

**Biochemistry & Molecular Biology (BMB) 829**  
**Special Problems in Macromolecular Analysis and Synthesis**  
**Fall Semester 2022**

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

Credit Hours: 1

Course meeting days and time: Tue & Thu 2:40 – 4 pm

Course location: BCH 111

## **Instructors**

**Charles G. Hoogstraten; BMB 829 Course Coordinator**

[hoogstr3@msu.edu](mailto: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](mailto:quinnrob@msu.edu)

120 Biochemistry Building,

517-353-1426

Office Hours: By appointment

**Matthew Bernard, PhD; Module Instructor**

[mbernard@msu.edu](mailto:mbernard@msu.edu)

2315 Bioengineering Building (IQ)

517-355-4076

Office Hours: By appointment

## **Outline of Module Topics (current as of 6/23/2022: Adjustments likely)**

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. Because of effects of the ongoing COVID pandemic, lectures will be recorded (audio and video feeds) and posted to D2L whenever practicable. These recordings are not a replacement for class attendance, but students are encouraged to make use of them in cases of known or suspected COVID exposure or the observation of symptoms in order to avoid possible viral spread. Note that lecture recordings will not be possible in cases of hands-on workshops, facility visits, or technical difficulties.

### Required Technologies:

This course will make extensive use of the D2L platform at Michigan State ([d2l.msu.edu](https://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.

### Recommended Texts & Other Materials:

Additional recommended reading and viewing materials will be provided on D2L.

### COVID-19 Statement:

BMB 829 fully supports and expects compliance with all stated University policies relating to infectious disease safety. Students declining to follow guidelines relating to appropriate viral safety will be asked to leave the classroom.

The BMB 829 instructors are fully cognizant of the difficulties the pandemic has posed for many students. Our goal is to see all of our students succeed despite the ongoing challenges of the pandemic. Should you find yourself in scheduling, academic, or mental or emotional health difficulties, you are urged to contact the current course instructor and Prof. Hoogstraten as soon as possible so that appropriate accommodations may be made. In addition, MSU has made extensive resources available through the Keep Learning section of the University website, including academics (<https://remote.msu.edu/learning/additional-resources.html>) and for students facing challenges related to mental health (<https://remote.msu.edu/learning/mental-health.html>). Students are encouraged to make full use of any or all of these resources as the need arises.

### 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](mailto:hoogstr3@msu.edu)) and/or lead instructor for the module ([quinnrob@msu.edu](mailto: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 four problems sets given during the session (one flow cytometry; three 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	Wednesday, November 9 <sup>th</sup>	Bernard	Flow Cytometry Principles: Instrumentation and Applications
2	Monday, November 14 <sup>th</sup>	Bernard	Flow Cytometry Principles: Panel and Experimental Design
3	Wednesday, November 16 <sup>th</sup>	Bernard	Flow Cytometry: Applying Learning Objectives and Flow Cytometry Concepts from Hypothesis to Data Analysis
4	Monday, November 21 <sup>st</sup>	Quinn	Defining analytical goals; selecting extraction, separation, and ionization methods
5	Wednesday, November 23 <sup>rd</sup>	Quinn	Strategies for Metabolite Annotation and Identification
6	Wednesday, November 30 <sup>th</sup>	Quinn	Untargeted profiling of metabolites (metabolomics and lipidomics) and Targeted measurements
7	Monday, December 5 <sup>th</sup>	Quinn	GNPS and advanced mass spectrometry cheminformatics
8	Wednesday, December 7 <sup>th</sup>	Quinn	Final exam and hands on analysis of your own data on GNPS.