Biochemistry & Molecular Biology (BMB) 829
Special Problems in Macromolecular Analysis and Synthesis
Fall Semester 2024

Module 4: Separation and Analysis of Cells and Molecules
Section 304
Course Syllabus, Policies, and Schedule

Credit Hours: 1
Course meeting days and time: Mon/Wed 2:40 p.m. – 4:00 p.m., 11/4/2023 – 12/4/2023 (no class 11/27)
Course location: BCH 111

Instructors

Charles G. Hoogstraten; BMB 829 Course Coordinator
hoogstr3@msu.edu
302D Biochemistry Building
(517) 353-3978 (only checked occasionally)
Office hours: By appointment

Robert Quinn, PhD; Module Lead Instructor
quinnrob@msu.edu
120 Biochemistry Building,
517-353-1426
Office Hours: By appointment

Matthew Bernard, PhD; **Module Instructor**
mbernard@msu.edu
2315 Bioengineering Building (IQ)
517-355-4076
Office Hours: By appointment

Outline of Module Topics

Module 1: Introduction to Methods in Biochemistry & Molecular Biology

Module 2: Recombinant DNA & Genome Editing

Module 3: Genetic and Biophysical Analysis of Molecular Interactions

Module 4: Separation and Analysis of Cells & Biomolecules

Module 5: Molecular Structure Determination and Analysis

Course Description and Objectives

BMB 829 is a modular course that seeks to introduce students to modern molecular and structural/analytical techniques of interest in the biochemistry and molecular biology laboratories. Students may enroll in each of sections 301, 302, 303, 304, and 305 (corresponding to modules 1 through 5) once for a total of up to five credits; however, *Module 1 must be completed before any of the remaining modules can be taken.*

Required Textbook & Course Materials:
No required textbooks; required reading material will be provided by instructors on D2L.

Format:
This course will be taught in-person, with any exceptions announced by the instructor both in class and on D2L. There will be a lecture-based teaching component covering material for the separation of cells and molecules and hands-on class assignments devoted to analyzing your own data we will generate during the course.

Required Technologies:
This course will make extensive use of the D2L platform at Michigan State (d2l.msu.edu) to communicate course materials of various sorts. An internet connection and device capable of downloading documents, displaying Microsoft Word and PowerPoint and Adobe PDF documents and displaying video are required. You will also be required to create your own GNPS mass spectrometry data analysis account. This can be found at gnps.ucsd.edu and is free for all users.

Recommended Texts & Other Materials:
Additional recommended reading and viewing materials will be provided on D2L.

Learning Continuity Statement:
Should students be unable to attend class for an extended period of time, they should communicate this to the Course Coordinator (hoogstr3@msu.edu) and/or lead instructor for the module (quinnrob@msu.edu) as soon possible once the situation becomes evident. Students should work with course instructors to develop a schedule for regular communication and reasonable timelines for completing assignments including exams.

Course Continuity Statement:
Should an instructor be required to be absent for an extended period of time, scheduling of different course modules may be adjusted accordingly. Students may communicate with either the Course Coordinator or any of the other course instructors regarding grading and assessment modifications.

Prerequisites:
Recommended background equivalent to BMB 462. For all modules except Module 1, prior completion of Module 1 is expected.

Late Work Policy:

Full credit for late submissions will only be considered if arranged with the instructor in advance of the due date. Otherwise, point penalties may be assigned or late work may not be accepted at the discretion of the individual instructor. Communication with the instructor about situations leading to late work as soon as possible is *strongly* advised.

Student Expectations:
All participants in this class are held to the standard set by MSU's Policy on Integrity of Scholarship and Grades. The policy can be read in full at the MSU Ombudsperson's website.

On March 22, 2016, The Associated Students of Michigan State University (ASMSU) adopted the following Spartan Code of Honor:
"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do."

Disability Access:
Students must inform the instructor and course coordinator at the beginning of the semester, or as soon as reasonably possible after a situation arises during the semester, of any accommodations needed. Information related to disability access is available on the Resource Center for Persons with Disabilities (RCPD) website. Students: to make an appointment with a specialist, call: (517) 353-9642 Or TTY: (517) 355-1293 or visit the RCPD website.

Module Outline and Schedule

Assessments:
Grading for this module will be based on the three problems sets given during the session (one flow cytometry; two mass spectrometry, the module's exam (given at the end of the session), and a take home exam on an applied exercise in mass spectrometry data analysis). This applied exercise will involve generating mass spectrometry data on your own samples and analyzed independently. The entire applied exercise can be done from a common laptop computer with a good internet connection. Letter grades will be assigned at the end of the semester and will be curved based on the final distribution of student scores.

Course Outline:
The planned schedule of lecture presentations is presented in the table below, with class meeting number, dates, instructors, and lecture topics.

#	Date	Instructor	Topic
1	Monday, November 4th	Bernard	Flow Cytometry Principles: Instrumentation and Applications
2	Wednesday, November 6th	Bernard	Flow Cytometry Principles: Panel and Experimental Design
3	Monday, November 11th	Quinn	Defining analytical goals; selecting extraction, separation, and ionization methods
4	Wednesday, November 13th	Bernard	Flow Cytometry: Applying Learning Objectives and Flow Cytometry Concepts from Hypothesis to Data Analysis
5	Monday, November 18th	Quinn	Strategies for Metabolite Annotation and Identification
6	Wendesday, November 20th	Quinn	Targeted measurements and Untargeted profiling of metabolites (metabolomics and lipidomics) (problem set 1 due)
7	Monday, November 25th	Quinn	Extraction and Running LC-MS/MS on your fermented food and beverages
8	Monday, December 2th	Quinn	GNPS and advanced mass spectrometry cheminformatics (problem set 2 due)
9	Wednesday, December 4th	Quinn	Final exam and hands on analysis of your own data on GNPS. (Applied exam question due Dec 8th)

Grading: Exam 65 pts, Three problem sets 30 pts total, Attendance 5 pts = Total 100 pts.