Monthly Bulletin

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Why this bulletin?

In the present phase of advertising the ANNETTE Courses, in addition to a continuous update of the ANNETTE course page on the ENEN Website,

http://www.enen.eu/en/projects/annette/annette-project-courses1.html

we felt the need to advertise in a more effective way the next upcoming courses, in order to alert the prospective attendance. Sending a periodic reminder about courses to ENEN Members and selected Stakeholders, in fact, is considered a useful service. However, this bulletin may serve also as a means of communicating the progress of the project as a whole and the content of these first issues may indeed evolve. We hope that this initiative will be considered useful and may be liked by recipients, as a means to attract learners to nuclear matters, being one of our most important missions.

COMING SOON COURSES

BELGIAN NUCLEAR EDUCATION NETWORK COURSES

BNEN Belgian Nuclear higher Education Network

ULB LIÈGE université UCL Université catholique de Louvain SCK•CEN GHENT UNIVERSITY VUB VRIJE UNIVERSITEIT BRUSSEL KU LEUVEN

Course Outline and Content

BNEN, the Belgian Nuclear higher Education Network organises a one-year (60 ECTS) master-after-master programme in nuclear engineering. BNEN is organised through a consortium of six Belgian universities and the Belgian Nuclear Research Centre, SCK•CEN.

The primary objective of the BNEN programme is to educate young engineers in nuclear engineering and its applications and to develop and maintain high-level nuclear competences in Belgium and abroad. BNEN catalyses networking between academia, research centres, industry and other nuclear stakeholders.

The courses of the BNEN programme are available to participants with scientific background in the framework of the ANNETTE project. Participants can choose *one or a couple* of individual courses of the BNEN programme to integrate in their total course programme. Upon completion of a course, a certificate without legal value stating that a student completed the course(s) successfully, can be provided by BNEN. In order to also get the ECTS for the course, the participant should register at one of the partner universities in Belgium. In order to be admitted to the *complete* BNEN programme (meaning the 60 ECTS advanced master), the usual admission criteria and application process, described on the BNEN website (bnen.sckcen.be/en), should be followed.

Download the BNEN brochure here.

BNEN Programme

The BNEN one-year programme of 60 ECTS includes compulsory modules, elective modules and a master thesis.

Compulsory modules (31 ECTS)

Exercises and hands-on sessions in the specialised laboratories of SCK•CEN complement the theoretical classes and strengthen the development of nuclear skills and attitudes in a research environment. Various technical visits are organised to research and industrial nuclear facilities.

- Introduction to nuclear energy (3 ECTS)
- Introduction to nuclear physics and nuclear measurements (3 ECTS)
- Nuclear materials (3 ECTS)
- Nuclear fuel cycle (3 ECTS)
- Radiation protection (3 ECTS)
- Nuclear thermal hydraulics (5 ECTS)
- Nuclear reactor theory (6 ECTS)
- Safety of nuclear power plants (5 ECTS)

Elective modules (9 ECTS to be chosen from the list below)

The compulsory modules are chosen in such a way that the bulk of the program is focused on nuclear engineering. By introducing the option of at least three elective courses, the BNEN students have the possibility to choose either a direction into 'power generation' or either into 'radioprotection/radioecology /…'.

- Advanced nuclear reactor physics and technology (3 ECTS)
- Advanced nuclear materials (3 ECTS)
- Advanced radiation protection radiation ecology (3 ECTS)
- Advanced courses of the nuclear fuel cycle (3 ECTS)
- Nuclear and radiological risk governance (3 ECTS)
- Advanced course elective topic (3 ECTS)

Master thesis (20 ECTS)

The master thesis is an essential part of the programme, where the students have to apply the competences they have acquired during the year on a specific research project of their choice. The subjects can be chosen in a large domain of nuclear engineering related topics, that are directly linked to the R&D programme of SCK•CEN, research of the professors at the partner universities, or operational problems in industry.

Details

All teaching activities take place at SCK•CEN. Courses are organised in English and in a modular way; teaching in blocks of one to three weeks for each module allows optimal time management for students and lecturers, facilitates registration for individual modules, and allows easy access for international students.

Detailed description of Learning Outcomes, lecturer(s), content, course material, pre-assumed knowledge and examination of each module is reported at the BNEN website.

Date of availability of the BNEN programme

The BNEN academic year runs from September until the end of June. In the programme there are 24 weeks of courses and 11 weeks for project work and examinations. On the link Academic Calendar detailed information on the year 2018-2019 can be found (to be posted soon!).

COURSE ON RADIATION AND RADIOLOGICAL PROTECTION
NTEC and Manchester University

Radiation and Radiological Protection

Course Outline and Content
Summary

Explains the properties of different types of radiation occurring as a result of nuclear processes and identifies means whereby levels of radiation and dosages can be detected and measured. The principles of radiation protection and shielding are outlined and demonstrated through practical experience with radioactive sources and detection equipment. The module concludes with an overview of ionising radiation regulations and legislation governing the impact of radiation on people and the environment. The safe handling of accidents is illustrated through case studies of real incidents.
On completion, students should have obtained:

- A full understanding of the sources, types of radiation and hazards associated with nuclear processes
- Knowledge of radiation detection and monitoring equipment
- Appreciation of the principles governing the design of radiological protection equipment
- Understanding of Ionising Radiation Regulations

Syllabus

- The nucleus and nuclear processes
- Radiation and radiation detection
- Biological effects of radiation
- Assessment of radiation exposure
- Dosimetry
- Ionising radiations regulations
- Evaluating the effects of exposure to radiation
- Practical laboratory: introduction to radiation detectors and monitors
- Practical laboratory: demonstration of properties of nuclear radiation
- Case studies – safe handling of accidents

Method of Delivery

One week of lectures, laboratories and tutorials **at The University of Manchester 10th-14th September 2018**

Deadline for registration 10th August 2018

COURSE ON DECOMMISSIONING, RADIOACTIVE WASTE AND ENVIRONMENTAL MANAGEMENT

NTEC and Manchester University

Decommissioning, Radioactive Waste and Environmental Management

Summary

A suitable introduction to the basics of nuclear decommissioning, lower activity radioactive waste and environmental management for students with no experience of the nuclear industries in the U.K.

The module aims to introduce and develop subject knowledge and theoretical, conceptual and analytical skills in technical, environmental and policy issues and principles associated with nuclear decommissioning and waste management (principally lower activity wastes) and the environmental management thereof in the UK.

On completion, students should be able to:

- Discuss the scientific, environmental and socio-political issues affecting the decommissioning
- Acquire, evaluate and use the principal sources of data on issues affecting the decommissioning of nuclear facilities and nuclear waste management of nuclear facilities and legacy nuclear waste management
- Critically evaluate decommissioning management.
- Critically appraise the waste management principles applicable to nuclear decommissioning.

Syllabus

The principle elements of this module relating to nuclear decommissioning and the associated areas of lower activity radioactive waste and environmental management will cover:

- Decommissioning and decommissioning strategies
- Policy, governance, social and political issues
- Regulatory aspects
- Best Practicable Environmental Options
- Environmental Impact Assessment
- Environmental safety cases
- The waste hierarchy and waste minimisation
- Waste storage and disposal
- Site characterisation of contaminated land and remediation
- Sustainable practice on nuclear sites
- A decommissioning exercise

Method of Delivery

One week of lectures and tutorials **at University of Central Lancashire 24th-28th September 2018**

Deadline for registration 24th August 2018

COURSE ON REACTOR EXERCISES ANPS@KIT

Course Outline and Content

The object of the course is a fundamental understanding of neutron physics and the operation of a nuclear reactor. This includes practical exercises to start-up, run and shut-down on a SUR-100 nuclear reactor.
The course is made of the following units (the indicated time duration is approximate, and totals in the range of 24 hours):

· Unit 1 – Introduction into reactor physics (4 hours)
· Unit 2 – Practical Excercise 1 (4 hours)
· Unit 3 – Reactor kinetics (4 hours)
· Unit 4 – Practical Excercise 2 (4 hours)
· Unit 5 – Advanced reactor kinetics (4 hours)
· Unit 6 – Practical Excercise 3 (4 hours)

Detailed Learning Outcomes are reported at this link.

Requested Background
Basic knowledge in Physics and Nuclear Technology is required.
Teachers
Prof. Dr.-Ing. J. Starflinger (University Stuttgart)
Dipl.-Phys. G. Pohlner (University Stuttgart)
C. Nigbur (University Stuttgart)
Method of Delivery
Presence is required. Links to the lecture presentation material will be provided at a later stage.
Final Examination
Written test
Date of availability:
September 2018

FLOW AND HEAT TRANSFER IN A REACTOR CORE ANPS@KIT

Course Content

This course deals with thermal-hydraulic modelling in fuel assemblies. It starts with a short introduction of the structure and design criteria of nuclear reactors. Three different approaches of thermal-hydraulic analysis are presented, i.e. single channel approach, sub-channel approach and 3-dimensional approach. For each approach fundamental idea, mathematic background, required closure models will be described. Moreover, merits and shortages of each approach will be discussed. In addition to several application examples, opportunity will be given to students to make exercise with sub-channel analysis codes.

Lecturer
Prof. Xu Cheng, IFRT, KIT CS

Schedule: 4 days
24.09. - 27.09.2018; 9 am to 5 pm daily

Location
KIT-Campus South, Institute of Fusion and Reactor Technology (IFRT)
Vincenz-Prießnitz-Str. 3, D-76131 Karlsruhe
Building 07.08, Room 331

COURSE ON Coupled Neutron Kinetics /Thermal Hydraulic Codes for Safety Assessment of Nuclear Power Plants ANPS@KIT

Title	Coupled Neutron Kinetics /Thermal Hydraulic Codes for Safety Assessment of Nuclear Power Plants
Prerequisites	Reactor Physics, Nuclear Power Plants, Thermal Hydraulics of Nuclear Reactors
Goal of the course	Analysis of LWR Transients with Coupled Neutron Kinetics / Thermal Hydraulic Codes
Content	• Introduction to the role of coupled codes in safety evaluations • Deterministic safety analysis methodologies • Physical modes of thermal hydraulic and neutron kinetics codes • Approaches for code coupling

COURSE ON Technology and Management of the Decommissioning of Nuclear Facilities ANPS@KIT

	• Validation of coupled codes • Working with coupled codes (simple cases) • Main steps for the development of integral plant models (needed data, thermal hydraulic models, neutron kinetics models) • Running coupled simulations, uncertainty quantification • Code systems to be used: TRACE/PARCS
Lecturer	Dr. V. Sanchez-Espinoza, KIT-Campus Nord, INR
Schedule 3 days **shifted!!**	10.09. - 14.09.2018; 9 am to 5 pm daily
Location	KIT Campus North; FTU, Building 101, Room 155

Deadline for application: **27.08.2018**

Title	Technology and Management of the Decommissioning of Nuclear Facilities
Prerequisites	Basic knowledge of nuclear power engineering
Goal of the course	Inform about the state of the science with respect to mechanical decommissioning technologies as well as the modern management methods required to handle the highly complex course of events in order to equip the course participants with the tools to independently solve decommissioning tasks at hand.
Content	The course starts with the presentation of modern management methods (e.g. Lean Management) required for the handling of the highly complex course of events of the decommissioning of nuclear power plants. Furthermore, in the mornings, the participants will hear about the state of science and technology along with a basic technical overview of the most important decommissioning areas (e.g. decontamination, deconstruction of reinforced concrete and installations, demolition of massive reinforced concrete structures, etc.). In the afternoons, the newly acquired knowledge can then be put into practice at the institute's own test site. At the same time, current R & D projects will be presented and discussed. Finally, the course concludes with a visit to a nuclear facility currently under decommissioning.
Lecturer	Prof. Dr.-Ing. Sascha Gentes and his colleagues
Schedule	10.09. - 14.09.2018; 9 am to 5 pm daily
Location	KIT Campus South Institute for Technology and Management in Construction Department for Decommissioning of Nuclear Facilities Am Fasanengarten, Buildg. 50.31, Room 012 76131 Karlsruhe

Deadline for application: **15.07.2018**!!!

COURSE ON VR-1 TRAINING REACTOR BY CTU

Course Outline and Content

The course in oriented on nuclear reactor physics, tasks in neutron detection and neutron flux distribution, delayed neutron detection, reactor kinetics and dynamics, reactivity measurement, control rod calibration, critical experiment, digital I&C and reactor operation by course participants under supervision of qualified person are carried out during the course.

Following activities are carried out during the course:

- visit of the reactor and reactor hall (3hours)
- neutron detection and neutron flux distribution measurement (3 hours)
- delayed neutron detection (3 hours)
- reactor kinetics study (3 hours)
- reactor dynamics study (3 hours)
- reactivity measurement (3 hours)
- control rod calibration (3 hours)
- critical experiment (3 hours)
- digital safety and control system of the VR-1 reactor (3 hours)
- start-up and operation of the vr-1 reactor (3 hours)

Two tasks are typically carried out in one day, so the standard course lenght is 5 days. It is also possible to organize a 3 days course with little bit reduced tasks.The course could be completed by a visit of Skoda Nuclear Machinery Company, Nuclear Research Institute in Rez or Nuclear Power Plant in Temelin.

Requested Background

Basic knowledge in mathematics, physics and reactor physics.

Teachers:

Staff of Department of Nuclear Reactor
Faculty of Nuclear Science and Physical Engineering
Czech Technical University in Prague,
V Holesovickach 2
CZ180 00 Prague 8
Czech Republic
web: http://www.reaktor-vr1.cz/en/
mail: reactor@reactor-VR1.cz

Course evaluation:
Qualified discussion on tasks proceedings of participants
Date of course delivery
24th to 26th of September 2018

COURSE ON PRINCIPLES OF RADIATION PROTECTION INTERNATIONAL FRAMEWORK. REGULATORY CONTROL by "IFIN Horia Hulubei" (e-learning)

Course Outline and Content:

The course is aimed to provide advanced knowledge of fundamental radiation protection principles applied to planned, emergency and existing exposure situations. The content will offer the theoretical and practical understanding of the European and international radiation protection legal framework, the

regulatory control concepts to achieve an appropriate standard of radiological protection.

The programme is addressed to:

Radiation Protection Experts or Officers, Medical Physics Experts, Nuclear specialists, Specialists from other disciplines demanded in the nuclear workforce and to those who are interested in continuous professional development in order to cover present needs in different sectors of nuclear energy and ionizing radiation applications.

The course is structured as follows:
Unit 1 – Principles of radiation protection (1 ECTS)
Unit 2 – International Framework. Regulatory Control (1 ECTS)
Detailed Learning Outcomes are reported at this link

Requested Background:

The learner is assumed to have basic knowledge of Physics, Engineering (EQF Level 6).

Lecturers:

Mrs. Gabriela Rosca-Fartat
Mr. Gabriel Stanescu, PhD
"Horia Hulubei" National Institute for Physics and Nuclear Engineering (IFIN – HH)
Nuclear Training Centre
30 Reactorului, RO-077125, Bucharest-Magurele, Romania
Method of Delivery:
Asynchronous e-learning. Links to the course material will be provided at a later stage.

Final Examination: multiple-choice test

Date of availability of the course material: 15 September 2018

COURSE ON BASIC OPERATION OF NUCLEAR REACTORS
(24 - 28 September 2018)

Course Outline and Content
The objective of the course is to acquire basic knowledge on the principles and operation of nuclear reactors, focusing on the practical and safety aspects of reactor operation.

The course will contain 18 hours of lectures, 9h of practical work on the nuclear reactor ISIS and 3h of practical work on PWR simulator. The detailed learning outcomes are reported here.
The course is made of the following lectures:

- Reactors principle and safety
- Neutron physics and thermal-hydraulics of nuclear reactors
- Fuel loading operation and approach to criticality on ISIS reactor
- Reactor start-up and temperature effects on ISIS reactor
- Practical work on PWR simulator

Requested Background
The learner is assumed to have basic knowledge of Mathematics and Physics.
Teachers
Xavier Wohleber (CEA), Jean-Christophe Klein (INSTN), Frederic Fouquet (INSTN), Hubert Grard (INSTN)
Method of Delivery
Lectures and practical works.

See the main link for further information.

Date: **24-28 September 2018**

European Nuclear Education Network Association

Tel: +33 637 304 617
E-mail: secretariat@enen.eu

FOR GENERAL INFO:

Web page of ANNETTE Courses
http://www.enen.eu/en/projects/annette/annette-project-courses1.html
Web page for course application:
http://www.enen.eu/en/projects/annette/eoi1.html

LINK TO COURSE LIST

LINK TO THE APPLICATION FORM