

Course number, Course CRN, COURSE TITLE
BIOL-4451-110, 10629, Bioinformatics
Spring 2020
Texas A&M University-Central Texas

COURSE DATES, MODALITY, AND LOCATION

Jan 13, 2020 - May 08, 2020

This is a 100% online course, 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/>].

INSTRUCTOR AND CONTACT INFORMATION

Instructor: Dr Gunisha Sagar

Office: Beck Family Heritage Hall, Room # 302E

Phone: 245-501-5843

Email: gunisha_sagar@tamuct.edu

Office Hours

Email me for questions to my CANVAS email. I will address them within 24-48 hrs. If needed can set time for WebEx, Skype and Phone appointment via CANVAS email.

Student-instructor interaction

I would be checking and replying to emails within 24-48 hrs. The appointments to discuss should be made via CANVAS email at least two days prior.

WARRIOR SHIELD

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

Warrior Shield is an emergency notification service that gives Texas A&M University-Central Texas the ability to communicate health and safety emergency information quickly via email, text message, and social media. All students are automatically enrolled in Warrior Shield through their myCT email account.

Connect to Warrior Shield by [911Cellular](https://portal.publicsafetycloud.net/Account/Login) [<https://portal.publicsafetycloud.net/Account/Login>] to change where you receive your alerts or to opt out. By staying enrolled in Warrior Shield, university officials can quickly pass on safety-related information, regardless of your location.

COURSE INFORMATION

Course Overview and description

BIOL-4451-110 is an undergraduate level (4 credit) course offered by Science and Mathematics department. It is a combined lecture and laboratory course that involves online method of instruction & learning. There is a vast world of freely available data that is available for students to download, investigate, and use by using specialized software programs. This course entails: A) Study of genomic sequences and the effect of genetic variation on phenotypes. B) Compare sequences amongst different genomes belonging to same or diverse kingdoms by using alignment software. C) Construct phylogenetic trees by using alignment tools and specialized software. D) Learn analytical techniques that can be used to evaluate sequenced data. E) Study genomes of diverse kingdoms from a bioinformatics perspective.

Prerequisite(s): BIOL 4470 and BIOL 4471.

Course Objective or Goal

- a) to use bioinformatics tools to analyze and interpret various types of biological data.
- b) be familiar with a variety of issues in cellular and molecular biology that can be investigated using computational approaches.

Student Learning Outcomes

This course will introduce students to the sources/databases to obtain data (from DNA sequencing projects) and the software available to analyze them. At the end of this course: A) Students will be able to use their newly acquired skills to explore publicly available biological data. B) Also they will learn techniques to study their gene of interest i.e. (Your Favorite Gene, YFG) in different species. C) They will compare genome of species at gene and protein level by conducting BLAST searches. D) Learn to construct phylogenetic and network maps.

Competency Goals Statements (certification or standards)

N/A

Required Reading and Textbook(s)

Bioinformatics and Functional Genomics, by Jonathan Pevsner (3rd Edition), Publisher Wiley Blackwell, ISBN: 9781118581780.

COURSE REQUIREMENTS

Course Requirements: (include point values for each- not just a percentage)

Periodic quizzes (lectures) and assignments (Lectures and Laboratory) would be posted for assessing understanding of topics covered weekly. The topics and dates for the quizzes and assignments are listed in course outline and in Canvas. **All assignments and quizzes will be due on Saturday by midnight of the posted week.**

Course Requirements:

Contents	Points
a) Quizzes (5)	100 points (20 points each)
b) Assignments (4)	100 points (25 points each)
c) Powerpoint presentation of an article (1)	100 points
d) Poster on(Cloning of YFG) (1)	100 points
e) Portfolio of YFG	100 points
Total	500 points

The Power point presentation of an article will be graded as:

- | | |
|------------------------------------------------------------------------------|-------------------|
| A) Selection of an appropriate paper pertaining to Your Favorite Gene “YFG”- | 5 Points |
| B) Incorporation of relevant topics in slides as listed: | 45 points: (9X5) |
| I. Paper Title | |
| II. Introduction | |
| III. Objectives of the study | |
| IV. Techniques Used | |
| V. Results (figures and figure legends) | |
| VI. Conclusions | |
| VII. Take Home Message | |
| VIII. Relevance of the study | |
| IX. References | |
| C) Slide quality | 10 points |
| D) Content description :English (vocabulary and grammar) | 10 points |
| E) Style and Format | 10 points |
| F) Incorporation and explanation of bioinformatics tool | 20 points |
| Total | 100 points |

The Poster presentation on In Silico Cloning of YFG (Geneious) will be graded as:

- | | |
|---------------------------------|-------------------|
| A) Heading/Topic | 5 points |
| B) Abstract | 10 points |
| C) Introduction | 15 points |
| About gene | |
| Location of gene | |
| Mutant phenotype | |
| D) Steps | 20 points |
| E) Methods | 20 points |
| F) Discussion | 10 points |
| G) Layout of presentation | 10 points |
| H) Style: Writing content, Font | 10 points |
| Total | 100 points |

Portfolio Presentation: Incorporating all techniques will be graded as:

Portfolio:

You are responsible for turning in one portfolio at the end of the semester. The portfolio will include the characterization of your favorite gene with bioinformatics tools learnt in laboratory sessions. Plagiarism is a serious offense and any instances of plagiarism will result in action against the offending student(s).

A) Cover Sheet	5 points
B) Table of Contents	10 points
C) Introduction	10 points
D) Report Pages for each technique used incorporating:	50 points (5x10pts)
I. Title - e.g., Multiple Sequence Alignment	
II. Purpose	
III. Method	
IV. Results	
V. Discussion and Conclusions	
E) Overall Report Conclusions	15 points
F) References	10 points
Total	100 points

Grading Criteria Rubric and Conversion

The **final grade** will be calculated from combining points from: Five Quizzes (20 % of final grade), Four Assignments (20% of final grade), Portfolio (20% of final grade), Poster, (20 % of final grade) & Presentation (20% of final grade).

Grading scheme

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

The grades will be posted promptly on canvas grade book within a week of submission of Quizzes and Assignments. Grading of posters, powerpoint presentation and portfolio may take two weeks.

Grading Policies

If quizzes and assignments are not submitted by deadline listed in course calendar then 10 points will be deducted for each late submission.

COURSE OUTLINE AND CALENDAR

BIOL-4451- Lecture & Laboratory Schedule (Subject to change)

Week 1

Jan 13-19 Introduction
Lecture: Review Central Dogma
Lab: Introduction to Your Favorite Gene (YFG), Select YFG, Literature Survey on YFG, Introduction to Citation Management Software i.e. EndNote.
Lab Assignment-1: Search for YFG

Week 2

Jan 20-26 Lecture: Access to Sequence Data and Related Information (Chapter 2)
Lecture Quiz-1: Access to Sequence Data and Related Information
Lab: Retrieval of biological information
(ex. nucleic acid sequence, protein sequence, domains present in protein) for YFG
Lab Assignment-1 Search for YFG
(Due on Jan 25th by midnight)

Week 3

Jan 27-Feb 2 Lecture: Introduction to BLAST (Chapter 4)
Lecture Quiz-1: Access to Sequence Data and Related Information
(Due on Feb 1st by midnight)
Lab: BLAST Analysis for YFG

- Week 4
Feb 3-9 Lecture: Pairwise Alignment (Chapter 3)
 Lab: Pairwise Alignment for YFG
- Week 5
Feb 10-16 Lecture: Multiple Sequence Alignment (MSA) (Chapter 6)
 Lab: Multiple Sequence Alignment of YFG
 Lab Assignment-2: Pairwise and Multiple Sequence Alignment
- Week 6
Feb 17-23 Lecture: Phylogenetic Analysis (Chapter 7)
 Lecture Quiz-2: Phylogenetic Analysis
 Lab: Constructing a Phylogenetic Tree of YFG
 Lab Assignment-2: Pairwise and Multiple Sequence Alignment
 (Due on 22nd Feb by midnight)
- Week 7
Feb 24-29 Lecture: Genomes Across The Tree of Life (Chapter 15)
 Lecture Quiz-2 (Due on Feb 28th by midnight)
 Lab: Introduction to the Bioinformatics Software Platform: Geneious
- Week 8
March 1-8 Lecture: Genomes Across The Tree of Life (Chapter 15)
 Lecture Quiz-3: Genomes Across The Tree of Life (Contd)
 Lab: Analysis of YFG with Geneious
- Week 9
March 16-22 Lecture: Human Genomes (Chapter 20)
 Lecture Quiz-3: Genomes Across The Tree of Life
 (Due on March 21st by midnight)
 Lab: In Silico Cloning of YFG
 Paper Presentation (Powerpoint with voice recording)
 (Due on March 21st by midnight)
- Week 10
March 23-29 Lecture: Network Analysis & Gene Ontology
 Lab: Building a Network map for YFG
 Lab Assignment-3: Network Analysis
- Week 11
March 30 Lecture: Genomes – Viruses and Bacteria (Chapter 16-17)
-Apr 5 Lab: GO map for YFG
 Lab Assignment-3: Network Analysis
 (Due on April 4th by midnight)
- Week 12
April 6-12 Lecture: Genomes – Fungi (Chapter 18)
 Lecture Quiz-4: Fungi

Lab: Primer design for YFG
Lab Assignment-4: Viruses and Bacteria

Week 13
April 13-19 Lecture: RNA-Seq (Chapter 11)
Lecture Quiz-4: Fungi
(Due on April 18th by midnight)
Lab: Analysis of RNA-Seq data in Galaxy
Lab Assignment 4: Viruses and Bacteria
(Due on April 18th by midnight)

Week 14
April 20-26 Lecture: Functional Genomics (Chapter 14)
Lecture Quiz-5: Functional Genomics
Lab: Analysis of Genomes-Eukaryotes

Week 15
April 27-
May 3 Lecture: Human Diseases (Chapter 21)
Lecture Quiz 5: Functional Genomics
(Due on May 2nd by midnight)

Week 16
May 4-9 Review and Poster submission by May 7th by midnight

Important University Dates

January 13, 2020	Add, Drop and Late Registration Begins for 16- and First 8-Week Classes \$25 Fee assessed for late registrants
January 13, 2020	Classes Begin for Spring Semester
January 15, 2020	Deadline for Add, Drop, and Late Registration for 16- and First 8-Week Classes
January 20, 2020	Martin Luther King, Jr Day (University Closed)
January 21, 2020	Deadline to Drop First 8-Week Classes with No Record
January 29, 2020	Deadline to Drop 16-Week Classes with No Record
February 21, 2020	Deadline to Drop First 8-Week Classes with a Quit (Q) or Withdraw (W)

March 1, 2020	Deadline for Teacher Education and Professional Certification Applications
March 6, 2020	Classes end for 1st 8-Weeks
March 9-12, 2020	Spring Break (No Classes - Administrative Offices Open)
March 13, 2020	Spring Break (University Closed)
March 10, 2020	Deadline for Faculty Submission of First 8-Week Final Class Grades (due by 3pm)
March 15, 2020	Deadline for Clinical Teaching/Practicum Applications
March 16, 2020	Add, Drop, and Late Registration Begins for Second 8-Week Classes \$25 Fee assessed for late registrants
March 16, 2020	Classes Begin for Second 8-Week Session
March 16, 2020	Class Schedule Published for Summer Semester
March 18, 2020	Deadline for Add, Drop, and Late Registration for Second 8-Week Classes
March 23, 2020	Deadline to Drop Second 8-Week Classes with No Record
March 27, 2020	Deadline for Graduation Application for Ceremony Participation
March 30, 2020	Registration Opens for Seniors, Post-Bacc, and Graduate Students for Summer Semester
April 3, 2020	Deadline to Drop 16-Week Classes with a Quit (Q) or Withdraw (W)
April 6, 2020	Registration opens for all students for the Summer and Fall Semesters
April 24, 2020	Deadline to Drop Second 8-Week Classes with a Quit (Q) or Withdraw (W)
May 8, 2020	Deadline for Applications for Tuition Rebate for Spring Graduation (5pm)
May 8, 2020	Deadline for Degree Conferral Applications to the Registrar's Office. \$20 Late Application Fee.
May 8, 2020	Deadline to Withdraw from the University for 16- and Second 8-Week Classes
May 8, 2020	Spring Semester Ends

TECHNOLOGY REQUIREMENTS AND SUPPORT

This course will use the A&M-Central Texas Instructure Canvas learning management system. Logon to A&M-Central Texas Canvas [<https://tamuct.instructure.com>].

Username: Your MyCT username (xx123 or everything before the "@" in your MyCT e-mail address) Password: Your MyCT password

Canvas use is mandatory as lectures, laboratory exercises, assignments and quizzes will be posted throughout the course.

Technology Requirements

This course will use the A&M-Central Texas Instructure Canvas learning management system. We strongly recommend the latest versions of Chrome or Firefox browsers. 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/>]. You will log in through our Microsoft portal.

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

Canvas Support

Use the Canvas Help link, located at the bottom of the left-hand menu, for issues with Canvas. You can select "Chat with Canvas Support," submit a support request through "Report a Problem," or call the Canvas support line: 1-844-757-0953.

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

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

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.

UNIVERSITY RESOURCES, PROCEDURES, AND GUIDELINES

Drop Policy

If you discover that you need to drop this class, you must complete a [Drop Request Form](https://www.tamuct.edu/registrar/docs/Drop_Request_Form.pdf) [https://www.tamuct.edu/registrar/docs/Drop_Request_Form.pdf].

Professors cannot drop students; this is always the responsibility of the student. The Registrar's Office will provide a deadline on the Academic Calendar for which the form must be completed, signed and returned. Once you return the signed form to the Registrar's 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 Registrar's 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.

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. Academic integrity is defined as a commitment to honesty, trust, fairness, respect, and responsibility. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. Academic misconduct is any act that improperly affects a true and honest evaluation of a student's academic performance and includes, but is not limited to, working with others in an unauthorized manner, cheating on an examination or other academic work, plagiarism and improper citation of sources, using another student's work, collusion, and the abuse of resource materials. All academic misconduct concerns will be referred to the university's Office of Student Conduct. Ignorance of the university's standards and expectations is never an excuse to act with a lack of integrity. 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 report](https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=0),
[https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=0].

Academic Accommodations

At Texas A&M University-Central Texas, we value an inclusive learning environment where every student has an equal chance to succeed and has the right to a barrier-free education. The Office of Access and Inclusion is responsible for ensuring that students with a disability receive equal access to the university's programs, services and activities. If you believe you have a disability requiring reasonable accommodations please contact the Office of Access and Inclusion, WH-212; or call (254) 501-5836. Any information you provide is private and confidential and will be treated as such.

For more information please visit our [Access & Inclusion](https://tamuct.instructure.com/courses/717) Canvas page (log-in required)
[https://tamuct.instructure.com/courses/717]

Important information for Pregnant and/or Parenting Students

Texas A&M University-Central Texas supports students who are pregnant and/or parenting. In accordance with requirements of Title IX and related guidance from US Department of Education's Office of Civil Rights, the Dean of Student Affairs' Office can assist students who are pregnant and/or parenting in seeking accommodations related to pregnancy and/or parenting. Students should seek out assistance as early in the pregnancy as possible. For more

information, please visit [Student Affairs](https://www.tamuct.edu/student-affairs/index.html) [https://www.tamuct.edu/student-affairs/index.html]. Students may also contact the institution's Title IX Coordinator. If you would like to read more about these [requirements and guidelines](http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf) 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 prohibits discrimination on the basis of sex and gender—including pregnancy, parenting, and all related conditions. A&M-Central Texas is able to provide flexible and individualized reasonable accommodation to pregnant and parenting students. All pregnant and parenting students should contact the Associate Dean in the Division of Student Affairs at (254) 501-5909 to seek out assistance. Students may also contact the University's Title IX Coordinator.

Tutoring

Tutoring is available to all A&M-Central Texas students, both on-campus and online. Subjects tutored on campus include Accounting, Advanced Math, Biology, Finance, Statistics, Mathematics, and Study Skills. Tutors are available at the Tutoring Center in Warrior Hall, Suite 111. Tutor.com tutoring **will not offer writing support** beginning August 1, 2019, but will continue to offer other tutoring support.

If you have a question regarding tutor schedules, need to schedule a tutoring session, are interested in becoming a tutor, or have any other question, contact Academic Support Programs at (254) 501-5836, visit the Office of Student Success at 212F Warrior Hall, or by emailing studentsuccess@tamuct.edu .

Chat live with a tutor 24/7 for almost any subject from on your computer! Tutor.com is an online tutoring platform that enables A&M-Central Texas students to log in and receive online tutoring support at no additional cost. This tool provides tutoring in over 40 subject areas. Access Tutor.com through Canvas.

University Writing Center

Located in Warrior Hall 416, the University Writing Center (UWC) at Texas A&M University–Central Texas (TAMUCT) is a free workspace open to all TAMUCT students from 10:00 a.m.-5:00 p.m. Monday thru Thursday with satellite hours in the University Library Monday thru Thursday from 6:00-9:00 p.m. This semester, the UWC is also offering online only hours from 12:00-3:00 p.m. on Saturdays.

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 visiting the UWC during normal operating hours (both half-hour and hour sessions are available) or 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 if you have any questions about the UWC and/or need any assistance with scheduling.

University Library

The University Library provides many services in support of research across campus and at a distance. We offer over 200 electronic databases containing approximately 250,000 eBooks and 82,000 journals, in addition to the 85,000 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 on Skype or in-person at the library. 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 work spaces, 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](http://tamuct.libguides.com/index) [http://tamuct.libguides.com/index].

OPTIONAL 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 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/departments/compliance/titleix.php) [https://www.tamuct.edu/departments/compliance/titleix.php].

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, who are exhibiting concerning behaviors, or individuals causing a significant disruption to our community, please make a referral to the Behavioral Intervention Team. Referring your concern shows you care. You can complete the [referral](https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=2) online [https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=2].

Anonymous referrals are accepted. Please see the [Behavioral Intervention Team](https://www.tamuct.edu/student-affairs/bat.html) website for more information [https://www.tamuct.edu/student-affairs/bat.html]. If a person's behavior poses an imminent threat to you or another, contact 911 or A&M-Central Texas University Police at 254-501-5800.

OTHER POLICIES

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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