PHYS-451 **Radiation and reactor experiments**

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Cursus	Sem.	Type
Nuclear engineering	MA1	Obl.

Language of teaching	English
Credits	6
Withdrawal	Unauthorized
Session	Winter
Semester	Fall
Exam	During the semester
Workload	180h
Weeks	14
Hours	**4 weekly**
Practical work	4 weekly
Number of positions	**30**

It is not allowed to withdraw from this subject after the registration deadline.

Summary

The reactor experiments course aims to introduce the students to radiation detection techniques and nuclear reactor experiments. The core of the course is the unique opportunity to conduct reactor experiments, as the control rod calibration, and approach to critical.

Content

- Radiation detector systems, alpha and beta particles
- Radiation detector systems, gamma spectroscopy
- Introduction to neutron detectors (He-3, BF3)
- Slowing-down area (Fermi age) of Pu-Be neutrons in H2O
- Approach-to-critical experiments
- Buckling measurements
- Reactor power calibration
- Control rod calibration

Learning Outcomes

By the end of the course, the student must be able to:

- Apply measurement techniques for alpha, beta, gamma and neutron radiation detection.
- Carry out measurement techniques to obtain CROCUS reactor characteristics.
- Conduct both reactor power and control rod calibration.
- Plan the critical experiment.

Teaching methods

Instructions and supervision during lab work

Assessment methods

reports and oral examination during the semester

Resources

Bibliography

Handouts will be distributed

- James E. Martin, "Physics for Radiation Protection", Wiley-VCH (2nd edition, 2006)
- F.M. Khan, "The Physics of Radiation Therapy", Lippincott, Williams & Wilkins, (4th edition, 2010)
- G.C. Lowenthal, P.L. Airey, "Practical Applications of Radioactivity and Nuclear Reactions", Cambridge University Press (2001)
- K.H. Lieser, "Nuclear and Radiochemistry", Wiley-VCH (2nd edition, 2001)

Moodle Link

- https://go.epfl.ch/PHYS-451