

BIOLOGY OF DISEASE VECTORS
BIOL 4409 -4 credits
Texas A&M University San Antonio, College of Arts and Sciences
Fall 2026 Syllabus

Dr. Megan Wise, Science & Technology Building 311G, **Work phone:** 784-2218

e-mail: mwisedev@tamusa.edu

“Walk-in” Office hours: TBD

Or “By appointment”

Class Meeting Times and Location(s):

Lecture: Tuesdays and Thursdays 3:30-4:45pm

Recitation - **On-line**

Required Materials:

- There is no book required for this course, your power point lectures and the scientific articles assigned will serve as the content of the course.
- On-Line Components
 - Blackboard
 - The recitation activities will take place online via Blackboard (see description below)
 - Lectures will be posted on Blackboard prior to the scheduled lecture
 - Announcements regarding lectures, labs, assignments, quizzes, and grading will be posted on Blackboard
 - Grades for individual assignments/labs etc... will be posted on Blackboard as we go along.
 - ChatGPT free version – we will be working with AI as a tool to help but understand.
 - Library Guide for this course: [Library Guide for course](#)

Catalog Description and Prerequisites:

Biology of Disease Vectors the biology and ecology of arthropods that transmit medically important diseases. Students will gain an understanding of the complex relationship between vectors and the pathogens they transmit, specifically the physiological, evolutionary, and ecological relationship. Students will also learn applied and epidemiological aspects of aspects of this complex relationship. A mandatory recitation is associated with this course. Prerequisites: BIOL 2411 and ENGL 2311 Recommended BIOL 3407 and BIOL 3402. This is a writing intentional course

Learning objectives

1. Students will gain an understanding of the complex relationship between vectors and the pathogens they transmit, specifically the physiological relationship and the evolutionary relationship between pathogen and vector.
2. Students will also learn the tools used to study this complex relationship, the epidemiology of the diseases carried by vectors, and methods of control.

3. Students will understand how to critically evaluate peer-reviewed journal articles and synthesize concepts and ideas into a scientific literature review.
4. Students will develop and employ writing processes that are appropriate for the types of writing they will be asked to complete in the biological sciences.
5. Students will employ context-specific expectations of grammar, sentence structure, punctuation and spelling as key facets of effective scientific writing.
6. Students will engage in discipline-specific collaborative writing practices.
7. Students will understand ethical writing principles

Course content:

Lecture Section

TOPICS COVERED:

FOUNDATIONS & VECTOR BIOLOGY

- Introduction: arthropods and what makes a vector
- Evolution of arthropod disease vectors
- Mosquito biology: nutrition, blood feeding, host-seeking, olfaction & behavior
- Vector-pathogen interactions: midgut, salivary glands, endocrinology & immunity
- Other Dipteran vectors: sandflies, black flies, tsetse flies & biting midges
- Ticks, mites & kissing bugs
- Fleas, lice & bedbugs

DISEASE ECOLOGY, SURVEILLANCE & CONTROL

- Invasive species & emerging diseases
- Vector surveillance & epidemiology
- Chemical control & insecticide resistance
- Biological control
- Sterile insect technique
- Genetic control & emerging technologies
- Integrated vector management
- Climate, urbanization & future challenges in vector biology

3 Exams – (150 points each)

- Exams will be take-home essays and will cover lecture material, assigned scientific papers, and in-class discussions.
- Exams are to be completed individually using course materials (PowerPoints, scientific journal articles, and notes).
- Exams must represent each student's own work. The use of AI to generate exam answers is not permitted. See AI policy below.

Scientific Literature Review – (150 points)

- Students will complete a scientific literature review on a topic related to vector biology. The project will develop across the semester through a topic proposal, source set and preliminary thesis, structured outline, first draft, peer review, and final paper.
- Students will submit a brief topic proposal for approval. Individual meetings will be scheduled only when needed.
- Additional directions and expectations for each milestone will be provided.
- 3-Minute Research Briefing – (50 points)
At the end of the semester, students will give a 3-minute research briefing using one slide to summarize the question, major conclusions from the literature, a key figure or example, and an important unresolved issue.

- We will discuss appropriate and transparent uses of AI as a tool for understanding, organizing, and evaluating scientific literature. AI-generated writing may not substitute for the student's own synthesis.

Writing Workshops – (15 points each; points may vary by activity)

- Four workshops will support the literature review. Points associated with these will be based primarily on attendance, preparation, participation, and completion.
- Workshop preparation may occur during the online recitation period, while major synthesis and peer-review activities will occur in class.
 - Workshop I – Writing concisely, paraphrasing, and plagiarism
 - Workshop II – Finding, reading, and organizing scientific literature
 - Workshop III – Synthesis, themes, and thesis development
 - Workshop IV – Peer review and revision

On-Line Recitation Section

- The mandatory recitation provides the additional work expected for the fourth credit hour and supports preparation for scientific-paper discussions, current-event activities, and the literature review.
- Recitation activities will include reading assigned journal articles, examining figures, researching current vector-borne disease events, completing writing workshops, and working on literature-review milestones. Preparation completed during the online recitation will support discussion-based and application activities during class.
- Six peer-reviewed papers will be assigned across the semester. Students may use appropriate tools, including AI when permitted, to help understand and prepare for the papers, but must be able to interpret and discuss the science themselves in class.
 - Paper discussions and associated activities will be worth 15-20 points depending on the activity. They will focus on interpreting figures, identifying research questions and variables, evaluating whether conclusions are supported, connecting findings to course concepts, and proposing logical next steps. Activities will be graded primarily for preparation and participation.
- Assigned papers remain course content and may be included on take-home exams.

Current Events / Vector News

- Four times during the semester, the class will examine a recent vector-borne disease event, outbreak, invasive-vector report, resistance issue, or emerging control technology.
- Students will connect the event to vector/pathogen/host biology, disease ecology, surveillance, and control concepts. Current-event activities will be worth 10 and will be graded primarily for preparation and participation.

Policies & Suggestions for Success:

- Come to class regularly and on time
- Take notes directly on the PowerPoints (hard copies or smart tablet) – this will be imperative to doing well on the take-home exams
- Ask questions in class
- Be an active participant

- Display mutual respect for all in the classroom, including me.

Lecture Attendance:

- **Attendance is expected** and points for attendance will be assessed for any in-class workshops/writing assignments/peer-review days/presentation days

Make-up Policies:

- Exams are take-home over the course of 3-4 days and they are submitted through blackboard, therefore make-up accommodations are limited (see below).
- In-class activities and paper discussions require participation on specific days and thus cannot be made up. However, see make-up policies below.
- Due dates for anything assigned will be strictly enforced and for every day it is late 10% will be docked.
- Due to the nature of most assignments and exams as described in the course content, the acceptable situations for make-up accommodations are:
 - Hospitalization
 - Hospitalization of an immediate family for which you are the primary caretaker.
 - Incapacitating illness, such as COVID
 - Any others – please contact me and we can discuss, I can be flexible up to a point, but reserve the right to deny.

Grading

Your final grade will be based on the total number of points earned divided by the total number of points available.

If the class average at the end of the semester is less than 70%, I will institute a course scale.

Therefore, I will not be scaling exams or assignments during the course of the semester. However, throughout the course of the semester, you will be informed of your standing. A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F = below 60%

AI Policies

Use of Generative AI Permitted Under Some Circumstances or With Explicit Permission

There are situations and contexts within this course where you may be asked to use artificial intelligence (AI) tools to explore how they can be used. Outside of those circumstances, **you should not use AI tools to generate content (text, video, audio, images) that will end up in any student work (exams, assignments, activities, discussion responses, etc.) that is part of your evaluation in this course. Any student work submitted using AI tools should clearly indicate with attribution what work is the student's work and what part is generated by the AI. In such cases, no more than 25% of the student work should be generated by AI.** If any part of this is confusing or uncertain, students should reach out to their instructor for clarification before submitting work for grading. Use of AI-generated content without the instructor's permission and/or proper attribution in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

Week / Dates	Lecture Topics	Recitation / Application	Literature Review / Major Due Dates
1 Aug 25–27	Introduction: What Makes a Vector? Arthropods; vector-borne disease; vector competence/capacity; introduction to mosquitoes	Introduction to reading scientific papers; no graded paper assignment	Introduce literature review
2 Sep 1–3	Mosquito Biology I Nutrition, blood feeding, host-seeking, olfaction & behavior	Paper Discussion 1: Mosquito behavior/host choice	
3 Sep 8–10	Mosquito Biology II Midgut, salivary glands, endocrinology, pathogen–vector interactions	Current Event 1: Vector News	Topic brainstorming
4 Sep 15–17	Other Dipteran Vectors Sandflies, black flies, tsetse flies, biting midges	Paper Discussion 2: Non-mosquito vector	Topic proposal due
5 Sep 22–24	Unit I synthesis and review	No recitation deliverable	EXAM I assigned Friday, Sep 25; due Monday, Sep 28 by midnight
6 Sep 29–Oct 1	Ticks, Mites & Kissing Bugs	Paper Discussion 3: Vector–pathogen interaction	Workshop 1: Writing concisely, paraphrasing & plagiarism
7 Oct 6–8	Fleas, Lice, Bedbugs + Vector Immunity	No written recitation assignment	Workshop 2: Finding, reading & organizing scientific literature Begin assembling literature
8 Oct 13–15	Disease Ecology, Invasive Species & Emerging Disease	Current Event 2: Emerging disease/outbreak case	Source set + preliminary thesis due
9 Oct 20–22	Vector Surveillance & Epidemiology	Paper Discussion 4: Surveillance/disease ecology	Workshop 3: Synthesis, themes & thesis
10 Oct 27–29	Unit II synthesis and review	No recitation deliverable	EXAM II assigned Friday, Oct 30; due Monday, Nov 2 by midnight
11 Nov 3–5	Chemical Control & Insecticide Resistance	Current Event 3: Resistance/control issue	Structured outline / writing progress
12 Nov 10–12	Biological Control & Sterile Insect Technique	Paper Discussion 5: Vector control	Writing time

13 Nov 17–19	Genetic Control & Emerging Technologies	Paper Discussion 6: Genetic/novel control	FIRST DRAFT DUE
14 Nov 23–27	THANKSGIVING BREAK	No class / no recitation	
15 Dec 1–4	Integrated Vector Management; Where Is Vector Biology Going? Climate, urbanization, emerging pathogens, new technologies; course synthesis	Current Event 4 + 3- minute Research Briefings	Workshop 4: Peer review/revision FINAL LITERATURE REVIEW DUE by Friday, Dec 4
Finals Dec 7–11	No regular classes	—	EXAM III take-home; assigned after last class and due during finals week (exact deadline TBD)