



TEXAS A&M UNIVERSITY
SAN ANTONIO

BIOL 4402: Developmental Biology (Credit hour 4)

This course includes lecture and lab

Course Instructor: Dr. Thiya Mukherjee

Contact: Email: tmukherjee@tamusa.edu (** best way to contact me)
Phone: 784-2192
Office: SciTech 311N

Class Location, Day and Time: Lecture SciTech/STEM 179, Tuesday (T): 9.30-10.45 AM
Thursday (R): 9.30-10.45 AM
Lab CAB 302 Wednesday (W): 11.00-1.45 PM

Course Description and Expectation:

Books required: Developmental Biology, 13th edition (Michael Barresi and Scott Gilbert)
Mechanism in Plant Development (Ottoline Leyser and Stephen Day) ** **For additional reading**
Any additional material including journal articles and activities will be provided by Dr. Mukherjee. All materials for course administration and assessment will be provided in the learning platform **Blackboard**

This course will explore the general principles of development, emphasizing different model systems and their developmental life cycles, genetic regulation, cell signaling and communication, as well as the key distinctions between plant and animal development. Additionally, we will examine developmental plasticity and the evolutionary aspects of development. Lecture components will include three exams and student presentations, which will serve as the primary assessment methods. A total of three exams will be administered throughout the course.

Weekly lab sessions will involve hands-on activities using plant models and virtual labs focused on other model systems. Students will be assessed based on active participation, lab reports, and journal article presentations and discussions.

Attendance and participation in both lectures and labs will contribute to the final grade. Qualifying in all these components are MUST to pass this course.

Office hours: Virtual and by prior email appointment only. Email sent during the weekends will be answered the next business day

Learning Objectives:

- Understand the core principles and mechanisms of development in animals and plants
- Analyze genetic regulation and signaling pathways in development
- Compare developmental strategies between plants and animals
- Conduct hands-on and virtual experiments to understand key aspect of factors affecting development

Evaluation: (Total 200 points)

- Active class participation and attendance: 20 points

This will include attendance and active participation in lectures, online discussions and lab. Use this time to ask questions and interact with your peers. To encourage engagement, I will randomly call on students during lecture and lab sessions.

- 3 lecture exams: 20 points each (Total 3*20=60 points)

The exams will cover lecture content, assigned readings, and any additional material provided. Attending **review lectures** is highly recommended for strong performance.

- Student presentation (lecture): 40 points

Students will work in groups to research an assigned development topic and present their findings as if teaching the class, including the instructor.

- Lab report: 40 points

Students are responsible for maintaining an online lab report. Lab reports need to be worked on during and after each lab session. This means you should have an entry for each session with the date, even if you miss a class.

- Paper presentation and discussion: 40 points

As a part of the lab students are required to present and discuss research articles related to various topics on development that will be given by the instructor.

Grading Scale: (in percentage)

- 90-100% = A
- 80-89%= B
- 70-79%= C
- 60-69%= D
- <60% =F

Course policies:

- Student conduct expectations: Students are expected to uphold personal and academic integrity, remain open to new ideas, and contribute to a community that values diversity and mutual growth. At all times, individuals from various backgrounds and cultures should support one another's intellectual, social, and personal development. While the faculty and staff at TAMUSA are dedicated to assisting students, each student is ultimately responsible for their own learning. Students should aim for academic excellence, demonstrate responsibility and respect, and contribute meaningfully to the university and broader communities. Above all, they are encouraged to cultivate a lifelong love of learning and a commitment to emotional and physical well-being.
- Active participation and attendance policy: This is a key expectation for all students in this course. Active class participation and attendance will contribute to 20 points of the grade. Lecture and lab attendance is **MANDATORY**. For lecture and lab, I take formal attendance and there is no make-up opportunities for any missed lab. You must be in lecture or lab within 10 mins of the starting time. After that no entry will be permitted.
- Policy on oral and written assignments: Clear communication both oral and written are pre-require in science. No points for grammar will be deducted, however, clear expression of ideas is necessary in both oral and written assignments to **NOT** lose points.
- Policy on grade appeal: If you believe an error was made in grading, please do not hesitate to bring it to my attention as soon as possible. If you struggle with this course, please let me know and do not wait till the end of the semester. **For an assignment, you are welcome to inquire why points were deducted, but all grades will solely be based on the work submitted at the time of assignment. No verbal clarification of answers will be taken into consideration at a later time point.**
- Policy on make-up or late assignments: **All assignments are due on the schedule date unless discussed with Dr. Mukherjee ahead of time.**
- **No use of generative AI permitted:** Biol 4402 assumes that all work submitted by students will be generated by the students themselves, working individually or in groups. Students should not have another person/entity do the writing of any portion of an assignment for them, which includes hiring a person or a company to write assignments and/or using artificial intelligence (AI) tools like ChatGPT. Use of any AI-generated content in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

IMPORTANT POLICIES AND RESOURCES

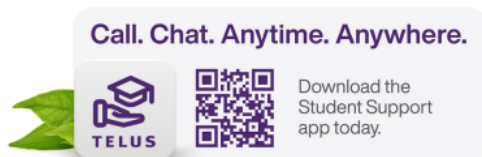
Academic Accommodations for Individuals with Disabilities: Texas A&M University-San Antonio is committed to providing all students with reasonable access to learning opportunities and accommodations in accordance with The Americans with Disabilities Act, as amended, and Section 504 of the Rehabilitation Act. If you experience barriers to your education due to a disability or think you may have a disability, Disability Support Services is located in the Central Academic Building, Suite 210. You can also contact us via phone at (210) 784-1335, visit us <https://www.tamusa.edu/Disability-Support-Services/index.html> or email us at dss@tamusa.edu. Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability-related needs with Disability Support Services and their instructors as soon as possible.

Academic Learning Center: The Academic Learning Center provides free course-based tutoring to all currently enrolled students at Texas A&M University-San Antonio. Students wishing to work with a tutor can make appointments through the Brainfuse online tutoring platform. Brainfuse can be accessed in the *Tools* section of Blackboard. You can contact the Academic Learning Center by emailing tutoring@tamusa.edu, calling (210) 784-1307, or visiting the Central Academic Building, room 202.

Counseling/Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the Student Counseling Center (SCC). To schedule an appointment, call 210-784-1331 or visit Madla 120.

All mental health services provided by the SCC are free and confidential (as the law allows). The Student Counseling Center provides brief individual and group therapy, crisis intervention, consultation, case management, and prevention services. For more information on SCC services visit tamusa.edu/studentcounseling

Crisis support is available 24/7 by calling the SCC at 210-784-1331 (after-hours select option '2'). Additionally, the TELUS Student Support App provides a variety of mental health resources to including support for in the moment distress, an anonymous peer to peer support network, mental health screenings, podcasts, and articles to improve your mental wellbeing.



Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio's mass notification. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update your information visit: <https://tamusa.bbcportal.com/>.

More information about Emergency Operations Plan and the Emergency Action Plan can be found here: <https://www.tamusa.edu/about-us/emergency-management/>. Download the SafeZone App (<https://safezoneapp.com/>) for emergencies or call (210) 784-1911. Non-Emergency (210) 784-1900.

Financial Aid and Verification of Attendance: According to the following federal regulation, 34 CFR 668.21: U.S. Department of Education (DoE) Title IV regulation, a student can only receive Title IV funds based on Title IV eligibility criteria which include class attendance. If Title IV funds are disbursed to ineligible students (including students who fail to begin attendance), the institution must return these funds to the U.S. DoE within 30 days of becoming aware that the student will not or has not begun attendance. Faculty will provide the Office of Financial Aid with an electronic notification if a student has not attended the first week of class. Any student receiving federal financial aid who does not attend the first week of class will have their aid terminated and returned to the DoE. Please note that any student who stops attending at any time during the semester may also need to return a portion of their federal aid.

Writing, Language, and Digital Composing Center: The Writing, Language, and Digital Composing Center supports graduate and undergraduate students in all three colleges as well as faculty and staff. Tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Our language tutors support students enrolled in Spanish courses and students composing in Spanish for any assignment. Our digital studio tutors support students working on digital projects such as eportfolios, class presentations, or other digital multimedia projects. Students can schedule appointments through JagWire under the Student Services tab. Click on “Writing, Language, and Digital Composing Center” to make your appointment. The Center offers face-to-face, synchronous online, and asynchronous digital appointments. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our website at <https://www.tamusa.edu/academics/>.

Meeting Basic Needs: Any student who has difficulty affording groceries or accessing sufficient food to eat every day or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to submit a CARE referral (<https://www.tamusa.edu/university-policies/Student-Rights-and-Responsibilities/file-a-report.html>) for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to direct you to available resources.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to visit the Office of Military Affairs for any question involving federal or state VA Education Benefits. Visit the Patriots’ Casa building, room 202, or to contact the Office of Military Affairs with any questions at military.va@tamusa.edu or (210)784-1397.

Religious Observances: Texas A&M University-San Antonio recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or course work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes.

The Six-Drop Rule: Students are subject to the requirements of Senate Bill (SB) 1231 passed by the Texas Legislature in 2007. SB 1231 limits students to a maximum of six (6) non-punitive course drops (i.e., courses a student chooses to drop) during their undergraduate careers. A non-punitive drop does not affect the student’s GPA. However, course drops that exceed the maximum allowed by SB 1231 will be treated as “F” grades and will impact the student’s GPA.

Statement of Harassment and Discrimination: Texas A&M University-San Antonio is committed to the fundamental principles of academic freedom, equal opportunity, and human dignity. To fulfill its multiple missions as an institution of higher learning, A&M-San Antonio encourages a climate that values and nurtures collegiality and the uniqueness of the individual within our state, nation, and world. All decisions and actions involving students and employees should be based on applicable law and individual merit. Texas A&M University-San Antonio, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, gender identity, gender expression, or pregnancy/parenting status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the appropriate offices within their respective units.

Texas A&M University-San Antonio faculty are committed to providing a safe learning environment for all students and for the university as a whole. If you have experienced any form

of sex- or gender-based discrimination or harassment, including sexual assault, sexual harassment, domestic or dating violence, or stalking, know that help and support are available. A&M-San Antonio's Title IX Coordinator can support those impacted by such conduct in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The university strongly encourages all students to report any such incidents to the Title IX Coordinator. Please be aware that all A&M-San Antonio employees (other than those designated as confidential resources such as counselors and trained victim advocates) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about a situation of sexual harassment, sexual violence, or other related misconduct, the faculty member must share that information with the university's Title IX Coordinator (titleix@tamusa.edu, 210-784-2061, CAB 439K). If you wish to speak to a confidential employee who does not have this reporting requirement, you can contact the Student Counseling Center at (210) 784-1331 or visit them in Madla 120.

Pregnant/Parenting Students: Texas A&M-San Antonio does not require a pregnant or parenting student, solely because of that status or issues related to that status, to (1) take a leave of absence or withdraw from their degree or certificate program; (2) limit the student's studies; (3) participate in an alternative program; (4) change the student's major, degree, or certificate program; or (5) refrain from joining or cease participating in any course, activity, or program at the University. The university will provide such reasonable accommodations to pregnant students as would be provided to a student with a temporary medical condition that are related to the health and safety of the student and the student's unborn child. These could include maintaining a safe distance from substances, areas, and activities known to be hazardous to pregnant individuals and their unborn child; excused absences because of illness or medical appointments; modified due dates for assignments; rescheduled tests/exams; taking a leave of absence; and being provided access to instructional materials and video recordings of lectures for excused absences, if these would be provided to any other student with an excused absence. Pregnant/parenting students are encouraged to contact the Title IX Coordinator with any questions or concerns related to their status (titleix@tamusa.edu; 210-784-2061; CAB 439K).

Texas A&M-San Antonio has also designated the Title IX Coordinator as the liaison officer for current or incoming students who are the parent or guardian of a child younger than 18 years of age. The Title IX Coordinator can provide students with information regarding support services and other resources.

Students' Rights and Responsibilities: The following statement of students' rights and responsibilities is intended to reflect the philosophical base upon which University Student Rules are built. This philosophy acknowledges the existence of both rights and responsibilities, which is inherent to an individual not only as a student at Texas A&M University-San Antonio but also as a citizen of this country.

Students' Rights

1. A student shall have the right to participate in a free exchange of ideas, and there shall be no University rule or administrative rule that in any way abridges the rights of freedom of speech, expression, petition and peaceful assembly as set forth in the U.S. Constitution.
2. Each student shall have the right to participate in all areas and activities of the University, free from any form of discrimination, including harassment, based on race, color, national or ethnic origin, religion, sex, disability, age, sexual orientation, gender identity, gender expression, and pregnancy/parenting or veteran status in accordance with applicable federal and state laws.

3. A student has the right to personal privacy except as otherwise provided by law, and this will be observed by students and University authorities alike.
4. Each student subject to disciplinary action arising from violations of university student rules shall be assured a fundamentally fair process.

Students' Responsibilities

1. A student has the responsibility to respect the rights and property of others, including other students, the faculty, and administration.
2. A student has the responsibility to be fully acquainted with the published University Student Rules found in the Student Handbook, [Student Code of Conduct](#), on our website, and University Catalog, and to comply with them, as well as with federal, state, and local laws.
3. A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.
4. A student has the responsibility to recognize the University's obligation to provide a safe environment for learning.
5. A student has the responsibility to check their university email for any updates or official university notifications.

We expect that students will behave in a manner that is dignified, respectful, and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation, or disability. Conduct that infringes on the rights of another individual will not be tolerated.

Students are expected to exhibit a high level of honesty and integrity in their pursuit of higher education. Students engaging in an act that violates the standards of academic integrity will find themselves facing academic and/or disciplinary sanctions. Academic misconduct is any act, or attempt, which gives an unfair advantage to the student. Additionally, any behavior specifically prohibited by a faculty member in the course syllabus or class discussion may be considered as academic misconduct. For more information on academic misconduct policies and procedures please review the Student Code of Conduct (<https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/documents/Student-Handbook-2022-23.pdf>) or visit the resources available in the OSRR website (<https://www.tamusa.edu/university-policies/student-rights-and-responsibilities/academic-integrity.html>).

SCHEDULE (Lecture) * All lecture slides will be provided (some reading chapters may be subject to minor change)

Calendar Day	Mode of Teaching	Topic	Reading
01/21/25	In person	Syllabus review/ Expectations	No reading
01/23/25	In person	Introduction and Model organisms	MB &SG-Ch 1
01/28/25	Guest lecture online	Parasite life cycle and development	Review paper
01/30/25	Material provided	Development tutorial and personhood quiz (extra points)	Link provided
02/04/25	In person	Genetic Regulation of Development	MB &SG -Ch 3 and OL&SD -Ch 3
02/06/25	In person	Genetic Regulation of Development	MB &SG -Ch 3 and OL&SD -Ch 3
02/11/25	In person	Review paper discussion on genetic regulation	Review paper
02/13/25	In person	Review for Exam 1 (01/21/25- 02/11/25)	
02/18/25	In person	Exam 1 (01/21/25- 02/11/25)	
02/20/25	In person	Signal transduction and cell communication	MB &SG – Ch 4 and OL&SD- Ch 3,6,7,9 and articles provided
02/25/25	In person	Signal transduction and cell communication	MB &SG - Ch4 and OL&SD- Ch 3,6,7,9 and articles provided
02/27/25	In person	Stem Cells in development	MB &SG - Ch5
03/04/25	In person	Stem Cells in research	Journal article
03/06/25	In person	Gametogenesis and Fertilization	MB &SG – Ch6,7
03/11/25	SPRING BREAK		
03/13/25			
03/18/25	In person	Gametogenesis and Fertilization	MB &SG – Ch6,7
03/20/25	In person	Beginning of a new organism	MB &SG – Ch7
03/25/25	In person	Review for Exam 2 (02/20/25- 03/20/25)	
03/27/25	In person	Exam 2 (02/20/25- 03/20/25)	Project topics
04/01/25	In person	Why plants are not animals?	OL&SD- Ch 2,10
04/03/25	In person	Developmental Plasticity and effect of environment	MB &SG – Ch25 and OL&SD- Ch 7,8
04/08/25	In person	Developmental Plasticity and effect of environment	MB &SG – Ch25 and OL&SD- Ch 7,8
04/10/25	In person	Evo devo of development	MB &SG – Ch26
04/15/25	In person	Evo devo of development	MB &SG – Ch26
04/17/25	In person	Review for Exam 3 (04/1/25- 04/15/25)	
04/22/25	In person	Student presentation	
04/24/25	In person	Student presentation	

04/29/25	In person	Student presentation	
05/01/25	In person	Exam 3 (04/1/25- 04/15/25)	
05/06/25	NO class study day		
05/08/25	No lecture		

SCHEDULE (Lab) **You must bring a laptop with access to internet

Calendar Day	Topic
01/22/25	Syllabus/ Expectation
01/29/25	No lab
02/05/25	Microscope use (virtual)+ Slide identification
02/12/25	Meiosis/mitosis (virtual)+ Slide identification
02/19/25	Aseptic technique+ Media plate prep
02/26/25	Soil prep+ Germination experiment
03/05/25	Sea Urchin embryology (virtual)+ Light and hormone effect on plant development initiation
03/19/25	Measurement of plant organs (Light and hormone effect), paper distribution
03/26/25	Measurement of plant organs (Light and hormone effect), seed sowing on plate
04/02/25	Measurement of plant organs (Light and hormone effect), recording gravitropism
04/09/25	Article presentation
04/16/25	Article presentation
04/23/25	Measurement of plant organs (Light and hormone effect), recording gravitropism
04/30/25	Epidermal cell development of seeds
05/07/25	No lab