

HLSC 207 PRINCIPLES OF BIOLOGY III: ORGANISMAL BIOLOGY, Fall 2017

MWF 9:00-9:50 in 1205 Cambridge Community Center

As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever branching and beautiful ramifications. (Charles Darwin, 1859)

Learning objectives: The learning and teaching objectives for this course are to facilitate the ability of HLSC 207 students:

- 1) to master physical, chemical, mathematical, evolutionary, and genomic principles for characterizing the diversity, structure, and function of all organisms;
- 2) to learn how to apply these general principles toward addressing specific problems in organismal biology;
- 3) to encourage four types of higher scientific thinking important in all aspects of biology, including organismal biology:
 - A) *mechanistic thinking* – to reason how something happens, which often involves the understanding and application of appropriate molecular, genetic, developmental, physiological, etc. mechanisms;
 - B) *evolutionary thinking* – to reason why something happens, which often involves the understanding and application of appropriate deductions from geological, genomic, phylogenetic, etc. evidence;
 - C) *critical thinking* (also called reasoning from principle) - to apply fundamental principles to understanding important biological processes and/or social issues; and
 - D) *creative thinking* (also called hypothesis generation) - to develop their own hypotheses about an important process in organismal biology, to specify what experiments and/or observations are needed to test that hypothesis, and to predict plausible results from those experiments and/or observations.
- 4) to move from being passive listeners toward becoming active participants in their learning process; and
- 5) to engage in effective group learning for mastering organismal biology.

Course design: This course incorporates a series of unique small-group, active-engagement activities (GAE's) to help students master the fundamental principles of organismal biology and their application toward solving new problems.

Course website: www.myelms.umd.edu

Teaching Team

Dr. Todd Cooke

E-mail: tjcooke@umd.edu

Phone: 301-405-1628

Individual Office Hours: **W 12 Noon - 3 PM** in 1103 La Plata. Schedule 30-minute appointments via Google Calendar (www.ils.umd.edu/Advising/ Todd Cooke)

Open Office Hours: **TH 11 AM - 2 PM** in the dining area outside Maryland Food Coop in Stamp Student Union

Teaching Assistants - Office hours are held in the 9th Floor Lounge of La Plata Hall

Chloe Garfinkel (chlo7778@gmail.com) on **Sundays** at 7-9 PM

Jessica Yin (jyin1@umd.edu) on **Sundays** at 7-9 PM

Smaraki (Rhea) Dash (smaraki.dash7@gmail.com) on **Wednesdays** at 7-9 PM

John Locke (jelocke2@gmail.com) on **Thursdays** at 7-9 PM

Liam Butler (lbutler2@terpmail.umd.edu) on **Thursdays** at 7-9 PM

Principal contact: email address and course website. If the university is closed for an extended period, the information needed to complete the course will be posted on the website.

Textbook: Textbook readings from: Reece et al. (2014) Campbell Biology, Tenth Edition. You may instead use an equivalent introductory biology textbook published not more than 6 years ago. Refer to the index of your chosen book to find the equivalent readings to those assigned from Campbell Biology, 10th Edition.

Grading: Course grades are based on a total of **460 points** distributed as follows:

Three Mid-term Exams (60 pts. each = 180 pts.): Each midterm exam is worth 60 pts.

Final Exam (100 pts.): This exam consists of 60 points devoted to the material covered in the last quarter of the class following the third mid-term, plus 40 points of comprehensive questions.

Homework assignments (10 @ 20 pts. each, lowest dropped = 180 pts.): Homework assignments based on the Group Activity Exercises (GAE) will be distributed during most weeks. We encourage each group to schedule a regular meeting time every week to discuss and work on the homework based on the preceding GAE. ***However, any written work you turn in should be your own, so write your assignments on your own after the group meeting!*** Please be aware that any assignments from 2 or more students that are very similar in wording and organization will be considered plagiarism, awarded zero points, and referred to the Office of Student Conduct for appropriate action. The penalty for late work is 2 pts/day. No work will be accepted that is more than five days late.

Extra credit (up to 20 pts): ILS is participating in several on-line surveys that the BSCI program is using to measure the attitudes and backgrounds of the students taking its classes. These surveys are optional, but you can receive up to 20 extra-credit points for participating in these surveys. These points will be awarded on the basis of your sincere efforts to complete the surveys, not on how well you score on them. ***No other extra-credit opportunities will be made available.***

Grading scale: Final grades will be calculated as the percentage earned of a total of **460 points**. In order to be guaranteed a particular grade, you need to receive the following percentage of points. The grade breaks may be moved down (i.e. to increase the number of higher grades) at the discretion of the professor. The grade breaks will not be moved up.

>97 % = A+	87-89 % = B+	77-79 % = C+	60-69 % = D	<60% = F
93-97 % = A	83-86 % = B	73-76 % = C		
90-92 % = A-	80-82 % = B-	70-72 % = C-		

Course-related Policies for Undergraduate Studies: You will find the complete listing of all course-related policies for undergraduate students at <http://www.ugst.umd.edu/courserelatedpolicies.html>. Topics that are addressed in these various policies include academic integrity, student and instructor conduct, accessibility and accommodations, attendance and excused absences, grades and appeals, copyright and intellectual property. I have abstracted and described some of the most relevant policies below.

University Policy on Excused Absences: “Events that justify an excused absence include: religious observances, mandatory military obligation, illness of the student or illness of an immediate family member, participation in university activities at the request of university authorities, and compelling circumstances beyond the student's control (e.g., death in the family, required court appearance). “Absences stemming from work duties other than military obligation (e.g., unexpected changes in shift assignments) and traffic/transit problems do not typically qualify for excused absence.”

“The student must provide appropriate documentation of the absence. The documentation must be provided in writing to the instructor by the means specified in the syllabus. For medically necessitated absences: Students may, one time per course per semester, provide a self-signed excuse as documentation of an absence from a single class (e.g., lecture, recitation, or laboratory session) that **does not coincide with a major assessment or assignment due date**. For all other medically necessitated absences, a course instructor may request that students provide documentation from a physician or the University Health Center to verify an absence. In cases where students are asked to provide verification, the course instructor may request the dates of treatment or the time frame that the student was unable to meet academic responsibilities, but may not request diagnostic information. For all other absences students must provide verifiable documentation upon request (e.g., religious calendar, court summons, death announcement, etc.)”

Make-up Exams: *What if I miss an exam?* Obtain the appropriate documentation necessary to justify the absence. If you have an excused and documented absence, I shall schedule a make-up exam only if you supply the appropriate documentation, as described in the preceding passage.

Rescheduling exams due to religious or foreseeable, University approved, conflicts: University policy states “The student must notify the instructor in a timely manner. The notification should be provided either prior to the absence or as soon afterwards as possible. In the case of religious observances, athletic events, and planned absences known at the beginning of the semester, the student must inform the instructor during the schedule adjustment period. All other absences must be reported as soon as is practical.” See above sections on university policy for excused absences for more information.

Regrading Requests: For lecture exams, a regarding request will be considered only if the original was written in pen. If you feel you were graded incorrectly on an exam, you should pursue the following procedure to obtain a regrading:

- 1) Refer to the answer key that will be posted the day of the exam, to make sure you know what the correct answer is.
- 2) Return the exam to your instructor along with a written explanation of why you feel you should have received more points, and including reference to the posted answer key.

Important Note: The firm deadline for regarding requests is ONE WEEK after the graded exam was made available (regardless of when you actually pick it up). You may not submit a regarding request for the final.

Disability Support Services: I am dedicated to providing a supportive environment for all students, including students with disabilities. If you have a disability that affects your participation and/or performance in the class, or you think you might, contact Accessibility and Disability Service at 301.314.7682, or adsfrontdesk@umd.edu. You will need to provide timely documentation from DSS to the course instructor in order to receive disability accommodations in this course.

Course Evaluations: Near the end of the semester, you will have the opportunity to submit a Course Evaluation at: <http://www.courseevalum.umd.edu> Course evaluations are an important part of the process by which the University of Maryland seeks to improve teaching and learning. By completing evaluations for your courses, you will be able to view student evaluations for all UMD courses having sufficient response rates.

Academic integrity: The University is an academic community. Its fundamental purpose is the pursuit of knowledge. Like all other communities, the University can function properly only if its members adhere to clearly established goals and values. Essential to the fundamental purpose of the University is the commitment to the principles of truth and academic honesty. Accordingly, the Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld. While all members of the University share this responsibility, the Code of Academic Integrity is designed so that special responsibility for upholding the principle of academic honesty lies with the students. The University of Maryland honor system is fully described in the Code of Academic Integrity that is administered by an all-student Honor Council. For further information, see the website of the Office of Student Conduct at: <http://osc.umd.edu/OSC/Default.aspx>.

In essence, the Code of Academic Integrity sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. The University defines the different forms of academic dishonesty as:

CHEATING: fraud, deceit, or dishonesty in any academic course or exercise in an attempt to gain an unfair advantage and/or intentionally using or attempting to use unauthorized materials, information, or study aids in any academic course or exercise.

FABRICATION: intentional and unauthorized falsification or invention of any information or citation in an academic course or exercise.

FACILITATING ACADEMIC DISHONESTY: intentionally or knowingly helping or attempting to help another to violate any provision of this *Code*.

PLAGIARISM: intentionally or knowingly representing the words or ideas of another as one's own in any academic course or exercise.

All UMD students are asked to write and sign the following Honor Pledge to all submitted assignments and exams:

I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination.

Several Other Useful University Websites

Counseling Center, including Counseling Service, Accessibility and Disability Service, and Learning Assistance Service - <https://www.counseling.umd.edu>

The Writing Center - <http://www.english.umd.edu/academics/writingcenter>

HLSC 207 Principles of Biology III: Organismal Biology Fall 2017

Textbook readings: Reece et al., 2014. Campbell Biology, 10th Ed. Pearson

L = lecture, GAE = group active engagement

Date	#	Class	Principles of Life - supplemental readings	Homework schedule
M Aug 28	1	L - The HLSC 207 Adventure	pp. 0-15	
		Physics and Phylogeny Toolkit		
W Aug 30	2	GAE - Thermodynamics of life - Energy for free	pp. 141-148	
F Sep 1	3	GAE - Thermodynamics II - Universal physicochemical principles	Same as above	Thermodynamics HW available
M Sep 4		Labor Day Holiday		
W Sep 6	4	L - Deep origins - The earliest signs of life	pp. 57-58, 520-524	
F Sep 8	5	GAE - Phylogeny - The trees of life	Skim Chap. 26 - focus on key concepts	Thermodynamics HW due, Phylogeny HW available
		Diversity of Life - Principles and Patterns		
M Sep 11	6	L - Prokaryotic diversity I - What wonderful life!	pp. 462-464, Chap. 27	
W Sep 13	7	L - Prokaryotic diversity II - What wonderful life: pathogens and much more	Same as above	
F Sep 15	8	GAE- What Wonderful Life in Extreme Environments - Origin of Life	Same as above	Phylogeny HW due, Early Life HW available
M Sep 18	9	L - Prokaryotic bioenergetics - All that jazz about redox reactions	pp. 163-164, 172-174, 197-198	
W Sep 20	10	L - Prokaryotic bioenergetics - ETCetera, ETCetera, ETCetera	Same as above	
F Sep 22	11	GAE - Endosymbiosis - A civil union of unequal partners	pp. 109-111, 528-529	Early Life HW due
M Sep 25	12	MID-TERM EXAM 1 (60 pts.) - Classes 1-10		
W Sep 27	13	L - Origin and diversity of unicellular eukaryotes - It's not easy being green (or red or brown)	Skim Chap 28 - focus on key concepts	

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F Sep 29	14	L - Eukaryotic multicellularity - Joining together for the common good	Same as above	
M Oct 2	15	L - Plants I - Making the land even greener	Skim Chap. 29 and 30- focus on key concepts	Eukaryotic evolution HW available
W Oct 4	16	GAE - Plants II - Making the land even greener	Same as above	
F Oct 6	17	GAE - Diffusion - Physical opportunity and biological constraint	pp. 130-131	Diffusion HW available
M Oct 9	18	L - Fungi - To be, or not to be ... motile	Skim Chap. 31 - focus on key concepts	Eukaryotic evolution HW due
W Oct 11	19	L - Evolution of basal animals - Simple beginnings of great complexity	Skim Chap. 32 - focus on key concepts, pp. 684-687	
F Oct 13	20	GAE - Evolutionary developmental biology - Homeobox stories	pp. 457-458, 530, 670-672	Diffusion HW due
M Oct 16	21	L - Bilaterian animals - Up and running (and flying and swimming) I	Skim Chap. 33 (pp. 688-698)- focus on key concepts	
W Oct 18	22	L - Bilaterian animals - Up and running (and flying and swimming) II	Skim Chap. 33 (pp. 699-710)- focus on key concepts	
F Oct 20	23	L - Chordates - Our own personal phylum	Skim Chap. 34 - focus on key concepts	
M Oct 23	24	MID-TERM EXAM 2 (60 pts.) - Classes 12-23		
		Form and Function - Fundamental Processes		
W Oct 25	25	GAE - Scaling of multicellular organisms - Does size matter?	pp. 98, 689	Scaling HW available
F Oct 27	26	L - Animal development - Heads, tails, and everything in between	Skim Chap. 47 - focus on key concepts	Human evolution essay HW available
M Oct 30	27	L - Gas Exchange I - Moving molecules	pp. 790-792, 933-937	
W Nov 1	28	GAE - Gas Exchange II- Clever tricks	pp. 938-940	Scaling HW due
F Nov 3	29	GAE - Comparative features of circulatory systems - Sharing the wealth	pp. 786-790, 915-918	Circulation HW available
M Nov 6	30	GAE - Animal Circulation - Evolutionary pressure games	pp. 918-920, 923-927	

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W Nov 8	31	L - Comparative transmembrane nutrient transport - Everybody's doing it	pp. 134-136, 782	
F Nov 10	32	GAE - Animal nutrition - No guts, no glory	Skim Chap. 41 - focus on key concepts	Circulation HW due
M Nov 13	33	GAE - Comparative osmoregulation - Homologous mechanisms operating in different environments	pp. 131-133, 782-783, 971-977	Human evolution essay HW due; Osmoreg. HW
W Nov 15	34	L - Kidneys - Salty story of nitrogenous waste	pp. 978-987	Osmoregulation HW: Early due date
F Nov 17	35	MID-TERM EXAM 3 (60 pts.) - Classes 25-34		
M Nov 20	36	L - Electrical and chemical signaling I: www.excite.org(anism)	Skim Chap. 48 - focus on key concepts	Osmoregulation HW due
W Nov 22		University is officially open, but no classes		
		Thanksgiving vacation (11/23 - 11/26)		
M Nov 27	37	GAE - Electrical and chemical signaling II: www.excite.org(anism)2	Same as above	
W Nov 29	38	L - Sensory systems I - Making sense of the environment	Skim Chap. 50 (pp. 1101-1119)- focus on key concepts	
F Dec 1	39	L - Sensory systems II - Making even more sense of the environment	Same as above	
M Dec 4	40	L - Neural systems - Integrating the organism	Skim Chap. 49 - focus on key concepts	
W Dec 6	41	L - Molecular machines of motion - homologous genes, divergent sequences, and similar functions	pp. 112-116	
F Dec 8	42	GAE - Biomechanics - If I had a lever ...	pp. 1119-1130	Biomechanics HW available
M Dec 11	43	GAE - Biomechanics - Running the race	Same as above	Biomechanics HW due
SA Dec 16	44	Final Exam (100 pts) - 8-10 AM (note time difference!) Classes 36-43 (60 pts) plus comprehensive questions (40)		