# Introduction to F-18 radiochemistry, PET probe development, and technologies for PET probe synthesis

**WEDNESDAYS CNSI 5433 SOUTH, 10 am – 12 p**

This is an informal introductory course for interested students and postdoctoral fellows within the Crump Institute for Molecular Imaging and the Department of Molecular and Medical Pharmacology in the area of radiochemistry technologies. The aim of this START course is to introduce individuals to the field of PET imaging with special emphasis on PET radiochemistry, PET probe development and technologies for PET probe synthesis.

November 21st, 2012 *David Stout* Radiation and Lab Safety

Introduction to radiation and laboratory safety. Walkthrough of Crump Institute imaging, radiochemistry, and cyclotron facilities.

November 28th, 2012 *David Stout* Cyclotrons and Radiochemistry – Part I

Introduction to cyclotrons and radiochemistry. Lab demonstration of radiation shielding.

December 5th, 2012 *David Stout* Cyclotrons and Radiochemistry – Part II

Lab tour of cyclotron, targets, dose delivery and calibration systems.

December 12th, 2012 *Pei Yuin Keng* Fundamental F-18 Radiochemistry

Fundamentals of chemical reactions and chemistry at trace concentrations. Synthesis strategies with short-lived radioisotopes. Basics of F-18 chemistry (aliphatic and aromatic). Common practices and example syntheses

January 9th, 2013 *Saman Sadeghi*  Lab: FDG Synthesis and Quality Control

 ***Location: at UCLA Biomedical Cyclotron (BMC)***

FDG synthesis on a manual synthesizer. Demonstration of quality control procedures.

January 16th 2013 *Michael Phelps* PET Imaging

History and significance of PET. Research and clinical applications of PET.

January 23rd, 2013 *Pei Yuin Keng* Nucleophilic Radiofluorination Strategies

New F-18 labeling strategies. Prosthetic group chemistry and site-specific labeling of biomolecules

February 6th, 2013 *Jorge Barrio* Introduction to PET Imaging and Biology

Mechanisms of PET tracers. Use of PET tracers to measure biological processes

February 20th, 2013 *Caius Radu* PET Tracer Design

Tracer biology, kinetics, and quantification. Tracer design. FAC development as an example.

March 6th, 2013 *Michael van Dam* Automated (Macroscale) Radiosynthesizers

General architecture and operation of synthesizers. Synthesis processes from an engineering perspective.

March 13th, 2013 *Michael van Dam* Lab: Automated (Macroscale) Radiosynthesizers

Setup, programming, and operation of an automated radiosynthesizer (ELIXYS).

March 16th-22nd, 2013 UCLA final exams

March 22nd-27th, 2013Spring break

March 27th, 2013 *Saman Sadeghi* Instrumentation and QC

Part I: Basics of electronic instrumentation. Data acquisition fundamentals. Introduction to LABView programming.

Part II: Analytical tools for radiochemistry research and quality control. Overview of separation and detection techniques.

April 3rd, 2013 *Saman Sadeghi* Lab: Instrumentation and QC

Valve and syringe pump control via a PC. User interace design. Feedback and automation.

April 10th, 2013 *TBD*  Lab: Radioanalytical Instrumentation

Part I: Principles of TLC (theory, practice, analysis, computing Rf values, use of standards)

Part II: Principles of HPLC (sample preparation, injection, columns, detectors, use of standards)

April 17th, 2013 *Michael van Dam* Microfluidic Radiosynthesizer – Part I

Prerequisite: M248 lecture on microfluidics/chemistry

Advantages of microfluidics for PET. Continuous flow and batch systems. Digital microfluidics.

April 24th, 2013 *Gaurav Shah*  Microfluidic Radiosynthesizer – Part II

Part I: Lecture on EWOD chip structure and fabrication

Part II: Walkthrough of cleanroom and equipment

May 1st, 2013 *Gaurav Shah*  Lab: Microfluidic Radiosynthesizer

Demonstration of synthesis on an EWOD microfluidic chip

May 8th, 2013 *Sherly Mosessian* Regulation for PET Radiopharmaceuticals

Regulatory requirements for the use of PET probes in animals and humans

May 15th, 2013 *David Stout* Preclinical Imaging Center

Use of PET and CT systems. Animal handling and probe injection. Walkthrough of a radiolabeling experiment (labeling to imaging).

May 22nd, 2013 *Martin* *Auerbach* PET Imaging in the Clinic

Applications of PET in current clinical research and practice.

Diagnosing , staging and restaging

May 29th, 2013 *Johannes Czernin* PET Imaging in the Clinic

Predictive and intermediate endpoint biomarkers

Treatment response