

# **Biology 588-01: Advanced Systems Biology Research**

Loyola Marymount University  
Spring 2020, 2 credit hours

## **Instructor**

Dr. Kam Dahlquist, Professor of Biology

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Office hours: Mondays, Tuesdays, Wednesdays 10:00 – 11:00 AM and by appointment

## **Pre-requisites**

Senior-level standing as a Biology major and consent of the instructor.

## **Class Meetings & Attendance:**

TBD, Life Sciences Building 263

This is a 2-unit research course. The expectation is that the student will attend one, 1-hour meeting per week and perform 8-9 hours of research per week, typically in two, 4-hour blocks. The meeting time and research blocks will be mutually agreed upon by the student and instructor. It is understood that the student may need to come into lab at other times in order to complete experiments. An unexcused absence will result in a 5% reduction in the overall course grade. The instructor should be notified as soon as possible, electronically or by phone, of the reasons for all absences. Arrangements will be made for the student to make up the missed work.

## **Work Load Expectations**

LMU's Credit Hour Policy

([https://www.lmu.edu/media/lmuacademics/provost/documents/LMU%20Credit%20Hour%20Policy\\_Final.pdf](https://www.lmu.edu/media/lmuacademics/provost/documents/LMU%20Credit%20Hour%20Policy_Final.pdf)) states that the work load expectation for a course is that for every one hour (50 minutes) of classroom instruction, the student will complete a minimum of two hours of out-of-class student work each week. This is a 2-unit research course where this expectation is met through the combination of meeting and research time, which constitutes an 8-10 hours per week commitment.

## **Laboratory Environment**

We are all responsible for maintaining a laboratory environment that is safe and conducive to learning.

1. As an LMU Lion, by the Lion's code (<http://studentaffairs.lmu.edu/wellness/lmucares/aboutlmucares/livethelionscode/>), you are pledged to join the discourse of the academy with honesty of voice and integrity of scholarship and to show respect for staff, professors, and other students.
2. You are responsible for your own learning.
3. Meetings and lab work will start promptly on time.
4. You are expected to come to meetings and lab having done the assigned reading and preparatory work in your laboratory notebook so that you are ready to participate in discussions and to perform the laboratory exercises.
5. You are expected to bring the required materials to each session.
6. Cell phones must not become a distraction to your work, and should be silenced and put away out of sight. Laptops and tablets may be used for your work; however, if they are being used for other purposes and become distracting to you or others, you will be asked to put them away.
7. All students are governed by LMU Community Standards publication (<https://studentaffairs.lmu.edu/media/studentaffairs/osccr/documents/1920-LMU-community-standards.pdf>). Disruptive behavior which is persistent or significantly interferes with classroom activities may be subject to disciplinary action. A student may be referred to the Office of Student Judicial Affairs if his or her behavior constitutes a violation of the conduct code.
8. Laboratory safety and citizenship rules will be followed (see separate handout).

### Required Textbook

There is no required text for this course. The student is expected to read all references cited in his or her report.

### Course Websites

The Dahlquist Lab website is found at <http://kdahlquist.github.io/DahlquistLab/>. The student needs to register at OpenWetWare.org to use the lab wiki found at <http://www.openwetware.org/wiki/Dahlquist>. Depending on the project, the student may also need to register for an account at GitHub, <https://github.com/join?source=header-home>.

### E-mail Communication

At times I will communicate with you using campus e-mail systems, so it is essential that you regularly check your lion.lmu.edu e-mail address or forward your lion account e-mail to your preferred e-mail address. Messages sent to me at night or on the weekend will be answered the next school day.

### University Policy on Academic Honesty

Loyola Marymount University is a community dedicated to academic excellence. Academic honesty in scholarship and creative work stands at the center of LMU's academic life, and is essential for true learning and creation of knowledge to take place. As a university in the Jesuit and Marymount traditions, this community expects its members to act in accordance with the highest standards of honesty and ethics at all times. Violations of academic honesty undermine the fundamental educational mission of the University and cannot be tolerated.

Academic dishonesty will be treated as an extremely serious matter with severe consequences. ***The minimum penalty for an instance of academic dishonesty in this course, even on a 1-point assignment or extra credit assignment, is a one-letter grade penalty in the course and a zero on the assignment.*** It is never permissible to turn in any work that has not been authored by the student, such as work that has been copied from another student or copied from a source (including Internet) without properly acknowledging the source. It is the student's responsibility to make sure that your work meets the standard set forth in the "Academic Honesty Policy" (see <http://academics.lmu.edu/honesty>.) You are responsible for contacting the instructor before assignments are due to proactively resolve any questions you may have.

- LMU Academic Honesty Policy and Procedures  
<http://academics.lmu.edu/media/lmuacademics/academichonesty/documents/Academic%20Honesty%20Policy%20FINAL%20Appendices--051116.pdf>
- Guidelines for Literature Citations in a Scientific Paper handout
- BIOL 367, 368, or 478 LibGuide found at <http://libguides.lmu.edu/BIOL367>, <http://libguides.lmu.edu/BIOL368>, or <http://libguides.lmu.edu/BIOL478>
- Davidson College Department of Biology Statement on Plagiarism  
<http://www.bio.davidson.edu/dept/plagiarism.html>
- Notes on plagiarism from an electrical engineering & computer science perspective  
<http://dondi.lmu.build/share/misc/plagiarism.pdf>

You are required to sign the Academic Honesty Agreement for this course.

### Americans with Disabilities Act - Special Accommodations

Students with special needs who require reasonable modifications, special assistance, or accommodations in this course should promptly direct their request to the Disability Support Services (DSS) Office. Any student who currently has a documented disability (ADHD, Autism Spectrum Disorder, Learning, Physical, or Psychiatric) needing academic accommodations should contact the DSS Office (Daum Hall 2<sup>nd</sup> floor, 310-338-4216) as early in the semester as possible. All discussions will remain confidential. Please visit <http://www.lmu.edu/dss> for additional information. Please schedule an appointment with the instructor early in the semester to discuss any accommodations for this course for which you have been approved.

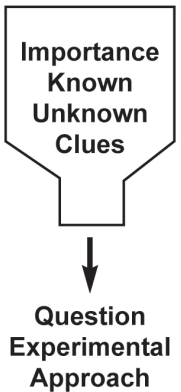
### Course Description

This course fulfills the capstone 500-level research requirement for the Biology major. Investigation of the systems-level properties of biological pathways and networks. Research may include bioinformatics, biomathematics and/or functional genomics techniques.

### Final Report Guidelines and Schedule of Due Dates

- The final report constitutes a formal write-up of all the research you have conducted in the Dahlquist Lab during your undergraduate career.
- The final report will be formatted as a manuscript for submission to a biology journal and will include the following sections: abstract, introduction, materials and methods, results, discussion, acknowledgments, and references.
  - Use 1" margins, Times New Roman, 12 point font, and double-space the lines.
  - Number your pages.
  - Follow the APA format for references, listing them in alphabetical order.
- The description, minimum length for each section, number of references, and due dates are specified below.

Section	Description	Due date
<b>Title and annotated bibliography</b>	<ul style="list-style-type: none"> <li>• The function of the title is to identify the main result or take-home message of the report. It should be as specific as possible and name the organism. It can be a phrase or a sentence.</li> <li>• The annotated bibliography is a list of a minimum of 10-15 primary research articles. (The list should include review articles, but these do not count toward the 10-15 total.)</li> <li>• Each should have a properly formatted citation (in the APA format).</li> <li>• Each should have 2-3 sentences as to why the article relates to the research project.</li> <li>• A minimum of 3-5 of the references from this bibliography will be discussed in depth in the Introduction and Discussion sections of the report.</li> </ul>	5:00 PM on Friday, January 24 (end of Week 2)  Electronic <i>or</i> hard copy
<b>Outline</b>	<ul style="list-style-type: none"> <li>• Outline of all sections of the report</li> <li>• In text citations must be used, and a properly formatted References section must also be included</li> <li>• Include a list of figures and tables</li> <li>• No set length; it needs to be long enough to be inclusive of all results from your body of work in the Dahlquist Lab</li> </ul>	5:00 PM on Friday, January 31 (end of Week 3)  Electronic <i>or</i> hard copy
<b>Results</b>	<ul style="list-style-type: none"> <li>• All figures and tables must be included, numbered sequentially in the order they appear in the text, with descriptive legends that give a key to all labels and abbreviations.</li> <li>• The results section includes a <u>narrative description</u> of all figures and tables along with analysis of results that includes detailed explanation of the evidence</li> <li>• In text citations must be used, and a properly formatted References section must also be included.</li> <li>• The <u>narrative description</u> (not including figures, tables, or legends) needs to be a minimum of 5 pages. However, beyond this minimum, it needs to be long enough to cover all of the research results from your body of work in the Dahlquist Lab to date.</li> </ul>	5:00 PM on Friday, February 14 (end of Week 5)  Electronic <i>or</i> hard copy

<b>Discussion</b>	<ul style="list-style-type: none"> <li>Research results must be discussed in terms of their significance, relevant literature (3-5 articles from the annotated bibliography), and future directions; write a concluding paragraph that summarizes the entire work</li> <li>Minimum length of 5-7 pages</li> <li>In text citations must be used (minimum of 2 per paragraph), and a properly formatted References section must also be included.</li> </ul>	5:00 PM on Friday, February 28 (end of Week 7)  Electronic <i>or</i> hard copy
<b>Introduction</b> 	<ul style="list-style-type: none"> <li>The introduction should tell a story and should provide all of the background information necessary for the reader to understand the project. The outline of a good introduction is shown at the left.</li> <li>A critical review of a minimum of 3-5 references to primary research articles from the annotated bibliography must be performed in the introduction.</li> <li>Minimum length of 6-10 pages</li> <li>In text citations must be used (minimum of 2 per paragraph), and a properly formatted References section must also be included</li> </ul>	5:00 PM on Friday, March 20 (end of Week 9)  Electronic <i>or</i> hard copy
<b>Materials &amp; Methods</b>	<ul style="list-style-type: none"> <li>Enough information must be provided in the methods for a practitioner in the field to reproduce all of the results, typically 3-5 pages.</li> <li>In text citations must be used, and a properly formatted References section must also be included.</li> </ul>	5:00 PM on Friday, April 3 (end of Week 11)  Electronic <i>or</i> hard copy
<b>Second draft of complete report</b>	<ul style="list-style-type: none"> <li>All sections, including: Abstract, Introduction, Materials &amp; Methods, Results, Discussion, Acknowledgments, References</li> <li>Abstract should be 250-500 words.</li> <li>Results and Discussion are updated with results gathered after the February 14 deadline</li> </ul>	5:00 PM on Friday, April 17 (end of Week 13)  Electronic <i>or</i> hard copy
<b>Final draft of complete report</b>	<ul style="list-style-type: none"> <li>All sections, including: Abstract, Introduction, Materials &amp; Methods, Results, Discussion, Acknowledgments, References</li> <li><b>Both</b> a hard copy and electronic copy of the report must be submitted to Dr. Dahlquist by the deadline.</li> </ul>	5:00 PM on Friday, May 1 (end of Week 15, last day of classes)  Electronic <b>and</b> hard copy

### Grading

The final grade for this course will be based on three criteria:

- Attendance at all meetings, research blocks, and scheduled presentations at conferences. An unexcused absence will result in a 5% deduction from the overall course grade.
- Meeting the interim deadlines for sections of the report on time. Late work will result in a deduction of 2% from the overall course grade per day it is late. If you anticipate handing in something late, please come see me ahead of time. Requests for extensions well in advance of the due date will be looked upon more favorably than those made at the last minute.
- The quality of the final submitted report, evaluated by the rubric provided.

Final course grading scale:	96-100%	A
	90-95%	A-
	86-89%	B+
	82-85%	B
	78-81%	B-
	74-77%	C+
	70-73%	C
	67-69%	C-
	60-66%	D
	≤ 59%	F

**Policy on Electronic Submission of Assignments**

- The schedule notes when electronic copies of assignments are permissible and when hard copies must be submitted.
- When documents are submitted electronically, your assignment is not considered “turned in” until I have received the attachment and have been able to open it. Missing attachments and corrupt files that cannot be opened are not considered “turned in” on time. You will receive an e-mail confirmation when your file has been received and opened.
- Please use your last name and the date as part of the file name for your attachment.

**Dissemination**

- You are expected to present your senior research at the LMU Undergraduate Research Symposium held on Saturday, March 21, 2020. The abstract deadline is Friday, February 7.
- You are expected to present your senior research in at least one other external research conference during the senior year. For example, you can present at the West Coast Biological Sciences Undergraduate Research Conference (WCBSURC), the TriBeta Pacific District Convention, or other professional meeting. The Biology Department can provide support for attending conferences.

**Extra Credit**

There are no extra credit opportunities for this course.

**Revision Notice**

If necessary, the contents of this syllabus and schedule are subject to revision; students are responsible for any changes or modifications announced in class. The most current version of this information resides on the Dahlquist Lab website Courses page:  
<http://kdahlquist.github.io/DahlquistLab/courses.htm>.

## Grading Rubric\*

	A-level	B-level	C-level	D	F
<b>Title/Abstract</b>	<ul style="list-style-type: none"> <li>Clear, well-written title that is the main message of the results</li> <li>Abstract is easily understood by a practitioner in the field and summarizes the significance, methods, main results, and conclusion.</li> </ul>	<ul style="list-style-type: none"> <li>Clear title that is the main message of the results</li> <li>Abstract can be understood by a practitioner in the field and summarizes the significance, methods, main results, and conclusion.</li> </ul>	<ul style="list-style-type: none"> <li>Poorly stated title, may be topic instead of message</li> <li>Abstract is unclear or incomplete</li> </ul>	<ul style="list-style-type: none"> <li>Title is short, and is a topic, not a message</li> <li>Abstract is unclear or incomplete</li> </ul>	<ul style="list-style-type: none"> <li>Report does not include all relevant sections and required content</li> </ul>
<b>Introduction</b>	<ul style="list-style-type: none"> <li>Excellent review of the relevant academic literature</li> <li>Organized logically like a “funnel” from the background and significance to the question</li> <li>Length is minimum of 6-10 pages</li> </ul>	<ul style="list-style-type: none"> <li>Good review of the relevant academic literature</li> <li>Organized logically like a “funnel” from the background and significance to the question</li> <li>Length is minimum of 6-10 pages</li> </ul>	<ul style="list-style-type: none"> <li>Average or limited review of the relevant academic literature</li> <li>Has issues with organization</li> <li>Length is barely 6 pages</li> </ul>	<ul style="list-style-type: none"> <li>Vague or no review of the relevant academic literature in the Introduction</li> <li>Limited and disorganized</li> <li>Length is fewer than 6 pages</li> </ul>	
<b>Materials &amp; methods</b>	<ul style="list-style-type: none"> <li>Complete, thorough, and accurate</li> <li>Length is 3-5 pages or longer</li> </ul>	<ul style="list-style-type: none"> <li>Complete and accurate, with some details missing</li> <li>Length is a minimum 3-5 pages</li> </ul>	<ul style="list-style-type: none"> <li>All methods mentioned, but minimal descriptions or a few inaccuracies</li> <li>Length barely 3 pages</li> </ul>	<ul style="list-style-type: none"> <li>Incomplete and/or inaccurate</li> <li>Length is fewer than 3 pages</li> </ul>	
<b>Results</b>	<ul style="list-style-type: none"> <li>All research results from the student’s body of work are included</li> <li>Figures and tables are clear, have detailed, explanatory legends, and are numbered sequentially in the order they are mentioned in the text</li> <li>Exceptional analysis of results that includes detailed explanations of supporting evidence</li> <li>Length of narrative text (excluding figures, tables, legends) is 5 pages or longer</li> </ul>	<ul style="list-style-type: none"> <li>All research results from the student’s body of work are included</li> <li>Figures and tables are clear with explanatory legends, may be out of order with respect to the text</li> <li>Good analysis of results that includes explanations of supporting evidence</li> <li>Length of narrative text (excluding figures, tables, legends) is a minimum of 5 pages</li> </ul>	<ul style="list-style-type: none"> <li>Most, but not all, research results from the student’s body of work are included</li> <li>Figures and tables are present with perfunctory legends, may be out of order with respect to the text</li> <li>Average analysis of results that includes superficial explanations of evidence</li> <li>Length of narrative text (excluding figures, tables, legends) is barely 5 pages</li> </ul>	<ul style="list-style-type: none"> <li>Research results are incomplete or are just presented as figures/tables with limited to no explanation or narrative analysis, out of order</li> <li>Summary, rather than analysis, of the evidence</li> <li>Length of narrative text (excluding figures, tables, legends) is fewer than 5 pages</li> </ul>	

<b>Discussion</b>	<ul style="list-style-type: none"> <li>Excellent discussion gives significance of the work, places it in the context of other literature, and suggests future directions</li> <li>Length is minimum of 5-7 pages</li> </ul>	<ul style="list-style-type: none"> <li>Good discussion gives significance of the work, mentions other literature, and suggests future directions</li> <li>Length is minimum of 5-7 pages</li> </ul>	<ul style="list-style-type: none"> <li>Discussion does not give the significance of the work, or does not mention other literature, or does not suggest future directions</li> <li>Length is barely 5 pages</li> </ul>	<ul style="list-style-type: none"> <li>Discussion limited and short</li> <li>Length is fewer than 5 pages</li> </ul>	
<b>Writing</b>	<ul style="list-style-type: none"> <li>Exceptional quality of writing, including sentence structure, grammar, punctuation, transitions, appropriate sentence and paragraph lengths, spelling, non-sexist language; paper is spell-checked and proof-read; student carefully explains academic jargon and concepts; formatting guidelines followed</li> </ul>	<ul style="list-style-type: none"> <li>Good quality of writing, including sentence structure, grammar, punctuation, transitions, appropriate sentence and paragraph lengths, spelling, non-sexist language; paper is spell-checked and proof-read; student carefully explains academic jargon and concepts; formatting guidelines followed</li> </ul>	<ul style="list-style-type: none"> <li>Fair quality of writing, including sentence structure, grammar, punctuation, transitions, appropriate sentence and paragraph lengths, spelling; paper is spell-checked and proofread; student adequately explains academic jargon and concepts; formatting guidelines mostly followed</li> </ul>	<ul style="list-style-type: none"> <li>Poor quality of writing; numerous, repetitive mistakes; failure to spellcheck, or proofread; formatting guidelines not followed</li> </ul>	<ul style="list-style-type: none"> <li>Very poor quality of writing; formatting guidelines not followed</li> </ul>
<b>References</b>	<ul style="list-style-type: none"> <li>Uses 5+ primary research articles, as well as reviews within the field; additional sources (media, primary documents, etc.) are relevant, and they are not treated as scholarly source material</li> <li>Citations appear appropriately throughout the paper (minimum of 2 per paragraph in the Introduction and Discussion), and they are in the proper (Name, Year) format</li> <li>References section includes all cited sources in the proper APA format and no others</li> </ul>	<ul style="list-style-type: none"> <li>Uses 5+ primary research articles, as well as reviews within the field; additional sources (media, primary documents, etc.) are relevant, and they are not treated as scholarly source material</li> <li>Citations appear appropriately throughout the paper (minimum of 2 per paragraph in the Introduction and Discussion), and they are in the proper (Name, year) format</li> <li>References section includes all cited sources in the proper APA format and no others</li> </ul>	<ul style="list-style-type: none"> <li>Uses fewer than 5 primary research articles from within the field and/or uses non-scholarly texts as academic sources</li> <li>Citations appear throughout the paper, but they are improperly placed and/or formatted</li> <li>References section includes all cited sources, but is not in the proper APA format and/or includes references not cited in the body of the thesis</li> </ul>	<ul style="list-style-type: none"> <li>Uses fewer than 3 academic sources</li> <li>Citations are consistently improperly placed and/or formatted</li> <li>References section does not include all cited sources and/or includes references not cited in the body of the thesis, and/or is not in the proper APA format</li> </ul>	<ul style="list-style-type: none"> <li>No citations, or all citations are improper</li> <li>References section does not include all cited sources, has extra sources, is not in the proper APA format, or is not included</li> <li><b>OR</b> There is evidence of plagiarism or other academic dishonesty in the paper.</li> </ul>

\*Rubric is modified from <https://www.coastal.edu/media/administration/honorsprogram/pdf/Honors%20Thesis%20Assessment.pdf>