ME244 January 3:0

Experimental Methods in Microfluidics

Instructor

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Teaching Assistant

NA
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Department: Mechanical

Course Time: Tue.,Thu.,2-3:30 PM

Lecture venue: ME Lecture Room

Detailed Course Page: http://www.kumarlab.com/courses/

Announcements

Brief description of the course

Introduction to experimental methods used in microfluidic systems. Fundamentals of flows at the microscale; emphasis on visualization and quantification of fluid flow at the micron-scale. Brownian motion and its quantification. Particle image velocimetry (PIV), micro-particle image velocimetry (Âµ-PIV) and three-component flow measurement in three dimensions. Measuring displacement at the micron scale; digital image correlation (DIC). Thermometry at the micron-scale; laser induced fluorescence (LIF). Applications to microfluidic, biomicrofluidic and biomechanics.

Prerequisites

Background in fluid mechanics and transport phenomena is encouraged. Knowledge of statistical techniques will be beneficial, but not required.

Syllabus

Brownian motion, Particle Image Velocimetry (PIV), Digital Image Correlation (DIC)

Course outcomes

The class is an elective, aimed at providing exposure to topics that are not usually covered in classes on fluid

mechanics, and solid mechanics.

The material to be covered and assessment procedure will particularly benefit students engaged in research projects related to the content of the course. This includes problems related to microfluidics, biomechanics, and lab-on-chip devices.

Grading policy

Homework: 30%

Midterm: 30%

Final project: 40%

Assignments

Resources

Raffel, M., Willert, C., Wereley, S.T., Kompenhans, J, Particle Image Velocimetry, Springer, 2007

Nguyen, Nam-Trung, Wereley, S.T., Fundamentals and Applications of Microfluidics, Artech House, 2006

Li, Dongqing (Ed), Encyclopedia of Microfluidics and Nanofluidics, Springer, 2008