

# EGSnrc course schedule

ICTP, Trieste, Italy, October 28 – November 8, 2024

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## 1. First week: October 28 – November 1






*Lecturers: Blake, Dave, Ernesto, Frédéric, Hugo, Iwan, Reid*

### 1.1. Monday October 28 — Introduction and photon physics

#### Morning






Time	Topic	Title	Instructor
9:00	 Welcome	Registration and coffee	
10:00	 Opening	Course welcome and presentation of lecturers	Roberto
10:30	 Lecture 1	History of Monte Carlo, EGS, and BEAM	Dave
11:00	 Lecture 2	History of EGSnrc and egs++	Iwan
11:30	 Lecture 3	Introduction to the Monte Carlo method	Frédéric
12:30	 Lunch		

## Afternoon






Time	Topic	Title	Instructor
14:30	 Lecture 4	What's in an EGSnrc application?	Reid
15:00	 Lecture 5	Photon physics	Ernesto
16:00	 Break		
16:30	 Lab 1	Getting started: run your first EGSnrc application	Hugo
18:00		End of day	

## 1.2. Tuesday October 29 — Data, transport parameters and electron physics

### Morning






Time	Topic	Title	Instructor
9:00	 Lecture 6	Restricted stopping powers, AE, and AP	Dave
9:45	 Lecture 7	PEGS4 data sets, pegsless mode, and examin	Ernesto
10:30	 Break		
11:00	 Lab 2	Create and examine PEGS4 data sets	Ernesto
12:30	 Lunch		

### Afternoon






Time	Topic	Title	Instructor
14:30	 Lecture 8	Electron physics	Frédéric
16:00	 Break		
16:30	 Lecture 9	Monte Carlo transport parameters	Iwan
17:00	 Lab 3	Vary transport parameters	Hugo
18:00		End of day	

## 1.3. Wednesday October 30 — Phase-space files and variance reduction

### Morning






Time	Topic	Title	Instructor
9:00	 Lecture 10	Phase space files	Hugo
10:00	 Lecture 11	Phase space file analysis with <code>beamdp</code>	Blake
10:30	 Break		
11:00	 Lab 4	Analyze phase space files with <code>beamdp</code>	Reid
12:30	 Lunch		

### Afternoon






Time	Topic	Title	Instructor
14:30	 Lecture 12	Statistical uncertainty in EGSnrc applications	Hugo
15:00	 Lecture 13	Variance reduction techniques	Iwan
16:00	 Break		
16:30	 Lab 5	Explore calculation efficiency and variance reduction	Hugo
18:00		End of day	

## 1.4. Thursday October 31 — BEAMnrc

### Morning






Time	Topic	Title	Instructor
9:00	 Lecture 14	BEAMnrc introduction and main inputs	Dave
10:00	 Lecture 15	BEAMnrc sources and component modules	Blake
10:30	 Break		
11:00	 Lab 6	Run BEAMnrc simulations	Blake
12:30	 Lunch		

## Afternoon






Time	Topic	Title	Instructor
14:30	 Lecture 16	Variance reduction in BEAMnrc	Iwan
15:30	 Lab 7	Investigate variance reduction in BEAMnrc	Blake
16:00	 Break		
16:30	 Lab 8	Create your own BEAMnrc accelerator	Blake
18:00		End of day	

## 1.5. Friday November 1 — DOSXYZnrc

### Morning

Time	Topic	Title	Instructor
9:00	 Lecture 17	DOSXYZnrc dose calculation in a phantom	Blake
10:00	 Lecture 18	Dose analysis and visualization tools	Reid
10:30	 Break		
11:00	 Lab 9	Calculate dose in a phantom with DOSXYZnrc	Ernesto
12:30	 Lunch		

### Afternoon






Time	Topic	Title	Instructor
14:30	 Lecture 19	DOSXYZnrc calculations with CT input	Blake
15:00	 Lecture 20	Phase space sources and BEAMnrc shared library sources	Reid
16:00	 Break		
16:30	 Lab 10	Run advanced DOSXYZnrc simulations	Blake
18:00		End of day	

## 2. Second week: November 4–8






*Lecturers: Dave, Ernesto, Frédéric, Hugo, Patricia, Reid*

## 2.1. Monday November 4 — Introduction to egs++

### Morning






Time	Topic	Title	Instructor
9:00	 Lecture 21	Fundamental geometry definition: <code>howfar</code> and <code>hownear</code>	Patricia
9:30	 Lecture 22	egs++: the EGSnrc C++ library and geometries	Frédéric
10:30	 Break		
11:00	 Lab 11	Build an ionization chamber model in egs++	Frédéric
12:30	 Lunch		

### Afternoon






Time	Topic	Title	Instructor
14:30	 Lecture 23	egs++ particle sources	Reid
15:00	 Lecture 24	EGSnrc scoring and egs++ <code>ausgab</code> objects	Ernesto
16:00	 Break		
16:30	 Lab 12	Investigate egs++ sources and <code>ausgab</code> scoring objects	Ernesto
18:00		End of day	

## 2.2. Tuesday November 5 — egs++ applications: `egs_chamber`

### Morning





Time	Topic	Title	Instructor
9:00	 Lecture 25	egs++ applications	Reid
9:30	 Lecture 26	egs++ applications: <code>egs_chamber</code>	Frédéric
10:30	 Break		
11:00	 Lab 13	Calculate chamber correction factors with <code>egs_chamber</code>	Frédéric
12:30	 Lunch		

## Afternoon

Time	Topic	Title	Instructor
14:30	 Lecture 27	EGSnrc transport in a magnetic field	Dave
15:30	 Lecture 28	Advanced variance reduction techniques in <code>egs_chamber</code>	Frédéric
16:00	 Break		
16:30	 Lab 14	Variance reduction techniques with <code>egs_chamber</code>	Frédéric
18:00		End of day	

## 2.3. Wednesday November 6 — egs++ applications: egs\_cbct, egs\_kerma, egs\_brachy

### Morning






Time	Topic	Title	Instructor
9:00	 Lecture 29	egs++ applications: <code>egs_kerma</code> , <code>egs_cbct</code>	Ernesto
10:30	 Break		
11:00	 Lab 15	Model CBCT scans of a human head using <code>egs_cbct</code>	Ernesto
12:30	 Lunch		

### Afternoon





Time	Topic	Title	Instructor
14:30	 Lecture 30	egs++ applications: <code>egs_brachy</code>	Patricia
16:00	 Break		
16:30	 Lab 16	Model an LDR brachytherapy treatment with <code>egs_brachy</code>	Patricia
18:00		End of day	

## 2.4. Thursday November 7 — Fundamental quantities and other research topics

### Morning






Time	Topic	Title	Instructor
9:00	 Lecture 31	FLURZnrc, SPRZnrc and g	Ernesto
10:00	 Lecture 32	(Special topics TBD)	Patricia
10:30	 Break		
11:00	 Lab 17	(Special topics lab)	Patricia
12:30	 Lunch		

### Afternoon





Time	Topic	Title	Instructor
14:30	 Lecture 33	(Special topics TBD)	Hugo
16:00	 Break		
16:30	 Lab 18	(Special topics lab)	Hugo
18:00		End of day	

## 2.5. Friday November 8 — Automation and open lab time

### Morning

Time	Topic	Title	Instructor
9:00	 Lecture 34	Automation of EGSnrc simulations	Reid
10:00	 Lab 19	Automate EGSnrc simulations	Reid
10:30	 Break		
11:00	 Lab	Open lab time	
12:30	 Lunch		

## Afternoon

Time	Topic	Title	Instructor
14:30	 Lab	Open lab time	
16:00	 Break		
16:30	 Lab	Open lab time	
18:00		End of day	