

**DRAFT SYLLABUS**  
**Integrated molecular and cellular biology for non-biologists II**  
**MG 661 (5 cr)**

**Instructor:** Helen Chamberlin

**Meeting times:** M (2 hr), W (2 hr), F (1 hr).

**Objectives:** The main objective of this course is to provide an overview of molecular and cellular biology to non-biology graduate and advanced undergraduate students with a major in mathematics, physics, chemistry or related fields. This course is the second of a series of two, and focuses primarily on tissues, organisms, and their interactions. The course is a required course of the Masters of Science program in Mathematical Biology (MSMB).

**Learning goals:**

Students can identify the scientific method, and describe how it is used to design and interpret biological experiments.

Students can identify and describe the major experimental methods used in biological research.

Students can conceptualize basic biological mechanisms.

Students can apply concepts discussed in class to new experimental and quantitative frameworks.

**Required textbook:** Selected chapters from B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter. *Molecular Biology of the Cell*, 2008, Fifth edition.  
Other required course material will be available through Carmen.

**Prerequisite:** MG660.

**Course structure:**

The course will consist of lecture/class discussion sections on M/W. Friday class will include discussion of homework assignments, laboratory visits, or midterm exams.

**Learning and assessment activities:**

**Class assignments:** The course will include three homework assignments. These will be based on exploratory topics relating concepts from class with quantitative issues and experimental design. All assignments are due at the beginning of class on the due date. 15% of grade (5% each).

**Laboratory visits:** Four visits to research laboratories relevant to the class will be included, allowing students to learn about current research and scientific methods.

**Class participation:** 10% of grade.

**Exams:** The course will include two midterms and one (cumulative) final exam. Each is open book, and open note.

Midterms: 50% of grade (25% each)

Final: 25% of grade

**Outline of the course by week:**

**Week 1-2: Cell-cell interactions** – Signals (including hormones), receptors, second messengers, and signal transduction pathways.

Alberts section IV (chapter 15)

Week 1 Friday: Assignment 1 distributed

Week 2 Friday: Laboratory visit, developmental biology

**Week 3: Important features of multicellularity** – Extracellular matrix, simple models of cell specialization.

Alberts section V (chapter 19)

Week 3 Friday: Assignment 1 due

**Week 4: Tissue production and function: muscle** – Muscle anatomy and physiology; muscle differentiation

Week 4 Friday: Midterm 1 & Assignment 2 distributed

**Week 5: Tissue production and function: nervous system** – Nervous system anatomy and physiology; vision

Alberts – chapter 11

Week 5 Friday: Laboratory visit, neurophysiology

**Week 6-7: Production of multicellularity: developmental biology** – Cell diversification, morphogenesis.

Alberts – CD-ROM chapter 22

Week 6 Friday: Assignment 2 due

Week 7 Friday: Midterm 2, Assignment 3 distributed

**Week 8: Interactions and defense: the immune system** - Cellular processes of innate and adaptive immunity.

Alberts – CD-ROM chapter 24, 25

Week 8 Friday: Laboratory visit, cell sorter

**Week 9: Special Integration Case 1** – Biological timing and clock mechanisms

Week 9 Friday: Assignment 3 due

**Week 10: Special Integration Case 2** – Host pathogen interactions

Week 10 Friday: Interactive laboratory experience, *C. elegans*/bacteria interactions

**Test week: Final exam**

**Statement on academic misconduct:**

“It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic

misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct ([http://studentaffairs.osu.edu/info\\_for\\_students/csc.asp](http://studentaffairs.osu.edu/info_for_students/csc.asp)).

**Statement of ADA compliance:**

“Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/>.”