



ALS 495: Master's Research Thesis

Instructor: Thesis advisor

Dates: 2-semester project (Fall and Spring)
12 credits total (6 credits for each semester)
or 6 credits total (3 credits for each semester or 6 credits in one semester)

Location: Thesis advisor location

MS Program Contact Information

Name	Position	Phone	Email
Anastasia Levitin	MS Program Director	(909) 607-0154	Anastasia_Levitin@kgi.edu
Susie Haynes	Administrative Assistant	(909) 607-0588	Susie_Haynes@kgi.edu

Course Description

This course aims to enable second-year students enrolled in the Master of Science in Applied Life Sciences program to conduct rigorous primary or secondary translational, infectious diseases, bioprocessing, clinical, or public health research, leading to completing a Master's thesis. Thesis requirements will differ by discipline, but in all cases, they will be modeled after a basic thesis, publication, or grant proposal and will have common components. These components include abstract, introduction, methods, results, discussion, figures and legends, and a bibliography.

Requirements

- Must be a 2nd-year student in the Masters of Science in Applied Life Sciences program;
- A thesis committee, including a thesis advisor and a committee member, must agree to advise the student;
- The ALS 495 Research Thesis Contract must be signed by the thesis committee and the MS program director and submitted to the Registrar's office.

Additional Clinical Thesis Requirements

- Must complete COPE-KGI Master's Thesis Project online application (<https://copehealthscholars.org/kgi-masters-thesis-project>) by May 1
- Schedule and complete an in-person interview with the potential thesis advisor and site program manager
- Complete the hospital clearance process by site-specific deadlines
- Complete all required online training modules AND pass the written entrance exam with a minimum score of 80%

Translational, Infectious Diseases and Bioprocessing Thesis Project Identification

- The students are advised to identify a lab/project of interest during the 1st year of studies and conduct Independent Research (primary, including bioinformatics project) or Independent Study (secondary research, literature overview, writing a review of the literature in the research field)
- If the identified project is outside of KGI, the MS program director must approve the project prior to the start date.

Learning Outcomes and Evidence Used to Assess Outcomes

Course Learning Outcome	Evidence Used to Assess Student Learning
Develop a deeper understanding of research design and methodology	Methods section of final thesis and Literature Mastery Seminars
Generate hypotheses and perform hypothesis-driven research	Full proposal and final thesis paper
Assess the literature, identify knowledge gaps and convey findings to the scientific community	The literature review and outline, full proposal, and final thesis paper
Analyze and report data results	Lab journal (research notebook), results and analysis papers, and final thesis paper
Apply appropriate research methodology to the design and completion of the project	Final thesis paper and poster presentation

Required Course Materials

The thesis advisor will provide all the required materials, or IT resources needed to complete the project (e.g., clinical clearances, textbooks, computer programs, etc.). Students will also routinely use electronic journal resources, databases, and other materials available through the Honnold Library.

Course Assessment

- Research progress and research record-keeping assessments will be the responsibility of the thesis advisor/committee, with a letter grade being assigned at the conclusion of each semester based on the thesis advisor/committee’s feedback;
- Students completing the course in one semester (option A, 6 credits) must submit all the assessments during the semester of their research experience;
- The thesis advisor must approve all milestone submissions prior to submission to ALS 495 site on Canvas.

Components of each semester’s assessment include the following:

Fall	% of Grade
Research progress (graded by the thesis advisor/committee) <ul style="list-style-type: none"> – Students registered for 6 credits/semester must dedicate a minimum of 18 hours/week to the project. Students registered for 3 credits/semester must devote a minimum of 9 hours/ week to the project. 	50%
Weekly Status Reports Weekly Status Reports must be <u>e-mailed</u> to the thesis advisor, <u>copying</u> the MS program director/Susie Haynes, AND <u>uploaded to Canvas</u> every Sunday by 11:59 pm except for the weeks during school breaks.	15%
Research Notebooks (record keeping, graded by the thesis advisor/committee)	10%
Timely completion of the milestones <ul style="list-style-type: none"> – Certificates (laboratory safety and/or appropriate CITI training) – Literature Review and Project Outline – Research Proposal 	25%
Spring	% of Grade
MS/MSTM Research Symposium	15%
Research progress (graded by the thesis advisor/committee) <ul style="list-style-type: none"> – Students registered for 6 credits/semester must dedicate a minimum of 18 hours/ week to the project. Students registered for 3 credits/semester must devote a minimum of 9 hours/ week to the project. 	50%
Weekly Status Reports Weekly Status Reports must be <u>e-mailed</u> to the thesis advisor, <u>copying</u> the MS program director/Susie Haynes, AND <u>uploaded to Canvas</u> every Sunday by 11:59 pm except for the weeks during school breaks.	15%
Research Notebooks (record keeping, graded by the thesis advisor/committee)	10%
Timely completion of the milestones <ul style="list-style-type: none"> – MS/MSTM Research Symposium Poster Abstract submission – MS/MSTM Research Symposium Poster submission – Thesis Draft – Final Thesis 	10%

Course Requirements and Thesis Milestones:

All MS thesis students must complete the following requirements by the specified deadlines below to ensure on-time graduation. It is the student's responsibility to submit any required paperwork.

Milestones grading timeline:

- On-time milestone submission (submitted the day the milestone is due) = **100%**
- 1-day delay in milestone submission = **90% (10% grade reduction)**
- 1-week delay in milestone submission = **50% (50% grade reduction)**
- Milestone submitted after 1 week = **0%**

NOTE: Student's thesis advisor must approve all research deliverables **prior to** submission

Year 1

Clinical Research Thesis Calendar

Due date	Milestones and Deadlines (subject to change)
May 1	<ul style="list-style-type: none"> – Complete the COPE-KGI Master's Thesis Project online application (https://copehealthscholars.org/kgi-masters-thesis-project).
June-July	<ul style="list-style-type: none"> – On-site interviews – Clearance appointments
July-August	<ul style="list-style-type: none"> – Clearance items due – Complete all required online training modules AND pass the written entrance exam with a minimum of 80%. Please note that students must pass the exam to continue into the program. – On-site orientations with preceptors

Translational, Infectious Diseases and Bioprocessing Research Thesis Calendar

Fall, Spring, or Summer Semester	<p><i>Research exploration</i></p> <ul style="list-style-type: none"> – Must identify a thesis advisor and broadly define a thesis research project – Recommended to complete a minimum of 3 credits of Independent Research/Study course or have some (non-credit) research experience in a laboratory of interest
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Public Health Research Thesis Calendar

Fall, Spring, or Summer Semester	<ul style="list-style-type: none"> – Recommended to complete 1.5-3 credits of Independent Research/Study course or have some (non-credit) research experience within a public health agency or organization
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Year 2

- Students registered for 6 credits/semester must dedicate a minimum of 18 hours/week to the project;
- Students registered for 3 credits/semester must devote a minimum of 9 hours/week to the project.

Students are strongly advised to meet with the thesis advisor weekly and with a committee member as needed

Fall Semester

Due date	Milestones and Deadlines		
End of 1 st week of semester	<ul style="list-style-type: none"> – ALS 495: Master's Research Thesis Contract submission to the Registrar <u>AND</u> Canvas – Thesis committee contact information submission to Susie Haynes (Susie_Haynes@kqi.edu) – Training Certificates submission to Canvas 		
	Training	Concentration Requirement	Offered by
	Responsible Conduct of Research	All thesis students	CITI ethics modules. Registration Instructions attached
	Health Privacy	Clinical Research	
	Human Subjects Research	Public Health Research	
Laboratory Safety Training	Translational, Infectious Diseases, and Bioprocessing Research	Thesis advisor/Jasmine Yu (Lab Safety Manager, Jasmine_Yu@kqi.edu)	
10/1	Literature Review and Project Outline (to be graded by the thesis advisor/committee, MS Written Thesis Rubric) <ul style="list-style-type: none"> – Must be approved by the thesis advisor and submitted to Canvas. 		
12/1	Full Research Proposal (to be graded by advisor/committee, MS Written Thesis Rubric) <ul style="list-style-type: none"> – Must be approved by the thesis advisor and submitted to Canvas. 		
12/15	Research Progress and Notebook grades and rubrics to be submitted by the thesis advisor/committee		

Spring Semester

4/1	Thesis Draft (to be graded by the thesis committee, MS Written Thesis Rubric) <ul style="list-style-type: none"> – Must be submitted by the student for a critical review to the thesis committee <u>AND</u> MS program director/Susie Haynes MS/MSTM Research Symposium Poster Abstract <ul style="list-style-type: none"> – Must be approved by the thesis advisor <u>AND</u> submitted to Canvas (poster template is available on Canvas) 		
2 nd Friday of April	MS/MSTM Research Symposium Poster <ul style="list-style-type: none"> – Must be approved by the thesis advisor <u>AND</u> submitted to Canvas in .pdf format. – Late submissions will not be accepted and printing will become responsibility of the student 		

3 rd Friday of April	<p>MS/MSTM Research Symposium Defence (to be graded using the MS Poster Presentation Rubric)</p> <ul style="list-style-type: none"> – Thesis students must defend their thesis work at the MS/MSTM Research Symposium – MS thesis committee members are strongly encouraged to attend their student's defence
1 st week of May	<p>MS Final Thesis</p> <ul style="list-style-type: none"> – Must incorporate all the addressed concerns and suggestions from the MS thesis committee – Must be submitted to Canvas <p>Research Progress and Notebook grades (with rubrics) and MS Thesis Completion Form</p> <ul style="list-style-type: none"> – Must be submitted by the MS thesis committee to the MS program director/Susie Haynes

Milestone Descriptions

Literature Review and Project Outline must include the following elements (min 5 pages):

- Review of literature/references supporting the study
- Problem statement
- Hypothesis/research questions
- Description of research design
- Description of data collection methods
- Work will be graded by the advisor/committee (MS Written Thesis Rubric)

Research Proposal must include the following elements (min 10 pages):

- Fully formed literature review/background section
- Clearly articulated problem statement
- Clearly articulated hypothesis/research questions
- Detailed description of research design and methodology; must include a description of data collection and storage, software/programs that will be used, analysis methods (e.g., statistical tests, coding schema), and time frames for data collection
- Work will be graded by the advisor/committee (MS Written Thesis Rubric)

Thesis Draft should be in the format of a well-edited, publication-ready research paper (min 15 pages). An example template is attached. The following elements must be included:

- Abstract
- Fully-formed literature review/background section
- Clearly articulated problem statement
- Clearly articulated hypothesis/research questions
- Detailed description of research design and methodology; must include a description of data collection and storage, software/programs that will be used, analysis methods (e.g., statistical tests, coding schema), and time frames for data collection
- Results section
- Analysis and discussion
- Reference list

- Work will be graded by the advisor/committee (MS Written Thesis Rubric)

MS Final Thesis

- The final version of the thesis must address all the suggestions and concerns raised by the MS thesis committee and during the MS/MSTM Research Symposium

Thesis Committee

- All students will have a 2-person MS thesis committee, which will consist of the thesis advisor and a committee member.
- Both committee members need to approve the thesis for the student to graduate with the MS in Applied Life Sciences degree. If there is a disagreement between the committee members, a third faculty member will be asked to evaluate the work, and final approval would be based on the majority agreement amongst the committee members.

Research Notebook: MS thesis students must keep a research notebook, which is a complete record of procedures and observations a scientist makes while conducting research. It should contain any necessary background, references, and information on how the experiments were performed, along with experimental results. The research notebook is a legal document in the case conducted research that contributes to issuing a patent and the lab's scientific legacy.

- The research notebook may be a paper notebook or an electronic file that will be used to record details and experimental results.
- The entries in the lab notebook must be detailed, clear, and legible and should be identified with an entry or experiment's date. Each entry should contain a summary of a finding and possibly a plan of future experiments.

Academic & Personal Support

KGI is committed to the success of our students. If you are in need of additional support for this course, please reach out to the instructor and teaching assistants for assistance. Peer tutoring is also available for many classes through www.kgi.edu/tutors. The Academic Affairs Office can also provide additional course, program-level, and personal support and referrals. These services can be accessed by reaching out to Associate Dean Jane Rosenthal at Jane_Rosenthal@kgi.edu or (909) 607-0172).

Accessibility Support

Keck Graduate Institute is committed to providing an enriching academic experience for all students. In compliance with the Americans with Disabilities Act, it is the policy of KGI to provide reasonable accommodations for students with disabilities. Any student with a documented disability who requires reasonable accommodations should contact KGI Student Accessibility Services by e-mail at student.accessibility@kgi.edu.

Academic Integrity & Honor Code

KGI is committed to the highest ethical and professional standards of conduct. Ethical conduct is an integral part of KGI's mission of education and research aimed at translating into practice for the benefit of humanity, the power and potential of the life sciences. The Institute expects all members to observe and exhibit ethical behavior, honesty, integrity, and good judgment regularly

in all facets of their work for and their relationships with the Institute. Each member is expected to demonstrate respect for the rights of others and is accountable for his/her actions.

To assist students in understanding their responsibilities under the Honor Code, the following is a partial list of conduct pertaining to academic matters, which violate the Honor Code. Prohibited conduct includes, but is not limited to, the following:

1. Plagiarism
 - Knowingly appropriating another's words or ideas and representing them as one's own
 - Use of another's ideas or words, including paraphrasing, without acknowledging the source
 - Professor may use "Turnitin" plagiarism detection software for assignments
2. Provide false information, data, results, or any other misrepresentation of work
3. Cheating
 - Unauthorized collaboration on assignments
 - Unauthorized sharing of information about examination content or questions
 - Use of previously submitted coursework for alternate purposes without prior approval
 - Use of any unauthorized materials or electronic sources for exams or assignments
4. Impeding the learning of others, including but not limited to interrupting another student's exam, requesting unauthorized information, or taking credit for another student's work

Reported violations of the Honor Code will be investigated. Failure to follow the Honor Code will carry sanctions which may include, an F for the assignment, exam or course. Impeding investigation, providing false statements, or failure to report violations are considered violations of the Honor Code.

Ignorance is NOT an excuse. The student bears the responsibility to learn from the individual instructor the procedure for acknowledging sources and indicating quotations as required for each assignment.

To report a violation of the KGI Honor Code or for more information, please visit <https://www.kgi.edu/student-life/student-affairs/student-conduct/> or contact the Dean of Students Cynthia Martinez (Cynthia_Martinez@kgi.edu).

Copyright Policy

Students are also advised to refer to the KGI Copyright Policy to understand the policies surrounding the protection of intellectual property and rules surrounding file-sharing and the use of software. [KGI Copyright Policy](#)

Diversity & Inclusion

KGI is committed to enriching society with breakthrough approaches to education and translational research. Diversity of backgrounds, cultures, disciplines, identities, and thoughts within our community serves as a catalyst for collaboration and excellence in all of our pursuits. KGI's welcoming, the diverse environment provides the opportunity for our students to think creatively and critically, communicate and interact effectively, and act ethically and respectfully. The active and open-minded engagement of every member of our community is vital to achieving the goals of the institution.

Office of Title IX: (909) 607-7150 or deanofstudents@kgi.edu. The Office of Title IX provides information about how to get help or help someone affected by harassment or discrimination, domestic violence, rights of protected classes, reporting options, and additional resources.

Mental Health and Wellness Resources

KGI values the full participation of all students in academic and campus life. We recognize that a variety of stressors can impact learning, mental health, and connecting with others. If you have difficulty coping with life's challenges, need someone to talk to, or just want some extra support, know that help is available, and you are not alone. The Division of Student Affairs can offer you support and resources (kgistudentaffairs.slack.com). Some resources include, but are not limited to:

Campus Health: www.7C.Health provides free 24/7 on-demand access for students to get quality medical and mental health care online or from their phone anytime they need it. Use your student SSO login information to access.

Monsour Counseling and Psychological Services (MCAPS): 909-621-8292

<https://services.claremont.edu/mcaps> MCAPS is committed to promoting psychological wellness for all students served by the Claremont Colleges Services.

Campus Safety: From a cell phone or off-campus phone, call (909) 607-2000 or (909) 607-7233.

Campus Safety can provide non-emergency assistance or information in a variety of areas.

National Suicide Prevention Lifeline: 1(800) 273-TALK (8255) – 24/7 on-call

www.suicidepreventionlifeline.org The lifeline provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Have additional questions? Please check out the [KGI Student Handbook](#).

Instructions for completion: Please carefully review the Student Poster to assess the questions presented below in the context of the KGI Learning outcome “Students can communicate effectively in an environment composed of scientists, engineers, and business professionals.”

Student: _____ Evaluator: _____

PRESENTATION	Score (circle one)				EXCELLENT (4)	GOOD (3)	FAIR (2)	POOR (1)
PRESENTATION DELIVERY	4	3	2	1	Clear speech, strong voice, good grammar	Presentation is easy to follow, some reading off poster, minor speech or grammar errors	Weak voice, passive grammar and/or extensive reading off poster	Presentation is hard to follow, hard to understand, confusing
VERBAL SUPPORT OF POSTER	4	3	2	1	Compelling storyline for poster; well connected to presentation flow	Adequate discussion supporting poster	Limited support for poster, too much reading of poster content	Verbal discussion; disconnected with poster
ENERGY AND CONNECTION WITH AUDIENCE	4	3	2	1	High energy, good eye contact, strong communication style	Solid presentation but not exciting style	Somewhat mechanical and rehearsed style but directed to audience	Low energy and does not involve audience
CONTENT	Score				Excellent (4)	Good (3)	Fair (2)	Poor (1)
CONTENT	4	3	2	1	Content is accurate and complete	Content is generally accurate but not entirely complete	Content is overly general with substantial inaccuracies and gaps in content	Content is inaccurate, overly general, and incomplete
STRENGTH OF ARGUMENT	4	3	2	1	Data provides convincing evidence to support conclusions; source material employed is of the highest relevance and quality	Data provides acceptable but not overly strong support for conclusions; source material employed is of adequate relevance and quality	Data does not provide sufficient support for conclusions; source material employed is of inadequate relevance and quality	No evidence provided to support conclusions; source material employed are absent or do not contribute to claims(s) or argument(s)
ORIGINALITY	4	3	2	1	Reviewers are likely to gain creative and fundamental insights about the topic	Reviewers likely to gain fundamental insights about the topic	Reviewers may learn isolated facts but are unlikely to gain fundamental insights	Reviewers are unlikely to learn anything or maybe misled

Comments:

MS Written Thesis Rubric

Student: _____ Evaluator: _____

	Excellent	5	4	Emerging	3	2	Below Expectation	1	N/A
Organization and progression of thought	Carefully organized, logical progression of thought, clear headers, sub-sections, motivate the significant questions that are addressed, present questions in the context of current literature; shows significant originality of thought			Follows general guidelines, some evidence of systematic progression, some recognition of significant questions, and some evidence of originality in thought			Inadequate or no apparent organization, disjointed train of thought		
Data Presentation	Appropriate use of tables and figures, with sufficient textual description, avoidance of redundancy			Some use of tables and figures			Predominantly text, making little use of tables, figures		
The link between data and conclusions	Able to substantiate objective conclusions deduced from results of data or theory			Provides acceptable but not overly strong substantiation of conclusions from data			Conclusions are not supported by sufficient evidence		
Analysis	Insightful analysis; original arguments are made that are non-obvious and require independent thinking; uses or proposes appropriate objective (statistical or mathematical) methods for addressing sources of uncertainty and draws attention to alternate interpretations			Some attempt to develop an independent analysis, but most of the analysis draws directly from derivative ideas, some evidence of objective methods engaged for data and uncertainty analysis.			Little evidence of independent analysis; little evidence of objectivity in data analysis		
Grammar & Style	The text is precise, features correct spelling and grammar, and shows a syntactic variety			The text contains occasional grammatical and spelling errors and has a limited syntactic variety			Errors in grammar, spelling, and style interfere with the ability to understand the document.		
Citation of information sources	Properly formatted citations are inserted wherever necessary			Citations in most necessary places may contain some formatting errors			Inadequate citations or no citations at all		

Comments:



MS Thesis Completion Form

We, the undersigned, certify that we have read this thesis of *(Student Name)*
_____ and approve it as adequate in scope and quality for
the Masters of Science in Applied Life Sciences program.

Thesis Advisor:

Signature *Printed Name* *Date*

Thesis Committee Member:

Signature *Printed Name* *Date*

MS Program Director:

Signature *Printed Name* *Date*



CITI Ethics Modules Instructions

Collaborative Institutional Training Initiative (CITI)

Online Training Registration & Course Selection Instructions

Keck Graduate Institute (KGI) has contracted with the Collaborative Institutional Training Initiative (CITI) to provide online training which meets our federal and state requirements in various areas.

Instructions are provided below.

Instructions

CITI training meeting KGI's requirements, including certification that training has been successfully completed, can be accomplished by logging on to and registering with the Collaborative Institutional Training Initiative (CITI) Program website (<https://www.citiprogram.org/?pageID=668>).

Click on ***Keck Graduate Institute*** as your affiliated subscriber organization. Please make sure you select the correct institution! Log in using your KGI username and password (your KGI e-mail username and password).

Once you log in, find the box entitled, "My Learner Tools for Keck Graduate Institute." Select "add a course." For "Question 1: Responsible Conduct of Research," you will select "Faculty, Staff & Students." Under "Question 2: Human Subjects Research," you will select "Human Subjects – Students."

The CITI program online course modules are self-paced and may be interrupted and resumed. Training time varies depending on your prior preparation and other factors, usually entailing no more than a couple of hours. Completion certificates will automatically be e-mailed to the KGI program administrator.



MS Thesis Weekly Status Report

Student Name: _____

Please submit this form every Sunday by 11:59 pm to get credit for your thesis work (submit to the ALS495 site on Canvas and e-mail to your advisor with Dr. Levitin copied).

Thesis/IR work period (e.g. 9/6 -9/13/20): _____

Day of Week	Hours (e.g. 9am-2pm)
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Total hours contributed: _____

Accomplishments:

Thesis Title

Your Name

*Submitted in partial fulfillment of the requirements for the degree of
Masters of Science in Applied Life Sciences*

Henry E. Riggs School of Applied Life Sciences
KECK GRADUATE INSTITUTE
20XX

This page is optional.

© 20XX

Your name

All Rights Reserved

ABSTRACT

(350 or fewer words) Do not put diagrams, photocopies, abbreviations, references, or footnotes in the abstract. Double-space the text.

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Acknowledgments

Make sure you acknowledge the sponsoring lab if you wrote your thesis about a research project. For collaborative work or projects, be sure to acknowledge those who contributed to the results. Be generous. Readers should also be acknowledged.

INTRODUCTION

Start text here. Everything should be double-spaced and block-justified. You can insert figures or tables in the text when they are first cited. They are best inserted as jpeg files with titles and legends attached. If this is done, make sure there is enough space between the text and the figure. If there are too many big figures and tables, you may opt to put them all at the end, after “references.” In that case, each figure/table should have its page. All figures must have titles and legends. Do not use fine print for figure legends.

Secondary Heading

Put a blank line between each section.

The Big Deal

Start a major section on a new page.

References

1. Do not use fine print. See Thesis guidelines for acceptable formats.
2. List all authors' names. Do not use et al. Write the full title of the references.
3. If you need to cite a web site, do this in a separate section. List the URL and title of that page. You should also put down the date you accessed it.
4. The text of each entry should be single-spaced. Then, leave extra space between each reference entry.
5. It is also easier for the readers to have a small indentation after each numbered entry.

Figures and Tables

If you decide to put large figures and tables at the back of your thesis, remember that the page numbers continue from references.

All figures must have descriptive titles AND legends. A legend should contain enough information to make sense without reading the main text, which could be some 20 pages away.

Do not use fine prints for figures or tables. If the table is too big to fit in one page, break it up into more pages.

Think carefully. Do you need to copy and paste other people's figures and tables? Is citing them enough? Most of the time, it is. If you need to do line-by-line or panel-by-panel discussions, then it is appropriate to reproduce other people's figures or tables.

Use YOUR figures and tables whenever possible.

A fat figure is better put in landscape orientation. You should still keep the page number at the top right corner and in the right orientation when the page is bound. And you need to remember the top of the page now is in the binding, so leave enough space. Just produce your figure or table and save as a jpeg to be inserted after rotation.