ENSTTI Training Catalogue 20

▸ Emergency Preparedness ▸ Nuclear Safety ▸ Nuclear Safeguards & Security ▸ Radiation Protection

Experts for experts

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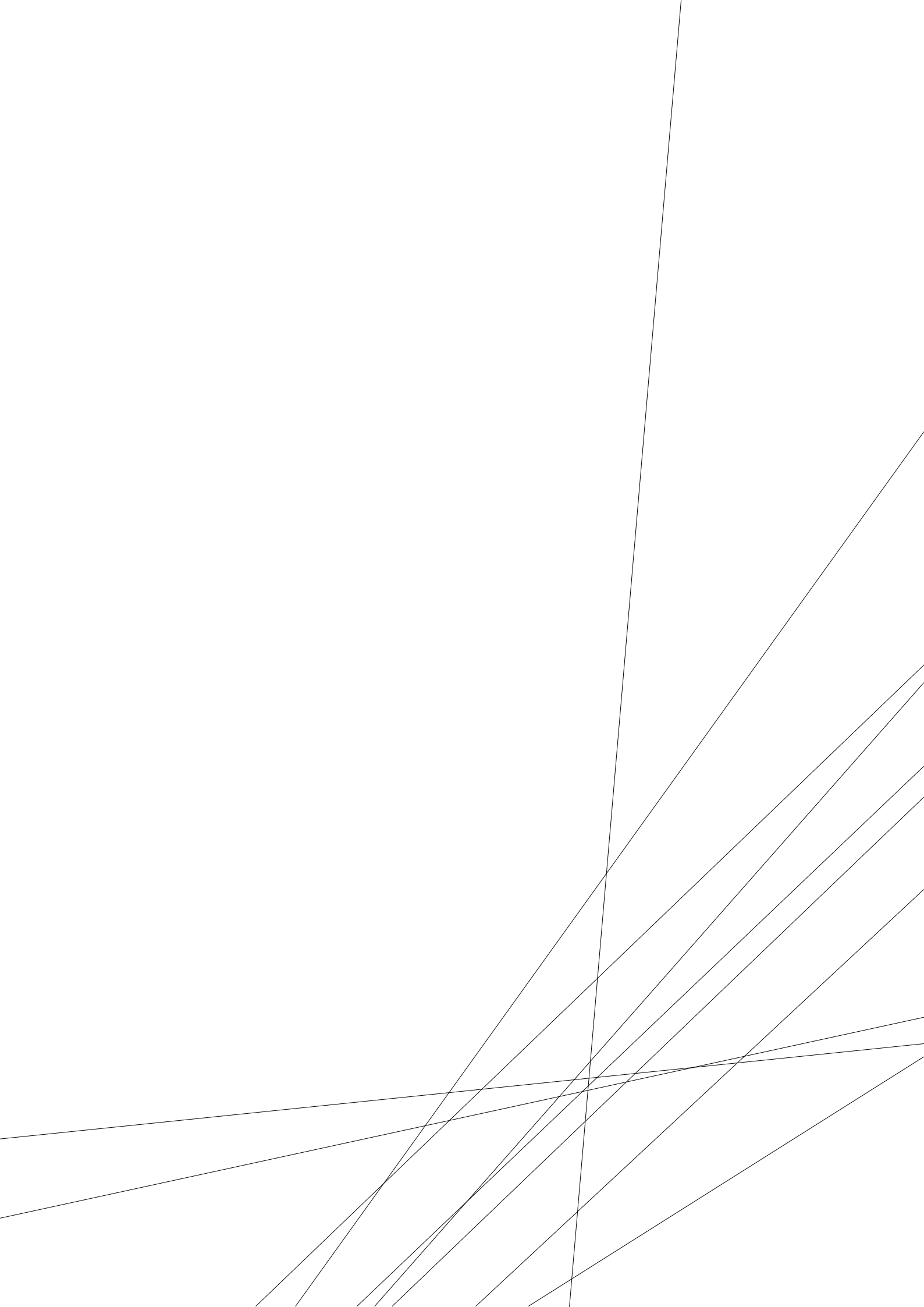

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FOREWORD

Dear Customers,

The ENSTTI catalogue already covers a broad range of training themes on emergency preparedness, nuclear safety & security, and radiation, waste and transport safety.

ENSTTI offers continuous training to ensure that personnel of the Nuclear Regulatory Authority and Technical Safety Organizations or any professionals involved in licensing procedures are able to maintain the level of skills and knowledge required for the current positions, and that they have the opportunity to prepare in time to take on new tasks or promotions.

Our training and tutoring programs are delivered exclusively by senior professionals from European TSOs and regulatory authorities who take the latest technical developments into consideration. This unique combination guarantees you lasting improvement in your practices.

Hoping to meet you soon in our training sessions, we are at your disposal to guide you in your choices and work with you to develop tailor-made training or adapt existing training courses..

Didier Louvat
Managing Director.

Your Contacts at ENSTTI

EU Training

Frédérique Boulesteix
Training Manager
+ 33 (0) 1 58 35 93 51

Other Training

Alena Prokofieva
Training Manager
+ 33 (0) 1 58 35 83 00

By email:
training-tutoring@enstti.eu

ENSTTI Presentation

ENSTTI is a professional training and tutoring institute. Its mission is to share the knowledge and expertise of the European nuclear safety organizations. The ENSTTI initiative was set up in 2010 to meet the growing need for trained experts, prompting the major European technical safety organizations for the nuclear industry (which are also members of the ETSON network) to pool their resources. Every year, more than a thousand participants enter its training and tutoring program.

Partners

The European Commission through its Instrument for Nuclear Safety Cooperation Training and Tutoring (INSC T&T), the IAEA Technical Cooperation Program, and the IAEA Nuclear Safety and Security Department (among other programs and resources), rely on ENSTTI to provide their beneficiary organizations and countries with training and tutoring in nuclear safety/security and radiation protection.

The Pedagogical Team

The team consists of a body of senior experts from nuclear safety organizations. Their goal is to promote harmonization of technical practices in the fields of nuclear safety, nuclear security and radiation protection, and to develop a network of regional and international experts.

ENSTTI is managed by a permanent team in charge of training course planning and design and administrative, logistical and prospective management.

Catalogue

The 2020 curriculum comprises 39 courses.
These are organized in 29 sessions that take place in Europe and elsewhere.

Our Training

Enstti offers courses in both intercompany and customized intracompany training each year. To best meet your needs, we can work with you to develop tailor-made training or adapt existing training courses.

Intracompany and Custom Solutions

ENSTTI, your custom training partner to help you meet the needs of your teams.

In addition to the sessions listed in the ENSTTI Training Catalogue, we are at your disposal to:
- address your strategic and professional goals;
- assess your needs and draw up a set of specifications;
- work with your teams to develop a training content to your satisfaction.

The custom training sessions are set up either on your premises, at ENSTTI, or in another place of your choosing.

The advantages of intracompany training:

Customization

The training procedures that are set up are geared not only to your employee needs, but also to your company and to the focus of your project. By learning more about your corporate culture, we can also adapt your own tools in order to design appropriate practical exercises and scenarios.

Flexibility

The duration of the training, the time frame and the instructor profiles are arranged to suit you, and your groups are formed as a function of employee profile.

Teaching Approach

ENSTTI training courses are designed based on active and participative methods, with a mix of theory and hands-on experience to foster and optimize the transfer of expertise and the sharing of knowledge.

Training Cost

Your entire team is trained together and at lower cost.

Tried-and-True Support Methods

The Intra training manager takes all of your issues into consideration when managing the training projects:

> **Before:** preliminary meeting or interview, recommendations (formats, contents, duration and tools), needs definition support, diagnostic assessment;
> **During:** training on your tools, teaching innovations, custom support, dedicated team;
> **After:** immediate and delayed assessment, debriefing, action plan and training program.

Examples of Customized Intra Training Projects

Explore ENSTTI's customized training solutions through examples of projects that we have designed and carried out for our customers in different fields of expertise, for either a TSO or a company. A dedicated ENSTTI team works with you and for you, from the time you make your request through to the actual setup, to develop a training procedure that is adapted to your needs and which takes your constraints into consideration.

Nuclear Safety

Course Title: Training Programs for Future CRISTAL Users

Customer: CEA, IRSN, AREVA, EDF

Duration: 4-5 days

Description: The CRISTAL calculation tool for the field of nuclear criticality safety has a data library and a new-generation user interface (LATEC). It is designed for safety studies, in particular in the case of requirements like MOX fuel, high burn-up fuel, etc.

Nuclear Security

Course Title: EXTREME

Customer: IAEA Department of Nuclear Safety & Security

Duration: 3 days

Description: Exercises are designed to make essential skills and knowledge available to the NPP staff, thereby ensuring an effective response to an emergency.

Radiation Protection

Course Title: Radiation Protection in the Workplace

Customer: NOVARKA Ukraine (Consortium VINCI & Bouygues)

Duration: 4 days

Description: Training course (in English, French and Russian) for workers who are potentially exposed to ionizing radiation in their professional environment.

Emergency Preparedness and Response

Course Title: Emergency response to transport accidents involving radioactive material at sea and in port zone.

Customer: Singapore Nuclear Research and Safety Initiative (SNRSI)

Duration: 5 days

Description: Specific training intended for port authorities, homefront and emergency response agencies and radiation protection regulatory body so that they are able to develop their emergency response plans to deal with incidents and accidents such as fire, leakage, breach in packaging, containers dropping into the sea.

Contact us

For support for your intracompany training projects, you can contact:
Alena Prokofieva (training manager)
+ 33 (0) 1 58 35 83 00
By email: training-tutoring@enstti.eu

Emergency Preparedness and Response

Our training offer

- CO1028 — National System for Emergency Preparedness and Response
- CO1034 — Regulatory Control of Nuclear Sites: Inspection of Emergency Preparedness and Response Arrangements
- CO1052 — Emergency Response to Transport Accidents involving Radioactive Materials at Sea and in Port Zones

The training on Emergency Preparedness and Response (EPR) in case of a nuclear or radiological accident situation deals with the radiation hazards associated with such a situation and how to be prepared to respond appropriately. It addresses international and European requirements; the effects of ionizing radiation; the exposure pathways; the strategy to manage population protection during the emergency and post-accidental phases; and the corresponding needs for planning, tools, equipment, and training.
EPR is illustrated using emergency situations arising, for example, in a nuclear power plant, during the transport of nuclear fuel, or with a damaged source.

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EMERGENCY PREPAREDNESS AND RESPONSE — Course in English

National System for Emergency Preparedness and Response

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1028

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

Helping people and organisations responsible for national emergency response to be ready to manage unexpected situations arising from nuclear or radiation related accidents so as to provide government with the best possible technical support and assistance for managing the crisis.

TARGET AUDIENCE

This training is intended for professionals from nuclear regulatory authorities and technical support organisations with responsibilities associated with the implementation of emergency preparedness at a national level.

PREREQUISITES

Participants should have a basic knowledge of accidents in nuclear facilities and in the field of applied radiation technologies.

LEARNING OUTCOMES

- A better understanding of the general principles of EP&R: basic goals & general requirements, implementation.
- A view of regulations in force in various European countries and differences between these countries.
- A better understanding of emergency response arrangements in different European countries: goals, emergency response phases, emergency management, roles & responsibilities, assessment methods & tools, on-site and off-site plans.
- A perspective of the importance of communication during a nuclear crisis and of acquiring its basic principles.
- A knowledge of resources needed for an emergency center to function.
- A practical understanding of emergency preparedness exercises.
- A better understanding of the role of mobile teams in emergency situations.

PROGRAM

The 5-day training module will cover the following subjects:

- Introduction to EP&R definitions and generalities, with presentation of related regulations in European countries.
- Emergency response arrangements in Europe in case of accident, including communication and information dissemination in emergency situations.
- The emergency centers of nuclear safety authorities and TSOs, including organization, methods & tools, information exchanges and emergency preparedness.
- Post-accident management and operational management.
- Technical visit with feedback from a radiotherapy accident.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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EMERGENCY PREPAREDNESS AND RESPONSE — Course in English

Regulatory Control of Nuclear Sites: Inspection of Emergency Preparedness and Response Arrangements

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course.

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1034

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Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

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Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide participants with an understanding of:
- The European and international regulatory frameworks on nuclear Emergency Preparedness and Response, including oversight and inspection focused on nuclear sites.
- The type and nature of potential accidents at nuclear power plants.
- The radiation hazards associated with such situations.
- The basic principles for protecting people and the environment.
- The regulatory framework on nuclear Emergency Preparedness and Response.

TARGET AUDIENCE

This training is intended for:
- Engineers and other professionals with responsibilities associated with implementation of emergency preparedness at a national level,
- Experts from nuclear regulatory authorities and technical support organisations.

PREREQUISITES

Participants should have a basic knowledge of accidents in nuclear facilities and in the field of applied radiation technologies.

LEARNING OUTCOMES

The successful completion of the course will give participants:
- A basic knowledge on NPP accidents along with their consequences.
- The general principles of emergency preparedness and response.
- A better understanding of recent developments regarding European and international requirements in this field, and their transposition into French, German and Spanish regulation.
- A better understanding of the EPR regulatory framework in France, Belgium and Spain, including inspection practices and recent improvements after the Fukushima Dai-Ichi accident.
- Knowledge on EPR Plans, including emergency response phases, emergency management, roles and responsibilities, role of emergency centers, assessment methods and tools, based on on-site and off-site plans.
- Information about how the emergencies were managed in various EU countries for different NPP accidents.

PROGRAM

The 5-day training module will cover the following subjects:

- The basic concepts related to NPP accidents, and their consequences.
- The exposure pathways and effects of ionizing radiation and protective measures.
- European and international requirements regarding Emergency Preparedness and Response (EPR) for a nuclear or radiological accident situation, including regulation, regulatory inspection and recent improvements in this field.
- The main arrangements and related plans, including the emergency centers of nuclear safety authorities and TSOs along with the organization, methods & tools and information exchanges used.
- Technical visits to the Spanish regulatory agency's Nuclear and Radioactive Emergency Centers, and to the new nationwide post-Fukushima Technical Support Center.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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EMERGENCY PREPAREDNESS AND RESPONSE — Course in English

Emergency Response to Transport Accidents involving Radioactive Materials at Sea and in Port Zones

Session: consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Specialized training course. Please contact us.

Code: CO1052

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Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing will be based on the emergency organization set up by participants on the last day of the training course. Successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

Strengthening and enhancing professional knowledge and skills on emergency preparedness and response relating to the maritime transport of radioactive material.

TARGET AUDIENCE

This training is intended for:
- Port authorities,
- The radiation protection regulatory body.

PREREQUISITES

Participants should have a basic knowledge of incidents and accidents involving fire, leakage, breach in packaging, containers dropping into the sea, etc.

LEARNING OUTCOMES

- A better understanding of the international regulations on the safe transport of radioactive materials and on safeguarding the transport of nuclear materials, with a focus on maritime specificities.
- A better understanding of the principles of international regulations for emergency organizations in case of a transport accident involving radioactive material.
- A better understanding of the different threats and difficulties related to maritime accidents involving radioactive material.
- A better understanding of actual methods to deal with such accidents.

PROGRAM

The 5-day training module alternates lectures and exercises on practical test-cases (table-top exercises on real accident situations). The training is divided into 13 lectures and 6 working group sessions.

Lectures
The lectures cover a wide range of aspects of the organization of emergency operations in case of a transport accident involving radioactive material. The aim of the course is to give a thorough understanding of international regulations and guidance (such as IAEA GSR Part 7, SSR-6, NSS-13, NSS-9 and TS-G-1.2, as well as IMO IMDG, INF and SOLAS). The French approach is also presented as an actual example. Students will be presented with cases based on potential or actual accidents. The following items are covered:
- review of potential hazards induced by radioactive materials.
- international regulations for the safe transport of radioactive materials.
- international regulations for the security of transport of nuclear materials.
- maritime transport of radioactive materials.
- emergency preparedness and response:
  - international regulations and guidance,
  - actual practice, experience and feedback,
  - developing an organization.

Working groups
Specific accident cases were developed for the trainees to test their knowledge and skills. These will be presented mostly during the last three days of the training course.

The trainees will perform the assessments by themselves with guidance from the trainers where necessary. The course is designed for ~20 participants, divided into two or three groups of 7-10 people as a function of how individual cases are addressed. Roles will be played (e.g. authority, consignor, technical support).

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

Nuclear Safety

The safety of nuclear facilities can be more effectively assessed when there is a full understanding of the physical and chemical phenomena at work during their operation. A wide range of activities contributes to the safety of existing nuclear facilities and future ones, including: drafting or reviewing safety files for facilities in operation or under construction; providing support to safety-authority inspection teams; helping to update national and international regulations; and developing research programs on accident prevention and on managing the consequences of major accidents.

Our training offer

- CO1001 — Technical Concepts, Techniques, Methods and Tools for the Assessment of Nuclear Safety and Radiation Protection
- CO1004 — Nuclear Power Reactor Safety for Regulators and Operators
- CO1005 — Nuclear Research Reactor Safety
- CO1009 — Probabilistic Safety Assessment
- CO1012 — Decommissioning Safety
- CO1014 — OPEX Operation Experience Feedback (Basic Concepts)
- CO1019 — Regulatory Control of Nuclear Sites: Inspection of I&C and Electrical Systems
- CO1020 — ASTEC: Accident Source Term Evaluation Code
- CO1022 — Oversight of Safety Culture and Management System
- CO1023 — Simulating Reactor Functioning during Incident and Accident - SOFIA
- CO1025 — Human and Organizational Factors
- CO1026 — Regulatory Control of Nuclear Sites: Inspection during the Site Characterization and Construction Phases (Module 1)
- CO1040 — Regulatory Control of Nuclear Sites: Inspection during the Construction Phase – Site Evaluation (Module 2)
- CO1030 — Regulatory Control of Nuclear Sites: Inspection of Safety Systems, Structures and Components
- CO1032 — Lessons Learned from Fukushima Daiichi Accident and the EU Stress Test
- CO1035 — Basic Safety Related Aspects and Regulatory Oversight on NPP Operation
- CO1036 — Application of Nuclear Safety Concepts in the Development of Regulations and Guidance
- CO1041 — VVER Design and Operational Safety (Module 1)
- CO1042 — Regulatory Review of VVER Accident Analysis Results (Module 2)
- CO1043 — Safety Aspects and Regulatory Requirements Related to Fusion Reactors in France
- CO1045 — Nuclear Criticality Safety
- CO1055 — CRISTAL - Tools for Criticality Safety Calculation

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NUCLEAR SAFETY | Course in English

Technical Concepts, Techniques, Methods and Tools for the Assessment of Nuclear Safety and Radiation Protection

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 3 weeks
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1001

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

The course is structured to approach the technical and cultural foundations of nuclear safety, nuclear security and radiation protection.
The training covers basic elements concerning safety for different types of nuclear installations (including NPPs, research reactors, and fuel cycle facilities), and diverse activities that use ionizing radiation.

TARGET AUDIENCE

The training course addresses mainly:
- Newcomers at regulatory authorities and technical safety organizations.
- Professionals at NRAs and TSOs recently assigned to the nuclear safety or radiation protection sector.
- Professionals involved in the licensing of all types of activities and facilities from the nuclear and radiological field.
- Personnel involved in research and education.

PREREQUISITES

A Master's degree or higher academic degree for professionals such as legal experts, engineers, nuclear scientists, physicians, agricultural engineers, veterinary surgeons, technicians and security professionals.

LEARNING OUTCOMES

Participants will be able to:
- Explain the fundamental principles that form the system for protecting people and environment against the harmful effects of ionizing radiation.
- Understand the technical disciplines related to the regulatory control of facilities and activities using ionizing radiation.
- Describe relevant international cooperation mechanisms and activities for sharing best practices in the fields covered by the training.
- Acquire general knowledge in reactor physics, on different type of nuclear reactor technologies and their operation as well as on their main safety features, and on safety assessment methods.
- Understand Deterministic and Probabilistic Safety Assessment (PSA) methods for nuclear facilities.
- Understand different anticipated Design Basis Accidents and their consequences.
- Understand the phenomena occurring during severe accidents and the measures for protecting people and environment.
- Understand how to take into account every aspect of transport safety in the design, fabrication, operation and maintenance of transport packages, and demonstrate that they comply with the regulations (designers, applicants, etc).

PROGRAM

In addition to the general introduction, the module will cover the following topics:

- Basics of nuclear reactor safety.
- Fundamentals of reactor physics, reactor technology, and the reactor core and fuel.
- Safety features of operating NPPs and research reactors.
- Safety assessment methods.
- Application of radiation protection principles.
- Nuclear fuel cycle safety.
- Decommissioning safety.
- Radioactive waste management.
- Analysis of accidents and nuclear events.
- Operating experience feedback.
- Nuclear security and non-proliferation
- Management system - Human and organizational factors - Safety culture.
- New-generation reactor design and safety options.

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NUCLEAR SAFETY | Course in English

Nuclear Power Reactor Safety for Regulators and Operators

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1004

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To improve the knowledge on safety issues and safety culture in the nuclear reactor field.

TARGET AUDIENCE

Professionals in the regulatory field.

PREREQUISITES

Participants must be newcomers to the nuclear industry with a degree in engineering, chemistry, or physics.

LEARNING OUTCOMES

Participants will acquire a general knowledge of the strengths and weaknesses of PWR, BWR, CANDU, VVER and RBMK, both during normal operation and under severe accident scenarios.

PROGRAM

The training course covers the following topics:

- Description and critical investigation of reactors in western and eastern Europe, e.g. PWR, BWR, CANDU, VVER and RBMK (the last mainly for accident reasons).
- Fuel and core design optimization in these types of reactor.
- Neutronics, thermal hydraulics and containment characteristics of these types of reactor.
- Introduction and description of main aspects of deterministic and probabilistic safety analysis, event trees, fault trees and core damage frequency.
- Physical barriers and design approach (negative reactivity, fuel pellet, cladding, reactor vessel, containment building).
- Description of relevant accident scenarios with a thorough look at safety aspects.
- Malfunction reduction rate (redundancy, separation, differentiation).
- External event minimization (anti-seismic construction, breakwaters, fences).
- Near-field concentration of radionuclides released to the environment as gases, aerosols or particulates, in the air and at ground level.
- Safety authority regulations and procedures (human error, quality control, inspections).
- Detailed information about the decommissioning operations required to dismantle a nuclear power plant.
- Development and verification of accident management procedures.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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NUCLEAR SAFETY | Course in English

Nuclear Research Reactor Safety

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1005

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Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
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Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide instruction on nuclear safety and regulatory control related to nuclear research reactors, covering safety requirements, safety analysis methodology, the defense-in-depth concept, and application of a graded approach, including hands-on training at a research reactor.

TARGET AUDIENCE

This training is intended for:
- Engineers
- Researchers
- Other professionals from nuclear regulatory authorities and technical support organizations.

PREREQUISITES

Participants are expected to have basic knowledge in the areas of nuclear and radiation science and technologies.

LEARNING OUTCOMES

Participants will be able to:

- Understand the safety aspects of research reactor operation.
- Present relevant safety issues on topics like defense in depth, the nuclear licensing process, application of a graded approach, modifications, long-term operation, and stress tests.
- Present nuclear safety principles and standards, including safety requirements and an understanding of their application.

PROGRAM

The training course covers the following topics:

- Basics of reactor physics and visits to research reactor with demonstration of neutron and gamma detection.
- Nuclear safety and implementation on research reactor safety systems and reactor safety during experiments.
- Operational safety of research reactor.
- Regulatory inspection.
- Safety of experiments.
- Periodic safety review (PSR).
- Safety assessment.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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NUCLEAR SAFETY | Course in English

Probabilistic Safety Assessment

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1009

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Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
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Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To present the main issues around reliability for design, failure, modes and effects analysis, reliability data estimation, probabilistic safety assessment (PSA), analysis of event sequences including severe accidents, component qualification and reliability, uncertainty and sensitivity analysis, risk-informed decision making.

TARGET AUDIENCE

The training course is intended for professionals employed by nuclear regulatory authorities and technical support organizations involved in nuclear safety activities.

PREREQUISITES

Participants must have a university degree or similar higher education diploma in science or engineering and a basic knowledge in the fields of reactor engineering, reactor physics and probability with statistics.

LEARNING OUTCOMES

An understanding and working knowledge of:
- Reliability theory and applications.
- Probabilistic safety assessment.
- Probabilistic uncertainty analysis.
- Risk-informed decision making.

PROGRAM

In addition to the general introduction, the module will cover the following topics:

- Reliability theory and applications for design and FNEA, data and reliability estimation.
- Probabilistic safety assessment: workshop on PSA Level 1 and Level 2. Complete by practical workshop.
- Probabilistic uncertainty analysis and risk-informed decision-making.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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NUCLEAR SAFETY | Course in English

Decommissioning Safety

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1012

REGISTER NOW

Contact
Alena Prokofieva
+33 (0)1 58 35 83 00
+33 (0)6 08 48 32 85
mailto : alena.prokofieva@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To address topics relevant to the decommissioning of nuclear facilities.
The training will consider aspects of national and international regulations, practical experiences and working-group activities related to the conduct of regulatory review.

TARGET AUDIENCE

This training is intended mainly for professionals from nuclear regulatory authorities and technical safety organizations.

PREREQUISITES

Participants should have work experience and be familiar with fundamentals on different types of nuclear facilities.

LEARNING OUTCOMES

Participants will acquire:

- The fundamentals of decommissioning of nuclear facilities, including, inter alia, aspects of planning, conduct and termination of decommissioning.
- Detailed knowledge on the decommissioning of different types of nuclear facilities and on start points for decommissioning phases.
- Feedback on licensing and supervision experience during decommissioning.
- An introduction to an internationally accepted methodology for conducting decommissioning safety assessments.
- An introduction to an internationally accepted methodology for the regulatory review of decommissioning safety assessment results.
- Information on safety assessment and related reviews from national examples.
- An understanding of how safety assessment results are implemented during decommissioning operations.

PROGRAM

The training will start with an overview of decommissioning aspects and the presentation of ongoing decommissioning projects (NPPs and fuel cycle facilities). This will ensure that all participants share the same understanding of decommissioning, and will set the scene for the further lectures.

A presentation of the methodologies used in France to make safety assessments and conduct regulatory reviews of such assessments will be the starting point for lectures by specialists on the following subjects: risk identification; human factors; radiation protection; fire safety; risks linked to handling activities during decommissioning; and radiological characterization vs. waste management.

A test case in radiation protection during decommissioning will be proposed to illustrate how to deal with these issues, and a specific session will be dedicated to innovative techniques for decommissioning, featuring 3D simulation and contaminated site characterization with geostatistical concepts.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

OPEX Operation Experience Feedback (Basic Concepts)

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1014

REGISTER NOW

Contact
Alena Prokofieva
+33 (0)1 58 35 83 00
+33 (0)6 08 48 32 85
mailto : alena.prokofieva@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

The objective of this training module is to provide the trainees with a practical knowledge of the issues, objectives, methods and tools required for the analysis of experience feedback from nuclear facilities.

TARGET AUDIENCE

The training course is intended for professionals involved in activities related to nuclear-facility safety monitoring and assessment.

PREREQUISITES

To derive benefit from the training, participants will need to have basic knowledge in the area of nuclear facility safety.

LEARNING OUTCOMES

Participants will acquire the knowledge required to implement monitoring activities for the analysis of operating-experience feedback from nuclear facility operators.

PROGRAM

The course covers the following topics:

- Historical aspects relating to the analysis of operating-experience feedback from nuclear facilities.
- Objectives, issues and limits of the analysis of operating-experience feedback from nuclear facilities.
- National and international regulatory contexts.
- Tools for analyzing and utilizing experience feedback.
- Incident analysis methods, more particularly for the organizational and human aspects.

The work is based on concrete examples and performed in groups. It enables trainees to better understand the various aspects brought up in the theoretical classes (especially on the organization required and the analytical methods used).

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an assessment during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Regulatory Control of Nuclear Sites: Inspection of I&C and Electrical Systems

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1019

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide trainees with an understanding of the regulatory control processes related to reactor instrumentation, plant control and electrical systems.

TARGET AUDIENCE

This training is intended for:
- Engineers wishing to acquire general knowledge of I&C and Electrical Systems technology and operation, and their role in the safety of nuclear facilities in normal and accident conditions.
- Professionals from regulatory authorities and technical support organizations.
- Members of reactor operator/licensee professional staff.

PREREQUISITES

Participants are expected to have basic knowledge in the area of nuclear and radiation science and technologies.

LEARNING OUTCOMES

Participants will acquire:

- The fundamentals of instrumentation and control systems.
- The fundamentals of electrical systems.
- Insight into the differences between analogue and digital I&C systems and individual pros and cons for different applications.
- The ability to apply their knowledge and skills to the main digital components, both the ones currently used and those considered for use in future nuclear plants.
- A grasp of design and regulatory requirements.
- Knowledge about the state of the art on human-machine interfacing and computerized control rooms.
- A grasp of the competencies on main components and issues related to the electrical systems and networks in a plant.
- A grasp of the regulatory procedures needed to ensure a good level of compliance with safety requirements.

PROGRAM

In addition to the general introduction, the 5-day training module will cover the following subjects:

- The basis for inspection and its role in the overall licensing process.
- The importance of reactor electrical systems and instrumentation/control systems in safety.
- Design, conduct, reporting and follow-up of inspection programs for SSCs during design, manufacture, construction, testing, commissioning and operation.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

ASTEC: Accident Source Term Evaluation Code

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1020

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises are supervised by experienced TSO experts belonging to the IRSN ASTEC team.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide a basic understanding of the ASTEC software capabilities and its application in reactor accident source term assessment and severe accident management. It should be noted that participants cannot be expected to acquire an in-depth theoretical knowledge of severe accident phenomena from the brief description of ASTEC physical modeling principles presented in this course.

TARGET AUDIENCE

The training course is intended for the benefit of professional engineers and scientists with university-level degrees involved in NPP safety analysis related especially to severe accidents.

PREREQUISITES

Participants will require knowledge of severe accident phenomenology and an experience in running computer codes.

LEARNING OUTCOMES

Participants will acquire:

- An understanding of ASTEC software capabilities.
- Sufficient understanding of the software use to perform first calculations for the purpose of interpreting severe accident experiments and developing NPP accident scenarios.

PROGRAM

The Accident Source Term Evaluation Code (ASTEC) has been developed over a number of years for the simulation of severe accident sequences in water-cooled nuclear power plants. The software simulates all severe accident phenomena, except steam explosion and loss-of-containment mechanical integrity, from the initiating event up to the possible release of radioactive products ("source term") from the containment.
The main ASTEC applications include nuclear reactor safety analysis source term evaluations, and development of severe accident management guidelines.
The current V2 version is applicable to water-cooled reactors including PWR, VVER and BWR and to pressurized heavy-water reactors.
The software builds on the European body of knowledge on severe accidents. It has been subjected to an intensive validation through more than 160 experiments, including separate- and coupled-effect tests, integral tests (e.g. Phébus FP in-pile tests) and, in particular, OECD/NEA ISP exercises. The validation matrix is being continuously expanded based on the results of ongoing international programs (PEARL, STEM2-OECD, CCI-OECD, ThAI-OECD, etc.).

Following a general presentation of the software structure and user tools, the lectures focus on various modules used to simulate severe accident phenomena, each one addressing either NPP zones during the whole scenario or specific parts of the scenarios.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Oversight of Safety Culture and Management System

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1022

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To present the fundamentals, principles and requirements to develop, implement and use an integrated management system fitted to the regulatory needs and to its technical safety organization (TSO).

TARGET AUDIENCE

This training is intended for professionals from:
- nuclear regulatory authorities,
- technical safety organizations,
- operators of nuclear facilities,

who wish to develop an integrated management system that complies with IAEA requirements and is aligned with the most recently recognized industrial standards.

PREREQUISITES

No particular knowledge is required.

LEARNING OUTCOMES

Participants will acquire:

- An understanding of the main principles of an integrated management system and the benefits of adopting such a system.
- An understanding of how to establish, implement, assess and improve an integrated management system for their own organization based on a process approach.
- An ability to use the principles, methods and tools to develop, implement, monitor and improve a process.

PROGRAM

The training will start by recalling the basics on quality control and quality assurance and how they evolve into a quality management system and integrated management system.

The requirements of international standards (ISO, IAEA, etc) will be discussed and compared in order to understand their respective approach, similarities and differences.

Emphasis will be given to the process approach, as recommended by IAEA in its recent publications, and also to important issues like satisfaction of interested parties, graded approach, continuous improvement, transparency, communication to the public.

Part of the training will cover the safety culture concept and provide examples of how it is integrated into the management system.

Examples will be used to demonstrate how ISO 9001 and IAEA GS-R-3 requirements are implemented in some management systems.

The training course covers the following topics:

- Concepts of integrated management system.
- Developing process mapping and capacity building.
- Practical organization of audits and specific topics.
- Examples of an integrated management system in safety organisations

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Simulating Reactor Functioning during Incident and Accident - SOFIA

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us
The maximum number of students is limited to eight participants.

Code: CO1023

REGISTER NOW

Contact
Alena Prokofieva
+33 (0)1 58 35 83 00
+33 (0)6 08 48 32 85
mailto : alena.prokofieva@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To acquire a working knowledge of the SOFIA simulator for observation of functioning under incident and accident conditions.

TARGET AUDIENCE

This training is intended for engineers who wish to acquire general knowledge in functioning physics and safety of pressurized water reactors (PWR) under normal and accident conditions.

PREREQUISITES

Participants should have some basic knowledge of PWRs.

LEARNING OUTCOMES

Participants will acquire:
▪ A better understanding of the physical phenomena that occur in a PWR during normal operation, especially during the startup stage and under accident conditions.
▪ A global view of the main systems of the nuclear island used in normal and accident conditions, and of how they interact.
▪ An understanding of the main steps in normal operational procedures as the function of the main automatic controls of the plant unit, for different states of the plant (from cold shutdown state for maintenance to full power operation).
▪ An understanding of the main operational safety procedures under accident conditions (LOCA, SGTR).
▪ The ability to assess situations that can lead to severe accidents, such as loss of cooling water, loss of steam generator feedwater supply, or loss of power; demonstration through simulation of the Three Miles Island (TMI) and Fukushima accidents.

PROGRAM

The course focuses on lectures and practical work sessions on the SOFIA simulator.
To perform analysis of thermal hydraulics during a reactor accident or safety assessment, the French technical safety organization IRSN uses the CATHARE (Code for Analysis of Thermal Hydraulics during an Accident of Reactor and Safety Evaluation) system code for PWR safety analysis, accident management and definition of plant operating procedures, and for research and development.

The module will cover the following subjects:
▪ PWR systems and normal reactor operation:
  - Introduction to PWR operation.
  - Main PWR systems.
  - General information and sequence leading to the hot shutdown state.
  - Description of the CATHARE thermal-hydraulic code.
  - Basics of core physics, divergence and core control.
  - Divergence and power increase turbine coupling.
▪ Design basis accidents for PWR:
  - Description of loss-of-coolant accidents (LOCA).
  - Large-break LOCA transient (LB LOCA).
  - Small-break LOCA transient (SB LOCA), fourth sequence: failure of first actions.
  - Description of steam generator tube rupture (SGTR accidents).
  - SGTR transient.
  - Sixth sequence: intervention strategy.
  - Seventh sequence: decision-making process for assault.
▪ Other PWR accidents:
  - TMI and Fukushima accidents.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Human and Organizational Factors

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1025

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide a detailed overview (concepts and methods) in the field of Human and Organizational Factors (HOF).

TARGET AUDIENCE

This training is intended for:
- engineers.
- researchers.
- other professionals from Nuclear Regulatory Authorities (NRA) and Technical Support Organisations (TSO) involved in nuclear safety activities.

PREREQUISITES

Participants are expected to have basic knowledge of nuclear safety activities.

LEARNING OUTCOMES

Participants will be able to:
- Estimate the different factors influencing working situations, such as the environment, rules, organization, management or human actions.
- Understand, for a given working situation, the differences between the prescribed task and the actual one.
- Evaluate the contribution of human action in the global reliability of high risk systems like nuclear industries.
- Identify the contribution of HOF studies to nuclear safety at every step of the facility life cycle (design, operation, dismantling).
- Understand the HOF methodology to lead an event analysis.
- Acquire a global view of the key organizational features of a learning process in high risk systems such as nuclear industries.
- Know the conceptual and theoretical basis useful to understand crisis management in a globalized world.

PROGRAM

The 5-day training module will cover the following subjects:

- The Überlingen Accident working group.
- Introduction to Human and Organizational Factors: key concepts and methods.
- From human error to organizational reliability.
- Human and organizational factors in design.
- Human and organizational factors in operation.
- Human and organizational factors in dismantling.
- Operating experience feedback and event investigation.
- Analysis of an event.
- Working groups.
- Man-machine interface and control-room supervision.
- Human and organizational factors and nuclear assessment.
- Human reliability analysis.
- Crisis management.
- Safety culture.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Regulatory Control of Nuclear Sites: Inspection during the Site Characterization and Construction Phases (Module 1)

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1026

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide trainees with an understanding of the site characteristics that influence safety and of the approaches for investigating and assessing the significance of such characteristics.

TARGET AUDIENCE

This training addresses:

- Professionals involved in regulatory and technical support processes related to the investigation of nuclear facility sites and assessment of their suitability.
- Professionals who are relatively new to the nuclear regulatory process and experienced technical specialists who wish to gain further insights into the licensing process and its interaction with the more detailed technical work that supports the regulatory process.

PREREQUISITES

Participants will require a basic knowledge of nuclear facility technology, nuclear and radiation safety, and nuclear regulatory processes.

LEARNING OUTCOMES

Participants will gain an understanding of the site-related characteristics that are relevant to nuclear and radiological safety, and of the approaches taken to investigate these characteristics and to assess their impact on the suitability of the site.

PROGRAM

The first module covers nuclear regulatory activities related to the investigation and assessment of the suitability of nuclear facility sites, both during the site selection phase and periodically during the operational phase. It includes the design, coordination, reporting and follow-up of regulatory inspection programs relating to the site.

In addition to the general introduction, the module will cover the following subjects:

- Regulatory aspects of siting and site evaluation.
- Assessment of external events.
- Site characteristics influencing the potential effects of the nuclear facility in the surrounding area.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

Note: *The two modules (Module 1 "Regulatory Control of Nuclear Sites: Inspection during the Site Characterization and Construction Phases" and Module 2 "Regulatory Control of Nuclear Sites: Inspection during the Construction Phase - Site Assessment") are stand-alone and participants can attend both or either modules.*

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Regulatory Control of Nuclear Sites: Inspection during the Construction Phase – Site Evaluation (Module 2)

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1040

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide trainees with an understanding of site characteristics that are important to safety, along with the approaches for investigating their characteristics and assessing their significance.

TARGET AUDIENCE

This training is intended for:
- Professionals involved in regulatory and technical support processes related to the investigation of nuclear facility sites and assessment of their suitability.
- Specialists entering into site assessment projects.
- Senior regulatory staff with project responsibilities for safety assessment and demonstration where site assessment plays a significant role.

PREREQUISITES

Participants will require a basic knowledge of nuclear facility technology, nuclear and radiation safety, and nuclear regulatory processes.

LEARNING OUTCOMES

Participants will acquire knowledge and an understanding of how regulatory processes work in practice for site investigation and assessment in the siting, design and construction phases of nuclear facility development.

PROGRAM

The module intends to provide a practical understanding of the safety principles presented in Module 1 "Inspection during the Site Characterization and Construction Phases". It addresses the technical assessment of site characteristics and how these are linked to the safety-assessment and safety-demonstration processes. Using a very hands-on approach, it focuses on the assessment of the effects of external events occurring around the site, and the characteristics of the site and surrounding environment that could influence the transfer of radioactive material releases to people and the environment.

The module will present five days of practical exercises and case studies related to the assessment of external hazards and of environmental impacts:

- Each practical-exercise session will briefly present the regulatory framework for the corresponding topic.
- Each group will present its results for general discussion.
- Two sessions will introduce the use of specific technical assessment tools: Renext for the estimation of extreme values of meteorological and hydrogeological hazards, and Erica for the assessment of environmental impact.
- Each case-study session will be introduced with the regulatory framework and illustrate how safety regulatory principles are implemented in the field when selecting and assessing site suitability for the nuclear facility.
- An interactive session will focus on issues related to the country of participants.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

Note: *The two modules (Module 1 "Regulatory Control of Nuclear Sites: Inspection during the Site Characterization and Construction Phases" and Module 2 "Regulatory Control of Nuclear Sites: Inspection during the Construction Phase-Site Assessment") are stand-alone and participants can attend both or either modules.*

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Regulatory Control of Nuclear Sites: Inspection of Safety Systems, Structures and Components

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1030

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide participants with an understanding of the approach to the design, conduct, reporting and follow-up of inspection programs for structures, systems and components important to safety during design, manufacture, construction, installation, commissioning and operational phases of a nuclear power plant lifetime.

TARGET AUDIENCE

This training is intended for professionals involved in regulatory processes related to the design, construction, commissioning and operation of nuclear power plants and research reactors.

PREREQUISITES

Participants are expected to have basic knowledge of nuclear installation technology, nuclear and radiation safety and nuclear regulatory processes.

LEARNING OUTCOMES

- An understanding of compliance assurance activities within the regulatory process.
- A knowledge of how to apply this understanding to the inspection of reactor systems, structures and components important to safety throughout the reactor lifetime.
- An ability to develop, conduct and follow up inspection activities.

PROGRAM

The training course covers the following topics:

- The overall licensing process.
- NPP structures, system and components that are important to safety.
- Design, conduct, reporting and follow-up of inspection programs for structure system and components during design, manufacture, construction, testing, commissioning and operation phases of the nuclear power plant lifetime.

Each day will have a summary session to enable general feedback and discussion of the topics covered during the day.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Lessons Learned from the Fukushima Daiichi Accident and the EU Stress Test

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1032

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, round table with experienced experts from European safety organizations. Practical exercises will take place during the week.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide trainees with a thorough background on the accident at the Fukushima Daiichi nuclear power plant, its consequences and all related topics; on the lessons learned from the plant behavior assessment, the severe-accident management and emergency response; and on the insights from post-Fukushima activities like the EU stress tests.

TARGET AUDIENCE

Professionals involved in nuclear safety and radiation protection activities, and who are employed by nuclear regulators or their technical safety organizations.

PREREQUISITES

Basic knowledge in the area of nuclear and radiation science and technologies.

LEARNING OUTCOMES

Trainees will gain important up-to-date information to apply to their activities in the fields of nuclear safety and radiation protection.

PROGRAM

The 5-day training module will cover the following subjects:

- General presentations of the accident, its management and consequences.
- Extreme natural hazards.
- Safety systems of the Fukushima Daiichi plant and accident management.
- European stress tests.
- Examples of national approaches in Europe.
- Off-site emergency response and consequences of the Fukushima Daiichi accident – short-term response and long-term management.
- Challenges related to emergency preparedness and post-accident management.
- Facility types other than NPP, and R & D related to the Fukushima accident.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Basic Safety Related Aspects and Regulatory Oversight on NPP Operation

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1035

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide basic knowledge on the most relevant safety aspects of NPP operation, on the structure of a risk-informed oversight system, and on the adequate balance of the different oversight activities, with a presentation of practical cases for discussions among the attendees.

TARGET AUDIENCE

This training is intended for:
- Engineers
- Researchers
- Others professionals from Nuclear Regulatory Authorities (NRA) and Technical Support Organizations (TSO).

PREREQUISITES

Participants are expected to have basic knowledge in the area of NPP and regulatory activities.

LEARNING OUTCOMES

Participants will acquire:

- Knowledge on the scope, content and significance of the most relevant safety-related aspects of NPP operation.
- A detailed view of the main components of a risk-informed regulatory oversight model for operating NPP, including: items included in the baseline inspection program; reactive inspections of significant events; assessment of inspection findings; development of NPP performance indicators which could give significant insights on licensee safety awareness and potentially emerging problems; definition of regulatory activities to cope with declining plant safety performance; and the enforcement process.
- An understanding of the practical application to real cases of the above-mentioned points.

PROGRAM

Regulatory oversight of operating nuclear power plants (NPP) is a key aspect in assuring safe NPP operation and proper adherence to licensing basis as required in plant authorization.
To fulfill this aim, it is of paramount importance to have:
- A clear definition of the main aspects requiring oversight with respect to NPP operation. This includes the clear definition and scope of the main safety-related aspects that need to be considered in the regulatory oversight.
- A well-balanced and comprehensive system to establish and develop the regulatory oversight activities.

The training course covers the following topics:

- Key safety related aspects on NPP operation.
- Regulatory oversight criteria and scope description.
- Practical cases.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Application of Nuclear Safety Concepts in the Development of Regulations and Guidance

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1036

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide basic knowledge on the safety concepts that have evolved and been agreed internationally and which provide a basis for nuclear, radiation, radioactive waste and radioactive material transport safety legislation and regulatory guidance.

TARGET AUDIENCE

This training is intended for professionals involved in developing and applying regulations and administering regulatory processes related to the design, construction, commissioning and operations of nuclear installations and facilities and activities using ionizing radiation.

PREREQUISITES

Participants are expected to have basic knowledge of nuclear installation technology, nuclear and radiation safety and nuclear regulatory processes.

LEARNING OUTCOMES

Participants will acquire:

- An understanding of the safety concepts and their scientific and philosophical basis and how these concepts have been expressed in safety requirements.
- An ability to more effectively engage in the development or revision of regulations and regulatory guidance and in the implementation of regulatory processes.

PROGRAM

In addition to the general introduction, the module will consist of 5-day of training, which will cover the following subjects:

- Responsibilities for safety and the role of governments and regulatory authorities.
- Leadership and management of safety.
- Radiation protection principles of justification, optimization and limitation.
- Nuclear safety and the prevention of accidents.
- Emergency preparedness and response.
- Reduction of existing or unregulated radiation risks.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

VVER Design and Operational Safety (Module 1)

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1041

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide the technical background on VVER safety and safety-related systems design and operation, as well as the regulatory safety review methodology to apply in the licensing process and during the operation of Nuclear Power Plant (NPP).

TARGET AUDIENCE

This training is intended for professionals from regulatory bodies and technical support organizations of "newcomer countries" with VVER-type NPP programs, who are or who will be involved in safety-document review and assessment or in licensing and monitoring activities for this type of facilities.

PREREQUISITES

Participants are expected to have basic knowledge of nuclear facility technology, nuclear and radiation safety and nuclear regulatory processes.

LEARNING OUTCOMES

Participants will be familiarized with:
- Objectives, scope and main steps of the regulatory review within licensing and commissioning processes.
- Safety review methodology and organization.
- System design and operating documentation, including emergency operating procedures.
- Periodical testing and maintenance strategy.
- Organization of operating-experience feedback analysis and the development and implementation of safety improvement measures.
- Main steps of commissioning and unit startup.

PROGRAM

The training course provides the main elements of the VVER design and operational safety principles and requirements, along with their implementation with regard to the regulatory safety review.

The lecturers have a wide national and international experience both in VVER safety assessment and licensing, and in the safety assessment of Generation III reactors.

Training sessions will include:

- Plenary sessions dedicated to lectures and discussions on common topics.
- Case-study sessions for practical training on how to review and assess safety-related documents and safety cases.

A number of practical exercises will take place during the week in which participants will work in groups to address issues related to the subject matters being presented.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

Note: *The two modules (Module 1 "VVER Design and Operational Safety" and Module 2 "Regulatory Review of VVER Accident Analysis Results") are stand-alone and participants can attend both or either modules.*

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Regulatory Review of VVER Accident Analysis Results (Module 2)

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1042

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide the technical background on VVER safety assessment, with a focus on the accident analysis and design justification for safety and safety-related systems, structures and components (SSCs) to apply in regulatory safety review during the nuclear power plant (NPP) licensing process.

TARGET AUDIENCE

This training is intended for professionals from regulatory bodies and technical support organizations of "newcomer countries" with VVER-type NPP program who are or who will be involved in review and assessment of safety documents, and in the licensing and monitoring of this type of facilities.

PREREQUISITES

Participants should be familiar with VVER technology, basic safety principles and the design of safety and safety-related systems.

LEARNING OUTCOMES

Participants will be familiarized with:
- Regulatory requirements and design justification of safety and safety-related SSCs of Generation III reactors.
- Main steps in the regulatory review of safety systems using a deterministic approach.
- Definition and categorization of initiating events in design-stage accident analysis.
- Main tools, assumptions, limitations and results of accident analysis calculations. Links with the characteristics and classification of safety SSCs.
- Justification, development and implementation of symptom-based emergency operations instructions and severe accident management guidelines.

PROGRAM

The training course provides the main elements of regulatory review with regard to VVER accident analysis and safety justification.

The lecturers have a wide national and international experience in VVER safety assessment and licensing, and in the safety assessment of Generation III reactors.

The training session will include:

- Plenary sessions dedicated to lectures and discussions on common topics.
- Case-study sessions for practical training on how to review and assess safety-related documents and safety cases.

A number of practical exercises will take place during the week in which participants will work in groups to address issues related to the subject matters being presented.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

Note: *The two modules (Module 2 "Regulatory Review of VVER Accident Analysis Results" and Module 1 "VVER Design and Operational Safety") are stand-alone and participants can attend both or either modules.*

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Experts *for experts*

NUCLEAR SAFETY | Course in English

Safety Aspects and Regulatory Requirements Related to Fusion Reactors in France

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 2 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Specialized training course. Please contact us.

Code: CO1043

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide participants with an overview of nuclear safety principles, regulatory requirements and the licensing process applied in France for nuclear facilities during the different phases of their life cycle, with a focus on the design and construction phases and associated quality requirements.

TARGET AUDIENCE

This training is intended for project leaders and professionals involved in:

- ITER design and construction
- Quality assurance
- Structures procurement
- Systems and components (SSCs) related to safety
- The licensing process and regulatory issues

PREREQUISITES

Participants should have a master degree in physical, chemical or natural sciences.

LEARNING OUTCOMES

Participants will be able to:

- Describe the safety function in a fusion plant, discuss the potential risks in a Magnetic Fusion Plant, explain the confinement and safety barrier, and understand the waste-generation mechanism and mass produced.
- Understand the safety organization in France, the purpose and fundamental principles of nuclear safety and the concept of safety culture.
- Learn more about French safety and regulatory requirements and the associated binding and enforcement provisions.
- Take cognizance of the importance of the quality management system; of the need to apply the specified quality rules for each SSC in accordance with its safety classification; and of the equal need to apply the same specified quality provisions to SSC subcontractors and ensure their compliance during the design, fabrication/construction, testing and inspection processes.

PROGRAM

The course focuses on the nuclear safety principles, regulatory requirements and licensing process applied in France for nuclear facilities during the different phases of their life cycle.

The 5-day training module will cover the following subjects:

- Presentation of the training course and the expected results.
- The principles and objectives of nuclear reactor safety.
- French nuclear safety regulations.
- The organization of nuclear safety in France, with presentation of the main stakeholders (including emergency preparedness and response).
- The licensing process during the different phases of a nuclear facility's life cycle.
- ITER safety expertise: methods and results.
- Quality management system for facilities and operations, with practical examples on issues related to its implementation.
- The meaning of safety culture for operators and their subcontractors.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SAFETY — Course in English

Nuclear Criticality Safety

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us
The maximum number of students is limited to twelve participants.

Code: CO1045

REGISTER NOW

Contact
Alena Prokofieva
+33 (0)1 58 35 83 00
+33 (0)6 08 48 32 85
mailto : alena.prokofieva@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

When operations are performed on fissile materials outside nuclear reactor cores (storage facilities, laboratories, factories and transport), these operations present a particular risk: the risk of criticality. The nuclear criticality safety is the prevention of nuclear criticality accidents and the limitation of the consequences of such accidents they should occur.
This training provides basic knowledge on nuclear criticality safety.

TARGET AUDIENCE

Person responsible for design, fabrication or maintenance of nuclear criticality safety for a process or facility. These persons would be nuclear criticality safety specialists with the responsibilities of assessment, calculation or peer review of nuclear criticality safety documentation. Also, Individuals or bodies with responsibilities of oversight and regulation of facilities and processes.

Concerned area:

- fissile material transportation.
- fuel cycle plants (fuel manufacturing, recycling, etc).
- laboratories and fissile materials storage.
- reactor core in loading and unloading.
- plants permanently shut down or being dismantled.

PREREQUISITES

Have knowledge of neutron physic and nuclear safety.

LEARNING OUTCOMES

- To understand the issues related to nuclear criticality safety.
- To learn the main principles retained to the prevention of criticality.
- To acquire basic knowledge related to criticality characterization and prevention (physical properties).
- To introduce the phenomenon of a criticality accident and to explain the French regulation on nuclear criticality safety (methods of control and reference fissile medium).

PROGRAM

Basic concept
Physical properties of nuclear criticality, phenomenon and consequences of a criticality accident.

Reference fissile medium and methods of control / control modes
Notions used in the French regulation (main principles of methods of control: mass, geometry, moderation, concentration, poisoning).

Criticality accident
Feedback of past criticality accidents (exercises in small groups).

Calculation codes
Presentation of French codes used for nuclear criticality safety assessment.

Case study
Based on a fictive industrial equipment.

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Experts *for experts*

NUCLEAR SAFETY | Course in English

CRISTAL - Tools for Criticality Safety Calculation

Session: Consult on-line training schedule

Intra-company training session is available on demand.

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us
The maximum number of students is limited to twelve participants.

Code: CO1055

REGISTER NOW

Contact
Alena Prokofieva
+33 (0)1 58 35 83 00
+33 (0)6 08 48 32 85
mailto : alena.prokofieva@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Practical exercices and software practice on real cases will take place during the week.

A USB stick containing the course material will be provided.

OBJECTIVES

The main objective of the training is to use the CRISTAL V2 package for criticality calculations with LATEC graphical front-end and simulation back-end with CRISTAL codes (APOLLO2, MORET 5 et TRIPOLI-4®). Underlying numerical recipes of simulation and their limitations in the criticality-safety assessment framework are described. This training is designed to meet the needs of nuclear criticality safety practitioners.

TARGET AUDIENCE

A person and organization responsible for design, fabrication, maintenance or review of nuclear criticality safety for a process or transportation. These persons would be Nuclear criticality safety specialists with the responsibilities of assessment and calculation.

CRISTAL package is used to performed calculations for:

- fissile materials transportations.
- nuclear fuel cycle facilities (fuel processing, reprocessing…).
- laboratories and storage units.
- unloaded nuclear reactor core.
- decommissioning or decommissioned facilities.

PREREQUISITES

Knowledge in neutronics and main principles on nuclear criticality safety (criticality control parameters, fissile materials, etc).

LEARNING OUTCOMES

After the course, participants will :
- Have a general knowledge of CRISTAL package (structure, simulations tools, libraries, etc).
- Be able to perform criticality calculations with CRISTAL V2 package, relying on state-of-the-art neutronic simulation tools (APOLLO2, TRIPOLI-4®, MORET 5) and international nuclear database.
- Understand the application range of different simulation tools and methods.

PROGRAM

Basics
CRISTAL V2 package – Architecture and main components – Calculation routes

Deterministic method
APOLLO2 simulation code, recommended calculation routes, standard calculations, practical cases.

Monte Carlo method
MORET 5 and TRIPOLI-4® simulation codes, features, practical cases.

Modelling environnement
LATEC workbench, dilution laws, basics, perform and validate criticality-safety calculations

Nuclear Safeguards & Security

An understanding of nuclear security and safeguards depends on knowledge about issues like how to physically protect nuclear facilities or shipments of nuclear material; cybersecurity at nuclear facilities; nuclear material accounting and control; and international safeguards. Covering a number of aspects, ENSTTI courses present these different concepts and explain the existing synergies and differences.

Our training offer

- CO1008 — EXTREME – External Threat Response Management Exercise
- CO1011 — Nuclear Materials Protection, Nuclear Safeguards and Interface with Nuclear Safety
- CO1053 — Implementing Nuclear Safeguards in practice

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Experts *for experts*

NUCLEAR SECURITY | Course in English

EXTREME – External Threat Response Management Exercise

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 3 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1008

REGISTER NOW

Contact
Alena Prokofieva
+33 (0)1 58 35 83 00
+33 (0)6 08 48 32 85
mailto : alena.prokofieva@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

Identifying and developing key issues around response effectiveness in case of a severe attack against an NPP.

TARGET AUDIENCE

Professionals:
- involved in nuclear safety and security,
- from national nuclear security authorities,
- from police forces involved in nuclear emergency planning and response.

PREREQUISITES

Participants should have basic knowledge in the fields of nuclear energy and nuclear security.

LEARNING OUTCOMES

To improve participants' skills and understanding in the following areas:

- decision-making process to solve a complex and highly specific situation with possibly conflicting issues.
- coordination and interfaces between all stakeholders, including information and communication issues.
- planning, preparation and training to cope with a nuclear crisis resulting from a severe attack on a nuclear facility.
- managing time and people, mainly in order to recover a safe, secure situation at the nuclear site.

PROGRAM

The scenario-driven course is based on generic case study to address crisis decision management. The scenario considers an attack on an NPP, requiring an emergency response at national level. It provides successive failures of safety functions, requiring that timely and appropriate measures be taken to stop the aggression and restore safety and security at the site. The discussion is time-stepped and facilitated.

The 3-day training module divides the scenario into four phases and nine sequences, each addressing a homogeneous stage of the emergency situation:

- Reflex phase:
  - First sequence: the attack.
- Reflection phase:
  - Second sequence: first statement/first response.
  - Third sequence: emergency management deployment.
  - Fourth sequence: failure of first actions.
  - Fifth sequence: analysis of the situation.
  - Sixth sequence: intervention strategy.
  - Seventh sequence: decision-making process for assault.
- Response phase:
  - Eighth sequence: assault by SWAT.
- Recovery phase:
  - Ninth sequence: recovery strategy.

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Experts *for experts*

NUCLEAR SECURITY | Course in English

Nuclear Materials Protection, Nuclear Safeguards and Interface with Nuclear Safety

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1011

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

- Raising awareness and instructing in the field of nuclear security, and on how it interfaces with nuclear safety and the safeguards for nuclear and other radioactive materials.
- Maintaining/increasing technical skills and ensuring sustainable development of nuclear technology.

TARGET AUDIENCE

Professionals involved in nuclear security activities employed in National Regulatory Authorities (NRA) and Technical Support Organizations (TSO).

PREREQUISITES

Participants should have basic knowledge in the fields of nuclear energy and nuclear security.

LEARNING OUTCOMES

Improved understanding and skills in relation to nuclear security and its interfaces with nuclear safety and safeguards.

PROGRAM

The course focuses on international safeguards, the physical protection of nuclear materials, and accounting for and controlling nuclear materials.

The 5-day training module will cover the following subjects:

- Nuclear security culture, the compatibility between nuclear safety and nuclear security, and the complementarities between security and safeguards.
- The approach to dealing with non-proliferation issues through international safeguards (IAEA and EURATOM).
- Nuclear security principles.
- Security of nuclear materials and nuclear facilities.
- The transport of nuclear materials.
- Accounting for and controlling nuclear materials (in connection with nuclear security).
- Measurement of nuclear materials for protection against theft.
- Security of radioactive materials.
- The assessment process for nuclear security systems.
- Emergency situations related to nuclear security.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

NUCLEAR SECURITY | Course in English

Implementing Nuclear Safeguards in practice

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1053

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

Increase the knowledge of the participants:
- On the importance of implementing fully safeguards obligations to facilitate the effective and efficient application of safeguards for the country;
- On the continued evolvement of safeguards through modern technology and newly developed concepts.

TARGET AUDIENCE

Professionals involved in nuclear safeguards activities employed in National Regulatory Authorities (NRA) and Technical Support Organizations (TSO).

PREREQUISITES

Participants should have basic knowledge in the fields of nuclear energy and nuclear safeguards.

LEARNING OUTCOMES

Participants will be able to:
- Understand the international and EURATOM safeguards agreements including the Additional Protocols and the Small Quantity Protocols;
- Contribute to the practical implementation of safeguards in their country in applying the principles of nuclear material accountancy and control;
- Understand differences and interfaces between nuclear safeguards and nuclear security;
- Describe safeguards techniques and to practically use some of them.

PROGRAM

The course focuses on implementing international safeguards in practice. The 5-day training module will cover the following subjects:

Application of safeguards
- Non-proliferation treaty and IAEA verification;
- IAEA safeguards agreements;
- Regional control;
- Small quantity protocol (SQP);
- Additional protocol and declaration.

Verification activities
- EURATOM inspections;
- Non Destructive Assay – gamma-ray spectrometry;
- Non Destructive Assay – neutron counting;
- Destructive assay – Containment and surveillance and monitoring;
- Hands-on demonstration of the relevant equipment.

Case study
- Measures taken by country's Nuclear Regulatory Authorities for establishing safeguards infrastructure and providing operational support for verification activities;
- Principles of nuclear material accountancy and control.

Safeguards & Security interface
- Information on the legal framework for nuclear security and on the categorization of nuclear material for nuclear security purposes;
- Principal differences and possible synergies between nuclear safeguards and nuclear security.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

Using ionizing radiation for beneficial purposes requires appropriate protection of workers, patients, the public and the environment. Knowing and implementing safety standards for radiation protection management of radioactive waste and safe transport of radioactive waste and transport of radioactive material is of utmost importance for any stakeholder of a national regulatory system.

Radiation Protection

Our training offer

- CO1007 — Radiation Protection and Confinement Systems
- CO1018 — Application of IAEA Regulations in Qualification and Approval of Packages for the Transport of Radioactive Materials
- CO1021 — The Legal and Regulatory Basis for Nuclear and Radiation Safety
- CO1024 — Regulatory Control of Radiation Protection in Medical Applications
- CO1027 — Regulatory Control of the Safety of Spent Fuel & Radioactive Waste Management
- CO1031 — Radiation Protection
- CO1039 — Regulatory Control of Nuclear Sites: Inspection of Environmental and Occupational Radiation Protection (Module 1)
- CO1044 — Regulatory Control of Nuclear Sites: Surveillance of Environmental Radioactivity (Module 2)
- CO1046 — Regulatory Control of Radiation Protection in Mining and Minerals Processing Facilities and Activities
- CO1047 — Regulatory Control of Radiation Sources
- CO1048 — Regulatory Review and Assessment of the Safety Case for Disposal Facilities

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Experts *for experts*

RADIATION PROTECTION | Course in English

Radiation Protection and Confinement Systems

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1007

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide a transfer of knowledge on radiation protection for workers and the population and on confinement of radioactive substances in nuclear facilities.

TARGET AUDIENCE

Professionals employed in nuclear regulatory authorities or technical support organization involved in nuclear safety and radiation protection activities.

PREREQUISITES

Participants need basic knowledge in the fields of ionizing radiations and nuclear safety.

LEARNING OUTCOMES

A higher level of skills and understanding on the following topics:
- The fundamental principles of radiation protection and corresponding regulations.
- The types of ionizing radiations and their health effects.
- Occupational exposure paths in the nuclear facility and the provisions for minimizing, monitoring and optimizing such exposure.
- The design principles for containing the radioactive substances and minimizing the radioactive releases in nuclear power plants and fuel cycle facilities.
- Assessing radiation protection measures and documentation in medical applications.
- The main steps for assessing the radiological impact of the releases on the population. Ways to limit the exposure of the population in case of an accident, and the different offsite countermeasures which can be implemented.

PROGRAM

The course is divided into three parts:

- **Part 1.** Radiation protection for workers.
- **Part 2.** Containment systems.
- **Part 3.** Radiation protection of the population.

The terminology used is taken from the IAEA safety glossary (2007 Edition). In particular:

- Confinement refers to the safety function of preventing or controlling the releases of radioactive material to the environment in operation or in case of an accident.
- Containment refers to the means for achieving that safety function. It therefore refers to the methods or the physical structures designed to prevent or control the release and the dispersion of radioactive substances in the environment.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION | Course in English

Application of International Regulations in Qualification and Approval of Packages for the Transport of Radioactive Materials

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1018

REGISTER NOW

OBJECTIVES

The design and development of packages for the transport of radioactive materials must comply with the IAEA's strict safety requirements. With that in mind, the course presents the philosophy behind the regulations, the general context, and the major technical issues relevant to safety demonstrations.

TARGET AUDIENCE

Professionals involved in the safety of transport of radioactive materials, such as:
- Package designers,
- Applicants for package approvals,
- Members of Nuclear Regulatory Authorities (NRAs),
- Members of Technical Safety Organisations (TSOs).

LEARNING OUTCOMES

- A better understanding of the principles of the international regulations for the transport of radioactive materials.
- An ability to perform complete assessments of safety analysis reports (NRAs, TSOs).
- A better understanding of how to take into account every aspect of transport safety when designing packages (from concept to maintenance operations) and to demonstrate that they comply with regulations (designers, applicants, etc).

PREREQUISITES

Participants should have basic knowledge in the fields of nuclear safety, mechanical studies, material behavior and heat transfer.

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

PROGRAM

The training covers the principles of international regulations on the transport of radioactive materials; how to perform complete assessments of safety analysis reports; how to take every aspect of transport safety (from concept to maintenance operations) into account in the package design; and demonstrating compliance with the regulations.

Lectures
Covering all aspects of the safe transport of radioactive materials, the lectures focus on a correct understanding and interpretation of international regulations (such as IAEA GSR and SSR-6). European practices are also presented as examples. Subjects include:
- international regulations and practice.
- package safety demonstrations (covering mechanical behavior, thermal behavior, containment, radiation protection, criticality safety, radiolysis/thermals).
- safe, correct use of packages.
- assuring compliance.
- emergency management.

Working groups
A ~100-page, 11-part safety analysis report (SAR) on a concept package is used, covering every aspect of safety demonstrations (IAEA SSR-6, chapters I, III, IV, VI and VII). Each trainee receives a copy of the SAR. The objective is to perform a quick assessment (or preliminary analysis) of each of the following:
- elements important for safety and material classification (2 hrs).
- mechanical behavior (4½ hrs).
- thermal behavior (2½ hrs).
- containment (2½ hrs).
- radiation protection (1½ hrs).
- criticality safety (3 hrs).

Participants are guided by a much simplified, yet complete version of the "IRSN Feedback Experience List for Transport Safety Assessment", a document from the French national guide for applicants (Guide ASN n°7) that addresses every issue encountered frequently in safety demonstrations.
Divided into groups of 4 to 6 people, the trainees use their level of knowledge to perform the assessment either by themselves or guided by the trainers.

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Experts *for experts*

RADIATION PROTECTION | Course in English

The Legal and Regulatory Basis for Nuclear and Radiation Safety

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1021

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide an understanding of the nature of radiation hazards associated with nuclear installations and uses of radioactive sources and the principles and philosophy of safety and protection.

TARGET AUDIENCE

Professionals involved in activities related to the regulatory control or safety assessment of nuclear facilities and uses of radioactive materials.
Professionals employed by nuclear regulatory or nuclear safety technical expertise organizations.

PREREQUISITES

Participants will require a basic knowledge in the area of nuclear and radiation science and technologies. Persons with knowledge of nuclear law will also benefit from the course.

LEARNING OUTCOMES

Participants will acquire:

- Knowledge on how regulatory processes work in practice for all nuclear facility types and uses of ionizing radiation and for all phases of facility service life.
- An understanding of the philosophical approaches to nuclear and radiation safety and how these are incorporated into legal frameworks and regulatory processes.
- Knowledge towards working more effectively within national legal and regulatory frameworks in the areas of regulatory guidance development, review of safety documentation, establishing conditions for authorization, and compliance assurance activities.

PROGRAM

The training covers nuclear safety legislation, national infrastructural needs for nuclear and radiation safety and the international conventions and codes of practice.
It addresses the regulatory process for all types of nuclear facilities and uses of radioactive materials and radiation and also covers the lifecycle of facilities from siting through design, construction and operation to decommissioning.
It covers emergency situations and issues related to legacy facilities and lost or orphaned sources of radiation.

The five-day training module will cover the following subjects:

- The nature of nuclear and radiation hazards and the principles and philosophy of safety and protection.
- Nuclear legislation.
- International codes and conventions.
- Regulatory processes.
- Regulatory experience in practice.

Practical exercises during the week will involve participants working in groups to address issues related to the subject matter being presented.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION | Course in English

Regulatory Control of Radiation Protection in Medical Applications

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1024

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To improve knowledge in the activities of nuclear regulatory authorities and technical support organizations with respect to the regulatory control of radiation protection in medical applications (radiotherapy, nuclear medicine and diagnostic and interventional radiology).

TARGET AUDIENCE

Professionals from nuclear regulatory authorities or technical support organizations involved in the licensing and inspection of medical activities or facilities utilizing sources of ionizing radiation.

PREREQUISITES

Participants need basic knowledge of ionizing radiation physics, dosimetric quantities and radiation dose measurement.

LEARNING OUTCOMES

- A better understanding of the nuclear regulatory framework, the international safety standards for radiation protection, and related EU legislation.
- Knowledge of the main elements of a regulatory program in radiation protection in medical applications.
- Knowledge of the types, design & application of radiation sources and equipment used in radiotherapy, nuclear medicine & diagnostic and interventional radiology.
- An ability to assess radiation protection measures and documentation in medical applications.

PROGRAM

The 5-part course covers:

- **Part 1.** The nuclear regulatory framework.
- **Part 2.** Medical applications for ionizing radiation.
- **Part 3.** Radiation protection in medical facilities.
- **Part 4.** Elements of the regulatory program for radiation protection in medical applications.
- **Part 5.** Practical exercises and technical visits to nuclear-medicine and radiotherapy services.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION | Course in English

Regulatory Control of the Safety of Spent Fuel & Radioactive Waste Management

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1027

REGISTER NOW

OBJECTIVES

To provide awareness and a transfer of knowledge on the safety related to each step of management, including storage and final disposal.

TARGET AUDIENCE

Professionals employed by nuclear regulatory or nuclear safety technical expertise organizations, with a Master's degree or similar higher-education qualification and who are involved in radioactive-waste safety assessment activities.

PREREQUISITES

Participants will require basic knowledge in the fields of nuclear safety and radioactive waste management.

LEARNING OUTCOMES

Participants will acquire:

- Knowledge of international waste-management standards, including national aspects.
- An overview of pre-disposal radwaste management steps and techniques, with regard to the design of the safe final destination.
- An understanding of the main safety issues involved in near-surface and geological disposal, with practical cases in mind.
- The keys of anticipating the development of knowledge and resources required to assess hazards posed by radwaste repositories.

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

PROGRAM

Spent fuel and radioactive waste management is a matter of concern in all nuclear countries. Some countries have already identified final disposal as a sustainable final solution in their national waste management strategy.

The training course covers the following topics:

- Regulatory framework in waste management, international standards, EU countries implementation.
- Pre-disposal requirements (basic steps, waste characterization, acceptance criteria, conditioning, nuclear waste packages).
- The storage of disused radioactive sources and spent fuel, along with the safety assessment aspects. Near-surface disposal (main safety issues, feedback from the French experience, comparison between interim storage and near storage, disposal facilities, natural external hazards).
- The main safety issues implicated in near-surface and geological disposal, with practical cases in mind.
- The main challenges faced in establishing constructive dialogue with the stakeholders involved in a waste disposal project.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION — Course in English

Radiation Protection

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1031

REGISTER NOW

OBJECTIVES

To improve knowledge in the radiation protection of workers, patients and the population.

TARGET AUDIENCE

Professionals from nuclear regulatory authorities or technical support organizations involved in the licensing and inspection of medical activities or facilities utilizing sources of ionizing radiation.

PREREQUISITES

Participants need basic knowledge of ionizing radiation physics, dosimetric quantities and radiation dose measurement.

LEARNING OUTCOMES

Participants will acquire a better understanding of:
- The fundamental principles of radiation protection and their implementation in regulations.
- The types of ionizing radiation and their health effects.
- Occupational exposure paths and the provisions for minimizing, monitoring and optimizing such exposure in typical practices.
- How to minimize the exposure of patients.
- How to assess the radiological impact of radioactive releases on the population.
- The ways to limit the exposure of the population in case of an accident, and the different offsite countermeasures which can be implemented.

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

PROGRAM

The course will develop the following subjects:

- The need to assess the exposure to all types of ionizing radiation in order to achieve adequate radiation protection of workers and the population.
- Implementing provisions to limit and optimize the internal and external exposure of workers, including the tools used to monitor and minimize worker exposure.
- The provisions anticipated to optimize the exposure of patients in diagnostic or interventional applications and deliver the necessary dose to the targets while minimizing the exposure of healthy tissues in therapeutic applications.
- Reducing the radioactive releases of a practice in the environment during normal operation as an objective.
- How to deal with accidental releases.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION | Course in English

Regulatory Control of Nuclear Sites: Inspection of Environmental and Occupational Radiation Protection (Module 1)

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1039

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To provide participants with an understanding of the basis for regulatory inspection programs; of how such programs are linked to the nature of the radiation hazards associated with nuclear installations; and how to design, conduct and follow up such inspection programs for environmental and occupational radiation protection in nuclear installations.

TARGET AUDIENCE

- Professionals, primarily from nuclear regulatory or nuclear safety technical expertise organizations, who are involved in activities related to the regulatory control or assessment of the safety of nuclear installations.
- Professional from licensee organizations with responsibilities for safety and licensing.

PREREQUISITES

Participants will require basic knowledge in the area of nuclear and radiation science and technologies and an understanding of nuclear safety and regulatory processes.

LEARNING OUTCOMES

Participants will acquire an understanding of:
- Compliance assurance activities undertaken by the regulatory authority, with a focus on inspection.
- The nature of radiation hazards associated with nuclear facilities.
- The radiation protection and safety programs set up to monitor radiation exposure of workers in these facilities and of the surrounding populations.
- How to address the design, conduct, reporting and follow-up of inspection programs.

PROGRAM

The 5-day training module will cover the following subjects:

- An introduction to regulatory inspection.
- Regulatory inspection related to protection of the public and the environment.
- Regulatory inspection related to operational radiation protection.

It includes a number of practical exercises in which participants will work in groups to address issues related to the subject matter being presented.

Each day, there is a summary session to enable general feedback and discussion of the topics covered during the day.

At the end of the module, there will be a roundtable discussion session to address issues identified by participants, followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION | Course in English

Regulatory Control of Nuclear Sites: Surveillance of Environmental Radioactivity (Module 2)

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1044

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To help participants understand the principles that guide environmental radioactivity monitoring and to provide the foundation needed to develop environmental surveillance programs.

TARGET AUDIENCE

- Professionals involved in nuclear safety and radiation protection activities.
- Professional employed by nuclear regulators or their technical safety organizations.

PREREQUISITES

Participants are expected to have basic knowledge in nuclear and radiation science and technologies and to have attended a course on radioprotection.

LEARNING OUTCOMES

Participants will acquire:
- Background information on environmental monitoring and the general principles guiding the development of monitoring programs.
- The ability to assess the adequacy of an environmental radioactivity monitoring network.

PROGRAM

The 5-day training module will cover the following subjects:

- Environment radiological background and basis for surveillance of environmental radioactivity.
- International context, processes, and control of releases from facilities and activities that use ionizing radiation.
- Elements of physical dispersion and food-chain transfers.
- Metrology for environmental matrices.
- Environmental monitoring principles and practicalities with focus on 3H and 14C monitoring.
- Developing metrological facilities for radiological surveillance.
- NNR environmental laboratory visit, facts on natural background radiation in South Africa and establishing a background for a licensed nuclear site.
- Data treatment of monitoring results and dose assessment from routine releases and from emergency situations.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION | Course in English

Regulatory Control of Radiation Protection in Mining and Minerals Processing Facilities and Activities

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1046

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To help participants understand the nature of radiation hazards associated with mining and minerals processing, along with the principles of safety and protection and their regulatory control.

TARGET AUDIENCE

- Professionals involved in activities related to the regulatory control or safety assessment of mining and processing facilities for uranium or other ores or minerals containing elevated levels of naturally occurring radionuclides.
- Professionals employed by nuclear regulatory or nuclear safety technical expertise organizations.

PREREQUISITES

Participants will require a basic knowledge in the area of radiation science, mining and minerals-processing technologies.
Persons with knowledge of nuclear law will also benefit from the course.

LEARNING OUTCOMES

Participants will acquire:
- An understanding of how safety requirements are incorporated in the legal and regulatory processes and how the regulatory process works in practice.
- The ability to work more effectively within national legal and regulatory frameworks in the areas of regulatory guidance development, review of safety documentation, establishment of conditions of authorization, and compliance assurance activities.

PROGRAM

The course presents the safety principles applied to natural radioactivity and discusses the associated regulatory processes, including the establishment of safety standards, regulatory review of safety assessments, establishment of conditions of authorization and the implementation of regulatory compliance assurance programs including inspection.
The international, regional, and national dimensions of radiation safety will also be presented.

The 5-day training module covers the following subjects:
- The nature of radiation hazards associated with mining and minerals processing and the principles of safety and protection.
- Regulatory processes applied to mining and minerals processing.
- Operational radiation protection of workers in surface and underground facilities.
- Public protection and environmental monitoring.
- Radioactive waste management.
- Legacy issues.

Practical exercises will take place throughout the week in which participants work in groups to address issues related to the subject matter being presented, and a site visit will take place.

At the end of the module, a roundtable discussion session addresses issues identified by participants. It is followed by an evaluation during which participants give their impressions of the module, with a review of the degree to which the needs expressed on the first day of training were met.

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Experts *for experts*

RADIATION PROTECTION | Course in English

Regulatory Control of Radiation Sources

Session: Consult on-line training schedule

Registration deadline: 3 months prior to course

Duration: 5 days
Certificate of attendance will be issued to participants who attend the full course.

Price: Contact us

Code: CO1047

REGISTER NOW

Contact
Frédérique Boulesteix
+33 (0)1 58 35 93 51
+33 (0)7 78 18 83 75
mailto : frederique.boulesteix@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exam) will be performed on the full course content and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussion and practical sessions are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

To cover the key regulatory activities related to radiation applications in medicine, industry, agriculture, research and education in order to increase the knowledge and technical skills of participants and ensure sustained development of national regulatory infrastructure.

TARGET AUDIENCE

Professionals from nuclear regulatory or nuclear safety technical expertise organizations involved in activities related to regulatory control or the safety assessment of radiation source use and related activities and facilities.

PREREQUISITES

Basic knowledge in the fields of radiation protection and radiation sources.

LEARNING OUTCOMES

- Trainees will gain knowledge and an understanding of how regulatory processes work in practice for all types and uses of radiation sources and for all phases of installation or activity lifetime.
- Trainees will be able to work effectively within national legal and regulatory frameworks in the areas of regulatory guidance development, review of safety documentation, establishment of authorization requirements and compliance assurance activities.

PROGRAM

The training covers an overview of the legal/regulatory framework and infrastructure needed for radiation safety, as well as related international safety standards and codes. It addresses the regulatory process for all types of uses of radiation sources and also covers the life cycle of facilities from siting, through design, construction and operation to decommissioning.

The 5-day training module will cover the following subjects:

- Need for regulatory programs.
- Legal and regulatory framework around the control of possession, use and end-of-life management of radiation sources.
- International safety standards, EU directives, and the international Code of Conduct on the Safety and Security of Radioactive Sources.
- Responsibilities of government and regulatory bodies.
- Management systems.
- Authorization, inspection and enforcement processes.
- Regulatory experience in practice.

A number of practical exercises will take place throughout the week in which participants work in groups to address issues related to the subject matter being presented.

On day two, a roundtable discussion will be organized with short presentations on accidents and incidents that have occurred with sealed radioactive sources. The aim is to outline the lessons learned on how to enhance regulatory control over disused sealed radioactive sources to avoid such accidents.
There will be a summary session to enable general feedback and discussion of the topics covered during the theoretical part of the training course.

An end-of-module roundtable discussion session will address the results of the exercises on the review and assessment of applications for authorizations and inspections, and on other issues identified by participants. A multiple-choice exam covering the material presented during the module will be given at the end of the module.

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SITEX Network

RADIATION PROTECTION — Course in English

Regulatory Review and Assessment of the Safety Case for Disposal Facilities

8 years of collaboration between various European and other national TSOs and regulatory authorities in the EU SITEX projects resulted in the establishment of several tools for harmonisation of the regulatory review and assessment of a safety case for disposal of radioactive waste. The review methods developed in this context form the heart of this course, providing a unique and innovative training opportunity for persons involved or who will be involved in the licensing of radioactive waste disposal from both operator and regulatory/TSO organisations.

Modules: The course is made up of 3 modules that can be attended successively or independently.
Module 1: 9-13 March 2020
Module 2: S2 2020
Module 3: S1 2021

Registration deadline: 1 month prior to each module

Duration: 5 days for each module.
Certificates of attendance will be issued to participants who attend each module.

Price: Contact us
20% discount for registration to the 3 modules of the course

Code: CO1048

REGISTER NOW

Contact
Alena Prokofieva
+33 (0)1 58 35 83 00
+33 (0)6 08 48 32 85
mailto : alena.prokofieva@enstti.eu

Online catalogue
www.enstti.eu/training-catalogue

Examination:
Knowledge testing (multiple choice exams) will be performed on each module of the course and successful candidates will be issued with a Knowledge Certificate.

Teaching methods:
Lectures, discussions and practical modules are included.
Working group exercises and technical visits are supervised by experienced TSO experts.

A USB stick containing the course material will be provided.

OBJECTIVES

The objective of the course is to provide participants with an insight into regulatory review and assessment. It provides an understanding of the safety requirements for geological disposal, the regulatory process for licensing geological disposal facilities, regulatory expectations of the safety case and its systematic review and assessment by the regulatory authority. The course is presented in three modules of one week each.
Module 1 provides a general introduction to the course and deals with the safety case context, safety strategy, site characterisation and the facility description.
Module 2 deals with safety assessment, specifically; post closure radiological impact assessment, operational safety assessment, site and engineering assessment and management system assessment.
Module 3 deals with the topics of optimisation, uncertainty management, integration of safety arguments and regulatory review and assessment of safety.

TARGET AUDIENCE

The training course is addressed mainly to technical staff of regulatory authorities, technical support organisations and waste management organisations involved with geological disposal. The course will also be of interest to research organisation, consulting organisations and government and non-government organisations dealing with geological disposal of radioactive waste.

LEARNING OUTCOMES

Insights into and understanding of:
- Safety requirements and regulatory expectations of the safety case the licensing process for geological disposal throughout the stages of development.
- Site, waste and disposal facility information needs for safety demonstration and supporting research programmes and activities.
- Safety assessment methodology – covering radiological impact, engineering and management systems.
- Approaches to optimisation of operational and post closure safety.
- Management of uncertainty in the safety assessment process.
- Integration of safety arguments within the safety case.
- Regulatory review and assessment.
- European experience in the development and licensing of geological disposal facilities.

PREREQUISISTES

Participants should ideally be engineers and scientists in the technical disciplines associated with radioactive waste disposal safety.

PROGRAM

Syllabus on Sitex_Network website:
www.sitex.network/activities/training

Module 1 provides a general introduction to the course and covers:
- the safety and regulatory requirements for the safety case
- the licensing process for geological disposal throughout the stages of site development
- waste and disposal facility information needed for safety demonstration and for supporting research programs and activities

Module 2 covers:
- safety assessment methodology
- radiological impacts
- engineering and management systems

Module 3 covers:
- approaches to optimization of operational and post-closure safety
- managing uncertainty in the safety assessment process
- integrating safety arguments into the safety case
- regulatory review and assessment

The overall course also provides an overview of European experience to date in the development and licensing of geological disposal facilities.

My Training Course at ENSTTI

Registration step by step: an educational trip

1. I register

- I go online to the ENSTTI website www.enstti.eu and choose the course that interests me.
- I fill out the registration form using my name as written on my passport.
- I click on "TRAINING AGREEMENT".
- I pay the full amount.

2. I Follow up my registration

- I will receive an email confirming my registration.
- The required documents need to be sent within 3 days.
- I will receive a Welcome Email.
- I will have to confirm my attendance in a short email to the Training Manager.
- Details are provided in the Welcome Email:
  - The invitation letter, which is sent by the organization that hosts the training.
  - For accommodation, I am responsible for reserving my hotel.
  - A list of hotels near the training location is provided.
  - For transportation, an access map to reach the training location is provided.
  - The training week usually lasts from Monday to Friday. Working hours are from 9:00 AM to 5:00 PM. ENSTTI guarantees a 7-hour training day.

Unforeseen circumstances?

If I cannot attend the training course, I send the Training Manager an email that explains why I am cancelling.
By email: training-tutoring@enstti.eu

3. D-day

- I arrive at the training location 30 minutes before the training starts.
- Each day I show the gatekeepers my passport and they will give me a badge, which I must return at the end of the day.
- The Training Manager will come to greet me and lead me to the classroom.
- The classrooms are bright and comfortable, and equipped with computers and projectors. I will be given a bag, a flyer, a pen, and a notebook. A USB flash drive containing the course materials will be provided.
- During the break, hot drinks, fruit juices and pastries will be offered.
- Participants and the module leader eat lunch together.
- I must sign the attendance sheet both morning and afternoon. The Training Manager will distribute an evaluation sheet to complete, preferably after each session.

4. To conclude

On the last day of training, I take the knowledge test. I turn in my evaluation sheet to the Training Manager and receive my attendance certificate.

Five good reasons to train with ENSTTI

- *Guarantee of training effectiveness*
  Quality recognized by certification bodies
  Training limited to 25 participants

- *Active teaching methods*
  Based on practical, appealing teaching methods. Half of the practice involves concrete case studies in small working groups, with quizzes, simulations, scenarios, etc.

- *Team of experienced and dependable trainers*
  An average 15 years' professional experience
  Nationally and internationally recognized experts in nuclear safety security and radiation protection

- *Practical arrangements as close as possible to your needs*
  A customized training course can be organized for your organization. Just tell us your needs and expectations, ENSTTI will plan it

- *One-year post-training hotline service offered*
  After the training course, you can contact the module leader for any question related to the topic of the training course

Our commitment to quality

ENSTTI's well-established programs, experienced trainers and AFAQ ISO 9001 and ISO 29 990 certified organization are a guarantee of success.

They trust us

- Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA, Italy),
- Atomic Energy Regulatory Board (AERB, India),
- Authority for Nuclear Safety and Radiation Protection (ANVS, Netherlands),
- Autorite de sûreté nucléaire (ASN, France),
- BEL V (Belgium),
- Canadian Nuclear Laboratories (CNL, Canada),
- Canadian Nuclear Safety Commission (CNSC, Canada),
- Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT, Spain),
- Centrum Výzkumu Řež (CV Řež, Czech Republic),
- Chubu Electric Power Co., Inc (Japan),
- Consejo de Seguridad Nuclear (CSN, Spain),
- Department of Atomic Energy (DAE, India),
- European Commission
- European Commission's Joint Research Center (EC JRC, EU),
- Federal Agency for Nuclear Control (FANC, Belgium),
- Federal Authority for Nuclear Regulation (FANR, UAE),
- Finnish Radiation and Nuclear Safety Authority (STUK, Finland),
- Fusion for Energy (F4E, UE),
- Institut de radioprotection et de sûreté nucléaire (IRSN, France),
- International Atomic Energy Agency (IAEA),
- King Abdullah City for Atomic and Renewable Energy (K.A. CARE, Saudi Arabia),
- Korea Institute of Nuclear Safety (KINS, Korea),
- Lietuvos Energetikos Institutas (LEI, Lithuania),
- MAVINCI A.S. (Turkey),
- National Emergency Crisis and Disasters Management Authority (NCEMA, UAE),
- National Environment Agency (NEA, Singapore),
- Nice University (France),
- Nuclear Material Control Center (NMCC, Japan),
- Nuclear Power Corporation of India Limited (NPCIL, India),
- Nuclear Regulation Authority (NRA, Japan)
- Paul Scherrer Institut (PSI, Switzerland),
- Scientific and Engineering Center for Nuclear and Radiation Safety (SECNRS, Russia)
- Singapore Nuclear Research and Safety Initiative (SNRSI, Singapore),
- State Nuclear Power Safety Inspectorate of Lithuania (VATESI, Lithuania),
- State Nuclear Regulatory Inspectorate of Ukraine (SNRIU, Ukraine),
- State Scientific Technical Center for Nuclear and Radiation Safety (SSTC, Ukraine),
- Státní Ustav Radiační Ochrany (SURO, Czech Republic),
- TECNATOM (Spain),
- TÜV-NORD (Germany),
- WorleyParsons, Ltd. (Australia).

Useful Information

Adminstration information

Corporate Name	ENSTTI (European Nuclear Safety Training & Tutoring Institute)
Address	12 rue de la Redoute – BP 17 92262 Fontenay-aux-Roses cedex France
Information & Registration	www.enstti.eu training-tutoring@enstti.eu
Siret Number	53166521400023
RCS Nanterre	531 665 214 000 23
APE/NAF	8559 B
VAT Number	FR16531665214
Training Provider Registration Number	11 92 18332 92 (DIRECTE Ile de France)
Bank Name and Address	BNP PARIBAS: 37-39 rue d'Anjou 75008 Paris France
IBAN	FR76 3000 4025 5200 0109 4305 007
BIC CODE	BNPAFRPPIFO
Legal Structure	European Economic Interest Grouping – EEIG

General Terms of Sale

1. Definitions

Trainee: participant benefiting from the training.
Client: the trainee's employer. The trainee is deemed a Client if he is his own employer.
Inter-company training: curriculum training, carried out on the premises of ENSTTI or on the premises made available to ENSTTI.
Intra-company training: training curriculum produced exclusively for the account of the Client or training made to measure on behalf of the Client, on the ENSTTI premises, the Client's premises, or the premises made available by the Client or by ENSTTI.
General Terms and Conditions of Sale: refers to this document as of 31/01/2018.

2. Purpose of Scope

The purpose of these General Terms of Sale is to define the general conditions for participation in inter-company professional training sessions organized by ENSTTI, and for the organization and implementation of intracompany training sessions by ENSTTI on behalf of the Client, who is a signatory to the training agreement defined below under Paragraphe 3. Contractual Documents.

3. Contractual Documents

Any registration to training is subject to a Vocational Training Agreement sent to the Client by ENSTTI, and signed and sealed by the Client. Said Agreement contains mention in particular of the details of the services provided, the price and the terms of payment.
The present General Terms of Sale prevail over any other Client document, in particular the Client's purchase order or general conditions of purchase.
The present General Terms of Sale and the Vocational Training Agreement constitute the contract concluded between the Parties. In the event of an interpretation dispute between the various contractual documents, the order of interpretation is as follows:

- The present General Terms of Sale
- The Vocational Training Agreement

4. Terms of Registration and Order

Prerequisites:

- The Client ensures and is able to justify that the Trainee has the necessary prerequisites for the training; checks the suitability of the training for the trainee's profile and objectives; and guarantees the veracity of the information provided. ENSTTI reserves the right to refuse a trainee who does not have the required prerequisites at the time of training.
- Registration for a training session must be applied for online at the www.enstti.eu website, at least two (2) months before the session start date. ENSTTI reserves the right to accept later registrations.
  Any registration by the Client is deemed to be accepted by the Client upon receipt of the registration confirmation issued by ENSTTI and implies his full and entire acceptance of these Terms and Conditions of Sale.
  No later than one (1) month before the beginning of the session, ENSTTI, or its partner, sends the trainee a personal invitation by email, providing all the practical information relating to the session (times, means of access ...).
  The Client undertakes to communicate to ENSTTI the e-mail addresses of the Trainees.
- Rules of Procedure
  The Client undertakes to ensure that the trainee complies with the Internal Rules provided at the beginning of the training session.
- Training certificate:
  The training certificates will be sent to the trainee.

5. Invoicing and Payment

a) Price

Prices are in euros excluding tax, plus VAT in force and/or any other taxes and/or taxes withheld at source in accordance with the legislation in force in the country concerned.
Prices are firm and non-revisable.

- For inter-company training,
  Registration fees cover educational services (teaching, practical work, use of simulators and other computer tools, documentation transfer, necessary supplies, and lunches). They do not include transport costs and accommodation. The prices are indicated on the training agreement. Any session started must be paid in full.
- For intra-company training, ENSTTI gives the Client a quote that includes the details of the prices, the billing and payment schedule. The prices set are exclusive of tax.

b) Payment

Payment is made by bank transfer into ENSTTI's account. ENSTTI's bank details are as follows:

Name and address of the bank:
BNPPARIBAS, 37-39 rue d'Anjou, 75008 Paris

IBAN: FR76 3000 4025 5200 0109 4305 007

BIC code: BNPAFRPPIFO

6. Cancellation and Notification

a) Condition of cancellation and postponement for inter-company training

- By the Client: any case of cancellation by the Client must be communicated in writing to ENSTTI. In case of cancellation within fewer than fourteen (14) working days before the beginning of the session, and unless the trainee is replaced by another one from the same establishment, the Client is liable for 50% of the registration fees. This replacement must be confirmed by filling in a registration form at the www.enstti.eu website. In case of a cancellation that is not confirmed in writing (including for absenteeism or abandonment), the Client is liable for 100% of the registration fees. In case of unexpected departure duly justified by the Client, the Trainee may be admitted to participate in a subsequent session with the prior written agreement of ENSTTI.
- By ENSTTI: ENSTTI reserves the right to cancel or postpone a training session, especially in case of insufficient number of participants. The Client is informed by email no later than fifteen (15) working days before the date of the session concerned. The fees received will be fully refunded. No compensation will be paid to the Client due to a postponement or cancellation by ENSTTI.

b) Condition of cancellation and postponement for intra-company training

- By the Client: any request for cancellation or postponement of all or part of the training by the Client must be notified by registered letter with acknowledgment of receipt to ENSTTI no later than fifteen (15) working days before the date of the session concerned. This period is calculated from the date of receipt of the cancellation request by ENSTTI. Any report notified within fewer than fifteen (15) working days is considered by ENSTTI as a cancellation of said session. The cancellation conditions specified below then apply.
- By ENSTTI: ENSTTI reserves the right to cancel or postpone a session by informing the Client by email, fax or simple letter no later than fifteen (15) working days before the date of the session in question. No compensation will be paid to the Client. ENSTTI undertakes to propose a new session date within a reasonable time following the cancellation.

7. Confidentiality and Property Rights of Pedagogical Documents

The documents communicated during the training session are confidential by nature, in whatever form of media. The Client undertakes to enforce this obligation for all his staff and more generally for any person whom he has put in contact with ENSTTI.

All the documents and educational information transmitted by ENSTTI as part of the training sessions belong to ENSTTI and/or its contractual partners and/or trainers. Their use, disclosure or copying is prohibited except with the express prior consent of ENSTTI. The documents communicated during the training session may not be used for purposes other than those of training support for the personnel designated by the Client. These documents are inseparable from the content of the training ENSTTI provides by word of mouth.

The Client shall refrain from removing the property notices that appear on the educational documents that ENSTTI sends under its services.

8. Publicity

The Client authorizes ENSTTI to refer to the name and logo of the Client as part of its communication operations for training, in any medium.

9. Termination

In the event that one of the Parties does not comply with the obligations arising from the Contract, the other Party may terminate the contract after formal notice to comply with it is sent by registered letter with acknowledgement of receipt and without effect within (30) working days after the date of sending.

10. Special Cases

In accordance with the ENSTTI policy for the integration of disabled people, ENSTTI will endeavor to take into account the specific needs when they have been indicated on the special requirements sheet downloadable from the ENSTTI website.

11. Liability - Insurance

The civil liability of ENSTTI is cumulatively limited to:
- Direct damage caused by ENSTTI to the Client, and
- The price actually paid by the Client under the Contract.

The Client and the insurers waive in this respect any recourse against ENSTTI exceeding the amount and damages referred to above.

ENSTTI can in no case be held responsible for financial, commercial or any other kind of damage caused directly or indirectly by the use of the information provided during the training sessions.

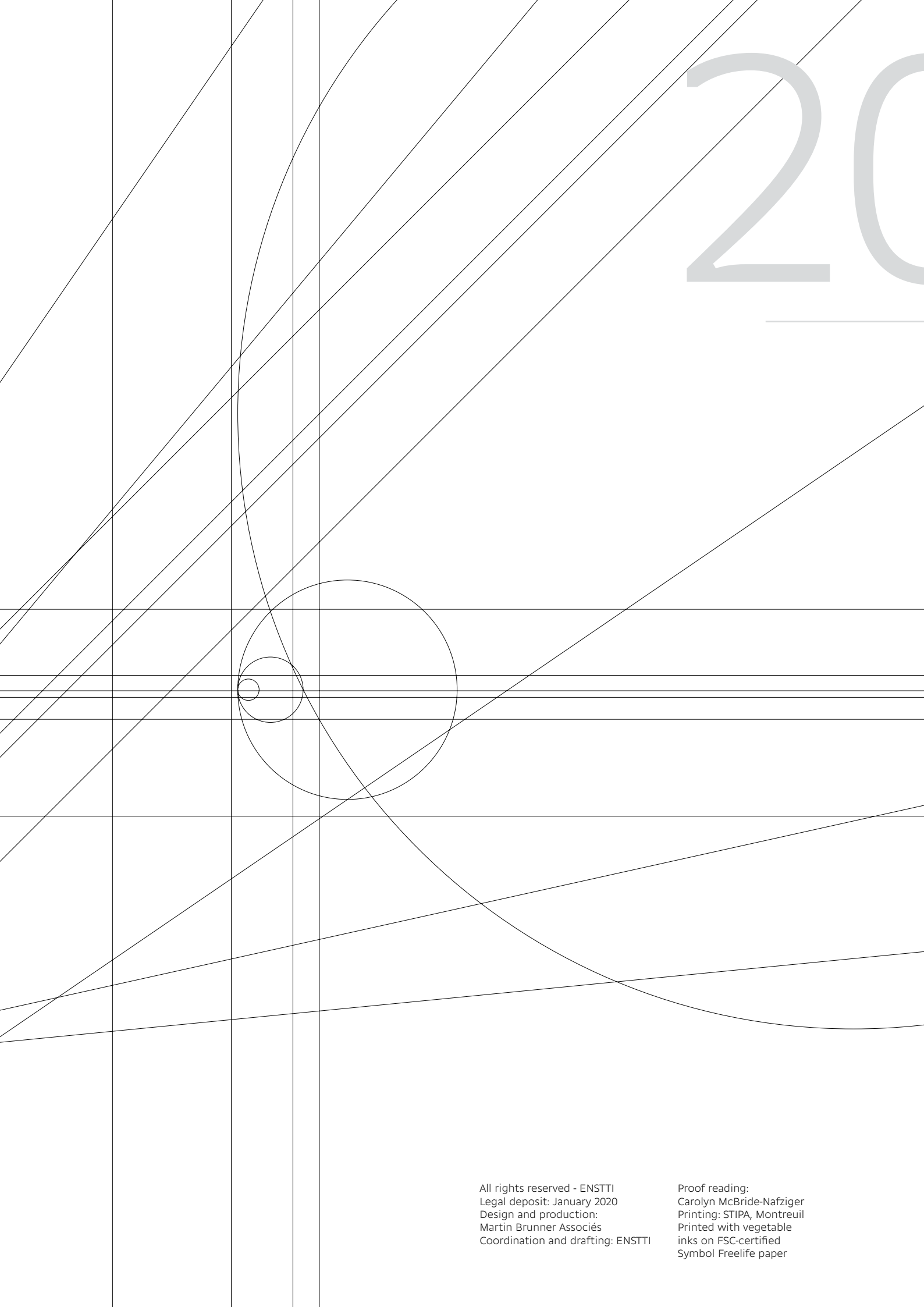
12. Miscellaneous - Disputes

These General Conditions of Sale are subject to French law for their interpretation and execution. Any dispute

not resolved amicably between the Parties within a period of one (1) month, and relating to the validity, the execution or the interpretation of the present General Conditions of Sale will be subject to the jurisdiction of the Court of Nanterre, France.

13. Updating Sales Terms and Conditions

The General Terms and Conditions of Sale may be updated. The applicable version is the last one in force on the date of the signature of the Training Agreement.



Legal deposit: January 2020
Design and production:
Martin Brunner Associés
Coordination and drafting: ENSTTI

Proof reading:
Carolyn McBride-Nafziger
Printing: STIPA, Montreuil
Printed with vegetable
inks on FSC-certified
Symbol Freelife paper

enstti

12 rue de la Redoute
92260 Fontenay-aux-Roses
France

Phone: + 33 (0) 1 58 35 72 32
E-mail: training-tutoring@enstti.eu
Find all our training on our website: www.enstti.eu

The ENSTTI management system is ISO 9001 certified and its Training Framework is ISO 29990 certified.