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

INTERNATIONAL. EUROPEAN. GERMAN.

European Master (M.Eng.) and Certification Program in

REM - Risk Engineering and Management

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

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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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WHY SHOULD YOU RELY ON STEINBEIS ?

The Steinbeis University Berlin (SHB) is the largest state-approved private university in Germany. Built on the ground-breaking intuition of Ferdinand von Steinbeis who invented in the 19th century a dual education combining academic study and practical work, the SHB has implemented its business-oriented technology transfer "Project Competence Concept". From the Bachelor study up to doctoral degree, more than 11,500 graduates have benefitted from the SHB's practice oriented higher education.

The Steinbeis Transfer Institute Advanced Risk Technologies is part of the Steinbeis University Berlin and dedicated for risk management activities. Building upon the success of the Group and its network of European, national and large-scale industry projects, the Institute is committed to transfer its know-how and holistic understanding to new generations of experts and leaders. The integrative approach and application-oriented study linked to industry and research projects are the cornerstones of the study programs offered by the Institute.

- **Founded in 1998**
- **State-approved**
- **+7000 Students**
- **+11 500 graduates**
- **Accredited**
- **Specialized in practice-oriented, extra-occupational higher education**

PHD PROGRAM

See the results of your doctorate work applied

In 2003, the SHB is bestowed the right to offer PhD programs. The Project Competence PhD also adheres to dual education principles in parallel to work. PhD students must work on a research project within a company or organization sponsoring them. The project must be approved and supervised by the SHB while the research forms the basis of the dissertation, underpinned by optional seminars on related subjects and compulsory colloquia to monitor progress.

Same as for the masters' degrees, the Institute for Advanced Risk Technologies might support you to find a 3-5 years projects which will finance your PhD and set the framework for your researches.

- **Financed**
- **3 to 5 years**
- **International network**
- **Mentored by field experts**
- **Focus on real world challenges**

The costs for the research project will be determined in the contract between the Institute of Advanced Risk Technologies and the sponsoring organization. The research project costs can be paid by the sponsoring organization.

3 MASTERS' DEGREES

- **Master of Risk Engineering and Management**
  M.Eng | 2 years |120 ECTS
- **Master of International Business and Risk Engineering**
  M.Eng. | 2 years | 120 ECTS
- **Master of Business Administration**
  MBA | 2 years | 90 ECTS

Being paid to study: an admission requirement

The Project Competence Concept ,based on the German dual education system, is implemented in every degree offered by the SHB. In concrete terms, students willing to enroll must have a sponsoring company or organization. They work for two years on a project in their companies and gather every 4 months for 1 month courses.

Through the real world projects mentored by industry experts and providing tangible outcomes, the two year project in the sponsoring company gives students the tools, competencies, network and confidence they need to boost their career as well as the support to finance their study.

PROFESSIONAL CERTIFICATION PROGRAM

8 Titles to be obtained

The certification program offers the opportunity to develop specific knowledge and skills for assessment and analysis of risks in their respective actual or future professional field. The specialization is obtained in parallel with full employment

The completed certification courses can be aligned with those of the Master program. If the candidates wish to enroll as Master students, the completed certification courses will be transferred into the structure of the Master.

For additional information, please visit our website or contact us directly.

1. **Risk Professional** - any module of the curriculum
   [5 ECTS – 13 Days]
2. **Risk Examiner** – Health, Safety, Security and Environment (HSSE) specialization
   [13 ECTS – 34 Days]
3. **Risk Examiner** – Plant, asset and equipment oriented risk management specialization
   [13 ECTS – 30 Days]
4. **Senior Risk Assessor** – Health, Safety, Security and Environment (HSSE) specialization
   [18 ECTS – 43 Days]
5. **Senior Risk Assessor** – Plant, asset and equipment oriented risk management specialization
   [18 ECTS – 39 Days]
6. **Risk Professional in Risk Based Inspection** – basics concepts of RBI
   [5 ECTS – 8 Days]
7. **Risk Examiner in Risk Based Inspection** – advanced methods and tools of RBI
   [9 ECTS – 21 Days]
8. **Risk Governance Specialist**
   [24 ECTS – 30 Days]

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 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 competencies 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 transfer methodological knowledge acquired from courses to solve practical challenges in the company.

Part of our commitment to the highest quality standards goes through the external assessment of our study programs. Furthermore, the accreditation ensures the international recognition of the earned degrees.

- The study programs have been accredited by ZEvA (Central Evaluation and Accreditation Agency) for the period 2016-2020
- The Institute is ISO 9001:2008 certified by ZDH-ZERT
- The Steinbeis University Berlin is state-approved

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, safety and risk assessors in the fields of industrial engineering, process engineering, financial risks, risk governance, etc.

Degree
Master of Engineering (M.Eng.)

Field - Specialization
Advanced Risk Technologies - Risk Engineering and Management

120 ECTS

Program form
Extra-occupational (Study & Work)

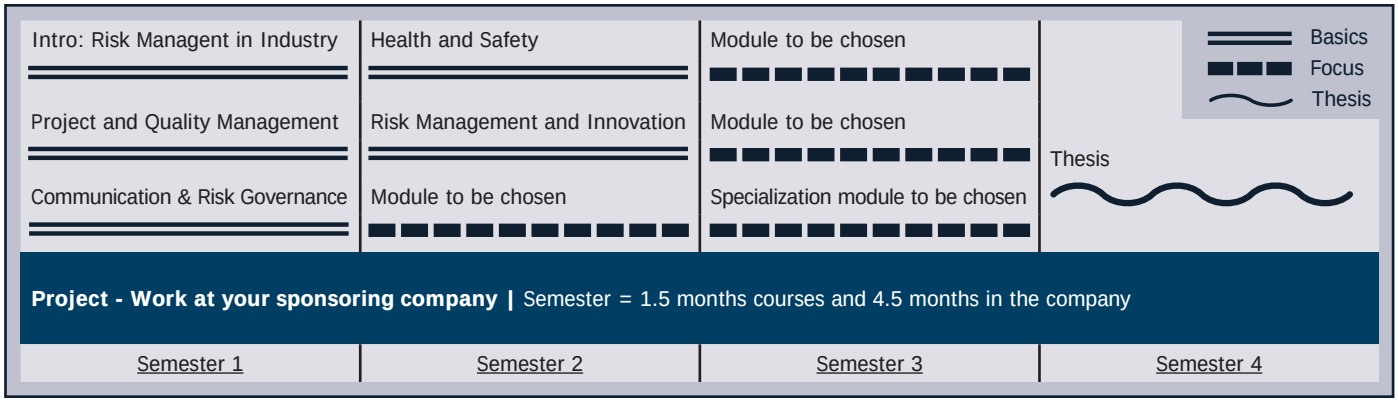
Duration
4 Semesters - 75 days seminar

25 places

Fees / Semester
€ 4700

Location
Stuttgart, Germany

Applications
All year round



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.

Examinations

The examinations 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 to 60 minutes verbal discussion, optional presentation included
3. Presentation: up to 20 minutes with visuals
4. Publishable 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 module

Admission requirements

- Bachelor’s Degree (180 ECTS) in the area of Engineering, Business Administration, Science or Industrial Engineering.
- Above average grade in previous studies (≥2.4 in the German grading system)
- Good knowledge of English certified (B2 level or equivalent)
- Successfully passing the aptitude test

Admission

The admission process involves 5 steps:

Step 1: Expression of interest by the student
Step 2: Preliminary eligibility check
Step 3: Full application
Step 4: Aptitude test (e-based) and/or approval test (oral)
Step 5: Enrollment

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 2015 was 18,800 €). For further information, please contact us directly.

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 sponsor), 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)

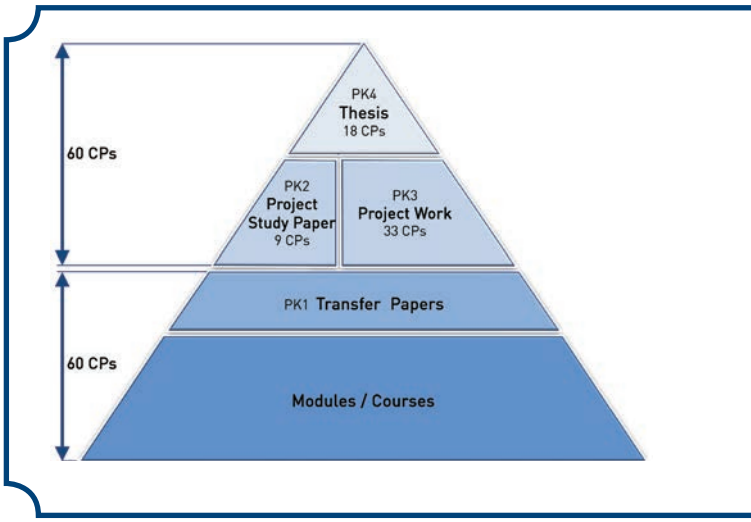
Credit Points: 33

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: 7 | Module type: compulsory

This module includes three compulsory courses, covering risk management in industry. The emphasis is on topics such as EU directives on industrial safety, major accident prevention, risk assessment methodologies, as well as International Standards of risk management and its application in industry. The module also highlights the importance of cultural differences management in business communication for successful business collaboration with partners.

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 the related EU directives and their application in industry. The course outlines goals, scope and required measures / obligations considering acute (e.g. accidents-related) and chronic (e.g. pollution-related) risks. Special attention is devoted to major accident prevention and related process safety risk assessment methodologies

I-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. A cognitive approach toward cultural and national differences will be used throughout the training..

I-R32 ISO31000: Principles and Methods of ISO 31000

The course covers the International Standard of ISO 31000:2009 highlighting the relationship between the risk management principles, framework and process as described in this International Standard. The course also highlights issues related to the applicability of the standard in industry and in general.

Compulsory Module | 35 CPs
As stated in the name, they are compulsory

Optional compulsory Module | 15 CPs
3 modules to be selected among optional compulsory modules

Specialization Module | 10 CPs
1 modules to be selected among specialization modules

Module II: Project and Quality Management

Credit Points: 5 | Module type: compulsory

Two compulsory courses compose the second module. Both the quality management and project management courses introduce essential and fundamental knowledge of standards as well as discussion methods and techniques of application

II-R51 QM: Quality Management

This course aims on the one hand to convince every attendee of the importance of an integrated quality management system by presenting the philosophy standing behind it, supported by numerous examples. On the other hand it will present the methodology and the tools required to implement quality management within their organization. Special attention will be given to the ISO 9001 standard and to the involvement of various organization's stakeholders.

II-R52 PM: Project Management

This course aims to prepare attendees to the special environment of project work. Whether as project stakeholders or managers, they will learn the frameworks, tools and techniques allowing them to adapt to every situation and to work effectively. They will learn from experienced training how to avoid common mistakes, and be able to understand both the technical and human aspects of a project.

Module III: Health and Safety

Credit Points: 6 | Module type: compulsory

The module concentrates on three main issues:

1) EU regulation in the field of HSSE (Health, Safety, Security and Environment), explaining the objectives and requirements, as well as the state-of-the art in the implementation including constraints and advantages.

2) EU regulation in the field of safety and health of workers at work.

3) 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.).

III-R06 HSSE: Health, Safety, Security and Environmental Risks

The course gives an overview of EU regulation in the field of HSSE (Health, Safety, Security and Environment), explains the objectives and requirements, as well as the state-of-the art in the implementation including constraints and advantages. Special focus is on the Integrated Pollution Prevention and Control (IPPC) and Industrial Emission Directive (IED) and on the prevention of major accidents (Seveso).

III-R12 OSHA: Occupational Saftey 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, general guidelines for the implementation of these principles as well as informing, consultation and balanced participation in accordance with national laws and/or practices. The course also discusses the training of workers and their representatives

III-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 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 for assessing the environmental burden of disease (EBD) based on calculation of DALYs (Disability Adjusted Life Year).

Module IV: Communication and Risk Governance

Credit Points: 7 | Module type: compulsory

The module includes topics such as risk governance concepts, corporate social responsibility and sustainability, emerging risks, business

communication and related topics. A presentation of the principles of modern risk governance includes its main elements (IRGC framework). In addition, it looks at the basic elements of the concept of Corporate (Social) Responsibility (CSR) and its practical application in industry. The module continues by presenting theoretical backgrounds and state-of-the-art research issues on perception and communication of risk. The understanding of communication processes and the improving of information and communication techniques related to risk and hazards are central themes of the course.

IV-R15 RGOV: Risk Governance Concepts and Practices

The course explains principles of modern risk governance including its main elements as described in the 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, socioeconomic 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-R14 iCSR&S: Integrated Corporate 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 the ISO 26000 standard.

IV-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.

Module V: Risk Management and Innovation

Credit Points: 10 | Module type: compulsory

This module is devoted to the development of new products and technologies. 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 module continues with safety management as it requires short, mid and long term decisions that may highly influence the ability of an organization to cope with its risks. The issue of Key Performance Indicators (KPIs), as used in the safety and risk assessment, is addressed in particular for assessing and managing emerging risks linked to New Technologies. There is an emphasis on new and alternative methods (e.g. those expert opinion or big data oriented), which can be used for better identifying the risks and the reason for their occurrence, as well as for better assessing the probabilities and factors determining the consequences.

V-R36 IRM: Innovation Risk Management

The development of new products and technologies is a risky and uncertain process. The management of innovation is a process - described in this course - 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. The TRL (Technology Readiness Level) assessment is done as practical example on several cases from industry.

V-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, 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-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.

V-R41 ISO31010: Principles and Methods of ISO 31010

The course deals with the issues related to practical implementation of ISO/IEC 31010 standard 31010:2009 (codified by The International Organization for Standardization and The International Electrotechnical Commission (IEC)). The standard itself intends to provide support for implementation of the main, ISO 31000 standard, giving principles of risk assessment and the risk management process. The course provides information as to the selection and application of the risk assessment techniques tackled in the standards and gives examples of application of single methods/techniques in engineering, insurance, finances and general risk analysis.

Module VI: Fire and Explosion Protection

Credit Points: 5 | Module type: optional compulsory

The module aims one the one hand to increase the knowledge in the field of explosion protection and modeling, especially gas and vapor explosion, as well as gas dispersion modeling, using examples for applied methods. On the other hand students should also acquire knowledge about fire protection in industry based on the regulation and practice in EU. Here they should also be able to understand and apply the basics of fire modelling.

VI-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

VI-R09 ExP: Explosion Protection

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

Module VII: Safety of Chemicals

Credit Points: 5 | Module type: optional compulsory

This module emphasizes on the legal requirements and guidelines applicable when dealing with chemicals. Whether in the production, transportation or use, chemicals are regulated and subject to several obligations which will be presented throughout the module. From the classification and labeling of substances to the appropriate response to an accident, the module will familiarize attendees with the specificities of dangerous goods.

VII-R10 REACH: Risk Analysis of Chemicals

The course aims to explain principles of the EU regulation in the area of registration, evaluation and authorization of chemicals – REACH (EC Nr. 1907/2006). It gives an explanation of the principles and obligations for manufacturers, importers and downstream users to ensure that the manufacturing, placing on the market or the using of such substances do not adversely affect human health or the environment.

VII-R11 ADR: Transport of Dangerous Materials

The course covers 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. It elaborates the main issues from ADR 2013 as well as safety measures and procedures in case of accidents.

Module VIII: Business Continuity and Sustainability

Credit Points: 5 | Module type: optional compulsory

The module gives participants the opportunity to improve their knowledge about the Life Cycle Assessment (LCA), gain the skills to perform simplified LCA studies and to analyze, discuss and comment international scientific articles on LCA. The focus will be on practical examples of applying LCA in industry and improving the environmental performance and sustainability of products and services. The module continues with general techniques for accident modeling and explains different models of explosion. It elaborates gas and vapor explosion, as well as gas dispersion modeling, using examples for applied methods.

VIII-R07 CoF: Accident and Consequences Modeling

The course deals with accident and consequences modeling in industry. Three main topics are covered by the course: modeling of explosion, fire modeling and industrial fires. The modeling is elaborated by explaining general techniques and illustrated by examples of applied methods: CDF model, Baker-Strehlow-Tang model, Reynolds Averaged Navier-Stokes (RANS) model, as well as Phenomenological and Stoichiometric models. Attendees will not only be able to differentiate between fire and explosion, but also know how to do simple calculations of consequence with an appropriate comprehension of explosion mechanism and fire principles

VIII-R16 LCA: Life Cycle Analysis and Assessment

The course gives the participants opportunity to improve the knowledge about the 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 provides a comprehensive overview of the 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 IXa: Risk Based Inspection - 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.

IXa-R28 RBICon: API RBI Concepts in Industry

The focus of the course is set on 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. This methodology encompasses techniques such as Probability of failure, Consequence of failure, Risk analysis and Inspection planning based on Risk Analysis.

IXa-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 equipment covered by this course are pressure vessels, piping, tankage, pressure relief devices and heat exchanger tube bundles

Module IXb: Risk Based Inspection - Advanced

Credit Points: 5 | Module type: optional compulsory

The module is devoted to the advanced issues of RBI analysis and, in particular, to the analysis of consequences of failure as defined by API RP 581:2008 Risk-Based Inspection Technology. It starts with general definitions aiming to ensure better understanding of the main topics of the module. The methodology for calculation is illustrated with examples. The second part looks at the CWA (CEN Workshop Agreement) 15740:2008, Risk-Based Inspection and Maintenance Procedures for European Industry (RIMAP). It explains the reasons to develop the European procedure and its differences and advantages in comparison to API RBI methodology. The focus of the last part of the module is on the damage mechanisms appearing in different industries and their influence to the calculation of probability of failure of equipment. A large number of elaborated examples are included.

IXb-R30 CAA: Consequence Analysis in an API RBI Assessment

This course teaches 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.

IXb-R31 BasicRIMAP: CWA 15740 RIMAP and the new EN standard

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.

IXb-R33 RBI PoF: RBI Probability of Failure - Damage Factors

The focus of the course is on the 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 X: Quantitative Risk Assessment

Credit Points: 5 | Module type: optional compulsory

The module 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, is discussed. A specific focus on domino effect and accidents triggered by Natural-Technological (Na-Tech) events is presented. In the second part the aim is the introduction to transportation risk analysis. The risk assessment of road, rail and pipeline transportation of hazardous substances is illustrated. The approaches to frequency calculation, consequences assessment and risk assessment is discussed. Case-studies are analyzed to illustrate the calculation and the use of individual, societal and other advanced risk indexes.

X-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.

X-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 analyzed to illustrate the calculation and the use of individual, societal and other advanced risk indexes.

Module XI: Special Issues

Credit Points: 5 | Module type: optional compulsory

In this module attendees shall learn to understand the importance of safety and reliability in relation to applications within production assurance, quality, risk, environmental protection, and sustainable development. They shall, in addition, gain an understanding of the relationship between costs/disadvantages and benefits related to different safety measures. The module will also highlight how the early recognition, classification and monitoring of emerging risks influences the framework in which safety measures have to be implemented.

XI-R17 EmRISK: Emerging Risks

The course introduces and presents emerging risks as well as their management. The risks considered as “emerging” are primarily the risks previously not recognized as such, e.g. the risks due to new processes, new technologies, new ways of working or risks due to social or organizational changes (the risks linked to nanotechnologies, bio-technology, new chemicals, outsourcing, globalization are

practical examples tackled within the course). The risks due to the change in public perception or new scientific knowledge are considered as well.

XI-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.

Module XIII-A: Petro

Credit Points: 10 | Module type: specialization

This module presents current global and regional 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. Reliability Centered Maintenance (RCM) and Root Cause Failure Analysis (RCFA), two methodologies used for the logical decision-making process of analysis and definition of the equipment maintenance requirements, as well as for accident prevention will be presented. Practical examples with the state-of-art tools are applied by the student in terms of self-study and independent work.

XIII-A-R02 PETRO: Risk Analysis in Petrochemical Industries

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

XIII-A-R04a RBI-PETRO: Risk Based Inspection - Petro

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 on 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.

XIII-A-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 the damage mechanisms appearing in different industries. A large number of well elaborated examples is included.

XIII-A-R44 Practical Example: Workshop Petro

Practical examples with the state-of-art tools are applied by the student. Relevant tools are iRiS-Petro, Orbit etc.

Module XIII-B: Power

Credit Points: 10 | Module type: specialization

The aim of this module is to familiarize attendees with some key risk engineering activities taking place in a power plant. It will present specific damage mechanisms for power industry, the principles and conditions for life and risk assessment as well as the procedure for risk-based inspection and maintenance as defined for European industry by CEN CWA 15740:2008. As a result, attendees should be able to modelize consequences on different level of risk assessment and to assess likelihood using statistical and API approach.

XIII-B-R03 Power: Risk Analysis in Power Industries

The course presents 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.

XIII-B-R04b RBI-POWER: Risk Based Inspection - Power

This course offers the state-of-the art knowledge of risk-based approaches currently applied in power generation industries. It highlights different levels of risk assessment and how to model consequences, as well as how to assess likelihood using statistical and other approaches. It goes deeper in risk sources including specific damage mechanisms commonly present in power plants. As an outcome, attendees will know how to optimize the inspection and monitoring strategy aimed to reduce risks and they will be able to optimize inspection plans and use inspection results in the risk management process of a power plant.

XIII-B-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 the damage mechanisms appearing in different industries. A large number of well elaborated examples is included.

XIII-B-R45 Practical Example: Workshop Power

Practical examples with the state-of-art tools are applied by the student. Relevant tools are iRiS-Power, SP249 etc.

Module XIII-C: Materials Engineering

Credit Points: 10 | Module type: specialization

Knowledge to be acquired in this module covers introduction in the fundamentals of material science and strength calculation to understand the formation of critical loading situation in key components in (power) plants and thus the damage mechanism oriented failure. At the end of the course students are expected to be in the position to evaluate possible damage scenarios in components on basis of general information such as operation data, material and macroscopic and microscopic damage appearance.

XIII-C-R42 MATERIALS: Materials Engineering

The course elaborates fundamentals of Materials Science, such as a general introduction, mechanical properties and related material testing of structural metallic materials. It gives a demonstration of specific damage mechanisms (creep, fatigue, creep-fatigue, corrosion). Welding of metallic materials and related problems is another focus.

XIII-C-R43 MAT&CON: Safety and Reliability of Materials and Constructions

The course elaborates the interaction between loading situation of components exposed to temperature and pressure in industrial plants and the associated material and failure behavior. It gives an explanation about the development of damage and describes adequate design and monitoring methods according to standards and state of art.

XIII-C-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 the damage mechanisms appearing in different industries. A large number of well elaborated examples is included.

XIII-C-R46 Practical Example: Workshop Materials

Practical examples with the state-of-art tools are applied by the

student. Relevant tools: iRiS-Materials, Stahlschlüssel etc

Module XIII-D: Business Continuity and Financial Risks

Credit Points: 10 | Module type: specialization

This module focuses on the business consequences of risk. It enables participants to understand and to apply the mechanics and techniques of the assessment, quantification and management of credit risk in the banking, insurance, asset management and enterprise environment. The aim of the module is to understand and also to implement the basic concepts, methods, products and measurement techniques of financial risk.

XIII-D-R13 BUSINESS: Business Continuity Risks & Insurance

Complement 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 the technical/engineering activities is practically always to be seen on the background of business implications and implications/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.

XIII-D-R48 PAT: Principles of Actuarial Theory

This course aims to present fundamental theories of actuarial science in life insurance, health insurance, liability insurance and reinsurance are content of this course. It shows how to prepare business decisions applying the presented models and theories to generate 'reasonable' solutions

XIII-D-R49 CR: Measurement and Management of Credit Risk

After an introduction to credit assessment methods, the course will tackle several aspects of credit and credit risk by presenting the different approaches and their related concepts and tools. The course enables participants to understand and apply the mechanics and techniques of the assessment, quantification and management of credit risk in the banking, insurance, asset management and enterprise environment

XIII-D-R50 RMS: Risk Management Strategies

This course will focus on the basic concepts, methods, products and measurement techniques of financial risk. The presentation of scenario analysis, simulation techniques as well as the Value-at-Risk concept and calculation will show the specificity of the financial field and the related risk management strategies.

XIII-D-R47 Practical Example: Workshop Business and Financial Risks

State-of-art tools are applied by the student on practical examples.

Module XIII-E: Big Data

Credit Points: 10 | Module type: specialization

Big and open data has long been recognized for its potential to change how organizations and institutional bodies work, to improve the delivery of services, and to potentially empower citizens. Such data can be used to bridge information gaps, share benchmarks, and define best practices in the assessment of vulnerabilities and risks, to replace traditional and intuitive decision-making processes with data-driven ones, and to expose variability as well as to uncover anomalies leading to more reliable processes. However, all these promises and potential can only be fully exploited by possessing and building a methodological know-how of how to transform the ever-growing, often unstructured, and vast amounts of data into actionable knowledge. This module therefore not only introduces students to risks and opportunities associated with big data, but also provides tools and analytical know-how to fully leverage such data.

XIII-E-R53 CST: Complex Systems Theory

Facing ever-growing amounts of data brings about the challenge to transform this data into actionable knowledge. This course provides theoretical, computational, and algorithmic frameworks that are often summarized under the term "Complex System Theory". The course will outline several different approaches to make complex and high-dimensional data sets accessible and amenable for visualization and further analysis, including network theory, statistics of strongly correlated systems, and the analysis of complex dynamic processes. With this equipped, we will understand why complex systems often introduce a new type of risk that is called "systemic risk", namely the risk that an entire system will break down or cease functioning as a result of an initially relatively minor default or error.

XIII-E-R54 ComSy: Managing Risks in Complex Systems

As the recent financial crisis that started in 2008 has shown, we do neither understand nor know how to deal with systemic risk. The

course introduces a quantitative framework to understand under which circumstances the increasing complexity and interconnections of socio-economic and environmental systems leave them more vulnerable to small risks that may trigger a possibly complex chain of events leading to consequences at much higher levels of organization. We will learn how to quantify the systemic risk in different types of complex system and how it can be managed in a data-driven way. This will be shown on various real-word examples, including financial markets, commodity trade, and health care

XIII-E-R55 Practical Example: Workshop Big Data

The course will cover several examples of where and how analytics of big data can be used to identify, understand and quantify novel types of risk or novel risk-risk interconnections. These example will cover natural language processing techniques to cluster large collections of unstructured data and its application in the detection of risk-risk interdependencies, mining social media in order to assess the impact and response to, both, endogenous and exogenous shocks, or how big and open data sets can be used to identify risks as well as opportunities in various contexts. The course will also provide an overview of the methodological know-how behind these examples. Since many of the data sets for the discussed examples are available for free, the students will have the opportunity to repeat the analyses and gain hands-on experience

Module XIII-F: Business Continuity & Project Risk

Credit Points: 10 | Module type: specialization

The aim of the module is to understand and also to implement the basic concepts, methods, products and measurement techniques of financial risk. Practical examples with the state-of-the-art tools are applied by the student in terms of self-study and independent work. It complements 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 the technical/engineering activities is practically always to be seen on the background of business implications and implications/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.

XIII-F-R50 RMS: Risk Management Strategies

This course will focus on the basic concepts, methods, products and measurement techniques of financial risk. The presentation of scenario analysis, simulation techniques as well as the Value-at-Risk concept and calculation will show the specificity of the financial field and the related risk management strategies.

XIII-F-R13 BUSINESS: Business Continuity Risks & Insurance

Complement 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 the technical/engineering activities is practically always to be seen on the background of business implications and implications/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.

XIII-F-R56 PMP®: Exam Preparation

The PMP® (Project Management Professional) is an internationally recognized certification offered by the Project Management Institute (PMI). This course aims to deepen the participant's knowledge regarding the ten project management Knowledge Areas described in the Guide to Project Management Body of Knowledge (PMBOK) in order to prepare him to the certification exam.

XIII-F-R57 Practical Example: Workshop Business and Project Risks

Practical examples with the state-of-art tools are applied by the student.

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.

Dr. Marco Gerbec

Professor at Jožef Stefan International Postgraduate School and senior researcher at Jožef Stefan Institute, Ljubljana, Slovenia. More than 15 years of experience in management of major accident hazards (process safety), risk assessments, expert reviews, as well as in consultations to the national competent authorities, and local industrial companies. Involved in a number of EU projects and actions. Lectured in Germany, PR of China, Serbia, Turkey and South Africa.

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. 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 mathematics, 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 organizations 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.

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.

Dr. Ing. Giovanni Uguccioni

Business Development Manager at D'Appolonia SpA in Italy, formerly head of the the Risk Analysis Unit in Snamprogetti SpA and HSE Technical Manager in D'Appolonia. His professional expertise covers risk analysis and risk assessment, including hazard identification methods, Fault Tree Analysis, modelling of accidents and development of Safety Reports under the "Seveso" Directive. He has participated in EU and Industry funded Projects for the development of Risk Analysis and consequence modeling.

Prof. Dr. Udo Weis

Professor for Business Administration and Engineering, director at Steinbeis Institute Advanced Risk Technologies, CEO of IFNEK GmbH and currently the Chairman of the National Standards Committee for Risk Management and a member of other international standardization bodies to risk management. For several years he acts as president of Germany's largest expert association VDSI, with more than 5,000 EHS professionals. He worked as head HSE department at ABB being responsible for 20 countries and is member in several advisory committees.

NETWORK & KNOW-HOW

The involvement of Steinbeis Advanced Risk Technologies in over 50 European, international and large-scaled industry projects is a key asset of the Institute. Today there are Steinbeis enterprises in 15 countries. In addition, project and co-operation partners in further 48 countries complement our network of experts.

- **It allows us to strengthen our network of experts and lecturers.**
- **Projects results as well as know-how are often transferred in the courses' contents ensuring that they always remain state-of-the-art.**
- **If you can't find a sponsoring company, some of those projects can serve as a basis for the Project Competence Concept underlying every Master program.**

Example: RBI in Power Plants in South Africa - Eskom
A certified Risk Based Inspection (RBI) programme as part of a plant life cycle management strategy.
www.eskomrbi.risk-technologies.com

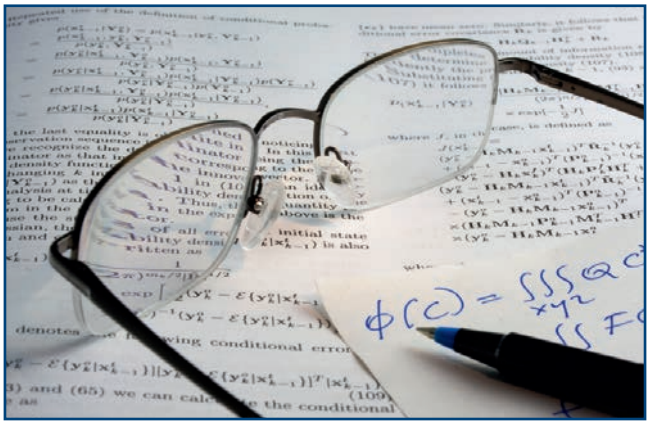
Example: RBI in Petrochemical Industry - Gazprom
Risk management and use of risk-based approaches in inspection, maintenance and HSE analyses of petrochemical plants in Serbia.
http://risknis.risk-technologies.com/

Example: EU-project iNTeg-Risk
Early Recognition, Monitoring and Integrated Management of Emerging, New Technology related Risks
www.integrisk.eu-vri.eu

Example: DEG-project SafeChina
Promoting the EU and German standards and practices of Environmental Protection and Industrial Safety in China.
www.safechina.risk-technologies.com

Example: EU-project EDEN
Improve CBRNE resilience through the adaptation and integration in complex multi-national/agency CBRNE operations.
www.eden-security-fp7.eu

Example: EU-project EuropeAid Turkey
Strengthen the institutional capacity of central bodies that are responsible for future implementation of the Seveso II Directive in Turkey.
www.europeaidturkey.risk-technologies.com



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

PROGRAM PARTNERS

The European Master and Certification Program was realized in close collaboration with universities, R&D institutions and industrial companies worldwide. Since its creation the Institute cooperated with the following organizations.

- **CNR** (Italy) www.cnr.it
- **Eskom** (South Africa) www.eskom.co.za
- **INERIS** (France) www.ineris.fr
- **Josef Stefan Institute** (Slovenia) www.ijs.si/ijsw/JSI
- **NIS Gazprom** (Serbia) www.nis.eu
- **SINTEF** (Norway) www.sintef.no
- **Swiss Re** (Switzerland) www.swissre.com
- **Steinbeis Advanced Risk Technologies GmbH** (Germany) www.risk-technologies.com
- **University of Bologna** (Italy), www.eng.unibo.it
- **University of Magdeburg** (Germany) www.ovgu.de
- **University of Pisa** (Italy) www.unipi.it
- **University of Stuttgart / ZIRIUS** (Germany) www.zirius.eu

HOW AND WHEN TO APPLY

Applications to the Master and Certification Program are open the whole year long.

Winter semester: October 1 - March 31
Summer semester: April 1 - September 30

Applications are handled via:
admissions@risk-technologies.com

Send us an email with:

- your CV in the EuroPass format
- a letter of motivation
- university diploma(s)
- university grades transcript(s)
- English language certificate (if not native speaker)

COURSE VENUES

During the lecturing periods, courses are held in one of our venues in Stuttgart. All locations are best equipped and provide a motivating learning environment.

Steinbeis-Haus für Management und Technologie (SHMT)
Stuttgart

Haus der Wirtschaft
Stuttgart

Langer Haus
Lange Straße 54
Stuttgart

CONTACT

For general enquiries

If you have questions, need information or would like to be supported to find a project in an organization, please contact

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Mr. Nicolas Schmid
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For Partnerships & professional training

If you're interested in the professional training opportunities, Project Competence Concept, or if you have questions please contact

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