EAST TEXAS A&M
U N I V E R S I T Y

BSC 424 SEA-PHAGES I: Discovery of Bacteriophages, Fall 2025
Credit hours: 3
CRN:
Instructor: Dr. Archana Srinivas
Participating co-instructor: Prof. Venu Cheriyath
Graduate Assistant Teacher (GAT): Ms. Shabnam Fathima
Offices: Science Bldg, STC 235, STC 260A
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eCompanion Site: D2L (Brightspace) @ MyLeo
Prerequisites: BSC 303 Cell Biology; Min. Grade C
Laboratory: Two hour labs on Tuesdays and Thursdays 1:00–3.50 PM.
Location: @ STC- 324 (Biochemistry and Molecular Biology laboratory
Office Hours: Tuesdays and Thursdays 3:30 PM–4:30 PM

E-Mails: Include BSC 424/ SEA-PHAGES in subject line of Emails; E-mails will be answered within 48 hrs.

Course overview:
This course is designed to immerse students in fundamental biological concepts and scientific reasoning through original, hypothesis-driven research. As part of the Howard Hughes Medical Institutes SEA-PHAGES (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science) research team, students will engage in hands-on molecular techniques to discover, propagate, and characterize bacteriophages isolated from soil samples across diverse biomes. They'll also sharpen their scientific communication skills by maintaining a laboratory notebook and presenting their findings in a final poster project. This unique opportunity allows students to explore novel bacteriophages while learning key concepts in molecular biology, microbiology, and evolution through practical experiments. The course includes a mix of lectures and lab work. Prerequisites: BSC 303 Cell Biology with a grade of C or more.

Student Learning Outcomes (SLO):
At course completion, students will:

1. Gain hands-on experience in Microbiology and Molecular Biology acquiring proficiency in aseptic technique and different molecular biological protocols
2. Contribute to the growing understanding of bacteriophages and their diversity
3. Understand the nature of research and conduct independent/collaborative research by participating in soil bacteriophage discovery
4. Isolate phage genomic DNA and characterize them
5. Gain an understanding of electron microscopy to visualize bacteriophage morphology
6. Submit genetic information of bacteriophages into a central database
7. Participate in a national network of researchers and educators through the SEA-PHAGES program
8. Present their research findings at national symposiums and conferences

Textbook or Lab Manual: Phage Discovery Guide, course material and protocols will be provided via D2L.

Lecture and lab Materials: PDFs of protocols, Power Point slides and video resources that I use for delivering lectures will be available on D2L Brightspace, the e-companion site for this course.

INSTRUCTIONAL METHOD

This is a face-to-face class and the course is designed as an individual laboratory research project with faculty instruction and supervision. Dates are approximate and subject to change. Any major changes to the syllabus will be posted in D2L and the syllabus will be updated accordingly. You are responsible for keeping up with any changes made to the syllabus. *You may be tested on any material listed in the syllabus, on your class page, and discussed in the class.*

Class Policies:

Attendance, Lab Safety & Participation (50 credit points, 5% of total): Attendance in ALL classes and labs are expected. Unexcused absences will not be permitted. If you do have an excused absence, you will have to schedule and attend open lab hours to make up for missed lab course material. Unexcused absences or excused absences with failure to make up for labs using open lab hours will result in you lagging far behind and having to drop the course or failing the course. This course will follow active learning methods and your active participation in all course activities are required for earning attendance and participation points. You will work both in groups and individually during and after the class to complete various assignments. Attendance will be taken in the beginning of every class. If you are not present for a majority of a class, it will be counted as an absence and you will lose points for both attendance and for participation. You are responsible for all material and assignments covered in class whether you are present or not.

How to Succeed in this Class:
For every lab session you are required to read the assigned protocols and watch the protocol videos posted online in D2L Brightspace to make your own flowchart of each lab protocol we master. The flowcharts should be uploaded online in the designated D2L Brightspace assignment. **Exit assessments will be given for each lab session are due @ 11.59 PM (midnight) on Tuesdays and Thursdays**. Benchmark assessments will be determined based on your mastery and accomplishment of techniques towards set goals in our research project – bacteriophage discovery.
Open lab hours - Friday afternoons – only upon request (Email me if you want to work on your project outside of lab hours)

Overview of Assignments:
1. Pre-lab workflow flowcharts (5%)
2. Attendance, Lab safety and participation (5%)
3. Exit assessments (10%)
4. Benchmark assignments (10%)
5. Lab Notebook - Weekly checks (weekly grade) LibreOffice/ Powerpoint (30%)
6. Project report (20%)
7. Project Presentation (20%)

NO EXTRA CREDIT

Grading Policy:
1. Pre-lab workflow flowchart (5%) 50 pts (2 pts per flowchart per lab ~ 25 course labs)
2. Attendance, Lab safety and participation (5%) 50 pts (Good lab practice will be awarded participation points)
3. Exit assessment (10%) – 100 pts (4 pts per exit assessment per lab) 25 exit assessments
4. Benchmark assignments (10%) 100 pts
5. Lab Notebook - Weekly checks (weekly grade) LibreOffice/ Powerpoint (30%) – 300 pts
6. Project report (20%) – 200 pts
7. Project Presentation (20%) – 200 pts
8. TOTAL : 1000 pts

NO EXTRA CREDIT

Grading Scale:
A = 900 to 1000 points (>90%)
B = 800 to 899 points (>80%)
C = 700 to 799 points (>70%)
D = 580 to 699 points (>58%)
F = 579 or fewer (<58%)
To calculate where you stand: You scores and percentage will be available in the grade book of D2L Brightspace and updated regularly. Add your scores in assignments which will be your total score in 1000. Calculate the percentage. This will be your grade.

Course Calendar and Lab Schedule:

Week	Date	Topics	Pre-lab and protocol resources
Week1	Aug 25th – Aug 29th 2025 Pre-lab workflow flowchart due at 10:59 AM Aug 27th	Introduction To Aspetic Technique, Pipetting technique And Environmental Sampling	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays
Week 2	Sep 1st – Sep 5th 2025 Pre-lab workflow flowchart due at 10:59 AM on Sep 1st and 4th	Environmental sample and Direct isolation – Introduction to Plaque assay and plaque morphology and selection	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays
Week 3	Sep 8th – Sep 12th 2025 Pre-lab workflow flowchart due at 10:59 AM	Environmental sample and Enriched isolation – Introduction to spot tests	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays
Week 4	Sep 15th – Sep19th 2025 Pre-lab workflow flowchart due at 10:59 AM	Introduction to serial dilution and plaque assays	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays QUBES Math packet resource
Week 5	Sep 22nd – Sep 26th 2025 Pre-lab workflow flowchart due at 10:59 AM	Purification of direct and enriched isolations to get phage lysate	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays QUBES Math packet resource

		Serial dilution and plaque assays to get clonal phage population	
Week 6	Sep 29th – Oct 3rd 2025 Pre-lab workflow flowchart due at 10:59 AM	Purification and Amplification Calculating titers and Making webbed plates	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays QUBES Math packet resource
Week 7	Oct 6th – Oct 10th 2025 Pre-lab workflow flowchart due at 10:59 AM	Purification and Amplification continued.. High titre plate to prepare clonal phage lysate	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays QUBES Math packet resource
	Benchmark Assessment – Did you complete steps to purify a phage ? Do you have a clonal phage population exhibiting consistent phage morphology? – Yes = Benchmark assessment I completed		
Week 8	Oct 13th – Oct 17th 2025 Pre-lab workflow flowchart due at 10:59 AM	Amplification continued. Concentrating phage lysate for downstream processing	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays
Week 9	Oct 20th – Oct 24th 2025 Pre-lab workflow flowchart due at 10:59 AM	Introduction to TEM and grid preparation	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays (Plan shipping prepared grid samples for TEM imaging – prepare and store high-titer lysate for archiving and sequencing)
Week 10	Oct 27th – Oct 31st 2025 Pre-lab workflow flowchart due at 10:59 AM	Introduction to DNA extraction – prepare for DNA extraction	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays
Week 11	Nov 3rd –Nov 7th 2025 Pre-lab workflow flowchart due at 10:59 AM	DNA extraction and restriction digest characterization	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays
Week 12	Nov 10th – Nov 14th 2025 Pre-lab workflow flowchart due at 10:59 AM	DNA extraction and restriction digest characterization continued	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays

Week 13	Nov 17th – Nov 21st 2025	Phage Olympics and project report preparation	Exit assessments are due @ 11.59 PM on Tuesdays and Thursdays Ship lysate for archiving and DNA for sequencing
Benchmark Assessment – Did you complete steps to amplify a clonal population of phage to get a high titer (5×10^9 pfu/ml)? Did you sequence and get minimum 40 ng/ul of DNA from your sample and complete characterization? Yes = Benchmark assessment II completed			
Week 14	Nov 24th – Nov 28th 2025 Lab only on Nov 25th (Tuesday) Thanksgiving week (Nov 24th , 2025)	No lab on Thursday	Project reports due on Nov 25th Wednesday
Unit 15	Dec 1st to Dec 5th 2025 (Dec 2nd and Dec 4th)		Project Presentations
No Final Exam			

*ALL DATES AND ASSIGNMENTS ARE TENTATIVE AND MAY SUBJECT TO CHANGE

Academic Integrity: A student of East Texas A&M University does not lie, cheat, steal, and the university will not tolerate those who do. A violation of the Texas A&M honor code and academic integrity involves any of the following offenses: cheating, fabrication, falsification, multiple submissions, plagiarism, and complicity in any of these offenses. The first instance of cheating will results in **"ZERO"** on the exam and/or on the assignment. The second instance of cheating will results in "**ZERO**" on the course. Cheating involves copying information from another student, non-allowable materials or source and plagiarism. Once again, violations of academic integrity will not be tolerated. This class will be conducted in strict observance of the Honor Code. Refer to your Student Handbook for details.

Conduct Policy: All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See Student's Guide Handbook, Policies and Procedures, Conduct). You are also required to follow the lab dress code when attending every class of this course.

Cell Phones/Pagers/Laptop/Tablets: Please turn your cell phone and/or pager (and other electronic devices) off during class. If you are on-call for your work, please place the cell phone or pager on silent or vibration mode. Electronic devices are strictly prohibited in lab.
If you utilize a laptop to take class notes, please be aware of potentially distracting others around you and seat yourself accordingly. Additionally, you may be asked to leave the class if it is determined you are utilizing a computer or electronic device to do outside work, surf the web inappropriately or communicate personal conversations. Texting is prohibited and devices will be collected and kept until the end of class.
All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (See Students' Guide Handbook, Policies and Procedures).

Tapes and Notes: While recordings of this class may be made for personal use with prior permission, recordings may not be sold or distributed to others. While you may make copies of these notes for your

personal use, no copy of these notes may be distributed to anyone other than persons who are currently enrolled in the class; nor may any copies be sold.

Lab behavior: The lab has a dress code. You are required to wear long pants, close toed shoes (no sandals or flip flops) and a lab coat. If handled improperly, some chemicals used in the lab become dangerous.

Drinking, eating and the use of electronic devices is PROHIBITED in the lab! Disruptive behavior in lab that could be considered a hazard to another student will result in immediate removal from the lab. Intentionally damaging lab equipment may result in a ZERO for the class and possibly severe financial penalties as many pieces of equipment we will be using are expensive. SEEK HELP if you do not know how to use some instruments (refer to laboratory manual and published resources for details)

ACCESS AND NAVIGATION

D2L Brightspace Access and Log in Information

This course will be facilitated using D2L Brightspace, the learning management system used by Texas A&M University-Commerce. To get started with the course, go to myLeo and from App window select MyLeoOnline (D2L Brightspace) App. From home menu choose your course.

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: It is strongly recommended you perform a "Browser Test" prior to the start of your course.

TECHNOLOGY REQUIREMENTS

Browser support

D2L is committed to performing key application testing when new browser versions are released. New and updated functionality is also tested against the latest version of supported browsers. However, due to the frequency of some browser releases, D2L cannot guarantee that each browser version will perform as expected. If you encounter any issues with any of the browser versions listed in the tables below, contact D2L Support, who will determine the best course of action for resolution. Reported issues are prioritized by supported browsers and then maintenance browsers.

Supported browsers are the latest or most recent browser versions that are tested against new versions of D2L products. Customers can report problems and receive support for issues. For an optimal experience, D2L recommends using supported browsers with D2L products.

Maintenance browsers are older browser versions that are not tested extensively against new versions of D2L products. Customers can still report problems and receive support for critical issues; however, D2L does not guarantee all issues will be addressed. A maintenance browser becomes officially unsupported after one year. Note the following:

- Ensure that your browser has JavaScript and Cookies enabled.
- For desktop systems, you must have Adobe Flash Player 10.1 or greater.
- The Brightspace Support features are now optimized for production environments when using the Google Chrome browser, Apple Safari browser, Microsoft Edge browser, Microsoft Internet Explorer browser, and Mozilla Firefox browsers.

Desktop Support

Browser	Supported Browser Version(s)	Maintenance Browser Version(s)
Microsoft® Edge	Latest	N/A
Microsoft® Internet Explorer®	N/A	11
Mozilla® Firefox®	Latest, ESR	N/A
Google® Chrome™	Latest	N/A
Apple® Safari®	Latest	N/A

Tablet and Mobile Support

Device	Operating System	Browser	Supported Browser Version(s)
Android™	**Android 4.4+**	**Chrome**	**Latest**
Apple	**iOS®**	**Safari, Chrome**	**The current major version of iOS (the latest minor or point release of that major version) and the previous major version of iOS (the latest minor or point release of that major version). For example, as of June 7, 2017, D2Lsupports iOS 10.3.2 and iOS 9.3.5, but not iOS 10.2.1, 9.0.2, or any other version.** Chrome: Latest version for the iOS browser.
Windows	**Windows 10**	**Edge, Chrome, Firefox**	**Latest of all** browser**s, and Firefox ESR.**

- You will need regular access to a computer with a broadband Internet connection. The minimum computer requirements are:
  - 512 MB of RAM, 1 GB or more preferred
  - Broadband connection required courses are heavily video intensive ○ Video display capable of high-color 16-bit display 1024 x 768 or higher resolution
- You must have a:
  - Sound card, which is usually integrated into your desktop or laptop computer ○ Speakers or headphones.
  - For courses utilizing video-conferencing tools and/or an online proctoring solution, a webcam and microphone are required.
- Both versions of Java (32 bit and 64 bit) must be installed and up to date on your machine. At a minimum Java 7, update 51, is required to support the learning management system. The most current version of Java can be downloaded at: JAVA web site http://www.java.com/en/download/manual.jsp
- Current anti-virus software must be installed and kept up to date.
Running the browser check will ensure your internet browser is supported.
> Pop-ups are allowed.
> JavaScript is enabled.
> Cookies are enabled.
- You will need some additional free software (plug-ins) for enhanced web browsing. Ensure that you download the free versions of the following software: ○ Adobe Reader https://get.adobe.com/reader/
  - Adobe Flash Player *(version 17 or later)* https://get.adobe.com/flashplayer/
  - Adobe Shockwave Player   https://get.adobe.com/shockwave/ ○ Apple Quick Time http://www.apple.com/quicktime/download/
- At a minimum, you must have Microsoft Office 2013, 2010, 2007 or Open Office. Microsoft Office is the standard office productivity software utilized by faculty, students, and staff. Microsoft Word is the standard word processing software, Microsoft Excel is the standard spreadsheet software, and Microsoft PowerPoint is the standard presentation software. Copying and pasting, along with attaching/uploading documents for assignment submission, will also be required. If you do not have Microsoft Office, you can check with the bookstore to see if they have any student copies.

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

Brightspace Support
Need Help?
Student Support
If you have any questions or are having difficulties with the course material, please contact your Instructor.
Technical Support
If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778 or click on the click on the words "click here" to submit an issue via email.

 Live Chat or

System Maintenance
Please note that on the 4th Sunday of each month there will be System Maintenance which means the system will not be available 12 pm-6 am CST.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Syllabus Change Policy:
The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures:
All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook. http://www.tamuc.edu/admissions/registrar/documents/studentGuidebook.pdf
Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette http://www.albion.com/netiquette/corerules.html

ETAMU Attendance:
For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01. http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity:
Students at East Texas A&M University are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:
https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03.pdf

Use of Artificial Intelligence, Open AI, Chat GPT, Chat Bot Software Statement

East Texas A&M University acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. **If no instructions are provided the student should assume that the use of such software is disallowed.**

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty
https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

13.99.99.R0.10 Graduate Student Academic Dishonesty
https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/graduate/13.99.99.R0.10.pdf

Students with Disabilities
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:
Office of Student Disability Resources and Services
EastTexas A&M University-Velma K. Waters Library: Room 162
Phone (903) 886-5150 or (903) 886-5835
Email: Heaven.Dunn@etamu.edu
Website: https://www.etamu.edu/student-disability-services/
East Texas A&M University will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.
Campus Concealed Carry Statement
Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in EastTexas A&M University buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun.
Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.
For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.
Web url: http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf
Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M- Commerce campuses. Report violations to the University Police Department at 903- 886-5868 or 9-1-1.

Early Intervention:
Early intervention for freshmen is designed to communicate the University's interest in their success and a willingness to participate fully to help students accomplish their academic objectives. The university through

faculty advisors and mentors will assist students who may be experiencing difficulty to focus on improvement and course completion. This process will allow students to be knowledgeable about their academic progress early in the semester and will provide faculty and staff with useful data for assisting students and enhancing retention. Grade reports will be mailed by the end of the sixth week of the semester. Additional information about first time undergraduates is available at

http://www.tamuc.edu/academics/universityCollege/successCoaches/default.aspx

Behavior: *All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment." (See Student's Guide Handbook, Policies and Procedures, Conduct).*

Plagiarism: *Plagiarism is a criminal activity. You must cite all sources of information. Unreferenced copying of material, whether parts of sentences, whole sentences, paragraphs, or entire articles can result in a score of zero for your assignment and may result in further disciplinary action. If you are copying material and citing references, you are expected to paraphrase and rewrite the sentences in your own words.*