



## Course Syllabus

HPAU, 2025, Section 001

### Course Information

BIO 335

Molecular Biology

4 Credit Hours

### Calendar: [2024-2026](#)

The calendar lists pertinent dates regarding drop and withdrawal dates.

### Instructor Information

Adam Voshall, PhD

Email Address: [adam.voshall@doane.edu](mailto:adam.voshall@doane.edu)

Office Hours: by appointment

If you need to contact me directly, my preference is that you email me. Please allow 24 hours for me to respond to emails Monday through Friday and 48 hours on the weekend.

### Communicating With the Instructor

When questions arise throughout the course, please remember to check the following resources for an answer **before** reaching out to me:

1. Course Syllabus
2. Announcements
3. The Question Center discussion board

### Question Center Discussion

The Question Center Discussion is a great place for you to ask questions and get answers from your peers and from me. You are encouraged to post your questions here before reaching out directly to me unless it is a time-sensitive matter. If you have questions of a personal nature such as relating to a personal emergency, questioning a grade on an assignment, or something else that needs to be communicated privately, you are welcome to contact me directly via email or phone.

### Response Time

If you need to contact me directly, my preference is that you will email me. Please allow 24 hours for me to respond to emails Monday through Friday and 48 hours on the weekend.

If you have a question about the technology being used in the course, please contact the Doane University Service Center for assistance, their contact information is listed later in the syllabus.

## **Technology Help**

If you have a question about the technology being used in the course, please contact the Doane University Service Center for assistance; their contact information is listed later in the syllabus. If there are third-party tools utilized in the course, please reach out to them directly.

## **Course Details**

### **Catalog Description**

This molecular biology course will explore the interface between genetics and biochemistry. Students will delve into the concepts underlying how biomolecules interact in various parts of the cell, focusing heavily on DNA replication, transcription, and translation. In this course, students will engage in a detailed study of varied aspects of molecular biology and will demonstrate their understanding of techniques such as molecular cloning, macromolecule blotting, and polymerase chain reaction, which are commonly used in research.

### **Course Prerequisites**

For successful completion of this course, it is recommended that students have completed Biology I, Biology II, and Organic Chemistry I.

### **Course Textbook and Materials**

#### **Required**

Molecular Biology of the Cell, 7th Edition. Bruce Alberts, Rebecca Heald, Alexander Johnson, David Morgan, Martin Raff, Keith Roberts, Peter Walter, John Wilson, Tim Hunt

ISBN 978-0-393-42708-0

\*Course books and materials will be integrated into your Canvas portal

### **Course Lab**

As this is a 4-credit course, you can expect to complete a module lab to fulfill the course requirements.

### **Learning Objectives and Course Outline**

#### **Course Objectives**

By the end of the course, you will be able to:

1. Discuss the structure function relationship of proteins/enzymes/DNA in the primary, secondary, tertiary, and quaternary dimensions.
2. Distinguish between the various structural forms of DNA and analyze the process in which DNA is turned into proteins.
3. Illustrate the process in which human DNA can be cloned into bacteria for pharmaceutical testing.
4. Discuss design elements needed for small molecules such as drugs to pass through the membrane to be processed by cells.
5. Explain how cells communicate with one another.
6. Model both the stages that the cell goes through during proliferation and cell death.
7. Analyze the different factors leading to cancer and how current pharmaceuticals circumvent those cellular processes.

8. Dissect how the body deals with infections.

Course Outline

Module	Topic	Assessments & Activities	Aligned Objectives
1	Introduction to the cell	<p>Assignments: Self-Introduction Discussion Week 1 Discussion Basic Concept Worksheet 1: DNA, chemical components of the cell, and proteins Exploratory Worksheet 1: Collagen</p> <p>Assessments: Week 1 Lab Week 1 Quiz Week 1 Interactive Case Study</p>	<p>Examine the structure function relationship that makes up proteins/enzymes and how they work.</p> <p>Discuss how regulatory elements in proteins can lead to varied expression levels when binding to a small molecule or other protein.</p> <p>Classify the different ways DNA can be shifted between or within organisms.</p> <p>Dissect the different components of the cell involved in membrane transport.</p> <p>Discuss the different components of the cell involved in the extracellular matrix</p>
2	Basic Genetic Mechanism	<p>Assignments: Week 2 Discussion Basic Concept Worksheet 2: Chromatin packing, Structure of Chromosomes, DNA replication mechanism, Ribosomes, gene expression Exploratory Worksheet 2: Lysine Modification</p> <p>Assessments: Week 2 Lab Week 2 Quiz Week 2 Interactive Case Study</p>	<p>Explore the different structure function relationships of different forms of DNA</p> <p>Explore the different genomes types and configurations in different types of life</p> <p>Explain the process for which DNA is translated into RNA which is then transcribed into Proteins</p> <p>Research different site-specific recombination strategies for DNA repair</p> <p>Discuss how post translational modifications can increase or decrease membrane permeability</p> <p>Dissect the mechanisms that DNA uses to replicate during proliferation</p>
3	Ways of Working with Cells	<p>Assignments: Week 3 Discussion Basic Concept Worksheet 3: Cell Growth, Analyzing DNA, Microscopy Exploratory Worksheet 3: CRISPR</p> <p>Assessments: Week 3 Lab</p>	<p>Create different methods for visualizing proteins/DNA</p> <p>Manipulate the processes needed to change DNA base pairs</p> <p>Explore the method to grow cells in a culture and purifying proteins from these cells</p> <p>Discuss classical methods for cloning DNA into different cellular systems</p>

Module	Topic	Assessments & Activities	Aligned Objectives
		Week 3 Quiz Week 3 Interactive Case Study	Dissect promoter regions and expression vectors needed for cloned DNA incorporation
4	Membrane structure and transport	<p>Assignments: Week 4 Discussion Basic Concept Worksheet 4: Membrane structure, Membrane transport of small molecules and the electronic properties of membranes; Intracellular compartments, Intracellular membrane traffic Exploratory Worksheet 4: Cancer Cell Membranes</p> <p>Assessments: Week 4 Lab Week 4 Quiz Week 4 Interactive Case Study</p>	<p>Define which types of molecules are more/less likely to have membrane permeability</p> <p>Explore how different channels allow for ionic diffusion into and out of the cell</p> <p>Dissect membrane structure of lipid bilayers</p> <p>Discover how proteins are released into the extracellular environment</p>
5	Cellular Communication	<p>Assignments: Week 5 Discussion Basic Concept Worksheet 5: Energy conversion: mitochondria and chloroplasts, Cell signaling, The cytoskeleton Exploratory Worksheet 5: Estrogen</p> <p>Assessments: Week 5 Lab Week 5 Quiz Week 5 Interactive Case Study</p>	<p>Examine how the mitochondria and chloroplasts accept and release small molecules</p> <p>Examine the processes cells go through in order to send signals within their own walls and to different cells</p> <p>Distinguish how small molecules bind to receptors in order to communicate over small and large distances</p>
6	The cell cycle and cell death	<p>Assignments: Week 6 Discussion Basic Concept Worksheet 6: The cell cycle and cell death Exploratory Worksheet 6: Bcl-2</p> <p>Assessments: Week 6 Lab Week 6 Quiz Week 6 Interactive Case Study</p>	<p>Discuss the various stages of the cell cycle</p> <p>Compare how mitosis and meiosis occur and what factors separate them.</p> <p>Analysis the process of apoptosis and how cell death can be circumvented</p>

Module	Topic	Assessments & Activities	Aligned Objectives
7	Cancer	<p>Assignments:  Week 7 Discussion  Basic Concept Worksheet 7:  Cell junctions and the extracellular matrix, Cancer  Development of multicellular organisms  Exploratory Worksheet 7:  CHOP</p> <p>Assessments:  Week 7 Lab  Week 7 Quiz  Week 7 Interactive Case Study</p>	<p>Compare the different junctions that cells have in order to communicate with one another</p> <p>Explore the DNA damage required to circumvent cell death and lead to immortal cancer cells</p> <p>Compare which hallmarks of cancer more readily lead to the formation of immortal cancer cells</p> <p>Research how CHOP treatment of Cyclophosphamide, Hydroxydaunorubicin, Oncovin and Prednisone has drastically reduced the amount of fatal cancer cases in the USA.</p> <p>Discuss how cancer cells avoid the current process in which foreign or irregular cells are removed.</p>
8	Stem cells and infection	<p>Assignments:  Week 8 Discussion  Basic Concept Worksheet 8:  Stem cells and tissue renewal, Pathogens and infections, The innate and adaptive immune systems  Exploratory Worksheet 8:</p> <p>Assessments:  Week 8 Lab  Week 8 Quiz  Week 8 Interactive Case Study  Final Exam</p>	<p>Compare the different types of pathogens that the body deals with</p> <p>Dissect the biology involved in the process of infection</p> <p>Examine how our immune system is able to adapt to different threats within our bodies.</p>

## Course Requirements

This is an online course and there will **not be any face-to-face class sessions**. All communications, submissions of assignments, course interactions, and posting of grades will utilize Canvas LMS (<https://doane.instructure.com>). You must have a **reliable internet connection** throughout the duration of the course.

## Attendance/Participation

Attendance in an online course means logging into Canvas regularly and participating in all of the activities that are posted in the course. In addition, check your Doane University email account regularly, as I may send important information about the course.

## **Class Preparation**

Preparation for class means reading the assigned readings and reviewing all information required for that module. You should plan to work on this course every day. Regular engagement is expected for online courses.

## **Use of Artificial Intelligence (AI)**

The use of AI tools (e.g., ChatGPT, Copilot, etc.) is permitted for research purposes only. All submitted work must be entirely authored by the student. Using AI to generate or complete assignments, answers, or assessments is strictly prohibited and will be considered a violation of academic integrity. Students are expected to engage with course material authentically and demonstrate their own understanding through original work.

## **Netiquette Guidelines**

At heart, Netiquette (etiquette for the Internet) is simple, good manners and business courtesy. Some of it may seem basic, but some infringements can result in major problems for others or can create an unintended insult to another user. The guidelines are adapted from The Core Rules of Netiquette by Virginia Shea (1994). For more information, please review the [Netiquette Guidelines](#) in the Student Resource Center.

## **Computer Requirements**

For the successful use of Canvas please refer to Doane University's [minimum computer requirements](#). This also includes:

- Reliable computer and internet connection
- A web browser (Chrome or Mozilla Firefox)
- Adobe Acrobat Reader (free)
- Word processing software—Microsoft Word or Google Docs
- Webcam and mic\*

\*For privacy purposes, use of a webcam is **optional** during video conferencing and recording.

## **Campus Network or Canvas Outage**

When access to Canvas is not available for an extended period of time (greater than one entire evening - 6 pm until 11 pm) you can reasonably expect that the due date for assignments will be changed to the next day.

## **Drop and Add Dates**

If you feel it is necessary to withdraw from the course, please contact your advisor for full details on the types of withdrawals that are available and their procedures.

Federal requirements state that students must complete 75% of the coursework to be eligible to receive an incomplete for the course. If students fall more than two weeks behind, they cannot meet this requirement.

## **Academic Integrity**

Fundamental to our mission, our core values, and our reputation, Doane University adheres to high academic standards. Students of Doane University are expected to conduct themselves in a manner reflecting personal and professional integrity. Disciplinary actions may be taken against students whose academic behavior is not congruent with the expectations of the University. Students are responsible for adhering to the standards detailed in this policy. Not being familiar with these standards does not mean that the students will not be accountable for adherence to them. Additional details on the Academic Integrity policy for violating academic integrity are published in the undergraduate and graduate catalogs. Please review [Doane University's Academic Integrity Policy](#).

## **Course Grading**

### **Submitting Assignments**

All assignments, unless otherwise communicated to me, must be submitted via Canvas. Each assignment will have a designated place to submit your work. All materials, assignments, and deadlines are subject to change without prior notice. It is your responsibility to stay in touch with me and review the course site, including Announcements, regularly to learn about changes to assignments or due dates.

### **Grading Scale**

Assignment of letter grades is based on a percentage of points earned. The letter grade will correspond with the following percentages achieved. All course requirements must be completed before a grade is assigned.

A+	97-100
A	93-96
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	<60

### **Grading Scheme**

The following outlines the weighted breakdown for how grades will be calculated:

Assignments – 25%

Discussions – 10%

Quizzes – 20%

Lab – 15%

Interactive Case Study – 20%

Final Exam – 10%

## **Late or Missed Assignments**

Include your Late/Missed Assignments Policy: Example All assignments must be completed and turned in to finish the course. Unless you discuss a late assignment with me prior to the assignment due date, your assignment will lose 20% each day it is late.

ALL assignments must be finished and turned in to complete the course. Unless the instructor is notified BEFORE the assignment is due and provides an opportunity for the student to submit his/her assignment late, points may be taken off for a late assignment.

## **Assignment & Assessment Feedback**

Please allow 1-3 days for feedback on assignments. Be sure to review all of my feedback, as this will help you reflect on what you have learned while receiving suggestions for improvement.

## **Grade Appeals**

Students who believe that their grade was miscalculated due to a mathematical error should contact the instructor within **ten (10) days of the grade posting**. A student is encouraged to talk with their advisor to offer an assessment of the concern and to clarify the steps of the appeal process. More information is published in the [Undergraduate and Graduate Catalogs](#).

## **Studying and Preparation Time**

The course requires you to spend time preparing and completing assignments. A three-credit course requires 144 hours of student work. Therefore, expect to spend approximately 9 hours a week preparing for and actively participating in this 16-week course.

## **Tutor Me**

Students will have access to a free tutor me service within their Canvas account. You can connect with a live free tutor or submit a paper to get feedback before submitting.

## **YuJa Verity Test Proctoring**

YuJa Verity is Doane University's proctoring system. It will be used in your course to proctor quizzes and exams. You will be required to complete a quiz through Verity at the beginning of the course to verify your identity. Once you complete this quiz, you may begin your course.

## **Rewrites**

Students may submit their assignments ahead of their due date for review by the instructor as long as the assignment is provided a minimum of three days prior to the course due date. The instructor will provide feedback on the assignment for consideration by the student.

## **Submitting Assignments**

All assignments, unless otherwise announced by the instructor, **MUST** be submitted via Canvas. Each assignment will have a designated place to submit the assignment. Support and Services

## **Technical Support**



If you are in need of technical assistance, please access the [Self-Service Portal](#). You may reach the help desk at 402-826-8411 or by email at [helpdesk@doane.edu](mailto:helpdesk@doane.edu).

## **Accessibility Statement**

In compliance with the Rehabilitation Act of 1973, Section 504, and the Americans with Disabilities Act of 1990, professional disability specialists and support staff at Doane University facilitate a comprehensive range of academic support services and accommodations for qualified students with disabilities. Doane University staff coordinate student transitions from high schools and community colleges, conduct in-service training for faculty and staff, enable the resolution of accessibility issues, conduct community outreach, and facilitate collaboration among Doane University staff on disability policies, procedures, and accommodations.

## **Accommodations & Disability Services**

[Doane University's Disability Services Office](#) will provide guidance on accommodations and universal access. To request accommodations please complete the [Self-Identification Form](#) and visit the website for additional information as soon as possible.

## **Academic Support**

Doane University offers all of its students access to [Academic Support](#) services.

## **Title IX Requirements: Mandatory Reporting**

At Doane, all university employees, including faculty, are considered Mandatory Reporters. As a Mandatory Reporter, I am required to report incidents of sexual misconduct and relationship violence to the Title IX Coordinator and, thus, cannot guarantee confidentiality. This means that if you tell me about an incident of sexual harassment, sexual assault, domestic violence, dating violence, stalking and/or other forms of prohibited discrimination, I have to share the information with the University's Title IX Coordinator. My report does not mean that you are officially reporting the incident. This process is in place to ensure you have access to and are able to receive the support and resources you need. For additional information, including confidential resources, please visit the [Campus Advocacy, Prevention, and Education \(CAPE\) Project](#).

## **Anti-Harassment Policy**

Doane University, referred to as the "University", is committed to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community. This policy addresses the University's responsibilities under Title IX, the Violence Against Women Reauthorization Act of 2013, and the Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act ("Clery Act"). More information is published in the [Student Handbooks](#).

## **Instructional Technology Accessibility and Privacy Policies**

[Technology accessibility and privacy policies](#) are available on the Student Resource Center within the Canvas LMS.

## **Regular and Substantive Interaction**

The U.S. Department of Education mandates that online courses include "regular and substantive interaction" (RSI) between students and instructors to be considered distance education. This course adheres to the RSI expected of all distance education courses. The course adheres to the regular component through

- a clear schedule of due dates for lessons, readings, and assessments, and
- an instructor of record who monitors student progress in the course and alerts students who are not engaging adequately in the course.

The substantive interaction is achieved through

- assessment of students' work with feedback on a scheduled basis
- an active discussion board about course content monitored by the instructor
- providing information about the course content on a regular basis or in response to questions.

### **Syllabus Addendum & Disclaimer**

I (the instructor) view the course syllabus as an educational contract between myself and each student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. I reserve the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes via email or in the course site Announcements. Please remember to check your Doane University email and the course site Announcements often.

### **Syllabus Changes**

The instructor and Doane University reserve the right to make changes as necessary to this course syllabus. All students will be notified of any changes.

### **Syllabus Addendum**

Each student is responsible for being aware of the policies, resources, and expectations as specified in the [Doane Syllabus Addendum](#).