Fall 9-1-2020

BIOM 227.01: Vectors and Parasites

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Syllabus
BIOM 227: Vectors and Parasites

I. COURSE INFORMATION:

- CRN: 73801
- Credits: 3
- Term: Fall 2020
- Day/time: T/R; 2:00PM-3:20PM
- Building/room: Gallagher 106
- Zoom links: Tuesdays; Thursdays

II. INSTRUCTOR CONTACT INFORMATION:

- Brent Ryckman
- Department: Division of Biological Sciences
- Office: Interdisciplinary Science Building (ISB) 215
- Phone (Lab): 406-243-6948
- Email (preferred): brent.ryckman@mso.umt.edu

- Office hours: By appointment. Email me to schedule.

III. COURSE SUMMARY:

A. Course Description:

- This course will present a survey of the biology, transmission dynamics, prevention and control of medically significant pathogens (bacterial, viruses, and protozoans) that are transmitted by arthropod vectors.
- Basic overview information for each unit topic will be given by the instructor in lecture format. The students will then elaborate on the material by formulating discussion questions, independently exploring these questions outside of class time using internet or other resources, and then participating in class discussions.
- Beyond familiarizing students with topics relating to vector-borne infectious diseases, this class will encourage students to practice critical and creative thinking skills with regard to modes of investigation, inquiry, questioning and the nature of scientific knowledge and so called “facts.”

B. Prerequisite knowledge:

- College-level general biology is recommended, but not required.

C. Textbook and other informational resources:

- There is no textbook for this class. Basic, overview information will be presented in unit lectures, and associated slideshows will be posted on Moodle for reference. In addition, students will find their own resources (e.g., internet) to explore the discussion questions formulated by the class.

D. Attendance:

- Given the discussion nature of the course, will be almost impossible to do well without regular attendance and participation in the discussions. In the event of unavoidable, long-term absences, contact the instructor to find a solution.

E. Basic Course Design

- Overview unit lectures (1-2 class periods each)
- Immediately following each unit lecture, students will submit 2 questions (one discrete and one abstract; see Section IV, below) to a provided Moodle-link (for credit)

- Instructor will curate one question of each type from among those submitted for the class to independently explore using internet and/or other information resources.
- Students submit provisional, written answers/discussions to a provided Moodle-link (for credit)
- In-class discussion of the questions based on students independent research (for credit)
- Note that this course design will result in overlap between units; i.e., while students are independently exploring questions related to one unit, the lectures will move on to the next unit.

IV. INVESTIGATION AND INQUIRY (some philosophical considerations for science and learning)

A. **Quotes on inquiry, questioning and the nature of advancing knowledge.**

- On openness or resistance to new ideas
  - Enrico Ferimi (1901-1954; quantum physicist; source unclear)
    - "Never underestimate the joy people derive from hearing something they already know".
- On being with questions.
  - Albert Einstein; (source unclear);
    - "It's not that I'm so smart, it's that I stay with problems longer"
  - Rainer Maria Rilke; from "Letters to a Young Poet" ca. 1905.
    - "Be patient toward all that is unsolved in your heart and try to love the questions themselves…"
  - Kwai Chang Caine; from the TV series "Kung Fu" (late 1970s)
    - "I seek not to know all the answers, but to understand the questions."
- On "truth", "facts" and advancing knowledge.
  - Pierre Teilhard de Chardin; from "The Phenomenon of Man" (1955).
    - "….the history of the living world can be summarized as the elaboration of ever more perfect eyes within a cosmos in which there is always something more to be seen."
  - Albert Einstein; (source unclear)
    - "Creating a new theory is not like destroying an old barn and erecting a skyscraper in its place. It is rather like climbing a mountain, gaining new and wider views, discovering unexpected connections between our starting points and its rich environment. But the point from which we started out still exists and can be seen, although it appears smaller and forms a tiny part of our broad view gained by the mastery of the obstacles on our adventurous way up."

B. **Types of questions (not always mutually exclusive, or as clearly delineated as presented here, and there are other ways of thinking about questions)**

- Discrete questions
  - Clearly seeking an "answer".
  - May help bring clarity to a subject, but also narrows the asker's viewpoint and generally restricts creativity.
  - Typically constrained by the asker's prior held assumptions and beliefs.
  - Types of discrete questions
    - Clarification
    - Informational/factual
    - Logical "next step"
    - More detail or depth
    - Often phrased with "what, when, how, where, etc".
- Abstract questions. (not the same as a "rhetorical question").
  - Not necessarily intended to elicit a clear answer.
  - Can expand the asker's viewpoint and promote creativity
  - Can move beyond the asker's held assumptions and beliefs
  - Types of abstract questions

        - exploratory
        - leading
        - thought experiment questions
        - paradoxes and apparent contradictions.
        - Can nucleate new “discrete” questions.
        - Often phrased with “why”.

C. **The nature of answers in science (and in life generally, perhaps)**

- Models, theories, laws, principles, facts, etc.
    - Are these explanations or descriptions of phenomena?
    - Are these statements of “universal truth” of “objective fact”?
        - What demonstrates or defines something as “true”?
        - If a theory or model cannot be proven universally “true”, does that make it necessarily “false”?
    - Are these tools? if so, what can they be used for?
        - Engineering applications, problem solving (assuming they are “true enough”).
        - Formulating new questions
    - Do these influence the new observations we make?
        - Charles Darwin; The Life and Letters of Charles Darwin, 1898
            - “…without the making of theories, I am convinced there would be no observation”
        - 1660: Ruben de la Vialle graffiti’ed his name over prehistoric cave paintings
            - There was no developed theory, model or conception of “prehistoric human” or that they might paint pictures of animals etc.
            - Perhaps de la Vialle thought he was the first human ever to access that cave, and thus was not intellectually open to “seeing” the prehistoric painting for what they really were.
        - Werner Heisenberg (quantum physicist; “Physics and Philosophy, 1958).
            - “We have to remember that what we observe is not nature in itself, but nature exposed to our method of questioning.”
        - Anonymous (all of use inherently operate this way at least at times)
            - “I’ll see it when I believe it!”
- Does a theory or model need to be “universally true” in order to be useful?
    - Example: consider the evolution of the major theories in physics.
        - Newtonian mechanics (addresses everyday human scale)
        - Relativity theory (addresses the vast scale of celestial body)
        - Quantum theory (addresses the intestinally small, subatomic scale)

V. ASSIGNMENTS, ASSESSMENTS, AND GRADING:

A. **“My Discussion Question” (2 points per unit)**

- At the end of a unit lecture, students will submit 2 questions to the Moodle-link provided.
    - One discrete question
    - One abstract question
        - For description of types of questions, see section IV
- File formats accepted: MS WORD, PDF, Text/edit, Pages
- Due date: upload within 24 hours of the relevant unit lecture.
- Grading
    - 1 point per question submitted
    - For full credit, questions must be
        - Submitted on time (within 24 hours of end of unit lecture)
        - Pertain to the unit material (at discretion of the instructor)
        - Fit with the definition of discrete and abstract questions presented in section IV above (at discretion of the instructor).

B. **"My Discussion Answers" (6 points per unit)**

- Instructor will curate the student submitted questions and choose one of each type (discrete and abstract) for the students to independently explore using outside resources.
- Students will write a short discussion of their findings, and upload to the Moodle link provided.
- The goal is not necessarily to find an "answer" but rather to explore the topic from different angles. (see section IV above).
- File formats accepted: MS WORD, PDF, Text/edit, Pages
- Submissions must include
    - Restatement of each question
    - Citation of the source(s) used, such that someone (i.e., the instructor) could access.
- Due dates; may vary between 2-7 days after questions made available. Must be submitted before the planned in-class discussion for full credit.
- Grading
    - 3 pts for each question answered/discussed
    - For full credit assignments must be:
        - submitted on time (before the planned in-class discussion).
        - original ("copy and pasting" from the internet will not be accepted; and while students may work together, each must provide their own discussion/analyses).
        - Demonstrative of effort
            - Recommended answer lengths (not including restatements of questions or source citations)
                - Discrete question "answers": approx. 20-100 words
                - Abstract question discussions: approximately 250 - 500 words.

C. **Discussion participation (12 points total)**

- To avoid discussion being dominated by a minority of eager students, the instructor will call on specific students at least once in the semester to begin the discussion session.
- For full credit, students must offer a beginning discussion that demonstrates adequate preparation. OR participate in the discussion initiated by other "called upon" students; again participation must demonstrated preparation (i.e., making it up "on the fly" will be noted).

D. **Final presentation/project "Vector bone disease and climate change" (50 points total for semester)**

- Students will research and prepare a short presentation (10 min) on a topic that creatively relates vector-borne diseases to global climate changes.
- Students are encouraged to draw on their individual backgrounds and interested to explore links between vector-borne diseases and climate change beyond the typically acknowledged links such as shifting habitat ranges of vector species.
- See provided scoring rubric for more details on expectations and evaluation criteria.
- This project will come in the last month of semester. Class meeting times will be used for students to report their progress and ideas and receive feedback from their peers and the instructor.
    - Grading
        - Attendance/participation in preparative discussion/feedback sessions
        - Peer evaluation of presentations (evaluation rubric provided by instructor)
        - Final presentation: Aggregate score of peer evaluations, weighted towards the instructor's evaluation.

E. **Exams (approximately 70 points total for semester)**

- 2 Exams; approximately 35 pts each.
- Dates to be determined.
- Exam scope and format
    - Exams will cover material presented in unit lectures as well as points that arise in the "My Question/Answer" discussions.

- Combination of multiple choice, true/false, matching, fill in the blank and short answer/essay questions.

F. **Learning outcomes. Students should be able to:**

1. Discuss considerations of host-parasite interactions
2. List the major human diseases transmitted by arthropod vectors
3. Distinguish the vector-borne human diseases that are caused by viruses, bacterial and protozoan pathogens
4. List the major arthropods that serve as vectors of human disease pathogens for humans and animals
5. Compare and contrast intervention approaches that vector, the pathogen, and the disease host
6. Discuss the implications of climate change on vector-borne diseases
7. Formulate discrete and abstract questions based on information presented in unit lectures
8. Perform independent research of information sources such as the internet to explore questions arising from lecture material.

G. **Grading (approximate; subject to change):**

	Semester total per assessment tool	Percent of final grade
My Discussion Questions	12	6.7
My Discussion Answers	36	20
Exams	70	39
Participation	12	6.7
Final presentation	50	28
Semester Total	180	100

Final grade	**Final Score**	**Percentage**
A	**167 - 180**	**93-100**
A-	**162 - 166**	**90-92**
B+	**156 - 161**	**87-89**
B	**149 - 155**	**83-86**
B-	**143 - 148**	**80-82**
C+	**139 - 142**	**77-79**
C	**131 - 138**	**73-76**
C-	**126 - 130**	**70-72**
D+	**121 - 125**	**67-69**
D	**113 - 119**	**63-66**
D-	**108 - 112**	**60-62**
F	**< 108**	**< 60**

VI. Disability Services

If you are a student with a disability and wish to request reasonable accommodations for this course, contact me privately to discuss the specific modifications. Please be advised, I may request that you provide a verification letter from Disability Services for Students. If you have not yet registered with Disability Services, located in Lommasson Center 154, please do so in order to coordinate your reasonable modifications. For more information, visit the Disability Services website at **www.umt.edu/disability**.

VII. UM CULTURAL LEAVE POLICY

Cultural or ceremonial leave allows excused absences for cultural, religious, and ceremonial purposes to meet the student's customs and traditions or to participate in related activities. To receive an authorized absence for a cultural, religious or ceremonial event the student or their advisor (proxy) must submit a formal written request to the instructor. This must include a brief description (with inclusive dates) of the cultural event or ceremony and the importance of the student's attendance or participation. Authorization for the absence is subject to approval by the instructor. Appeals may be made to the Chair, Dean or Provost. The excused absence or leave may not exceed five academic calendar days (not including weekends or holidays). Students remain responsible for completion or make-up of assignments as defined in the syllabus, at the discretion of the instructor.