

MRSEC Summer Course Announcement

We are writing to announce two new one week summer courses: “Modern Optical Microscopy” and “Introduction to Microfluidics Technology” to be held at Brandeis University, near Boston, MA. Both courses are hands-on laboratory courses, sponsored by the Materials Research Science and Engineering Center (MRSEC) at Brandeis. The microfluidics course will be offered the week of June 18 – June 22, 2012 while the optics course will be offered in the week of June 25 - 29, 2012. These courses are intended for graduate students, post docs, and/or faculty usually early in their research career, in both physical sciences and life sciences, and do not assume any specific prerequisites.

“Introduction to Microfluidics Technology” (June 18 – 22, 2012) will be taught by the director of the Brandeis Microfluidics Center. The course is based on strategies employed when teaching new users of the facility how to utilize microfluidic technology in research work.

“Modern Optical Microscopy” (June 25 - 29, 2012) will be taught by Professor Zvonimir Dogic of the Physics department at Brandeis. It is based on a very successful one semester graduate course offered at Brandeis on the same topic.

Please see information below for detailed course descriptions.

There is no tuition fee for these courses. A fixed fee will cover housing, on site breakfast and lunch from Monday through Friday for each course. Applicant requesting single occupancy rooms will pay a room and board fee of \$550, while applicants in double occupancy shared rooms will be charged \$350. Local students not needing housing will pay a food only fee of \$150.

We ask that you bring these courses to the attention of appropriate graduate students, and ask them to apply for either one or both, following the application instructions below.

Application Instructions

To apply, please email Melissa Kosinski-Collins, kosinski@brandeis.edu by March 30, 2012, with the following materials.

- Name and gender (for housing)
- Housing preference (single, double, no housing needed)
- Current CV
- Graduate classes taken and/or in which you are currently enrolled
- Field of research
- Research advisor name
- A short paragraph explaining how your research work will benefit from the course (or courses) for which you are applying
- In addition, please have your research advisor write a letter in support of your application emailed directly to kosinski@brandeis.edu with MRSEC Course Recommendation and your name in the subject line.

Applications will be reviewed on a rolling basis, and suitable students will be admitted as selected, throughout the months of March and April. Further information for those admitted will be provided. If you have questions before applying, please address them to Dr. Kosinski-Collins at the address given.

MRSEC Summer Course in Modern Optical Microscopy

Course Objectives

Modern optical microscopes have become powerful experimental tools capable of simultaneously visualizing large scale structures such as entire cells, and fluorescently labeled single molecules within these complex structures. They have found important applications in diverse scientific fields ranging anywhere from psychology and neuroscience to physics and cell biology. The primary goal of this summer school course is to train students in the fundamentals of microscopy optics. Our goal is to make the optics course accessible to students with all scientific backgrounds.

Course Description

The week-long course will be organized around three laboratory exercises, each taking about 10-12 hours to complete.

- In the first of these exercises, students construct simple benchtop optical setups to demonstrate fundamental principles of optics including geometrical optics, optical aberrations, Fourier optics and spatial filtering. This lab concludes with construction of a simple benchtop bright field microscope with Kohler illumination.
- The second laboratory exercise is focused on development of an epi-fluorescence/TIRF microscope on an optical bench. At this point students have gained sufficient knowledge to critically evaluate the performance of research grade microscopes and associated CCD cameras.
- The final laboratory will involve working with research grade bright field and fluorescence microscopes. Amongst other exercises, students learn how to measure the modulation transfer function of an optical system and determine how it depends on the numerical aperture of the microscope's objective lens and condenser optics.

MRSEC Summer Course in Microfluidics Technology

Course Objectives:

This course is an introduction to the microfabrication technologies available to build microfluidic devices. This course has been created in response to the great interest from industry, government and academia in the field of microfluidics. We will build several microfluidic devices to understand the microscale phenomena and their applications. Throughout the course, we will place an emphasis on hands-on experimentation with microfluidic systems where laminar flow, surface tension, and molecular diffusion dominate.

Prerequisites

To get the most out of this course, it will help if you have some familiarity with basic conservation equations of mass, momentum, and heat, and classical thermodynamics. Some chemistry laboratory experience is recommended but not required. However, students are required to take the online environmental health and safety trainings offered by the Boston Consortium (http://www.boston-consortium.org/professional_development/environmental_health_safety_training.asp) before the second day of this course.

Course Description

The course will be organized around five single day modules. We will give an overview of microfluidics and micro-fabrication technologies discussing photomask design using AUTOCAD. We will explore liquid phase photo-polymerization, soft lithography, and give students the opportunity to create and analyze their own experiment using fluorescence microscopy.