Molecular Basis of Life
MCB 301
Spring 2022

Instructors:
Nancy Horton
Professor of Molecular and Cellular Biology
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520-626-3828
Office hour: Tuesday 2pm
https://arizona.zoom.us/j/4349876707

Carol Dieckmann
Professor of Molecular and Cellular Biology
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Office hour: TBA (after spring break)

Teaching Assistants:
Noura Darwish, ndarwish@email.arizona.edu
Office hour: Mondays, 10-11 am, LSS 440

Brian Soong, tsoong@email.arizona.edu
Office hour: Fridays, 12:30-1:30pm, BSW 347 (available starting 2-4-22)

Kenneth Ly, kennethtranly@email.arizona.edu
Office hour: Wednesdays, 11:30-12:30, LSS 4th floor lobby outside of LSS 440
Note: starting in March, these office hours will be Friday, 11am-12pm, LSS 4th floor lobby outside of LSS 440

Preceptors:
Ashwin Siby ashwinsiby@email.arizona.edu
Office hours: Fridays, 12:30-1:30, zoom: https://arizona.zoom.us/j/82740034923

Brooke Carruthers, bcarruthers@email.arizona.edu
Office hours: Tuesdays, 11-12, zoom: https://arizona.zoom.us/j/82562294896

Julia Wieland, juliawieland@email.arizona.edu
Office hours: Mondays, 11-12, zoom link: https://arizona.zoom.us/j/9120107860

Course modality: This class is scheduled to be taught in person

Meeting times and locations for in-person classes:
MWF 2:00-2:50 PM Education, Rm 211
Discussions Friday at 3 PM or 4 PM, LSS 240 or 440 (see you section assignment)

Section A	BSW 210	4:00-4:50	Dr. Horton/Dr. Dieckmann
Section B	BSW 237	4:00-4:50	Noura Darwish
Section C	BSW 237	3:00-3:50	Kenneth Ly
Section D	Education 333	3:00-3:50	Brian Soong

Units: 3 units class + 1 unit discussion = 4 total units

Overall course objectives:
The course encompasses foundational material for the study of Molecular and Cellular Biology. It is one of three core courses required for the MCB major. The focus will be on the fundamental concepts governing the interaction of biological macromolecules required for the central dogma of molecular biology: DNA > RNA > protein. Topics to be covered: DNA structure, replication, RNA transcription, structure, modification, processing and turnover, protein translation and modification. Non-covalent protein-ligand, protein-protein and protein-nucleic acid interactions required for these processes will be explored in-depth.

In addition to lectures, small group in-class activities will: 1) introduce concepts that are the basis of interaction in large molecular assemblies, 2) introduce molecular and cell biology concepts that put macromolecular assemblies in a biological context.

Learning outcomes:

1. Students will demonstrate understanding of the ways that chemical principles govern the ability of biological molecules to form cellular complexes. They will be able to describe and apply concepts governing the assembly and function of macromolecular assemblies, such as nucleosomes, polymerases, ribosomes and spliceosomes.

2. Students will be able to describe accurately the cellular context within which macromolecules operate, and how evolution drives diversity at the molecular and macromolecular assembly level.

3. Students will be able to recognize important aspects of atomic-level representations of macromolecules and macromolecular assemblies, and understand how structure is related to function.

4. Students will gain understanding of the non-covalent interactions between macromolecules and small molecule or macromolecular ligands, how the strength of interaction changes under a variety of conditions and why, and how affinity between molecules can be measured and used to determine thermodynamic parameters.

5. Students will be able to describe how enzymes accelerate formation/breaking of covalent bonds, how rates of reactions can be measured and compared for speed and efficiency, how rates are related to thermodynamic parameters, and how enzymes can be inhibited and inhibitor effects quantitated.

Required text:
Molecular Biology: Principles and Practice, Cox, Doudna, O'Donnell, W.H.Freeman 2nd edition 2015.

Course Prerequisites or Co-requisites:
Prior completion of Introductory Biology, MCB 181R; Prior completion of first-semester Organic Chemistry, CHEM 241A.

Grading scheme:
There are four grading components to this course: quizzes (pre-class online and in-class), in-class problem sets, discussion participation, and exams.

Quizzes: On-line quizzes are due prior to most Monday and Wednesday 2 PM class periods (except the days before exams). In-class quizzes are given on Fridays. The total number of quizzes is 35, but the top

28 will be counted towards a total of 28 x 10 pts = **280 pts**. The quiz questions test your comprehension of the assigned reading material.

In-class problem sets: Students will work in small groups during 2 PM MWF class periods to solve problems focused on the major concept(s) of the lesson. Every student in attendance will receive 10 participation points/class period for participating. Your name must appear on the answer sheet prepared collectively by your group and the TA/preceptor assigned to your group will verify your participation and effort. These will be collected at the end of each class period. 10 pts x 36 classes. Top-scoring 30 sessions will be totaled. **Max score = 300**.

Discussion sections: Fridays at 3 or 4 PM. Points will be given by the instructors for attendance and **ACTIVE** participation. 10 pts x 14 classes. Top-scoring 12 sessions will be totaled. **Max score = 120.**

Exams: There will be a total of three 100-point exams: an exam will be given at the end of each multi-week module. Exams 2 and 3 will have 20 points devoted to prior exam material and 80 points on new material.

Exam 1 will be given on Wednesday February 9, 2 PM
Exam 2 will be given on Wednesday March 2, 2 PM
Exam 3 will be given on Wednesday April 6, 2 PM

The **Final Exam** will be given during the assigned time **1:00 PM - 3:00 PM Friday May 6**. The Final Exam will cover the last module (100 points) and include a comprehensive section covering all course material (100 points). **Max score on all exams = 500**. There are **NO** make-up exams.

Course grades: **Total possible points: 1200.** Grades will be assigned as follows based on total points: A = 90% of total points or higher, B = 80%, C = 70%, D = 60%, E = less than 60%. Points required for each grade may be adjusted at the end of the semester by the professor, but only to a **lower** value. These values will be posted.

Assessments/bonus points: There will be two, approximately half-hour, assessments given to measure acquisition of core course concepts. These assessments are required by MCB and the UA. These **bonus points** (20 points/assessment) can be used to enhance your course point total **AFTER grade cutoffs are assigned**, i.e. move grade level up if the total is just below the cutoff. The bonus points are offered as an incentive to try as hard as you can on the assessments.

Policies
Attendance:
Attendance is required. Attending class is vital to the learning process. As such, attendance is required at all 2 PM MWF classes and afternoon discussion section meetings on Fridays at 3 or 4 PM. Please notify the instructor ahead of class in case of expected absence.

All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.
See: http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02

Tardiness and leaving early may result in loss of attendance points. If, on occasion, you must arrive a few minutes late, please join your group as quickly and unobtrusively as possible, and join in the day's lesson without disrupting the process.

If you feel sick, or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel.

- Notify your instructor(s) if you will be missing a course meeting or an assignment deadline.
- Non-attendance for any reason does **not** guarantee an automatic extension of due date or rescheduling of examinations/assessments.
    - Please communicate and coordinate any request directly with your instructor.
- If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.
- Voluntary, free, and convenient COVID-19 testing is available for students on Main Campus.
- If you test positive for COVID-19 and you are participating in on-campus activities, you must report your results to Campus Health. To learn more about the process for reporting a positive test, visit the Case Notification Protocol.
- COVID-19 vaccine is available for all students at Campus Health.
- Visit the UArizona COVID-19 page for regular updates.

Behavior:
Civil interaction is encouraged at all times between all course students, TA's, and preceptors. Phone/laptop use will be allowed for course-related activity only.

Grading:
All exams will be copied before they are returned to students with a grade. If you want to have your exam re-graded, return it to Professor Horton (Exams 1 or 2) or Dieckmann (Exam 3) within **one week** of receiving the graded exam with a **written** explanation of what you want re-graded and why. **Do not return your exam to a TA or Preceptor. Individual exam grading will not be discussed in person/verbally in class or outside of class.** The exam will be re-graded by the Professor and returned to the student.

Student Code of Academic Integrity:
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog.
See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.
The University Libraries have some excellent tips for avoiding plagiarism available at: http://www.library.arizona.edu/help/tutorials/plagiarism/index.html.

Threatening behavior will not be tolerated as outlined:
http://policy.web.arizona.edu/threatening-behavior-students

Equipment and software requirements:
For this class you will need access to the following hardware: Laptop/Personal computer with internet access for completing the on-line quizzes and accessing content in D2L.

Academic advising:
If you have questions about your academic progress this semester, please reach out to your academic advisor (https://advising.arizona.edu/advisors/major). Contact the Advising Resource Center (https://advising.arizona.edu/) for all general advising questions and referral assistance. Call 520-626-8667 or email to advising@.arizona.edu

Life challenges:

If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at (520) 621-2057 or DOS-deanofstudents@email.arizona.edu.

Physical and mental-health challenges:
If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520) 621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

Statement on compliance with COVID-19 mitigation guidelines
As we enter the Spring semester, your and my health and safety remain the university's highest priority. To protect the health of everyone in this class, students are required to follow the university guidelines on COVID-19 mitigation. Please visit www.covid19.arizona.edu.

Class Recordings:
For lecture recordings, which are used at the discretion of the instructor, students must access content in D2L only. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UArizona values and educational policies (Code of Academic Integrity and the Student Code of Conduct) are also subject to civil action.

Disabled students:
Accessibility and Accommodations: At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu) to establish reasonable accommodations.

Confidentiality of Student Records:
Student records are held confidentially. To see the University's confidentiality policy, see http://www.registrar.arizona.edu/ferpa/default.htm

Additional Resources for Students:
UA Non-discrimination and Anti-harassment
policy: http://policy.arizona.edu/sites/default/files/Nondiscrimination.pdf

UA Academic policies and procedures are available at:
http://catalog.arizona.edu/2015-16/policies/aaindex.html

Student Assistance and Advocacy information is available at:
http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

Change to syllabus:
The information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor. Please check the D2L announcement page and course e-mails on a regular basis.