University of Wisconsin-Madison
Zoology 400: General Molecular Biology - Spring 2018
3 credits
https://canvas.wisc.edu/courses/89204

Cap: 20
Meeting Times: M/W/F 11:00-11:50 123 Noland Hall; Attendance is mandatory.

Instructional Mode: All face-to-face lecture format.

Course Designations & Attributes:
Breadth: Biological Sci.; Counts toward the Natural Sci req.
Level: Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S

Credit Hours:
This class meets for three 50-minute class period each week over the fall/spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2 hours out of classroom for every class period. The syllabus includes additional information about meeting times and expectations for student work.

Instructor:
Dr. Kurt Amann
121 Zoology Research
265-3150
kjamann@wisc.edu

Office Hours:
Thursdays, 10:00-11:00 pm, 121 Zoology Research, or by appointment

Required Text:
Lewin's GENES XII. Krebs, et al.

Course Description:
This lecture-based course will provide students with a broad understanding of the mechanisms of life at the molecular level. It is intended for intermediate and advanced undergraduates majoring in the biological sciences. The course will cover the structure, chemistry and functions of biological macromolecules, focusing primarily on the ways by which nucleic acids carry out their central roles in cells. Other topics will include the governing principles by which life evolved, functions and is organized; the experimental methods used to study these processes, and the historical context for our understanding of them. In other words: soup-to-nuts of nucleic acid biology and chemistry.

Requisites:
Biology/Botany/Zoology 151; or Biology/Botany 130; or Biology/Zoology 101; or Biology/Biocore 381.
Recommended: Chemistry 103/104 or 109 or 115/116 & Chemistry 341 or 343

Course Learning Outcomes:

Students successfully completing this course should:

- Understand the molecular basis of life and the relationship between the structure and function of biological macromolecules
- Understand the nature of the genetic material and its roles in inheritance, evolution and cellular function
- Understand the laboratory techniques of modern biology
- Be able to read and comprehend the primary scientific literature

Course Outline and Dates:

Lecture Date	Lecture	Topic	Assigned Reading
W 1-241	The chemical nature of the gene		1-34
F 1-26	2	Genes encode RNAs and polypeptides	1-34
M 1-29	3	Molecular biology methods and genetic engineering	35-70
W 1-314	Gene, interrupted		71-86
F 2-2	5	Nobel Day	primary literature
M 2-5	6	Content of the genome	87-100
W 2-7	7	Sequences and evolution	101-142
F 2-9	8	Clusters and repeats	143-160
M 2-12	9	Chromosomes	161-188
W 2-14	10	Chromatin	189-226
Exam I: Thursday, Feb 15, 7-9 pm.			
F 2-16	11	Nobel Day	primary literature
M 2-19	12	Replication and the cell cycle	227-244
W 2-21	13	Initiation of replication	245-260
F 2-23	14	Nobel Day	primary literature
M 2-26	15	Replication	261-282
W 2-28	16	Extrachromosomal replication	283-304
F 3-2	17	Nobel Day	primary literature
M 3-5	18	Recombination	305-338
W 3-7	19	DNA repair	339-366
F 3-9	20	Nobel Day	primary literature
M 3-12	21	Transposons and retroviruses	367-396
Exam II: Tuesday, March 13, 7-9 pm.			
W 3-1422	Somatic recombination and immune system hypermutation		397-440
F 3-16	23	Prokaryotic Transcription	441-478
M 3-19	24	Prokaryotic Transcription	441-478
W 3-2125	Eukaryotic Transcription		479-502
F 3-23	26	Nobel Day	primary literature
Mar 24 – Apr 1		Spring Break	
M 4-2	27	RNA processing	503-542
W 4-4	28	mRNA stability and localization	543-562
F 4-6	29	Nobel Day	primary literature
M 4-9	30	Catalytic RNAs	563-582
W 4-11	31	Catalytic RNAs	563-582
Exam III: Thursday, April 12, 7-9 pm.			

F 4-13	32	Translation	583-620
M 4-16	33	Using the Genetic Code	621-647
W 4-18	34	Operons	648-699
F 4-20	35	Phage	677-700
M 4-23	36	Eukaryotic Transcription	701-730
W 4-25	37	Epigenetics	731-748
F 4-27	38	Epigenetics	749-760
M 4-30	39	Noncoding RNAs	761-768
W 5-2	40	Regulatory RNAs	769-782
F 5-4	41	Nobel Day	primary literature

Final Exam: Saturday, May 6, 10:05-12:05

Grading: Your grade in the course will be determined by your performance on the four, equally weighted exams (22.5% each) and class participation/attendance (10%). Overall course grades will be determined by two independent means, as below. You will receive the *higher* of the two calculated grades.

Method I: Straight score
91-100: A
89-90.99: AB
81-88.99: B
79-80.99: BC
70-78.99: C
60-69.99: D
0-59.99: F

Method II: Class percentile curve
1-25% - A
26-30% - AB
31-60% - B
61-65% - BC
66-90% - C
91-95% - D
96-100% - F

Graduate Students:
Graduate students enrolled in the course will write a 5 page critical analysis of a piece of primary literature in the molecular biology field, to be worth 10% of the total semester grade. There will be no percentile curve option for graduate students.

Extra Credit:

There are roughly fifteen weeks in this semester. (Very) approximately once per week, I will post to learn@UW an article from the scientific literature relevant to the recent lecture material. Many of these articles will be in response to questions that you or your classmates have raised, so in a way, you are choosing them yourself. These articles are *not* assigned reading. But I really want you to read them anyway. So here's the deal:

Every time a paper is posted to the class website, you will have seven days to submit to me by email a .doc or .pdf file containing a 500-1000 word (longer is *not* better) summary/critique/interpretation of the article. The main point here is to convince me that you read and understood it. Don't worry yourself sick over making it pretty. I will score these submissions on a rough scale of 1-to-5, indicating the range of performance from total incompetence, through marginal proficiency to relative mastery.

Now… the point here is that you can earn extra credit by doing this. You can earn a maximum of *five* full percentage points toward your overall semester grade (on the straight, non-curved grading scale only – this does not affect the curved grading system in any way). So let's say you turn in ten of these reports and score a perfect 5 on each of them. 10 x 5 = 50. I divide this by a conversion factor of ten, and boom, you just earned your full 5 points of extra credit. You're done. You turned in fifteen of them and scored 3 points on each? 15 x 3 = 45. That's a free 4.5% you just earned. Get it?

It is important to recognize that you may *not* go back in time and submit articles from earlier in the semester. You have *one week* to do it from the time it's posted, and that's that. No waiting until the last week of the semester, when you realize you're 3% short of the grade you need to get into med school, and then begging me to let you turn in a dozen of these.

I hope it goes without saying that your work must be performed with complete independence. Plagiarific work is shockingly easy to spot in a class of this size.

Because of the advertised existence of these extra credit opportunities and the multiple mechanisms for earning your desired grade, I will not entertain additional requests for flexibility in grading.