



# Monthly Bulletin

This project has received funding from the Euratom research and training programme 2014-2018 under grant agreement No 661910

JUNE 14TH, 2018

ISSUE NO. 1-BIS

## Why this bulletin?

## COMING SOON COURSES

[COURSE ON GEOLOGICAL DISPOSAL OF RADIOACTIVE WASTE \(18 - 22 June 2018\)](#)

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 this first issue 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.



UNIVERSITÉ DE LORRAINE POLITÉCNICA



### Course Outline and Content

The course will provide several aspects of basic to advanced knowledge on geological disposal of radioactive waste including waste from fuel cycle, geological analogue, radionuclides transport modelling, geo-statistics and inverse problems.

The course will contain 30 hours of lectures. The detailed learning outcomes are reported [here](#).

The course is made of the following lectures:

- 1 - Introduction to radioactive waste disposal
- 2 - Waste from Fuel cycle
- 3 - Geological analogue
- 4 - Transport modelling
- 5 - Geo-statistics
- 6 - Groundwater modelling
- 7 - Interim storage

### Requested Background

The course is designed for Master level students. The learner is assumed to have basic knowledge of Mathematics and Physics.

### Teachers

Patxi Elorza (UPM), Arturo Hidalgo (UPM), Eduardo Gallego (UPM), Jean Marc Montel (UL), Behrooz Bazargan Sabet (UL)

### Method of Delivery

Synchronous e. learning lectures. On request, lectures can be followed by external students.

**Date of availability: 18-22 June 2018**



**PERFORMING THERMAL  
HYDRAULIC SAFETY  
ANALYSIS FOR NUCLEAR  
POWER PLANTS  
(9-13 July 2018)**

**Course Outline and Content**

The course aims at a transfer of knowledge on the understanding of complex system behaviour taking place in accidental situations in nuclear systems and specifically how this knowledge is linked to the daily work performed by analysts or engineering support companies at the power plant. The focus will be placed in relating the assistant knowledge on pressurized water reactors (PWR) plant systems with the (1) Transient and Accident Analyses (Chapter 15) required at plant's Final Safety Analysis Report and (2) beyond design basis event that might be part of Probabilistic Safety Assessment (PSA) event trees. Keeping this objective in mind, the course will cover some transients, design basis accidents (DBA) and beyond DBA accidents. The approach will be the following:

- An introductory theory on systems related to the transient and the expected evolution of the main parameters. The acceptance criteria to be fulfilled by the design will be introduced as well.
- Searching and understanding experimental or plant results directly related to the selected transient/accident.
- A simulation of the particular transient will be performed allowing the participants to plot several variables in order to analyze the thermal hydraulic plant response.
- A discussion on the adequacy of the current design to meet with the acceptance criteria will be done.

The course will cover through this approach the following items:

- PWR hydraulic systems related to transients.
- Expected phenomenology in the transient.
- PWR protection system and engineered safety features actuation signals.
- Expected operators actuation during the transient according to their procedures.
- Analysis of RELAP5 results.
- NUREG-0800 standard review plan for Safety Analysis Report.

**Target of the course**

The seminar is open to vendors, utilities, regulatory bodies, national laboratories, consulting companies and universities. A maximum of 15 participants may come from ANNETTE free of charge.

**Requested Background**

The participants are assumed to have basic knowledge on nuclear systems and PWR fundamental basics on reactor theory. Please note that this is not a course on RELAP5, neither an introductory course on PWR systems. RELAP5 will be used as a tool but the course is not intended to train on RELAP5 usage and no previous experience with system codes is required. The RELAP5 model will be configured in a way that the participants will be able to operate the system components by simple flags.

**Method of Delivery**

The method will combine theoretical explanations of the systems involved in the transients and the expected phenomenology taking place in the transient, observation and understanding of the transient and exercises with RELAP5 simulations.

**Dates and location**

The course on "Phenomenology of Design and Beyond Design Basis Accidents" will take place on **9-13 July 2018** at The Barcelona School of Industrial Engineering (ETSEIB). The School is part of the Technical University of Catalonia - BarcelonaTech (UPC), a public institution dedicated to higher education and research, specialized in the fields of engineering, architecture and science and is located in Barcelona with good connections to both the airport and the city center.

The course is organized by the Advanced Nuclear Technologies group (ANT) from the Technical University of Catalonia. ANT has a long experience in R&D and teaching in Nuclear Engineering, principally nuclear reactors technology, thermal-hydraulic analysis and safety for both fission and fusion reactors.

**Final Examination**

There will be a final written exam



**COURSE ON BASIC  
OPERATION OF NUCLEAR  
REACTORS  
(9 - 13 July 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 Gard (INSTN)

**Method of Delivery**

Lectures and practical works.

See the main link for further information.

**Date of availability: 9-13 July 2018**

**[Link to the full offer of ANNETTE Pilot Courses](http://www.enen.eu/en/projects/annette/annette-project-courses1.html)**

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

**[Link for submitting applications](http://www.enen.eu/en/projects/annette/eoi1.html)**

<http://www.enen.eu/en/projects/annette/eoi1.html>

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