NEUR507 – Topics in Radionuclidic Imaging

FALL semester

Course Information & Syllabus

Learning Objectives and Tips

NEUR507 aims to provide you with foundational knowledge of *in vivo* imaging using radioactive isotopes and is primarily focused on positron emission tomography (PET) studies of the brain. PET is an interdisciplinary field that involves medicine, molecular biology, radiochemistry, physics and computer science. PET has found research and clinical applications in oncology, neurology and cardiology and is an especially powerful modality for imaging of neuroreceptors, cerebral blood flow and abnormal protein deposits in the brain. The course covers most of the topics related to PET from isotope production and radiotracers syntheses to image acquisition and reconstruction. Examples of PET studies of various neurotransmission systems and misfolded protein accumulation as well as their implications in various neurodegenerative diseases and psychiatric conditions will be explained. The students will acquire knowledge of methods of the data acquisition and analysis to be able to design a PET study of their own.

Course Instructors

Prof. Alexey Kostikov (course coordinator) alexey.kostikov@mcgill.ca

Prof. Alex Thiel alex.thiel@mcgill.ca

Prof. Jean-Paul Soucy jean-paul.soucy@mcgill.ca

Prof. Pedro Rosa-Neto pedro.rosa-neto@mcgill.ca

Office Hours

There are no fixed office hours for this course. Please contact instructors *via* e-mail to schedule individual consultation via zoom or other remote communication platforms.

Course Information

Websites (myCourses)

Through 'MyCourses' portal select "Fall 2021 - NEUR-507-001 - Topics in Radionuclide Imaging"

If you have trouble logging into Zoom meetings, MyCourses or myMcGill, please contact ITS Customer Service (ICS): 514-398-3398, Email: customersupport.ist@mcgill.ca, Drop-in: 688 Sherbrook, Room 285

Course Material

Recommended book: *Basic Science of PET Imaging.* Editor: Magdy M. Khalil

Available via McGill Library at https://link.springer.com/book/10.1007%2F978-3-319-40070-9

Lecture Notes and pre-recordings (myCourses)

Lecture slides and pre-recordings will be available as ppt, pdf and mp4 files on myCourses before or shortly after the lectures. If available, you are required to watch those recordings prior to the lecture.

Tentative Course Evaluation and Key Dates

Mid-term exam		33%
Take home assignment	Due on the final exam day	33%
Final Exam		33%

Take home assignment is distributed by early to mid-November and is due on the day of the Final exam.

Summary of Course Content

Topics Covered by Prof. Alex Thiel

- Imaging cerebral blood flow and metabolism
- PET data analysis
- Imaging of neuroinflammation

Topics Covered by Prof. Jean-Paul Soucy

- SPECT and PET acquisition
- Dopamine system imaging

Topics Covered by Prof. Pedro Rosa-Neto

- Introduction to neuroreceptor quantification
- PET imaging in animal models of human disease
- PET Image reconstruction

Topics Covered by Prof. Alexey Kostikov

- Basics of radioactive decay
- Radioisotopes in life sciences
- Overview of PET tracers
- Regulations in production of radiopharmaceuticals