

BMS 631 Introduction to Flow Cytometry

Professor:

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Overview

A thorough excursion into the theory of flow cytometry. An understanding of what the technology is, how it operates, and where the applications exist. Covers optical systems, including filters, light excitation and emissions, fluorescent dyes and fluorescent molecules, electronics including detection systems, signal processing, data analysis, and computer applications. A discussion of lasers and other light sources, as well as quality control. Overview of the application areas in medical sciences, biological research, and other possible areas of use. The class is based on Howard Shapiro's excellent book "Practical Flow cytometry", 4th Edition and will generally be linked to many of the chapters in that text.

Specific areas covered by lectures:

- Historical introduction to detection technology development
- Background to cell analysis systems from Caspersson to Coulter
- Light and Matter - critical aspects of how light is measured
- Principles of Fluorescence
- Fundamental properties of Light sources as well as applications
- Properties of optical filters – bandpass, dichroics and alternatives
- Basic Optical Systems
- Detectors and Electronics
- Fluidic systems of flow cytometers
- Cell Sorting principles and processes
- Properties of fluorescent dyes
- Multiparameter Data processing
- Immunophenotyping
- DNA-RNA analysis
- Microbiology approaches in Flow Cytometry
- Functional Analysis and Advanced Applications
- Spectral Flow Cytometry – instrumentation and analytical components