COURSE SYLLABUS for BIO 4460 – PARASITOLOGY
4credit hours; Fall 2017
IMPORTANT NOTE: THIS SYLLABUS IS SUBJECT TO CHANGE AT THE DISCRETION OF THE INSTRUCTOR

Instructor: Dr. Tamara J. Cook **Office**: PPTR 189E or LDB 300
Phone: 294-1557 **Email**: tcook@shsu.edu
Office Hours: Mon-Thu 8:00 - 10:30 a.m. (probably in LDB 300); or by appointment

LOCATION & TIME: Lecture: LDB 215, MWF 11:00 – 11:50
Lab Section 02: LDB 139, M 3:00- 5:50 p.m.
Lab Section 03: LDB 139 W 3:00 – 5:50 p.m.

EVALUATION:

3 Lecture Exams @ 100 pts	300 pts
Comprehensive Essays	50 pts
3 Mystery Case Studies @ 50 pts	150 pts
Journaling Assignments @ 25 pts	100 pts
Laboratory Notebook	200 pts
TOTAL POSSIBLE POINTS	**800 PTS**

GRADING: A = 720+ B = 640-719 C = 560-639 D = 480-559 F < 480

LECTURE TEXT: *Foundations of Parasitology*, 8th or 9th edition
You must bring your textbook to ALL laboratory sessions.

COURSE CONTENT: Parasitology is an introduction to the biological relationship known as parasitism. Although there are many different types of parasites, our discussions will focus primarily on parasites that cause disease in humans. Lectures are intended to be dynamic, interactive presentations/discussions of the general biology of selected parasites. I feel that my role as instructor is to be a guide to learning rather than simply a dispenser of knowledge. Your active participation in the course will provide you with a basic, comtemporary understanding of the material.

Lectures focus on the morphology, life cycles, physiological adapatations, evolution, ecology and distribution of the major parasitic organisms of humans. Parasitology is really an interdisciplinary course, encompassing the fields of pathology, immunology, ecology, entomology, epidemiology, evolution, ecology, and systematics. Thus, you will not only learn about parasites but you will gain valuable knowledge of related disciplines.

Laboratory exercises focus on morphology, anatomy, and classification of parasites. We will concentrate on diagnostic life cycle stages and all labs will include extensive drawing of examined material.

COURSE OBJECTIVES: To learn and understand the principles of parasitology through acquisition of: 1) a basic working vocabulary, 2) the ability to diagnose parasitic infections, 3) knowledge of the theories and principles, and 4) the intellectual tools that allow students to apply facts and concepts to novel situations.

PREPARATION AND EXPECTATIONS: You are expected to attend all lecture and laboratory sessions. Parasitology is an advanced course that will demand careful preparation and study, and as such, attendance is absolutely essential for success in meeting the basic course requirements. Further, the lectures are drawn from a wide variety of sources including the primary literature. The textbook serves as a reference, but the course does not directly track its content. I operate on the assumption that you actively participate in your own education and therefore I also assume that you are doing your part to prepare for class by completing the appropriate textbook reading. Because of the quantity of material we cover in this class, it will be to your advantage to keep up on your readings and to regularly attend lecture. Because your laboratory notebook is a significant portion of your grade (25%) and because the scheduled lab time is the ONLY time you will be able to complete assignments, there are obviously serious penalties for missing labs!

COURSE EVALUATION

LECTURE EXAMINATIONS (350 POINTS): There will be three lecture exams (100 points each) consisting of a combination of fill in the blank, short answer, and essay questions taken from lecture material and reading assignments. They will require you to not only recall definitions and facts, but to also understand their meaning and context and to synthesize information from more than one lecture. The third exam will be given during the regularly scheduled final exam time and in addition to the 100 points for the regular lecture exam, there will be 50 points worth of comprehensive essay questions.

MYSTERY CASE STUDIES (150 POINTS): Three times during the semester I will provide you with a slide of a "mystery" parasite that we do not cover in lecture or lab and an accompanying scenario regarding the person or animal from which it was collected. Your task will be to identify the parasite and answer several questions about infection with this parasite. Adequate responses will require independent consultation with the primary literature and appropriate websites. Your responses to case study questions are to be typewritten. Each case study is worth **50 points**.

JOURNALING ASSIGNMENTS (100 POINTS): Four times during the semester I will present you with various scenarios about which you will need to compose short (400-1200 word) essays. These assignments are designed to help you identify common themes in parasitology, help you learn important concepts and integrate information from across lectures, and promote deeper thinking about these important concepts and common themes. Each Journal Assignment is worth **25 points**. Detailed instructions are provided in **Appendix A.**

LABORATORY NOTEBOOK (200 POINTS): You are to prepare, **in lab**, a set original drawings of lab material **as you observe it** and solve several case studies of parasitic infections. We may look at some parasites that we do not cover in lecture. In this event, you will also be required to provide some written information about these species. Detailed instructions and other important information for the laboratory portion of this course are provided in **Appendix B.**

MISCELLANESOUS IMPORTANT STUFF

ACADEMIC HONESTY: All students are expected to engage in academic pursuits in a manner that is above reproach. Students are expected to maintain complete honesty and integrity in the academic experiences both in and out of the classroom. Please read the University's Policy at this link: Academic Dishonesty Policies

USE OF ELECTRONIC DEVICES: During exams, cell phones and any other equipment capable of receiving, recording and/or transmitting information, must be put away in a book bag or purse. In short, it must not be readily accessible or accessed during an exam. ***If I even SEE such devices during an exam, I will take this as defacto evidence of cheating and you will receive a zero for that exam and may fail the course.*** **Cell phones are not permitted in lecture.** However, you may use your cell phone in lab to look up information regarding parasites or to take photos of the slides you are examining. It is up to the discretion of the TA to confiscate your phone if he deems you are using it for puposes other than those already mentioned. Laptops are permitted in both lecture and lab for note taking purposes, looking up information pertaining to case studies, etc…, but again it is up to my discretion and that of the TA if you are using laptops for purposes other than parasitology!

CLASSROOM RULES OF CONDUCT: Students are expected to assist in maintaining a classroom environment that is conducive to learning. Students are to treat faculty and students with respect. Students may tape record lectures and/or take notes using a laptop computer ***provided they do not disturb other students in the process***.

STUDENT ABSENCES ON RELIGIOUS HOLY DAYS: Students are allowed to miss class and other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. Students remain responsible for all work. *See Student Syllabus Guidelines*.

TENTATIVE LECTURE SEQUENCE: The following schedule is a list of the lecture sequence. The numbers in parentheses represent the number of lecture periods I intend to spend on each topic and the corresponding chapter in the 9th edition of *Foundations of Parasitology*. I assume that you will follow this schedule in preparing for class and completing the appropriate textbook reading.

Course Introduction (3, chapters 1-3)

Grading; significance of parasitism in world affairs; general principles and concepts; transmission; factors influencing parasitism; outcomes and implications of parasitism
Outline of "areas of responsibility" for selected groups of parasites

Introduction to the protozoa (1, chapter 4)

Terminology, structures, major life cycle events, and systematics

Amoebae (2, chapter 7)

General: structure, life history
Amebiasis: course of infection, pathology, diagnosis and treatment
Epidemiology: of intestinal amoebae
Commensal amoebae: why they matter
Various opportunistic parasitic amoebae

Flagellates (intestinal and urogenital) (2, chapter 6)

General: structure, life history

Hemoflagellates of humans (4, chapter 5)

General: structure and life history
Trypanosomes: trypanosomiasis & world affairs, African and American trypanosomiasis
Leishmania: Kala azar, cutaneous and mucocutaneous

LECTURE EXAM 1 (SEPTEMBER 25, 2017)

Apicomplexa (3, chapter 8)

General: anatomy, structure, life history
General Coccidiosis: economic impact in animals, role as human pathogens
Toxoplasma, Eimeria & Cryptosporidium: epidemiology and course of infection

***Plasmodium* (4, chapter 9)**

General: life history and course of infection
Malaria: pathology, symptoms, treatment and prognosis
Malaria and human affairs
Current research on malarial control

Introduction to Trematoda (1 chapters 13, 15, 17-18)

General: Adult anatomy/ reproductive biology; life cycles/development

Trematdoes (4, chapters 17-18)

Liver flukes: life histories, epidemiology, and pathology
Lung flukes: life histories, epidemiology, and pathology
Others time permitting

LECTURE EXAM 2 (OCTOBER 25, 2017)

Schistosomes (4, chapter 16)

General: course of infection, histopathology, treatment and prognosis
Schistosomiasis and human affairs: antigenic mimicry
Ecological models: approaches to parasite control
Cercarial dermatitis

Cestodes (4, chapters 20-21)

General: life history patterns among cestodes
Pseudophyllidea of humans: dibothriocephaliasis and sparganosis
Cyclophyllidiea of humans: Taenia, Echinococcus, and *Dipylidium*
Larval tapeworms: human disease
Others time permitting

Nematodes (5, chapters 22-30)

Enterobia: clinical manifestations, treatment/prognosis, parasitism & human institutions
Trichinella: course of infection, diagnosis/treatment, epidemiology, moral implications
Intestinal nematodes of humans: the diseases, intestinal nematodes and human nutrition
Hookworm disease
Filariasis: course of infection, pathology, treatment and control

LECTURE EXAM 3 & COMPREHENSIVE ESSAYS (DECEMBER 6, 2017 FROM 12:00-2:00 P.M.)

TENTATIVE LABORATORY SCHEDULE

WEEK OF		
Aug	28	Discussion of lab requirements and review of microscope skills
	4	*No Lab: Labor Day Holiday*
Sep	11	Parasitic and Commensal Amoebae
	18	Finish Parasitic and Commensal Amoebae/Mystery Parasite #1
	25	Intestinal and urogenital flagellates
Oct	2	Hemoflagellates
	9	Apicomplexa
	16	Protozoan Case Studies
	23	Trematoda— diagnostic stages/Mystery Parasite #2
	30	Trematoda— adult anatomy
Nov	6	Cestoda
	13	Nematoda/Mystery Parasite #3
	20	*No Lab: Thanksgiving Holiday*
	27	Helminth Case Studies

IMPORTANT DATES

What?	Date Assigned	Date Due
Journal Entry #1	Aug 30	Sep 13
Exam 1		Sep 25
Mystery Case Study #1	Sep 18/20 in lab	Oct 2/4 in lab
Laboratory Notebook #1		Oct 16/18 in lab
Exam 2		Oct 25
Journal Entry #2	Oct 20	Nov 3
Mystery Case Study #2	Oct 23/25 in lab	Nov 6/8 in lab
Journal Entry #3	Nov 3	Nov 17
Mystery Case Study #3	Nov 13/15 in lab	Nov 27/9 in lab
Laboratory Notebook #2		Nov 27/29 in lab
Journal Entry #4	Nov 17	Dec 6
Exam 3		Dec 6

APPENDIX A
JOURNALING ASSIGNMENTS

THE WHY

Because parasitology is such an interdisciplinary field of study (encompassing pathology, immunology, ecology, entomology, epidemiology, evolution, ecology, and systematics), there is not nearly enough time in a single semester to delve too deeply into any one of these areas for a given parasite. As you will quickly learn, despite the diversity of parasites, common themes will emerge. These "Journaling" assignments are designed to: 1) help you identify these common themes, 2) help you learn important concepts and integrate information from across lectures, and 3) promote deeper thinking, especially about issues of epidemiology and control. For example, despite the fact that *Entamoeba histolytica* is a protozoan parasite of the large instestine and *Clonorchis sinensis* is a trematode parasite of the liver, you will discover remarkable similarities in many aspects of epidemiological considerations.

THE WHAT

- Four times during the semester (see schedule of important dates in the syllabus) I will present you with various scenarios about which you will need to compose short (400-1200 word) essays.
  - Why have I asked you to write a precise number of words for each entry (or why so few)?
  - As you revise your thoughts down to the exact number of words permitted in each entry, you force yourself to be precise in your communication.
  - The ability to communicate in precise, succinct language with clarity of thought is incredibly important in science writing (and in many other situations as well)
- I will post assignments on Blackboard and you will turn in your essays via the Journal function Specific details vary with assignment and will be provided in the assignment instructions.
- All assignments must be posted by the stated deadline; NO EXCEPTIONS
- All entries must be typed, double spaced in 11 point Times New Roman or Calibri

THE EVALUATION

- Each Journal Assignment is worth 25 points and will be evaluated using the following criteria:
  - ✓ **25 points**—journal entry is superior: it is readable and thorough, but doesn't just summarize information; writer exhibits confident understanding of the concepts and issues; concepts are well explained for the intended audience; ideas are developed enough to provide a truly helpful explanation to readers; sources are cited; and there are almost no errors in spelling, punctuation, or grammar; journal entry was written in appropriate style.
  - ✓ **20 points**—journal entry is average: it is readable but less thorough, includes some summarizing of information; writer will reveal to the instructor that (s)he probably understands the concepts, but the lack of clarity in the writing or lack of fully developed explanations means that this entry would not teach the concept to new learners; these journal entries are usually "you know what I mean" essays (someone who already understands the concepts can tell that the writer probably does too but someone who does not already understand the concepts would not learn anything from the explanation; sources are cited; several to many errors in spelling, punctuation, or grammar; journal entry was written in appropriate style.
  - ✓ **15 points**—journal entry has all of the elements outlined for a 20 point essay, but was not written in the appropriate style and/or has a many spelling, punctuation, and grammar errors that make it difficult to determine how much the writer understands.
  - ✓ **10 points**—journal entry indicates minimal engagement with the material; may be difficult to read, incomplete or all summary; writer fails to demonstrate understanding of the concepts and issues, or the number of spelling, punctuation, or grammar errors is so high that the instructor cannot determine how much the writer understands.
  - ✓ **0 points**—no journal entry posted or not posted by the deadline.
- All journal entries will be read and graded within one week of posting
- I will post comments back to you: **If your assignment earned < 25 (but > 0), I will allow you one week to rewrite your entry, responding to my comments, for regrading.**
- Follow this link for an excellent explanation of the difference between summarizing and synthesizing! https://drsaraheaton.files.wordpress.com/2010/09/difference-between-summarizing-and-synthesizing.pdf

APPENDIX B

INFORMATION FOR PARASITOLOGY LABORATORY

The laboratory portion of this course is essentially *diagnostic parasitology*. Thus, it is designed to teach you the basics of identification of common parasites & commensals of humans. There is no required laboratory manual. I will provide you with the necessary information, **but you must bring your textbook to ALL laboratory sessions. I will not help anyone who does not have their textbook with them and open to the appropriate page!**

Our microscopes are almost brand new and they cost ~ $2000 each!!!! Thus, it is imperative that you are familiar with good microscope practices, therefore we will spend some time during the first lab period reviewing basic skills. You are responsible for the microscope and slides you examine this semester. I know how many slides of each specimen we have and I expect that there will be the same number at the end of the lab period as there was at the beginning. Of course, an occasional slide is inadvertently broken during the semester and we have budgeted for that. However, I ask you to please be particularly careful when handling the slides. One common way of misplacing and/or breaking slides is to accidently leave them on the stage of your microscope at the end of the class period, or lying on your open text book. So, you are NOT allowed to have more than one slide at your station at a a time and PLEASE check your microscope stage before you leave at the end of each laboratory period.

The lab portion of this course meets on Monday and Wednesday afternoons from 3:00 –5:50 p.m in LDB 139. Although I may occasionally schedule some open lab times it is unwise to count on having acesss to the material at any time other than your scheduled laboratory time. It is extremely important that you come to every lab, stay for the entire lab, and complete all of your work during our regularly scheduled lab time. If you have another course that conflicts with a portion of the laboratory, then you simply need to make a decision about which course you want to take. A duplicate laboratory will NOT be created for you, and a duplicate laboratory practical will NOT be created for you. Again, do not ask. This is probably a no brainer for most of you, but I receive multiple requests for these types of special favors each year. You may NOT take slides or microscopes out of the laboratory or to another room and you may NOT be in this room unless I am present. The way I see it, if you miss a class, you can either 1) study intensely during the next laboratory to make up the material, or 2) drop the course.

YOU MAY ONLY ATTEND THE LAB SECTION FOR WHICH YOU ARE REGISTERED

During some laboratories, demonstrations may be set up to supplement the slide collections. These demonstrations generally consist of specimens either too valuable or too rare to allow you to look at them at your own work station. And they may be demonstrations of parasites that we do not cover in lecture. Demonstrations will be set up for ONE laboratory period only and you will be tested over this material.

It was pretty much impossible to have lecture and lab topics coinicide. However, I generally will have at least introduced every major group in lecture prior to looking at it in lab. Therefore, if you prepare well for lecture, you will be prepared for lab. At the very least, it will be helpful, and will save laboratory time, if you briefly review each group of parasites before coming to lab. Believe me, it reduces confusion on your end and helps to reduce blood pressure on my end.

REQUIREMENTS FOR LAB NOTEBOOK

- **LAB DRAWINGS**: You are to prepare, **in lab**, a set original drawings of lab material **as you observe it**. (This portion of your lab notebook is worth 100 points).
  - At the beginning of each lab session, you will be provided with a list of species and instructions for labeling.
  - Although there is not a separate lab manual for this course you are required to purchase the following:
    - ✓ Pencil with #3 or #4 lead (NOT #2); can be found at Office Depot or Hobby Lobby
    - ✓ A 1 inch, three ring binder
    - ✓ A good eraser
    - ✓ High quality, 8½ x 11, heavy, white paper; NOT printer paper or artists drawing paper. The paper you need is often called "card stock" and some book stores stock an acceptable type called "biology drawing paper"
    - ✓ Ruler
  - This portion of your lab notebook is worth 100 points)

- **CASE STUDIES**: To help you begin synthesizing information from lecture and laboratory, twice during the semester, once when we have completed the protozoans (about mid-semester) and once when we have completed the worms (very near the end), I will provide you with several unlabeled slides of the appropriate diagnostic stage of various parasites we have examined in lab along with patient information.
  - You will be given an entire lab session to formulate solutions to various questions posed about these parasitic infections
  - Your responses should be legibly written on the answer sheet provided and included in your laboratory notebook
  - This portion of your laboratory notebook is worth 100 points.

- **FORMAT, GRADING AND DUE DATES**
  - You will turn in your lab notebook twice during the semester
    - ✓ Week of October 16th and November 27
  - The drawing portion of the notebook is worth 100 points
    - ✓ Your drawings **will not** be graded for artistic merit!
    - ✓ Your drawings **will** be graded on content and format
    - ✓ Did you draw what you were supposed to? Was everything labeled correctly? Are your drawings in the correct order? (In other words, can you follow instructions?!?!).
  - The case studies portion of the notebook is worth 100 points
    - ✓ Responses to qustions posed in this assignment must be in grammatically correct, complete sentences in legible handwriting
    - ✓ Responses are to be inserted into your notebook immediately following your drawings of that material
    - ✓ i.e. protozoan drawings followed by responses to protozoan case studies; helminth drawings followed by ressponses to helminth case studies

APPENDIX C
WRITING IN THE SCIENCES

GENRES OR WHO IS YOUR AUDIENCE: How you write depends a great deal on who you are writing for. In the sciences there are typically three genres, or writing styles that you should be comfortable with.

1. **Popular**—this is a scholarly and educated form of writing, yet one that is clearly understood by those outside of science. There is a limited use of technical terms and they are defined when used. It reads eloquently and does not use slang, first person, or informal expressions. A good example of this sort of writing would include writing found in popular science magazines (e.g. National Geographic, Discover, or Scientific American).
2. **Academic**—this is the style which scientists use when communicating information about new developments (i.e. results of original research experiments or observations) or clarifying scientific questions (i.e. review articles or opinion pieces in certain journals. Technical terms are used frequently and are only defined if they are not common in that discipline or are being used in a new way. Technical terminology is used frequently, and terms standard to the discipline are not defined or explained. A parasitologist writing a research article on the immune response to *Plasmodium* assumes that the reader is educated in this area of parasitology. Precision of language is very important in this type of writing.
3. **Professional/Technical**—this is the advanced writing style in which we write colleague to colleague in the professional scientific world. Usually no explanations of terms are presented and technical jargon is used frequently. The writing often refers to broad concepts that are familiar to all of the readers.

EXAMPLES: Below are examples of the main writing styles. Note that the academic style is the most informative. Although most science writing is in the academic style, I realize that not all of you are going to become academics and thus a few of your journal assignments are designed to give you practice in efficiently communicating in other styles.

1. **Popular:** "Trypanosomes are only one of many parasites inside the people of southern Sudan. If you could travel *Fantastic Voyage*-style through their skin, you would probably come across marble-sized nodules where you'd float past coiled worms as long as snakes and as thin as threads. Called *Onchocerca volvulus*, these animals, male and female, spend their ten-year-long lives in these nodules, making thousands of babies. The babies leave them and travel within the skin, in the hope that they'll gt taken up in the bite of a black fly."
   From: *Parasite Rex* by Carl Zimmer ©2000
2. **Academic**: In addition to *Trypanosoma brucei rhodesiense*, *Onchocerca volvulus* is also very prevelant in South Sudan; occasionally outbreaks occur in which the prevalence may reach 85%. *Onchocerca volvulus* adults are characteristically knotted together in pairs or groups that form nodules in subcutaneous tissue. As a result of the host's immune response, they become encapsulated by host fibrous tissue, mainly composed of collagens with numerous blood vessels located throughout the nodules. Females are typically 230 mm to 500 mm long and 250 µm to 450 µm wide while the males are only 16 mm to 42 mm long and 125 µm to 200 µm wide. The posterior end of the male has two spicules, is curled ventrally and lacks alae. Females are ovoviparous and may realase thousands of unsheathed microfilariae which remain in the skin. *Simulium* spp. serve as the intermediate host and become infected when taking a blood meal. The mouthparts of *Simulium* spp. are not adapated for deep piercing, so much of their diet consists of tissue juices.
3. **Professional Technical:** *Onchocerca volvulus* is prevalent in South Sudan. Adults in skin nodules, may reach 500 mm long and elicit a strong, fibrotic immune response. Females are ovoviparous, releasing thousands of unsheated microfiliariae that remain in the skin to be ingested by species of *Siululim* as they are taking a blood meal.

Follow this link for an excellent explanation of the difference between summarizing and synthesizing!
https://drsaraheaton.files.wordpress.com/2010/09/difference-between-summarizing-and-synthesizing.pdf