TEACHING GUIDE ON

NUCLEAR TECHNOLOGY, COURSE 2019-2020

MASTER MODULE	SEMESTER	CREDITS	COURSE TYPE
Physics and Radiation Technology	2	6	Optative

PROFESSOR(S)	CONTACT DETAILS
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	TUTORIALS TIMETABLE
	Porras: Mo,We 17-19, Fr 11-13. Praena: Mo 17-19, Th 17-20, Fr 12-13. Ibarra: in his teaching week/s

MASTER DEGREE

University Master in Physics: Radiations, Nanotechnology, Particles and Astrophysics, University of Granada

TEACHING DATES AND TIMES

Second semester

PRE-REQUISITES FOR REGISTRATION

Bachelor in Physics, Electronic or Telecommunication Engineering

BRIEF CONTENTS DESCRIPTION

Nuclear Fission: physics of nuclear reactors. New technologies in fission.
Nuclear fusion reactions. Accelerators of low and medium energy. Radioisotope production.
Other applications: magnetic resonance, neutron activation analysis, etc.

PROGRAM

1. Nuclear fission.
Nuclear reactions. neutron induced reactions. cross sections. Features of nuclear fission. Chain reactions. Nuclear reactors. Physics of nuclear reactors. Types of reactors. Nuclear fuel cycle and fission waste treatment. Security in nuclear power plants. Research reactors. New fission technologies. Accelerator driven systems. Spallation neutron sources: n_TOF and EES.
2. Nuclear fusion reactions.
D-D and D-T reactions. Magnetic and inertial confinement fusion. Facilities: ITER and IFMIF.
3. Accelerators of low and medium energy and applications.
Cyclotrons and Linacs. Reactions induced by charged particles. Production of radioisotopes of interest in medicine and basic sciences.
4. Other applications of technology: MRI, neutron activation, etc.

Most of these topics will be illustrated with Monte Carlo calculations in practical sessions, with the use of the code MCNPX

BIBLIOGRAPHY

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- GLASSTONE, S., SESONSKE, A., Nuclear Reactor Engineering, Van Nostrand Reinhold Co., 1994.
- DUDERSTADT, J. J., Nuclear Reactor Analysis, Wiley & Sons, 1976
- LAMARSH, J. R., Introduction to Nuclear Engineering. Addison Wesley, 1984.
- El ciclo de combustible nuclear, SNE, 1997.
- LEWIS, E.E. Nuclear Reactor Safety. Wiley Interscience. 1977.
- LAMARSH, J. R., Introduction to Nuclear Reactor Theory. Addison Wesley Co. 1975.
- COLLIER, J. G., HEWITT, G. F., Introduction to Nuclear Power, Hemisphere Publishing Corp., 1987.
- ORTEGA, X., JORBA, J. Las radiaciones ionizantes: aplicaciones y riesgos., Ediciones UPC. Barcelona , 1994
- WILLE, K. The Physics of Particle Accelerators: An Introduction, Oxford University Press 2001.
- Cyclotron Produced Radionuclides: Physical Characteristics and Production Methods, Technical Report Series 468, IAEA 2009.
- DeSOETE, D., GIJBELS R., HOSTE J. Neutron activation analysis, Wiley, 1972
- BETHGE, K., KRAFT, G., KREISLER, P., WALTER, G., Medical Applications of Nuclear Physics, Springer 2004.