

MCB 195A: Molecular Biology of Star Trek Colloquium
Fall 2019 – Social Sciences, Rm 308
Tu 2:00 PM – 2:50 PM
1 unit

<p>Instructor Information Betül Kaçar, Ph.D. Associate Professor Department of Molecular and Cellular Biology University of Arizona</p>	<p>Contact Information Email: betul@email.arizona.edu Phone: 520-621-3440 Instructor Availability Office Hours: Wednesdays, 1-2pm</p>
--	---

Course Description

Science, engineering and science fiction intertwine in our society in many unique and surprising ways. As just one example, the science fiction stories of Jules Verne from the latter half of the 19th century inspired active (though at the time, underfunded and sometimes amateur) scientific research into aeronautics and astronautics. These technological developments nevertheless led to the advent of human air- and spaceflight many decades later. The various series of Star Trek have played a similarly pivotal role in articulating popular concepts of ‘life in the universe’; some of these basic ideas continue to frame the way in which biology, chemistry, planetary geology and astronomy research is conducted today. In this course we will use plots and ideas about life in the universe, as explored in episodes of Star Trek series, as starting points for discussing contemporary topics in biology, evolution and genetics. For each seminar, participants will view a selected episode and conduct assigned reading on a scientific topic described in that episode.

Please note that seminar participation is gauged by the assimilation, dissection and critical discussion of the valid scientific concepts covered by each seminar topic, not by knowledge of Star Trek series character or production minutiae. Seminar attendees need not be previously familiar with Star Trek to productively participate in this course.

Course Prerequisites and Co-requisites:

Molecular and Cellular Biology Major and Freshman or Higher Standing

Required Course Materials

Reading: See below for details.

Other materials: Access to Star Trek episodes indicated below.

Required Course Extracurricular Activities: View Star Trek episodes indicated below in your own time prior to scheduled course discussions.

Course Objectives and Expected Learning Outcomes:

In this course, students will explore the following questions:

- What are the environments in which Earth life might have originated, emerged and survived?
- Could life originate elsewhere in the cosmos?
- Is life unique to our planet or a universal phenomenon?
- Is Carbon-based life the only possible form of life?
- How can we utilize synthetic biology to create variants of extant life?
- Are viruses alive?
- What are the scientific and ethical implications of intertwining biology with new forms of technology?

By participating in the class, students will be able to:

Upon successful completion of the MCB195, you will be able to:	Which aligns with MCB program outcome:
Discuss in broad terms key concepts in molecular and cellular biology including macromolecular functions within the cell, genetic analyses and engineering, elements of universal cellular architecture and metabolism, and cell/environmental interaction.	Demonstrate understanding of the molecular and cellular mechanisms that govern life and apply that understanding to novel scenarios.
Research a current issue in molecular and cellular biology, prebiotic chemistry or astrobiology.	Evaluate the reliability of sources of information about biology.
Give a short oral presentation on a current issue in molecular and cellular biology, prebiotic chemistry or astrobiology.	Communicate effectively about scientific ideas and methods.
Identify ethical questions that arise as new biology research emerges, with a focus on genetic engineering.	Demonstrate ability to analyze the role of biology in societal decisions and to apply ethical decision-making to evaluate existing and new scientific approaches

Tentative Schedule of Topics and Activities

Week Date	Topic	Episode and Reading Assignment
1 Aug. 27	Opening Discussion: Molecular Biology Across Great Distances of Time and Space	No reading
	Phase 1: History of Life	
2 Sep. 3	What is Life? Defining life, characterizing life-like behavior, artificial vs. synthetic vs. natural biology	TNG: The Measure of a Man
	<i>Earth History and Life</i>	TNG: Time's Arrow (Part 1)
3 Sep. 10	The origins of the universal cellular architecture; lab experimentation vs. historical/geologic evidence; prebiotic theoretical frameworks (RNA World, pyrite surfaces, information- vs. metabolism-first)	TNG: All Good Things...(Part 2)
4 Sep. 17	Life's informatic code; DNA and RNA as information storage media	TNG: The Chase (Guest Lecture)
5 Sep. 24	Cellular evolution and cell/virus interactions. Is de-evolution possible? Are viruses alive? How do viruses impact ecosystems/populations?	TNG: Genesis
6 Oct. 1	Life/environment interactions; cellular immune systems; antibody/pathogen responses	TNG: Unnatural Selection (Guest Lecture)
	Phase 2: Current Technologies and Topics in Cellular Biology	
7 Oct. 8	Natural clones; minimum viable population parameters; asexual vs. sexual reproduction; laboratory cloning techniques	TNG: Up the Long Ladder
8 Oct. 15	Molecular biology of aging; telomeres	TNG: Rascals
9 Oct. 22	Genetic engineering techniques; CRISPR	VOY: Lineage
	<i>The Future of Biology, on Earth and Beyond</i>	
10 Oct. 29	Medical ethics; genetically enhanced/modified humans and organisms	DS9: Dr. Bashir, I Presume
11 Nov. 5	Carbon- vs. Silicon-based life;	TNG: Home Soil
12 Nov. 12	Synthetic biology; cellular implants	VOY: Scorpion (Part 2)
13 Nov. 19	Exoplanetary discovery and characterization; pervasiveness of life; characterizing and recognizing biosignatures across interstellar distances	
14 Nov. 26	THANKSGIVING RECESS	
15, 16 Dec. 3-10	Summary and Perspectives Discussion/ Final Presentations	No reading

Attendance and Class Participation Policies

MCB 195A is an active colloquium where students are expected to attend class ready to discuss the week's reading and participate in the related activities. As such weekly attendance and participation are required. Exceptions will be made conflicts due to University-authorized commitments (pre-approved by the UA Dean of Students), or holidays observed by organized religion with which you are affiliated provided the instructor is contacted *before* the discussion is missed, proper documentation is provided, and a make-up assignment is completed within one week of the absence. At the instructor's discretion, some form of accommodation may be made in the event of extraordinary circumstances such as serious illness, accident, or family emergency.

To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or drc-info@email.arizona.edu.

If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Required Course Activities, Assignments/Exams

Class Discussion (14 total, 12 will count towards your grade): Students will participate in class-wide discussion.

In-Class Activities (16 total, 14 will count toward your grade): Students will turn in weekly journal entries based on in class activities.

Final Presentation (required): On the date of the final exam, student will make small group presentations on a topic of their choice. Grading rubric will be provided to students in advance.

Final Exam or Project

On the date of the scheduled final exam, student will make small group presentations on a topic of their choice.

<https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information>, and Final Exam Schedule, <http://www.registrar.arizona.edu/schedules/finals.htm>

Grading Scale and Grade Policies

Course grade will be based on:

Attendance and participation, 1 point per class (graded on weekly participation, best 12 out of 14)	35%
Journal entries, 1 point per entry (turned in for grading, best 12 out of 14)	35%
Final Presentation, 10 points (rubric will be provided)	30%

Classroom attendance is graded based on attendance and participation. Lack of attendance or disruptive activities during class will result in a grade of 0 points for that class.

Grades will be awarded by addition of points from assignments and the final presentation for each student. Grades will be assigned as follows:

Grade	
S	27 points or more
P	20-26 points
E	19 points or below

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively

Late Assignments Policy

All assignments are due either during the class period they are assigned (in-class discussions) or on the date listed on d2l for the final paper.

Extra credit policy

There will be no extra credit.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel

comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Some learning styles are best served by using personal electronics, such as laptops and iPads. These devices can be distracting to other learners. Therefore, students who prefer to use electronic devices for note-taking during lecture should use one side of the classroom.

Students are asked to refrain from disruptive conversations with people sitting around them during discussion. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave the class and may be reported to the Dean of Students.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Accessibility and Accommodations for Students with Disabilities

It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit <http://drc.arizona.edu>

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Academic Integrity Policies

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/codeofacademicintegrity>
<http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism, available at <http://new.library.arizona.edu/research/citing/plagiarism>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-Harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

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

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.