

## **Biology 63 – RNA: The Real Secret of Life**

12 (MWF 12:50-1:55; X-hr Tues 1:20-2:10); LSC 205

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### **Course Goals & Learning Objectives**

With the explosion of information about the nature of animal genomes it is clear that RNA might actually be the central molecule in life's central dogma as the eukaryotic cell can be described as an "RNA machine." Further, given that RNA is not only an older molecule than DNA that can serve both as an informational storage (genotype) and informational execution (phenotype), the "real" secret to life is not DNA, but RNA. Students will be exposed to much of the new exciting research currently being done in RNA biology and evolution, as they will be expected to read research papers, write a paper summarizing an area of RNA biology that they find particularly interesting, and present these findings to the class in the form of our class journal "RNA - The Real Secret of Life."

### **Text and Resources**

All readings are posted on the Canvas site.

### **Course Expectations & Grading**

There are four basic requirements for this class that need to be fulfilled:

First, working in groups of 3, students are expected to write a ~15 page paper (~20 or so with Figures and References at 1.5 line spacing) on any aspect of RNA biology they find interesting.

This paper is expected to summarize the relevant material, providing an abstract, giving the background, the current research efforts on the subject, and the likely future directions. A complete list of references must also be provided, and detailed figure legends must accompany the figures. The paper will be due at 6 PM (posted to Canvas) on the assigned Sunday.

Second, this paper serves as a "first draft" that during X hour the rest of the class will critique.

Each student will turn in to the authors (via email to me by 10 AM Tuesday morning) a ~ 1 page review of the paper addressing everything from flow, tone, science, readability, grammar - essentially anything that the reviewer thinks would improve the paper. The goal here is to help the students resolve any organizational, informational etc. problems that might be apparent within the written document so that they can rewrite it to present to the class as a second and near final draft on that second Wednesday (see below). A subset of the class will again review the paper, and one group of three will return to the authors a "track changes" document to help them finalize the paper for submission. At that point the students will then email to me as a word document their final draft, and I will finalize the formatting. At the end of the term I will compile all of the papers and have them bound into a proper journal for everyone in the class.

So, the schedule is:

First Sunday (11:59 PM): First draft posted to Canvas.

First Tuesday (Xhr, 1:20 PM): Critique of the first draft (reviews due to me over email by 10 AM)

Second Wednesday (11:59 PM): Second draft posted to Canvas.

Second Friday (5 PM): Critique of the second draft and the track changes returned to the authors.  
Third Friday (5:00 PM): Submission of final draft to me.

In order for this to work for everyone, all assignments must be done in a timely fashion. I will dock a student an increment in their letter grade for every late assignment. Finally, class participation is required, both attendance and contribution. In particular, students are not allowed to miss other student's critiques (barring sickness etc). Students are also expected to come to Discussion sessions having read the paper(s) beforehand. Classes, critiques and discussions will not be recorded. Let me know if you have any questions or if I forgot to address anything.

### **Course Schedule:**

Monday March 25<sup>th</sup> [Lecture 1: Discovery](#)

Background Reading: [Chapter 1.pdf](#)

Tuesday March 26<sup>th</sup> Xhr: Assigning groups, dates and topics for papers.

Wednesday March 27<sup>th</sup> Lecture 1 continued

Friday March 29<sup>th</sup> Lecture 1 continued

Sunday March 31<sup>st</sup> Group 1 paper due to class (all papers are due to the class by midnight

Sunday evenings - everything will just be sent via email to the class over Canvas)

Monday April 1<sup>st</sup> Discussion 1: Papers and reviews

[First Draft.pdf](#)

[Reviews.pdf](#)

Tuesday April 2<sup>nd</sup> Xhr: Group 1 review (all reviews are due to me by 10:00 AM Tuesday mornings)

Wednesday April 3<sup>rd</sup> Discussion 2: Second and final drafts

[Second Draft.pdf](#)

[Final Draft.pdf](#)

[Template.docx](#)

Friday April 5<sup>th</sup> [Discussion 3: RNAi](#)

Sunday April 7<sup>th</sup> Group 2 paper due

Monday April 8<sup>th</sup> [Lecture 2: Biogenesis](#)

Background Reading: [Chapter 2\\_final.pdf](#)

Tuesday April 9<sup>th</sup> Group 2 paper review

Wednesday April 10<sup>th</sup> Lecture 2 continued; Group 1 second draft due (all second draft papers are due to the class by 11:59 PM Wednesday evenings)

Friday April 12<sup>th</sup> Lecture 2 continued. Group 1 second review due by Groups 4 & 5; review + track changes by Group 6

Sunday April 14<sup>th</sup> Group 3 paper due

Monday April 15<sup>th</sup> [Lecture 3: Targeting](#)

Background reading: [Chapter 3.pdf](#)

Tuesday April 16<sup>th</sup> Group 3 review

Wednesday April 17<sup>th</sup> Lecture 3 continued. Group 2 second draft due; Group 1 final draft due to me

Friday April 19<sup>th</sup> [Discussion 4: microRNA processing](#). Group 2 second review due by Groups 5 & 6; review + track changes by Group 1

Sunday April 21<sup>st</sup> Group 4 paper due

Monday April 22<sup>nd</sup> Lecture 3 continued

Tuesday April 23<sup>rd</sup> Group 4 review

Wednesday April 24<sup>th</sup> Lecture 3 continued; Group 3 second draft due; Group 2 final draft due to me

Friday April 26<sup>th</sup> [Discussion 6: Non-canonical microRNA binding](#). Group 3 second review due by Groups 6 & 1; review + track changes by Group 2

Sunday April 28<sup>th</sup> Group 5 paper due

Monday April 29<sup>th</sup> [Lecture 4: Evolution](#)

Background Reading: [Chapter 5 final.pdf](#)

Tuesday April 30<sup>th</sup> Group 5 review

Wednesday May 1<sup>st</sup> Lecture 4 continued; Group 4 second draft due; Group 3 final draft due to me

Friday May 3<sup>rd</sup> [Discussion 7: oops....](#). Group 4 second review due by Groups 1 & 2; review + track changes by Group 3

Sunday May 5<sup>th</sup> Group 6 paper due

Monday May 6<sup>th</sup> [Lecture 5: Circuitry](#)

Background reading: None

Tuesday May 7<sup>th</sup> Group 6 review

Wednesday May 9<sup>th</sup> Lecture 5 continued; Group 5 final draft due; Group 4 final draft due to me

Friday May 10<sup>th</sup> [Discussion 8: mir-721 and myocarditis](#). Group 5 paper second review due by Groups 2 & 3; review + track changes by Group 4

Monday May 13<sup>th</sup> Lecture 5 continued.

Tuesday May 14<sup>th</sup> PIZZA & photo day on the green! (weather dependent).

Wednesday May 15<sup>th</sup> Lecture 5 continued; Group 6 second draft due; Group 5 final draft due to me

Friday May 17<sup>th</sup> Greenkey!. Group 6 paper second review due by Groups 3 & 4; review + track changes by Group 5

Monday May 20<sup>th</sup> [Lecture 6. Complexity](#)

Background Reading: [Bioessays 2009 Peterson.pdf](#)

Tuesday May 21<sup>st</sup> Review of [Peterson et al. \(in prep\)](#)

[SuppFile1\\_final.xlsx](#)

Background reading: [Zolotarav et al. \(2022\)](#)

Wednesday May 22<sup>nd</sup> Lecture 6 continued; Group 6 final draft due to me

Friday May 24<sup>th</sup> [Discussion 10: mir-1182 and cancer](#).

Monday May 27<sup>th</sup> No Class

Tuesday May 28<sup>th</sup> [Discussion 11: Tay et al. redux](#)

Wednesday May 29<sup>th</sup> Class Party!