TUBITAK TBAE Radiochemistry and Medical Radioisotopes School

Date: August 25-29, 2025
Venue: Ege University, Institute of Nuclear Sciences, İzmir and MCBU Dept. of Nuclear Medicine, Manisa

Scope:
The course will cover various aspects of radioisotope production and management technologies for medical and industrial applications. Both theoretical foundations and hands- on techniques will be introduced. Theoretical lectures will cover nuclear chemistry, analytical methods, quality control, preclinical and clinical applications. Radiopharmaceutical lab sessions emphasize radiopharmaceutical production and administration techniques, diagnostics, and theranostics.

Prerequisites:
Strong background in Physics, Chemistry, and Biology with an exposure to Nuclear Medicine and Pharmacy-related fields

Target audience: MS, PhD and Post-Doctoral Researchers. Advanced undergraduate students will be admitted if the prerequisites are satisfied.

Day 1: Introduction and Foundations

09:00 – 09:30 Introduction (Orkun Hasekioglu)
09:30 – 12:30 Foundations of nuclear physics (İsmail Boztosun)
- Radioactivity and Nuclear Decay
- Nuclear Structure and Stability
- Nuclear Models

11:00-11:15 Coffee Break
11:15-12:30 Foundations of nuclear physics (İsmail Boztosun)
- Nuclear Reactions
- Nuclear Fission and Fusion

12:30-13:30 Lunch Break
13:30 – 17:00 Foundations of radionuclide production and processing
- Alpha, Beta, Gamma, and Neutron Emitters **(İsmail Boztosun)**
- Radionuclide production facilities: Cyclotrons, Reactors and Generators **(Emin Yeltepe)**

15:00-15:15 Coffee Break
15:15-17:00 Foundations of radionuclide production and processing
- Radionuclide production, theoretical and practical variations **(Erdal Recepoğlu)**
- From Radiation to Images: Principles of Radiation Detection Techniques in Nuclear Medicine **(Coşkun Harmanşah)**

17:00-18:00 Special Topic:
- Pakistan PAEC

Day 2: Radiopharmaceutical Chemistry and Quality Control (EÜ) (Theory and lab)

09:00-10:00
- Radiation Protection **(Elçin Ekdal Karalı)**

10:00-11:00

- Fundamentals of Radiobiology: Interaction of radiation and living organisms **(Micheal Duncan Yoho)**

11:00-11:15 Coffee Break

11:15-12:15

- What is radiopharmaceutical (Complexation, Conjugation, radiolabeling) **(Agnieszka Majkowska–Pilip)**

12:15-13:15 Lunch Break

13:15-14:15

- Quality Control in Radiopharmaceuticals **(Çiğdem İçhedef)**

14:15-16:00

- Experimental Application 1: Analysis of Gamma Radiation Attenuation in Different Materials and Thicknesses, Detection and Monitoring of Radioactive Contamination Using a LaBr3(Ce) Semiconductor Detector (**Banu Yoho, Caner Taşköprü)**

16:00-16:15 Coffee Break

16:15-17:15

- **Special Topics:** TENMAK PHT (Proton Accelerator Facility)

Day 3: Radioisotope Production, Actinide Chemistry, Target Preparation and Seperation (EÜ) (Theory and lab)

09:00-10:00

- Actinide and Lantanide Chemistry **(Şenol Sert)**

10:00-11:00

- Radiochemistry, Target preparation, Separation, etc. **(Nicholas P van der Meulen)**

11:00-11:15 Coffee Break

11:15-12:30

- Experimental Application 2: Dose Calibrator **(Duygu Tuğçe Baran- Rumeysa Çelik-İrem Kaya**)

12:30-13:30 Lunch Break

13:30-15:45

- Experimental Application 3: Quality Assurance and Quality Control Methods in Radiopharmacy (radiochemical purity, radionuclidic purity, chromatography, pH) **(Özge Kozguş Güldü, Duygu Tuğçe Baran –Rumeysa Çelik-İrem Kaya)**

15:45-16:00 Coffee Break

16:00-17:00 Special Topic

- Uzbekistan INP

Day 4: *in vitro* and *in vivo* Preclinical Aspects (EÜ NBE)

09:00 – 10:00

- Preclinical *In Vitro* Studies of Novel Radiopharmaceuticals **(Buket Özel)**

10:00 – 10:45

- Experimental Application 4: Simple Cell Culture Experiment (Demo) **(Duygu Tuğçe Baran –Rumeysa Çelik-İrem Kaya**)

10:45-11:00 Coffee Break

11:00-12:00

- Preclinical *In vivo/Ex vivo* Evaluations of Novel Radiopharmaceuticals (**F. Zümrüt B. Müftüler)**

12:00 13:00 Lunch Break

13:00 – 15:00

- Experimental Application5: Simple Biodistribution Experiment in Animal Models **(F. Emrah Soylu, Emre Uygur- Duygu Tuğçe Baran –Rumeysa Çelik-İrem Kaya**)

15:00-16:00 Special Topic

- Karima Almasri

16:00-16:15 Coffee Break

16:15-17:15

- Advances in Cell Radiolabeling for Enhanced Cancer Imaging **(Volkan Tekin)**

17:15-18:15 Special Topic

- Kazakhstan INP

Day 5: Clinical applications – One day in a radiopharmaceutical lab, diagnostics, theranostics (Manisa)

09:00 – 10:00

- Internal dosimetry in Nuclear Medicine **(Yasemin Parlak)**

10:00 -11:00

- Current Diagnostic Radiopharmaceuticals **(Ayfer Akit)**

11:00-11:15 Coffee Break

11:15-12:15

- Current Theranostics Radiopharmaceuticals **(F. Gül Gümüşer)**

12:15-14:30 Lunch Break

14:30 – 15:15 Experimental Application 6:

- A day in Nuclear Medicine **(Yasemin Parlak, Didem Göksoy)**

15:15- 15:30 Coffee Break

15:30 – 16:00

- Special Topics: Career and R&D Opportunities in the Radiopharmaceutical Industry **(İsmail Boztosun)**
  Examination
- **Closing:** Participation Certificate Ceremony and General Evaluation (Manisa)