

LS 595: A Survey of Biology for Computational Researchers

Course Syllabus

Faculty Advisors

Cynthia Peterson

*Department of Biochemistry, Cellular, and
Molecular Biology*
Email: cbpeters@utk.edu

Paul Armsworth

*Department of Ecology and Evolutionary
Biology*
Email: parmswor@utk.edu

Course Organizers

Jordan Utley

*Genome Science and
Technology*
Jutley6@utk.edu
Office: Walters Life Science

Elizabeth Johnson

Micobiology
ejohns@utk.edu
Office: Hesler

Appointments are available upon request, and we are happy to meet with you!

Course Objectives

- 1 Overcome Lexicon Barrier:** One of the major goals of this course is to address the crippling language barrier that exists between computational researchers and biologists. Specifically, students are expected to develop a life science vocabulary through class discussions, journal readings and assignments which are focused on the development of vocabulary.
- 2 Bridge Culture Gap:** A biologist's world is complex and often not discrete. A major focus for this course will be teaching new researchers how to wade through a messy biological system and reduce it down to its key components. Specifically, students are expected to participate in daily lectures, both the journal discussions and guest lectures, to assist in this transition.
- 3 Emphasize Computational Topics:** To cram an entire degree's worth of biology into one course would be an impossible task. As a result, we plan to cover a breadth of topics in biology and centralize each module on a specific computational problem. Specifically, students are expected to summarize their understanding of each computational topic in short essay form at the end of each module. Additionally, each student will submit a final report which will expand on one computational topic.
- 4 Build Community:** There is a vibrant community of modelers and biologists at UT utilizing computational tools in their research. This course will actively focus on acquainting students with these faculty members through biweekly guest lectures on computational topics. We intend for the course to be a vehicle through which the faculty can engage students in discussion as well as highlight the computational challenges in their respective fields.

LS 595: A Survey of Biology for Computational Researchers

Course Syllabus

Course Information

Course Website: <http://web.utk.edu/~scaleit/LS595.htm>

Online Webinars: <http://www.igert.org/webinars/>

(Weekly invitations to online webinars will be available on the course website)

Grades:

A	93 - 100	B+	87 - 89	C+	77 - 79	D	65 - 69
A-	90 - 92	B	83 - 86	C	73 - 76	F	0 - 64
		B-	80 - 82	C-	70 - 72		

(Note, for graduate students enrolled in this course A- = A, B- = B, C- = C, D- = D, and D+ = D)

Final Grade will be determined by:

25% Journal Presentation and Assignments

25% Module Responses

25% Final Project

25% Interacting with Speakers/Participation

Module Schedule:

Dates	Topic in Computational Biology	Guest Lecturer
1.18 - 1.30	Genomics and Bioinformatics	Dr. Loren Hauser
2.1 - 2.13	Biochemistry and Protein Biophysics	Dr. Jerome Baudry
2.15 - 2.27	Cell Biology and Cell Signaling	Dr. Jaewook Joo
2.29 - 3.12	Immunology and Cell to Cell Communication	Dr. Vitaly Ganusov
3.14 - 4.2	Phylogenetics and Evolution	Dr. Brian O'Meara
4.4 - 4.16	Conservation and Populations Ecology	Dr. Paul Armsworth

Module Organization

Each two week module will contain six classes:

Day 1: Wednesday

Introductory Lecture

Previous Module Write up Due

Day 2: Friday

Introductory Lecture

Day 3: Monday

Peer-lead Journal Article Discussion

Day 4: Wednesday

Developmental Lecture

Journal Article Assignment Due

Day 5: Friday

Guest Lecture from a field professional

Day 6: Monday

Module Wrap-up and Project Clarification



LS 595: A Survey of Biology for Computational Researchers

Course Syllabus

Assessment

25% Interacting with Speakers/Participation

There are three main components to class participation:

1. Guest lecture participation and questions
2. Daily lecture participation
3. Journal discussion participation

Students will be expected to be active in daily conversation for the above activities. This would involve verbally demonstrating your understanding of the basic biological concepts and vocabulary.

Further, for the journal club, this will involve randomly selecting someone to explain a figure from the selected reading.

25% Journal Presentation and Assignments

1) 10% Journal Presentation

Only done once throughout the semester in a group of your choice

The sections to read for this assignment will vary from paper to paper (It may not be the whole paper!)

The presenting group will be responsible for:

1. A 10-15 minute group presentation on a selection from a scientific paper.
2. Presentations should include the following elements:
 - a. Simplified explanation of biological background
 - b. Definitions of any unfamiliar words or concepts
 - c. The Hypothesis being tested
 - d. At least one walk-through of a figure
 - e. Take away message from the selection

Your grade for your presentation is linked to accomplishing the above objectives.

2) 15% Journal Responses

3% each, we will drop the lowest.

For each journal presentation, there will be a set of vocabulary words and short answer/response questions that need to be filled out individually by each student. These will be distributed the day of the journal discussion.

All materials will be electronically submitted via Blackboard before the start of the following Wednesday's Class

LS 595: A Survey of Biology for Computational Researchers

Course Syllabus

Assessment

25% Module Responses

5% per module 6 total modules (we will drop the lowest)

Each response is a one page minimum, 2 page maximum (12 point font, 1.15 spacing, 1 inch margins)

Each module response will contain three sections:

1. Summary of the foundational biological concepts (and those needed to answer #2)
2. A brief explanation of how to use your computational expertise to solve a problem posed by the guest lecturer from this field of biology
3. What have you learned?

All materials will be electronically submitted via Blackboard before the start of the following Wednesday's Class

25% Final Project

Students will pick a module response to expand upon. (Pairs are optional for this assignment)

Topics (and pairs if applicable) are due by the beginning of class on Wednesday April 18th

Final Presentations will go in order of module topics during the last week of class, and the schedule will be determined on Wednesday April 18th

12.5% Paper: 3-4 pages

12.5% Presentation: 10-15min

A good paper and presentation should contain the following elements:

- a. Biological Background
- b. Additional Background from cited papers
- c. Clearly posed biological problem
- d. A review of what has been tried/is being used to address it
- e. An explanation of why current methods of solving this problem fall short
- f. Clearly posed computational solution to the problem

Presentations will be electronically submitted on the day that your module topic *starts presenting.*

Papers will be due by the end of the final exam period.

LS 595: A Survey of Biology for Computational Researchers

Course Syllabus

Course Policies

Attendance:

A major component of your course grade is directly linked to course participation. Prior to missing a class, please notify the course instructor and be prepared to set up additional means in which to obtain the day's material. Every class missed beyond two course periods will result in a 5% deduction from your participation grade.

Late Assignments:

Late assignments will be penalized 10% per day up to a maximum of 50%. If you have a legitimate problem completing an assignment, please contact the instructor well before the assignment is due.

Academic Honesty:

The Honor Code of UT shall be abided by. The Honor Statement is as follows:

“An essential feature of the University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.”

Students can refer to Hilltopics (<http://web.utk.edu/~homepage/hilltopics/default.html>) for more detailed information regarding UT's rules and regulations.

University Disability Statement:

Students who have a disability that requires accommodations(s) should make an appointment with the Office of Disability Services (974-6087) to discuss their specific needs.”

Seeking Assistance:

There are a variety of campus offices which provide services for students. Some are listed below:

Adult Student Services Center (<http://web.utk.edu/~adultssc/>)

Counseling Center

(<https://my.tennessee.edu/pls/portal/docs/PAGE/CC/COUNSELINGCENTERNEW/HTML/index.html>)

Statistical Consulting Center (<http://oit.utk.edu/scc/>)

Writing Center (<http://web.utk.edu/~english/writing/writing.shtml>)



LS 595: A Survey of Biology for Computational Researchers

Course Syllabus



THE UNIVERSITY of TENNESSEE

CONSENT FOR MEDIA AND PHOTOGRAPHY

I, (Please print name), _____, hereby give my consent for media recording and photographing of my image and release to the SCALE-IT Fellowship and University of Tennessee all rights of any kind to the materials in which I appear. The photographs are the property of the SCALE-IT Fellowship and the University of Tennessee. Their use shall include by not be limited to, printed publications, display advertising, editorial illustration, and broadcast or electronic media. This is a full release of all claims whatsoever I or my heirs, executors, administrators, or assigns now or hereafter have against the SCALE-IT Fellowship and University of Tennessee or its employers as regards any use that may be made by them of said photographic reproduction for purposes consistent with the university's mission of teaching, research, and service. Such uses as may be made will not constitute a direct endorsement by me or any product or service. I understand that there will be no financial or other remuneration for recording me, either for initial or subsequent transmission or playback.

I also understand that the SCALE-IT Fellowship and University of Tennessee is not responsible for any expense or liability incurred as a result of my participation in this recording, including medical expenses due to any sickness or injury incurred as a result.

I represent that I am at least 18 years of age, have read and understand the foregoing statement, and am competent to execute this agreement.

Date: _____

Signature: _____

