

## **BIOL 4390-110, 80600, RESEARCH EXPERIENCE**

### **Fall 2023**

Texas A&M University-Central Texas

### **COURSE DATES, MODALITY, AND LOCATION**

This is a face-to-face course.

Supplemental readings made available online using *the* A&M-Central Texas Canvas Learning Management System [<https://tamuct.instructure.com>].

#### **Time/Day:**

Lecture: M 4:00 pm – 5:00 pm

Lab: 3 hours, TBD by instructors

**Where:** Heritage Hall 309/311/312/315

**Contingency Plan:** In case the campus closes the course will be moved to 100% online.

### **INSTRUCTOR AND CONTACT INFORMATION**

#### **Instructor:**

Dr. Linh Pham, Associate Professor of Chemistry

Dr. Chamindika Siriwardana, Assistant Professor of Biology

Dr. Laura Weiser Erlandson, Associate Professor of Biology

#### **Office:**

Dr. Linh Pham: 302 F Heritage Hall

Dr. Chamindika Siriwardana: 302 E Heritage Hall

Dr. Laura Weiser Erlandson: 302 H Heritage Hall

#### **Phone:**

Dr. Linh Pham: 254-519-8012

Dr. Chamindika Siriwardana: 254-519-8717

Dr. Laura Weiser Erlandson: 254-519-5723

#### **Email:**

Dr. Linh Pham: All communication should be conducted through Canvas “Inbox”

Dr. Chamindika Siriwardana: [c.siriwardana@tamuct.edu](mailto:c.siriwardana@tamuct.edu)

Dr. Laura Weiser Erlandson: CANVAS inbox preferred

#### **Office Hours:**

Dr. Laura Weiser Erlandson: *I am available for students on an appointment basis. If you need a WebEx meeting or in-person meeting, please contact me by Canvas Inbox to set up an appointment 24 hours in advance.*

Dr. Linh Pham: *Tuesday and Thursday: 1:00 pm – 2:00 pm through Canvas Inbox*

*I am also available for students on an appointment basis. If you need a WebEx meeting or in-person meeting, please contact me by Canvas Inbox to set up an appointment 24 hours in advance.*

Dr. Chamindika Siriwardana: *Monday 11.00 am – 2.00 pm. I am available for students on an appointment basis. If you need a WebEx meeting or in-person meeting, please contact me by Canvas Inbox to set up an*

*appointment 24 hours in advance.*

## **Student-instructor interaction**

*In this course, interaction with the instructor and full participation in labs are the most effective ways to learn. Therefore, we encourage students to attend our office hours whenever you have questions. If students cannot make it to our office hours, do not hesitate to contact us in advance for an appointment. We will reply within 24 hours on business days.*

## **Emergency Warning System for Texas A&M University-Central Texas**

**SAFEZONE.** SafeZone provides a public safety application that gives you the ability to call for help with the push of a button. It also provides Texas A&M University-Central Texas the ability to communicate emergency information quickly via push notifications, email, and text messages. All students automatically receive email and text messages via their myCT accounts.

Downloading SafeZone allows access to push notifications and enables you to connect directly for help through the app.

You can download SafeZone from the app store and use your myCT credentials to log in. If you would like more information, you can visit the [SafeZone](http://www.safezoneapp.com) website [www.safezoneapp.com].

To register SafeZone on your phone, please follow these 3 easy steps:

1. Download the SafeZone App from your phone store using the link below:
  - o [iPhone/iPad](https://apps.apple.com/app/safezone/id533054756): [https://apps.apple.com/app/safezone/id533054756]
  - o [Android Phone / Tablet](https://play.google.com/store/apps/details?id=com.criticalarc.safezoneapp)  
[https://play.google.com/store/apps/details?id=com.criticalarc.safezoneapp]
2. Launch the app and enter your myCT email address (e.g. {name}@tamuct.edu)
3. Complete your profile and accept the terms of service

**For updates on COVID information**, please monitor the University [website](https://www.tamuct.edu/covid19/) [https://www.tamuct.edu/covid19/]

## **COURSE INFORMATION**

### **Course Overview and description**

Gain valuable research experience in the laboratory or field in this Course-based Undergraduate Research Experience (CURE) course. Students will work with faculty to design a research experiment, collect and analyze data, and interpret and present the results of the study.

Prerequisite(s): Permission of instructor.

### **Student Learning Outcomes**

*Upon successfully completing BIOL 4390, students will be able to:*

1. Design a sound scientific experiment
2. Create a budget for a scientific experiment
3. Use accepted technique to carry out a scientific experiment
4. Collect and analyze data using statistics and other chemistry/biology tools
5. Interpret and disseminate results of a scientific experiment

6. Document the entire research process

### Required Reading and Textbook(s)

- *Reading materials will be distributed by instructors*

### COURSE REQUIREMENTS

Requirements	Percentage	Points	SLOs
Progress reports	10%	100	4, 5, 6
Final report	30%	300	4, 5, 6
Laboratory Participation	60%	600	1, 2, 3, 4
<b>Total</b>	<b>100%</b>	<b>1000</b>	

1. **Mandatory Laboratory Safety Training:** All students are **required** to take the mandatory Laboratory Safety Training Module - found on in your Modules tab in CANVAS. You must take the training and **bring the signed "Safety Agreement Form"** to your instructor **before you are allowed in lab!!!** This is **YOUR RESPONSIBILITY** - any lab absences because you have not taken the training will be considered **unexcused!**
2. Laboratory Coats: everyone must have a disposable coat, no cloth coats allowed or provided. Disposable lab coats are available for purchase at the University bookstore.

### Grading Criteria Rubric and Conversion

Percentage	Course Grades
90% or higher	A
80-80.99%	B
70-79.99%	C
60-69.99%	D
59.99% or lower	F

- A 4.00 (90 +)** Achievement that is outstanding relative to the level necessary to meet course requirements.
- B 3.00 (80-89%)** Achievement that is significantly above the level necessary to meet course requirements.
- C 2.00 (70-79%)** Achievement that meets the course requirements in every respect.
- D 1.00 (60-69%)** Achievement that is worthy of credit even though it fails to meet fully course requirements.
- F 0.00 (<60%)** Represents failure and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an "I" (incomplete).
- I (Incomplete)** The "I" shall be assigned at the discretion of the instructor when, due to extraordinary circumstances, the student was prevented from completing the work of the course on time. The assignment of an "I" requires a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements. In no event may any such written agreement allow a period of longer than one year to complete the course requirements. For graduate and professional students, an "I" is to remain on the transcript until changed by the instructor or department. For all other students, work to make up an I must be submitted within one year of the last day of final examinations of the term in which the "I" was given; if not submitted by that time, then the "I" will automatically change to an F.
- To obtain an incomplete you must have been doing passing work in the course.*

## Posting of Grades

Grades will be posted on the Canvas Grade book where students can monitor their status.

## Grading Policies

**Read these carefully as we are strict with our policies.**

**Grading Policy.** Grades will not be curved and anyone achieving a 90% or above will receive an A in this course.

**Grade Dispute Policy.** Grading disputes must be put in writing (with justification such as supporting statements from the text or another credible source) and given to the instructors no earlier than 24 hours after the assignment has been returned. The instructors will consider your request carefully but reserve the right to adjust your grade up or down.

**Late Assignments.** The instructors expect all assignments to be turned in on time. Late assignments interfere with our ability to provide timely, detailed feedback, as well as with your ability to learn and process new material. Accordingly, any unauthorized late assignment will receive a **5% reduction in grade for each day it is late.** No assignments will be accepted after the closing date on Canvas.

## COURSE OUTLINE AND CALENDAR

### Complete Course Calendar

The following schedule may be subjected to modification and corrections during the course of the semester depending on students' research projects and students' learning speed.

Week	Lecture and Lab Topics
<b>Week 1</b> (Aug 28 – Sep 3)	Introduction to Research Project
<b>Week 2</b> (Sep 4 – 10)	Literature Review and Experiment Design
<b>Week 3</b> (Sep 11 – 17)	Literature Review and Experiment Design
<b>Week 4</b> (Sep 18 – 24)	Preparation of Materials and Methods
<b>Week 5</b> (Sep 25 – Oct 1)	Experiment Set up
<b>Week 6</b> (Oct 2 – 8)	Testing Experiments ( <i>First progress report</i> )
<b>Week 7</b> (Oct 9 – 15)	Testing Experiments
<b>Week 8</b> (Oct 16 – 22)	Conducting Experiments and Collecting Data
<b>Week 9</b> (Oct 23 – 29)	Conducting Experiments and Collecting Data
<b>Week 10</b> (Oct 30 – Nov 5)	Conducting Experiments and Collecting Data

Week	Lecture and Lab Topics
<b>Week 11</b> (Nov 6 – 12)	Conducting Experiments and Analyzing Data ( <i>Second progress report</i> )
<b>Week 12</b> (Nov 13– 19)	Conducting Experiments and Analyzing Data
<b>Week 13</b> (Nov 20 – 26)	Conducting Experiments and Analyzing Data
<b>Week 14</b> (Nov 27– Dec 3)	Conducting Experiments and Writing final report
<b>Week 15</b> (Dec 4 – Dec 10)	Writing final report
<b>Week 16</b> (Dec 11 – Dec 15)	Final report submission

### Important University Dates

Link to the current Academic Calendar:

<https://www.tamuct.edu/registrar/academic-calendar.html>

## TECHNOLOGY REQUIREMENTS AND SUPPORT

### Technology Requirements

This course will use the A&M-Central Texas Instructure Canvas learning management system. We strongly recommend the latest versions of Chrome, Firefox, Edge, or Safari browsers. Canvas will run on Windows, Mac, Linus, iOS, android, or any other device with a modern web browser. **Canvas no longer supports any version of Internet Explorer.**

Logon to A&M-Central Texas Canvas [<https://tamuct.instructure.com/>] or access Canvas through the TAMUCT Online link in myCT [<https://tamuct.onecampus.com/>] by clicking on the “TAMUCT Online Canvas” tile. You will then log in through our Microsoft portal.

Username: Your MyCT email address. Password: Your MyCT password

### Software Requirements

This course requires Office 365 (Word, Excel, and PowerPoint). Refworks citation tool is recommended for scientific writing. These software are available to current TAMUCT students free of charge.

To download Office 365: <https://tamuct.onecampus.com/task/all/office365-software>

To sign in Refworks: <https://tamuct.libguides.com/c.php?q=166317>

### Canvas Support

Use the Canvas Help tab, located at the bottom of the left-hand menu, for issues with Canvas. You can search the support articles or use the Email, Call, or Chat buttons at the bottom of the support pop-up to contact the Canvas Help Desk.

For issues related to course content and requirements, contact your instructor.

### Online Proctored Testing

Texas A&M University-Central Texas uses Proctorio for online identity verification and proctored testing. This service is provided at no direct cost to students. If the course requires identity verification or proctored testing, the technology requirements are: Any computer meeting the minimum computing requirements, plus web camera, speaker, and microphone (or headset). Proctorio requires use of the Chrome web browser with their custom plug in installed.

### **Other Technology Support**

For log-in problems, students should contact Help Desk Central, 24 hours a day, 7 days a week.

Email: [helpdesk@tamu.edu](mailto:helpdesk@tamu.edu)

Phone: (254) 519-5466

[Web Chat](http://hdc.tamu.edu): [<http://hdc.tamu.edu>]

*Please let the support technician know you are an A&M-Central Texas student.*

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## **UNIVERSITY RESOURCES, PROCEDURES, AND GUIDELINES**

### **Warrior Center for Student Success**

The Warrior Center for Student Success is a comprehensive academic support department at A&M-Central Texas, dedicated to fostering an environment of excellence and empowerment among its student body. The center offers a wide range of programs and services to ensure every student reaches their full potential, and is a haven for students seeking guidance, resources, and a strong support network to excel in their educational journey.

**ADA Access and Accommodations:** Texas A&M University-Central Texas ensures that students with disabilities have equal access to educational opportunities by providing appropriate accommodations and support services. If you believe you have a physical, learning or socio-emotional disability requiring reasonable accommodations, please visit [Access and Inclusion](https://www.tamuct.edu/student-affairs/access-inclusion.html) [<https://www.tamuct.edu/student-affairs/access-inclusion.html>] for more details or contact the Office of Access and Inclusion, WH-212; (254) 501-5836. Any information you provide is private and confidential.

**Success Coaching and Peer Mentoring:** Our experienced Success Coaches work one-on-one with students to develop personalized action plans, set academic goals, and build effective study strategies, time management skills, and resilience. Our Peer Mentors provide a valuable support system, offering guidance, encouragement, and a relatable perspective to help students navigate their academic and personal challenges. For more details call 254-501-5836 or 254-501-5928 or visit [Academic Support](https://www.tamuct.edu/student-affairs/academic-support.html) [<https://www.tamuct.edu/student-affairs/academic-support.html>]. Click the link to schedule a session (virtual or in-person) with a success coach [bit.ly/3q7uB50](http://bit.ly/3q7uB50) or visit WH, 111.

**Testing Services:** We offer a secure and comfortable environment for students and members of the community to take courses and distance learning exams, as well as placement tests and professional certification exams. Our Testing Service also offers resources and support referrals for testing related challenges (test anxiety, learning disabilities, etc.) and supports all approved ADA accommodations. Call (254) 519-5830 or visit the [Testing Center](https://www.tamuct.edu/testing-center/) [<https://www.tamuct.edu/testing-center/>].

**Tutoring and Supplemental Instruction Services:** Our team of qualified Tutors and Supplemental Instructors assist students in various non-writing subjects, promoting academic comprehension and enhancing learning

outcomes. Click the link to schedule a tutoring session with a TAMUCT tutor (virtual or in-person) or view tutor availability [bit.ly/43Q6wNz](http://bit.ly/43Q6wNz). You may also chat live with a remote tutor 24/7 for a variety of subjects through our partnership with Tutor.com, an online tutoring platform that is free to all TAMUCT students. To learn more please visit [Tutoring Services](https://www.tamuct.edu/student-affairs/academic-support.html#tutoring) [https://www.tamuct.edu/student-affairs/academic-support.html#tutoring] or call (254) 501-5836 or visit the Tutoring Hub in Warrior Hall, 111.

### **Academic Integrity**

Texas A&M University-Central Texas values the integrity of the academic enterprise and strives for the highest standards of academic conduct. A&M-Central Texas expects its students, faculty, and staff to support the adherence to high standards of personal and scholarly conduct to preserve the honor and integrity of the creative community. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. All academic misconduct concerns will be referred to the Student Conduct Office. When in doubt on collaboration, citation, or any issue, please contact your instructor before taking a course of action.

For more information regarding the [student conduct process](https://www.tamuct.edu/student-affairs/student-conduct.html), [https://www.tamuct.edu/student-affairs/student-conduct.html].

If you know of potential honor violations by other students, you may [submit a referral](https://cm.maxient.com/reporting.php?TAMUCentralTexas), [https://cm.maxient.com/reporting.php?TAMUCentralTexas].

### **Drop Policy**

If you discover that you need to drop this class, you must complete the [Drop Request](#) Dynamic Form through Warrior Web.

[https://federation.ngwebsolutions.com/sp/startSSO.ping?PartnerIdId=https://eis-prod.ec.tamuct.edu:443/samlssso&SpSessionAuthnAdapterId=tamuctDF&TargetResource=https%3a%2f%2fdynamicforms.ngwebsolutions.com%2fSubmit%2fStart%2f53b8369e-0502-4f36-be43-f02a4202f612].

Faculty cannot drop students; this is always the responsibility of the student. The Records and Admissions Office will provide a deadline on the Academic Calendar for which the form must be completed. Once you submit the completed form to the Records and Admissions Office, you must go into Warrior Web and confirm that you are no longer enrolled. If you still show as enrolled, FOLLOW-UP with the Records and Admissions Office immediately. You are to attend class until the procedure is complete to avoid penalty for absence. Should you miss the drop deadline or fail to follow the procedure, you will receive an F in the course, which may affect your financial aid and/or VA educational benefits.

### **Pregnant and/or Parenting Students Rights and Accommodations**

Texas A&M University-Central Texas supports students who are pregnant, experiencing pregnancy-related conditions, and/or parenting. In accordance with requirements of [Title IX and related guidance from US Department of Education's Office of Civil Rights](#), the Associate Dean in the Division of Student Affairs, (254) 501-5909, can assist students who are pregnant, experiencing pregnancy-related conditions, and/or parenting by provide flexible and individualized reasonable accommodations. Students should seek out assistance as early in the pregnancy as possible through the [Pregnancy & Parenting webpage](#) [https://www.tamuct.edu/student-affairs/pregnant-and-parenting-students.html]. For more information, please visit [Student Affairs](#) [https://www.tamuct.edu/student-affairs/pregnant-and-parenting-students.html]. If you would like to read more about these [requirements and guidelines](#) online, please visit the website [http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf].

[Title IX of the Education Amendments Act of 1972](https://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.html) specifically prohibits discrimination against a student based on pregnancy, childbirth, false pregnancy, termination of pregnancy, or recovery from any of these conditions [https://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.html].

Students experiencing any form of discrimination due to any of these conditions are encouraged to reach out to the Title IX Coordinator, 254.519.5716, [titleix@tamuct.edu](mailto:titleix@tamuct.edu), Founders Hall 317B, or the Associate Dean of Student Affairs, 254.501.5909, Warrior Hall 105.

### **Title IX Rights and Reporting Responsibilities**

Texas A&M University-Central Texas is committed to creating a safe and open learning environment for all students. If you or another student has experienced any form of gender discrimination or sexual misconduct, including sexual harassment, sexual assault, dating/domestic violence, and/or sex-based stalking, help and support are available. Our university strongly encourages all members of our campus community to report incidents and seek support for gender discrimination and sexual misconduct through the Title IX Office. You may contact the Title IX Office at 254.519.5716, [titleix@tamuct.edu](mailto:titleix@tamuct.edu), Founders Hall 317B, or learn more by visiting the [Title IX webpage](https://www.tamuct.edu/compliance/titleix.html) [https://www.tamuct.edu/compliance/titleix.html].

Please be aware that that under [Title IX](https://policies.tamus.edu/08-01-01.pdf), [Texas Senate Bill 212](https://policies.tamus.edu/08-01-01.pdf), and [System Regulation 08.01.01](https://policies.tamus.edu/08-01-01.pdf), [https://policies.tamus.edu/08-01-01.pdf] all university employees are mandated reporters and are required to disclose information about suspected or alleged violations as listed above and defined in System Regulation 08.01.01. If the Title IX Office receives information about an incident, they will reach out to offer information about resources, rights, and procedural options as a member of the campus community. Although I have an obligation to report, you will, in most cases, control how your case will be handled. When working with the Title IX Office you will have access to resources and accommodations but also have the opportunity to express if you wish to move forward with an investigation. Our goal is to make sure you are aware of the options available to you as a student. Community members are not required to respond to this outreach.

If you or another student wishes to speak to a confidential employee who does not have this reporting responsibility, you can contact the [Student Wellness & Counseling Center](https://www.tamuct.edu/student-affairs/student-counseling.html), [https://www.tamuct.edu/student-affairs/student-counseling.html], 254.501.5955, or [swacc@tamuct.edu](mailto:swacc@tamuct.edu), located in Warrior Hall Room 207L or the Student Support Advocate, 254.501.5978 or [ssa@tamuct.edu](mailto:ssa@tamuct.edu), located in founder Hall Room 317D.

### **University Library & Archives**

The University Library & Archives provides many services in support of research across campus and at a distance. We offer over 350 electronic databases containing approximately 1,203,947 eBooks and 134,750 journals, in addition to the 96,879 items in our print collection, which can be mailed to students who live more than 50 miles from campus. Research guides for each subject taught at A&M-Central Texas are available through our website to help students navigate these resources. On campus, the library offers technology including cameras, laptops, microphones, webcams, and digital sound recorders.

Research assistance from a librarian is also available 24 hours a day through our online chat service, and at the reference desk when the library is open. Research sessions can be scheduled for more comprehensive assistance, and may take place virtually through WebEx, Microsoft Teams or in-person at the library. [Schedule an appointment here](https://tamuct.libcal.com/appointments)

[https://tamuct.libcal.com/appointments]. Assistance may cover many topics, including how to find articles in peer-reviewed journals, how to cite resources, and how to piece together research for written assignments.



Our 27,000-square-foot facility on the A&M-Central Texas main campus includes student lounges, private study rooms, group workspaces, computer labs, family areas suitable for all ages, and many other features. Services such as interlibrary loan, TexShare, binding, and laminating are available. The library frequently offers workshops, tours, readings, and other events. For more information, please visit our [Library website](https://tamuct.libguides.com/index) [https://tamuct.libguides.com/index]

### **University Writing Center**

Located in Warrior Hall 416 and online, the University Writing Center (UWC) at Texas A&M University–Central Texas (A&M–Central Texas) is a free service open to all A&M–Central Texas students. The face-to-face hours of operation are from 10:00 a.m.-5:00 p.m. Monday and Thursday in Warrior Hall 416. Online tutoring is available Monday thru Thursday from 10:00 a.m.-5:00 p.m. and from 6:00-9:00 p.m. and on Saturdays from 12:00-3:00 p.m.

Tutors are prepared to help writers of all levels and abilities at any stage of the writing process. While tutors will not write, edit, or grade papers, they will assist students in developing more effective composing practices. By providing a practice audience for students’ ideas and writing, our tutors highlight the ways in which they read and interpret students’ texts, offering guidance and support throughout the various stages of the writing process. In addition, students may work independently in the UWC by checking out a laptop that runs the Microsoft Office suite and connects to WIFI, or by consulting our resources on writing, including all of the relevant style guides. Whether you need help brainstorming ideas, organizing an essay, proofreading, understanding proper citation practices, or just want a quiet place to work, the UWC is here to help!

Students may arrange a one-to-one session with a trained and experienced writing tutor by making an appointment via [WOnline](https://tamuct.mywconline.com/) [https://tamuct.mywconline.com/]. In addition, you can email Dr. Bruce Bowles Jr. at [bruce.bowles@tamuct.edu](mailto:bruce.bowles@tamuct.edu) if you have any questions about the UWC, need any assistance with scheduling, or would like to schedule a recurring appointment with your favorite tutor.

### **OTHER POLICY STATEMENTS**

#### **A Note about Sexual Violence at A&M-Central Texas**

Sexual violence is a serious safety, social justice, and public health issue. The university offers support for anyone struggling with these issues. University faculty are mandated reporters, so if someone discloses that they were sexually assaulted (or a victim of Domestic/Dating Violence or Stalking) while a student at TAMUCT, faculty members are required to inform the Title IX Office. If you want to discuss any of these issues confidentially, you can do so through Student Wellness and Counseling (254-501-5955) located on the second floor of Warrior Hall (207L).

Sexual violence can occur on our campus because predators often feel emboldened, and victims often feel silenced or shamed. It is incumbent on ALL of us to find ways to actively create environments that tell predators we don’t agree with their behaviors and tell survivors we will support them. Your actions matter. Don’t be a bystander; be an agent of change. For additional information on campus policy and resources visit the [Title IX webpage](https://www.tamuct.edu/compliance/titleix.html) [https://www.tamuct.edu/compliance/titleix.html].

#### **Behavioral Intervention**

Texas A&M University-Central Texas cares about the safety, health, and well-being of its students, faculty, staff, and community. If you are aware of individuals for whom you have a concern, please make a referral to

the Behavioral Intervention Team. Referring your concern shows you care. You can complete the [referral](#) online

[<https://cm.maxient.com/reporting.php?TAMUCentralTexas>].

Anonymous referrals are accepted. Please see the [Behavioral Intervention Team](#) website for more information [<https://www.tamuct.edu/bit>]. If a person's behavior poses an imminent threat to you or another, contact 911 or A&M-Central Texas University Police at 254-501-5805.

## SCIENCE POLICIES

### Lecture courses

1. There will be no bathroom breaks allowed during any exam. Be sure that you address this issue before beginning an exam.
2. Any student needing to take an exam at a **different time** as rest of students due to sickness or other accommodations will receive a **different version of exam**. This includes sickness, special accommodations, etc....
3. All students needing special accommodations must submit an accommodation form from the Office of Access and Inclusion listing the specific accommodations needed. Students are responsible for scheduling their own exam times with the TAMUCT Testing Center.
4. Any student missing an exam in class for any other reason (i.e. illness, death in family, etc....) must provide documentation for missing the exam (e.g. doctor's note, obituary notice, etc....). Exams must be made up within one week of original scheduled date, no exceptions.
5. All backpacks and materials as well as cell phones, smart watches and other electronic devices, must be turned off and placed at the front of the room on test day.
6. Jackets, sweaters, etc must be placed in the front of the room on test day, unless otherwise indicated by teacher.

### Laboratory courses

1. Attendance policy: A maximum of 3 absences will be allowed; additional absences in lab will result in an "F" for the entire course, regardless of excuse.
2. Laboratory Safety training: All students are **required** to take the mandatory Laboratory Safety Training Module - found on in your Modules tab in CANVAS. You must take the training and **bring the signed "Safety Agreement Form"** to your instructor **before you are allowed in lab!!!** This is **YOUR RESPONSIBILITY** - any lab absences because you have not taken the training will be considered **unexcused!**
3. Laboratory Coats: Students who have laboratories are required to purchase a laboratory coat from the TAMUCT Bookstore in Founder's Hall. Students must keep their laboratory coat in the laboratory room (you will be provided a storage bag); you cannot transport coats from lab to lab or bring outside the laboratory.

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## Copyright Notice

Students should assume that all course material is copyrighted by the respective author(s). Reproduction of course material is prohibited without consent by the author and/or course instructor. Violation of copyright is against the law and Texas A&M University-Central Texas' Code of Academic Honesty. All alleged violations will be reported to the Office of Student Conduct.

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[laura.erlandson@tamuct.edu](mailto:laura.erlandson@tamuct.edu) (Laura Weiser Erlandson); 254-519-8012; [linhpham@tamuct.edu](mailto:linhpham@tamuct.edu) (Linh Pham); 254-519-8717, [c.siriwardana@tamuct.edu](mailto:c.siriwardana@tamuct.edu) (Chamindika Siriwardana).

## Research Final Report

We will use the general format for a scientific paper in this course; however, as this is your final report that you will use as the foundation of your Biology Capstone thesis, we expect that you really explore the literature and develop your concluding ideas. **Remember that your Biology Capstone thesis will be at least 20 pages long with at least 10 of these pages dedicated to your Introduction Literature Review.** Scientific papers have an abstract, introduction, materials and methods, results, discussion, and literature cited. Keep in mind that scientists often pay for a paper to be peer-reviewed and published (not the other way around). Peer review means that all articles are read by other scientists (peers) who make editorial suggestions and ultimately decide whether a paper contains sound research and should be published.

For detailed instructions see the following *writing tutorials in your CANVAS shell*:

1. The Outline/Annotated outline
2. The Term paper/Literature review
3. The Laboratory report/Research paper
4. Citations

### The Abstract section:

This should be a brief summary of your entire paper. Use a little (1-2 sentences) from each section to make a clear, cohesive summary. Readers will decide from your abstract whether they will continue to read your entire research paper. This is typically around 250 words or so.

### The Introduction/Literature Review section:

This section will be quite extensive as I expect that you will research your topic thoroughly using mostly peer-reviewed, professional journals. Because this section is essentially a literature review paper, you are reviewing all that is currently known about your topic of interest. This includes past and present studies. Therefore, almost 100% of your sources will be peer-reviewed. You are to examine the fundamental and applied research that has contributed to our knowledge of the subject. Be sure to introduce and define your topic broadly first, then give more detail and examples to demonstrate your points.

This will lead the reader to a logical introduction to your main thesis or topic. You should clearly describe the specific questions you chose to study. State what you did in a general way, e.g., "We investigated the effect of obesity on heart rate by comparing heart rates of people with different Body Mass Indices after they climbed stairs", but do not give away the specific details of your methods or results. Finally, state your specific hypothesis at the end of this section.

### The Materials and Methods section:

The experiment has been completed by the time you turn in your thesis, so use past tense. This section includes a brief outline of the methods used in the experiments. The purpose of this section is to allow other experimenters to duplicate the methods you used, so it should be detailed enough so that someone else could read your report and repeat the experiment. However, you should NOT include trivial details (i.e., "we used test tubes that were 10cm long").

#### Good Example:

"We exposed *E. coli* cells to 0, 15, 30, or 45 seconds of ultraviolet irradiation at a wavelength of 280nm. Cells

from each irradiation treatment were diluted to 1:3 and 1:5 of their original concentration. One ml of each of these dilutions was plated on Luria broth nutrient agar and incubated overnight at 37°C. The number of colonies present in each plate was recorded.”

**Bad Example:**

“Our lab bench received cells from treatment #1, and these were serially diluted, so that there were 2 different concentrations of bacteria to count on the petri dishes. Lab bench 2 received cells from treatment 2. These were also serially diluted, resulting in 2 different concentrations of bacteria to count.”

**The Results section:**

The results section always starts with normal paragraph (text) format, NOT with tables or figures. You MUST first direct the reader's attention to EACH table and figure before they appear, indicate what they show, and summarize the important data in each.

**Good Example of How to Begin the Results:**

“The mean IQ of TAMUCT biology students was found to be 35% higher than the mean IQ of Harvard students and of students from many colleges (Figure 1)”.

As with all writing, the results should be organized into coherent logically organized paragraphs and sentences. Data are usually reported in paragraph form supplemented with visual figures and/or tables:

- Figure: a graph, picture, or diagram, and has a detailed legend at the top.
- Table: something that contains only numbers and has a detailed legend at the top.

Do NOT discuss the implications of the results in this section, nor attempt to explain why various results occurred. Only the important points of each figure and table should be described paragraph format; do not reiterate the whole figure.

Figures are to be inserted at the end of the paper after the Literature Cited section but before any appendices. Do NOT embed them in the text of your paper.

Raw data is NOT reported in the Results. Readers are usually interested only in summarized data (means, standard deviations, totals, etc.).

**The Discussion section:**

This is usually the most important part of your paper. This is your chance to show your extensive knowledge and command of your topic. In this section I expect you to be original, cleverly interpret the results you obtained, and draw general conclusions from them. The discussion should be narrow in scope to begin and end broadly.

This is a typical order of topics which might occur in the Discussion:

Begin the discussion by briefly stating the major conclusions from the results. Explain what the results mean. Discuss whether the results SUPPORT or do NOT support your original hypothesis (es). Your experiment is really very limited in scope, so DO NOT claim that you have "proven" or "disproven" a hypothesis; you perhaps obtained some small bit of evidence to support a hypothesis, or you provided some evidence which contradicts a hypothesis.

In next paragraph(s) expand your discussion of these results. You will want to compare them to results from other studies, which you should cite properly.

You may discuss sources of error in the experiment, but your BEST guess is that the results reflect reality. Students often feel that their discussion should consist of an analysis of all the things that went wrong with the experiment. *I strongly discourage this approach.* Naturally, all experiments have weaknesses, but for this exercise assume your results are reasonable. It is OK to get negative results. You should, however, suggest

additional experiments using better or different methods.

As the discussion continues it is important to offer some original ideas and interpretations. For example, discuss the implications or your results for the biology of the organism(s). For example, why did the behaviors you observe evolve? What does it mean ecologically? You may wish to suggest new experiments which would shed further light on the questions raised by your results.

### The Literature Cited section:

This section should list all references mentioned in the text. Unlike English papers and other term papers, we do not use footnotes, we avoid direct quotations, and we do not include material from encyclopedic type resources (including websites). You will *mostly* rely on peer reviewed published scientific papers for your information. You should not have any books or journals listed in this section unless you have cited the author and year in the text of the paper. If you are unsure whether a source is legitimate, consult your instructor.

**\*Depending on your instructors, please use the Council of Scientific Editors (CSE) "Author, Year" or "Citation-Sequence" citation style for your writing:**

<https://writing.wisc.edu/handbook/documentation/doccse/nameyear/>

<https://writing.wisc.edu/handbook/documentation/doccse/citationsystems/>

Reference the Citing References tutorial in your CANVAS shell\*

### The following hints will improve your writing:

1. Use the first person (I or we) to write more concisely.
2. Avoid long run-on sentences. We are trying to write concisely and clearly. Do not use twelve-letter words when simpler ones will do just fine.
3. Be positive about your results. Say "the data show" instead of "the data suggest".
4. Genus and species names in Latin are always italicized or underlined. Only the first letter of the genus is capitalized. Ex. *Homo sapiens*, *Danaus plexippus*, etc....
5. Number all pages and use the metric system. Write numbers as numerals when they are associated with measurement units (2 km), spell them out for numbers < 10 (five hamsters).
6. In general, DON'T use quotes. Instead, paraphrase the author and cite him/her. Quotes interrupt the flow of your text.
7. Scientific writing is formal communication. Do not use conversational language, colloquialisms, or slang
8. Some frequently misused/misspelled words:
  - a. affect/effect "Effect" is a noun (usually). "Affect" is always a verb. "The effect of their misuse will be that your grade will be affected by subtracting five points".
  - b. it's/its "It's" is the conjunction "it is". "Its" is the possessive form
  - c. their/there I assume this is just carelessness, proofread your paper.
  - d. between/among Between refers to two things, while among refers to more than two.
  - e. fewer/less Use "fewer" if you can count the items, "less" if you cannot. (less water, but fewer boats)
  - f. amount/number Use "amount" if you cannot count them, "number" if you can. (The amount of sand and the number of rocks)
  - g. oftentimes Drop the "times"; it is redundant.

- h. different from / different than: Different from is correct; different than is not.
- i. than/then “than” refers to a comparison – proofread your paper for mix-ups
- j. Always put a zero in front of a naked decimal point (0.12, not .12).
- k. **The word data is plural and the word datum is singular.** *These data show that .....*

Category	Exceeds expectations	Meets expectations	Below expectations	Does not meet expectations	Score
<b>Abstract</b>	Clearly and concisely states paper's purpose and main results. Includes at least one sentence from each main section. Engaging and thought provoking.	Clearly and concisely states the paper's purpose and main results. Missing 1 section.	States the paper's purpose and main results. Missing 2 or more sections.	Absent, incomplete, or confusing.	5.0%
<b>Introduction</b>	Thoroughly addresses the topic. Engages reader. Logical progression from broad to narrow topic. Clearly states main hypothesis.	The introduction states the main topic and states main hypothesis.	The introduction states the main topic but does not adequately state main hypothesis.	There is no clear introduction of main topic and hypothesis is missing.	10.0%
<b>Materials &amp; Methods</b>	Clear and detailed narrative of methods so reader can replicate study. Materials are included within text (not listed separately). Only essential information included. Mathematical analysis clearly stated.	Clear and detailed narrative of methods so reader can replicate study. Materials are included within text (not listed separately). Mathematical analysis stated.	Narrative of methods not adequately clear so reader can replicate study. Materials are listed separately. Mathematical analysis stated.	Vague narrative of methods. Materials are listed separately or no materials are indicated. No mathematical analysis stated.	10.0%
<b>Results</b>	Clearly and concisely states the results of the study including statistical analysis. Includes appropriate tables/figures to supplement statements. "Just the facts"; no interpretation or discussion of data.	Clearly and concisely states the results of the study including statistical analysis. Includes some tables/figures to supplement statements (may not be appropriate). May have little interpretation or discussion.	States some of the results of the study; missing some statistical analysis. Includes some tables/figures to supplement statements (may not be appropriate). May include interpretation or discussion of data.	Missing some results of the study; missing all statistical analysis. Tables/figures not included or no text included. May include interpretation or discussion of data.	20.0%
<b>Discussion</b>	The conclusion is engaging and restates the main results and thesis. In-depth discussion and elaboration of all sections of the paper. Relates topic back to 'real world' applications.	The conclusion restates the results. cursory discussion and elaboration of all sections of the paper. Vaguely relates topic back to 'real world' applications.	The conclusion does not adequately restate results or the thesis. Brief discussion of the paper. May not relate topic back to 'real world' applications.	The conclusion does not adequately restate results or the thesis. Incomplete or confusing discussion of the paper. Does not relate topic back to 'real world' applications.	25.0%
<b>Organization/Structural Development of Topic</b>	Writer demonstrates logical and subtle sequencing of ideas through well-developed paragraphs; transitions are used to enhance organization.	Paragraph development present but not perfected.	Logical organization; organization of ideas not fully developed.	No evidence of structure or organization.	5.0%
<b>Spelling/Punctuation</b>	No errors in punctuation, capitalization and spelling.	Almost no errors in punctuation, capitalization and spelling.	Many errors in punctuation, capitalization and spelling.	Numerous and distracting errors in punctuation, capitalization and spelling.	2.5%
<b>Grammar</b>	No errors sentence structure and word usage.	Almost no errors in sentence structure and word usage.	Many errors in sentence structure and word usage.	Numerous and distracting errors in sentence structure and word usage.	2.5%
<b>In-text citations</b>	All facts are cited using primary literature or peer sources. Correct format with no errors	Some facts are cited. Correct format, very few errors.	Few facts are cited. Correct format, few errors	No in-text citations.	5.0%
<b>Literature cited</b>	Correct format with no errors. Includes more than 10 major references (e.g. peer reviewed science journal articles, books, and no more than two professional internet sites. No encyclopedic type references).	Correct format with few errors. Includes more than 5 major references (e.g. peer reviewed science journal articles, books, and no more than two professional internet sites. No encyclopedic type references).	Correct format with some errors. Includes more than 3 major references (e.g. peer reviewed science journal articles, books, and no more than two professional internet sites. No encyclopedic type references).	Not correct format and/or with many errors. Includes more than 0-3 major references (e.g. peer reviewed science journal articles, books, and no more than two professional internet sites. No encyclopedic type references).	5.0%
<b>Figures and tables</b>	Tables/figures numbered consecutively in separate series. Title is complete enough to be understood without referring to text. Legend, headings, and units of measure are included. Footnotes used as necessary to provide clarity with respect to: units of measure that do not fit in the heading, explanations of abbreviations and symbols, statistical significance of entries.	Tables/figures numbered consecutively in separate series. Title is complete. Legend, headings, and units of measure are included. Footnotes used to provide clarity.	Tables/figures numbered, but not sequentially. Title is incomplete. Legend, headings, and units of measure are not fully included. Footnotes used but do not provide enough clarity	Tables/figures not numbered. No title. Legend, headings, and units of measure are not included. Footnotes are not used but are needed.	10.0%
<b>Total</b>					100.0%