

DISCIPLINAS ELETIVAS
2º Semestre / 2015

DISCIPLINA	NOME
F 057	Tópicos de Física Computacional VI

Horas Semanais						
Teóricas	Práticas	Laboratório	Orientação	Distância	Estudo em Casa	Sala de Aula
04	00	00	0	00	00	04
Nº semanas	Carga horária total		Créditos	Exame	Frequência	Aprovação
15	60		04	S	75%	N

Horário Proposto:
2:16 2:17 4:16 4:17

Ementa:
Atomic structure. The free-electron gas. Interactions of photons with matter. Interactions of electrons with matter. Monte Carlo simulation of radiation transport: basic concepts. Monte Carlo simulation of radiation transport: practical exercises with the PENELOPE/penEasy program.

Objetivos:
Understand main phenomena involved in the photon and electron interaction with matter employing Monte Carlo simulation technique.

Pré-Requisito na Graduação (se houver):
F589

Programa:
Interaction of photons and electrons with matter: concepts, theoretical models and Monte Carlo simulation
1-To know the main phenomena that take place when photons and electrons propagate through matter. 2-To be able to do basic calculations using simple models (hydrogen atom, free-electron gas) to describe the interactions of photons and electrons with atoms and condensed matter. 3-To know more elaborate formalisms (many-electron atoms, dielectric media). 4-To understand the basics of Monte Carlo techniques employed in the simulation of coupled photon and electron transport. 5- To use the general-purpose Monte Carlo code PENELOPE/penEasy to perform simple simulations of interest in medical physics (radiotherapy, radiology, nuclear medicine), spectrometry with simplified models of scintillation and semiconductor detectors, etc.

Critérios de Avaliação (alunos de Graduação):
1. Exam (theory and Monte Carlo simulation exercises).
2. Written report on a specific Monte Carlo task (each student will choose one according to his/her interests).

Critérios de Avaliação (alunos de Pós-Graduação, no caso de oferecimento conjunto entre Graduação e Pós):

Bibliografia:
Lecture notes (in pdf format).
Scientific articles (in pdf format).
F. Salvat, *PENELOPE, a Code System for Monte Carlo Simulation of Electron and Photon Transport* (OECD/NEA, Issy-les-Moulineaux, 2014).

DISCIPLINAS ELETIVAS
2º Semestre / 2015

Observações:

The course will be taught in English.

Schedule:

1. 20/July to 31/July (2 weeks), online:

Planning of the course.

2. 03/August to 14/August (2 weeks), face-to-face: Lectures of lessons A.1, A.2 and A.3. Approximately 12 h.

3. 17/August to 18/September (5 weeks), online: Online monitoring of the theoretical/computational exercises of part A via e-mail and Skype.

4. 21/September to 30/October (6 weeks), face-to-face: Lectures of lessons B.1 and B.2. Approximately 36 h.

5. 02/November to 17/December (7 weeks), partially face-to-face: Monitoring of the simulation tasks assigned to the students. This will be done both online, using e-mail and Skype, as well as in face-to-face meetings (1 day/week).