | Module type: compulsory

Three optional compulsory courses compose the second module. The asset and plant oriented risk management firstly introduces principles

of Risk Based Inspection in petrochemical and power generation industries dealing with the most important risk-based approaches in line with the main standard documents such as API RP 580 and API 581. The courses about RBI offer a state-of-the-art knowledge on methods and tools applied. Second, the module discusses methodologies for decision-making processes in maintenance and accident prevention. These are well illustrated by a number of instances from different industries.

II-R04a RBI-PETRO: Risk Based Inspection in Petrochemical Industries

The course elaborates on risk issues in petrochemical industries and explains principles of risk based inspection. It deals with existing risk-based approaches and gives links to applied codes and standards. The focus of the course is given to the main reference documents of American Petroleum Institute: Recommended Practice for Risk-Based Inspection (API RP 580) and Base Resource Document on RBI (API Publication 581) API 581.

II-R04b RBI-POWER: Risk Based Inspection in Power Industries

The state-of-the art knowledge of risk based approaches are presented which are currently applied in power generation industries by a wide range of professionals involved in different activities in conventional power generation.

II-R05 RCM&RCFA: Reliability Centered Maintenance and Root Cause Failure Analysis

Reliability Centered Maintenance (RCM) and Root Cause Failure Analysis (RCFA) are methodologies used for logical decision-making process for analysis and definition of the equipment maintenance requirements, as well as for accident prevention. The focus of the course is on damage mechanisms appearing in different industries. A large number of well elaborated examples is included.

Module III-A: HSSE – Basic I

Credit Points: 6 | Module type: compulsory

The module concentrates on two main issues; the overview of EU regulation in the field of HSSE and on techniques for accident modeling.

III-A-R06 HSSE: Health, Safety, Security and Environment

The course gives an overview of EU regulation in the field of HSSE (Health, Safety, Security and Environment), explanation of the objectives and requirements, as well as state-of-the art in the implementation including constraints and advantages. Special focus is: - on the integrated pollution prevention and control (IPPC) as defined in the new Industrial Emissions Directive (Directive 2010/75/EU) and the former IPPC directive (Directive 2008/1/EC), - on the prevention of major accidents (Directive 96/82/EC on the control of major-accident hazards - so-called Seveso II Directive).

III-A-R07 CoF: Accident and Consequences Modeling

General techniques for accident modeling and explanation of different models of explosion. It elaborates gas and vapor explosion, as well as gas dispersion modeling, using examples for applied methods. The course includes modeling of fire and presents current models.

Module III-B: HSSE – Basic II

Credit Points: 5 | Module type: optional compulsory

The module concentrates on two main issues; the overview of EU regulation in the field of HSSE and on techniques for accident modeling.

III-B-R08 FIRE: Fire Protection

The course starts with the theory of fire and extinguishment, and thoroughly explains fire protection principles. Further, the course gives details related to the fire protection concepts including legal background and requirements with special focus on industrial fires and risk analysis. The course introduces basic principles and application of fire modeling, explains the phenomenon of a fire and gives an overview of the fire models and their hierarchy and discusses particular models, including numerical. The theoretical part is complemented with number of examples, including calculations that illustrate the use of different fire models.

III-B-R09 ExP: Explosion Protection

The EU directive ATEX is presented in details, along with the principles of explosion prevention and protection adopted in this directive. Its practical application in the industrial plants is explained on a series of real life examples.

Module III-C: HSSE – Advanced

Credit Points: 5 | Module type: optional compulsory

Principles of chemicals regulation, legislative requirements and policies of dangerous materials transportation and general principles concerning the prevention of occupational risks are the main themes of this module.

III-C-R10 REACH: Risk Analysis of Chemicals

Principles of the EU regulation in the area of registration, evaluation and authorization of chemicals – REACH (EC Nr. 1907/2006 and amendments). The course explains principles and obligations for

manufacturers, importers and downstream users to ensure that they manufacture, place on the market or use such substances that do not adversely affect human health or the environment.

III-C-R11 ADR: Transport of Dangerous Materials

International and EU policies and legislative requirements related to the transport of dangerous materials and explains the European Agreement concerning the International Carriage of Dangerous Goods. The course elaborates on the main issues from ADR 2013 as well as safety measures and procedures in case of accidents.

III-C-R12 OSHA: Occupational Safety and Health

The course aims to explain the EU regulations in the field of safety and health of workers at work. Main topics include general principles concerning the prevention of occupational risks, the protection of safety and health, the elimination of risk and accident factors, the informing, consultation, balanced participation in accordance with national laws and/or practices and training of workers and their representatives, as well as general guidelines for the implementation of these principles.

Module IV-A: Risk Governance

Credit Points: 8 | Module type: compulsory

This module includes risk governance topics such as the corporate social responsibility applications to industrial companies, the International Risk Governance Framework and its elements as well as emerging risks analysis.

IV-A-R14 iCSR&S: Integrated Corporate Social Responsibility and Sustainability

The course presents basic elements of the concept of Corporate (Social) Responsibility (CSR) and its practical application in industry. It starts with Key elements of the CSR, focuses on CSR methodologies and tools and on the technology related aspects as a part of the modern practices of industry (HSE, HSSE). Analysis/comparison of the practices in the EU, US and other countries and relevant data and information on best practices worldwide are elaborated, including a number of relevant case studies from the key industries and references to main sources of relevant data and information. A particular unit of the course is dedicated to new ISO 260000 standard.

IV-A-R15 RGOV: Risk Governance

Principles of modern risk governance including its main elements (ef. IRGC framework): a) pre-assessment, b) risk appraisal, c) risk characterization and evaluation d) risk management and e-risk communication. Apart from each of the elements (e.g. under „Risk Assessment": hazard identification and estimation, exposure and vulnerability assessment, risk estimation, exposure and social concerns, socio-economic impacts) the examples from industrial practice will be shown and explained. A separate part of the course will be dedicated to the overview of specific methods and techniques (e.g. Delphi), as well as to the tools and instruments facilitating the application by industry, governments and public bodies.

IV-A-R17 EmRISK: Emerging Risks

The course introduces and transfers knowledge on emerging risks, and management of emerging risks. As „emerging" are considered primarily risks previously not recognized risks as such; for instance risks due to new processes, new technologies, new ways of working or social and organizational change (e.g. risks linked to nanotechnologies, bio-technology, new chemicals, outsourcing, globalization, etc). In addition the known risks emerging due to the change in public perception or new scientific knowledge are considered as well.

Module IV-B: Business Sustainability

Credit Points: 5 | Module type: optional compulsory

The Business Sustainability module, on one hand, deals with linkages of engineering activities and their impact on business. On the other hand it shows the environmental sustainability of different products and services, by using LCA applications.

IV-B-R13 BUSINESS: Business Continuity Risks & Insurance

Complement to other courses devoted to technical and engineering issues of risk management in industrial plants (petrochemical plants, process industry, power plants, etc.). Technical risks in the above plants can be a cause or a contributing factor in/for the business continuity and the final outcome of engineering activities is practically always to be seen on the background of business implications and impacts to the business activities of a company. The insurance aspects are the most relevant practical aspect linking the engineering and business side of the company operation and asset management: therefore these will be tackled, too.

IV-B-R16 LCA: Life Cycle Analysis and Assessment

The course gives participants the opportunity to improve their knowledge about Life Cycle Assessment (LCA) and to gain the skills to perform simplified LCA studies and to analyze, discuss and comment international scientific articles on LCA. The course will provide a comprehensive overview of the Life Cycle Assessment (LCA), Life Cycle Costing (LCC), International Reference Life Cycle Data System (ILCD) and European Reference Life Cycle Data System (ELCD). The focus will be on practical examples of applying LCA in industry and improving the environmental performance and sustainability of products and services.

Module IV-C: Management Implementation

Credit Points: 5 | Module type: optional compulsory

The three courses in this module proceed from general (intercultural) management concepts to risk management and the management of innovative new technologies.

IV-C-R19 BC&M: Business Communication and Management of Intercultural Differences

In the times of ever increasing globalization, cultural differences and multilingual issues play an important role in the area of business communication which can easily fail on apparently banal issues. This could be of particular importance also in collaborative international projects. The purpose of this course is exactly to assure that engineers, managers and IT experts can understand the importance of these aspects for the success of their collaboration with partners from other cultural background. In order to recognize, apprehend and manage cultural and international differences, a holistic and cognitive approach will be used throughout the training.

The course is open for any individual or Small- and Medium-sized Enterprise that is interested in the topic.

IV-C-R32 ISO31000: ISO 31000 Principles and Management

The course covers the International Standard of ISO 31000:2009 in detail which is codified by the International Organization for Standardization (ISO). The course is dedicated to elaborate on the relationship between the risk management principles, framework and process as described in this International Standard as well as touches upon the Standard's applicability in industry.

IV-C-R36 IRM: Innovation Risk Management

The development of new products and technologies is a risky and uncertain process. The success of the new technology does not lie just in the invention part or in the generation of innovative ideas, but in the successful management of the innovation process from an idea to products and services in the market. The management of innovation is a rigorous process which includes a disciplined, stage-by-stage approval process combined with regular measurement of every critical factor, ranging from the capability of the product to reach the target characteristics to success in the market.

Module V-A: RBI - Basics

Credit Points: 5 | Module type: optional compulsory

The module encompasses diverse themes of health oriented risk analysis, then goes deeper into Risk Based Inspection; concepts, regulation and the PoF inspection planning in petrochemical industry.

V-A-R27 PubHealth: Public Health Oriented Risk Analysis

The course covers the main topics of health oriented risk analysis with different aspects of risks and terminology used in the field. The main

part of the course is dedicated to the related actions used in overall analysis (assessment, perception, communication etc.). Furthermore, the course is illustrated by a number of examples, presents commonly used methods, in particular the issues like (1) Basics of Risk: Analysis, Assessment and Management, (2) Risk Analysis in Perspective (Measures of Risk), (3) Dose-Response Functions, (4) Risk Perception and Communication, (5) Variability and Uncertainty, (6) Cumulative Risk Assessment, (7) Risk Assessment, Management and Law and (8) Application to Public Health- WHO Methodology.

V-A-R28 RBICon: API RBI Concepts in Industry

The focus of the course is given to the standard of American Petroleum Institute API 581 (API RECOMMENDED PRACTICE 581:2008 Risk-Based Inspection Technology) and its application in petrochemical industry. The course elaborates the basic concepts of API 581 and explains the principles of Risk Based Inspection.

V-A-R29 P&C: Probability and Consequence of Failure of Equipment

The focus of the course is given to the RBI approach to the inspection planning in petrochemical industry as defined by the standard of American Petroleum Institute API RECOMMENDED PRACTICE 581:2008 Risk-Based Inspection Technology (API 581).

The course provides quantitative procedures to establish an inspection program for pressurized fixed equipment by using risk-based methods. The procedure includes calculation of probability and consequence of failure, risk analysis and inspection planning based on the assessed risk. The pressurized fixed equipments covered by this course are pressure vessels, piping, tankage, pressure relief devices and heat exchanger tube bundles.

Module V-B: RBI - Advanced

Credit Points: 5 | Module type: optional compulsory

Along the introductory courses of Risk Based Inspection, this module presents the state-of-the-art tools and techniques of RBI in both, petrochemical and power industries.

V-B-R30 CAA: Consequence Analysis in an API RBI Assessment

This course construes how to calculate the consequence of failure as defined by API RP 581:2008 Risk-Based Inspection Technology. The course starts with general definitions aiming to ensure better understanding of the main topics of the course. Methodology for calculation is always illustrated with examples.

V-B-R31 BasicRIMAP: CWA 15740 RIMAP - The Basics

The focus of the course is given to the document, CWA (CEN Workshop Agreement) 15740: 2008, Risk-Based Inspection and Maintenance Procedures for European Industry (RIMAP). It aims to explain reasons to develop the European procedure, differences and advantages in comparison to API RBI methodology.

V-B-R33 RBI PoF: RBI Probability of Failure - Damage Factors

The focus of the course is on damage mechanisms appearing in different industries and their influence to the calculation of probability of failure of equipment. A large number of well elaborated examples are included.

Module V-C: Special Issues I

Credit Points: 5 | Module type: optional compulsory

Special issues on qualitative and quantification techniques of safety and reliability analysis as well as perception and communication of risk.

V-C-R21 S&RA: Safety and Reliability Analysis

This course presents the basic theory for safety and reliability analysis. The starting point is definition and discussion of basic concepts related to reliability and risk analysis. Then qualitative techniques like functional analysis, FMECA and identification and evaluation of faults and hazards are introduced. The next step is to introduce familiar quantification techniques like reliability block diagrams, fault- and event tree analysis, and Markov methods. Special attention is paid to safety-critical systems (IEC 61508) where analysis of systems with common cause failures is important. The course ends with methods for estimation of failure rates and a survey of reliability data sources.

V-C-R34 RP&C: Risk Perception and Risk Communication

This course presents theoretical backgrounds and state-of-the-art research issues on perception and communication of risk. It aims to provide a solid basis for further developments of such work tasks by including theoretical achievements in the related fields, various examples from field work, and an internal training exercise. The understanding of communication processes and the improving of information and communication techniques related to risk and hazards are central themes of the course. The course will also provide insight into selected historical aspects as well as current topics and literature. Lecturing is complemented with exercises based on experience of focus group work.

Module V-D: Quantitative Risk Assessment

Credit Points: 5 | Module type: optional compulsory

Calculation of risk indexes with the focus onto domino effect, Na-Tech accidents and transportation of hazardous substances is the topic of this specialist module.

V-D-R26 QRA&A: Quantitative Risk Assessment and Advanced Applications

The course presents an introduction to Quantitative Risk Analysis, thus illustrating the necessary steps for the calculation of risk indexes. Practical approach to frequency calculation and consequence assessment, including vulnerability models, will be discussed. A specific focus on domino effect and accidents triggered by Natural-Technological (Na-Tech) events will be presented.

V-D-R35 TRA: Transportation Risk Assessment

The aim of the course is the introduction to transportation risk analysis. The risk assessment of road, rail and pipeline transportation of hazardous substances will be illustrated. The approaches to frequency calculation, consequence assessment, and risk assessment will be discussed. Case studies will be carried out to illustrate the calculation and the use of individual, societal and other advanced risk indexes.

Module V-E: Special Issues II

Credit Points: 5 | Module type: optional compulsory

Further risk analysis methods and risk psychology of organizations.

V-E-R37 VA&PA: Vulnerability Analysis and Return on Prevention Analysis

Vulnerability Analysis is a prerequisite to a risk assessment. Coupled with return on prevention analysis it could serve as an essential step in risk management and future scenarios development, giving managers and risk specialists a powerful decision assisting tool. This course aims to build up competences regarding vulnerability analysis in industry based on the current best practice in EU, as well as to provide basic knowledge regarding Return on Prevention Vulnerability analysis. Return on Prevention assessment gives the efficiency of the money and resources invested. The course presents the latest methodologies and instruments and also the latest stage of art.

V-E-R38 IRP: Industrial Risk Psychology

This course deals with a new approach – psychology approach to the employees, workplaces, and organization's risks. Industrial risks as positive – psychology approach (IRP-PA) contribute to an organization's success by improving the performance and well-being of its people and technological process. An IRP psychologist researches and identifies how risks can improve behaviors and attitudes by using risks through hiring practices, training programs, and feedback systems. IRP psychologists also help organizations transition among periods of change and development.

Module V-F: Special Issues III

Credit Points: 5 | Module type: optional compulsory

Different decision approaches for safety management and KPIs related to new, emerging technologies are elaborated in the module.

V-F-R39 DAA: Decision Aid Approaches for Risk Management

Decision making is a process where multiple factors interact to shape the final outcome. Those factors can be technical, informational, emotional/psychological and cultural. Nevertheless, the limited rationality of economic operators makes the decision exercise more and more difficult in a more and more complex world. Safety management requires short, mid and long term decisions that may highly influence the ability of the organization to cope with its risks.

V-F-R40 KPI: Concepts and Applications of Key Performance Indicators for New Technologies

The course addresses the issue of Key Performance Indicators (KPIs) as used in the safety and risk assessment, in particular for assessing and managing emerging risks linked to New Technologies. Main concepts developed by organizations like OECD, API, HSE/HSL, CCPS or VCI are presented in detail. Application of these and other concepts, as well as the corresponding guidelines, are discussed in the second part of the course, where also the practical aspects of these applications, including tools and practical views from industry on the use of indicators are presented and discussed.

HOW AND WHEN TO APPLY

Applications to the Master and Certification Program are open through out the whole year. General enquiries and applications are handled via **sti889@risk-technologies.com**.

For admissions and enrollment advice contact:
Ms. Roswitha Kokejl
rk@risk-technologies.com

CALENDAR OF COURSES

Review and select to the intensive courses of your interest from the portfolio and expand your professional knowledge in Risk Engineering and Management. By learning from highly qualified lecturers and by actively participating in course exercises your participation will help you bringing innovative ideas to your company. Upon successful completion of courses and modules you will be able to earn certificates or credit points.

Course schedule

You can find the list of currently scheduled courses at the web page **www.sti.risk-technologies.com**.

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