COURSE CODE: BIOL 3866

COURSE TITLE: Parasite Biology

NO. OF CREDITS: 3

LEVEL: III

PREREQUISITES:
BIOL1263 Living Organisms II or BIOL1261 Diversity of Organisms or (BIOL1065 Diversity of Plants and Animals and AGR11012 Microbiology) and either BIOL 2XXX Physiology of Animals or BIOL2862 Animal Physiology

ANTI-REQUISITE: BIOL2864 - Parasitism

COURSE DESCRIPTION

The course Parasite Biology is divided as follows:

- **The study of individual parasites**: It is only through the study of a parasite’s biology and functions that steps can be taken to fight it.
- **The study of host-parasite relationships**: Disciplines which investigate how the host and parasite(s) interact include Physiology, Biochemistry, Cell Biology, and Pharmacology.
- **Immunology**: This deals with the immunological response that is triggered in the host and the ways in which the parasite attempts to evade it. Disciplines include Cellular and Molecular Immunology.
- **Chemotherapy**: This area investigates the effect of drugs on both the parasite and the host, as well effective treatments to ensure the death of the parasite and the recuperation of the host. Disciplines include Organic Chemistry, Pharmacology, Biochemistry and Medicine.
- **Epidemiology**: This field looks at the spread of parasitic diseases through study of the host, parasite and vectors. Disciplines include Tropical Hygiene, Entomology and Geographical distribution.

This course will be taught using a mixture of lectures, seminars and projects, team oral presentations, individual essays, reading materials and seminar-style classes, laboratory session to reinforce lectures and for hands on experience identifying, understanding form and function, and evolutionary processes. Course assessment will be based on a student seminar and an essay on
current topics in parasitism together with lab exercises on form and function, and evolutionary processes. A final examination will be used to ensure student learning objectives are achieved.

**COURSE RATIONALE**
Parasitism is a very successful way of life. All of the major groups of animals have parasitic members and 50% of all known animal species are parasitic at some stage of their life cycle. One of the fascinations of parasites is the complexity of their life cycles, involving one, two, three or even four consecutive hosts and alternating between vertebrate hosts and invertebrate hosts and between terrestrial and aquatic environments. Therefore parasitic adaptations are responses to features in the parasite environment and this environment is the body of another organism, the host. In addition, approximately 15 million people still die each year from infectious diseases; most living in developing countries. Six diseases are considered most detrimental to human health by the World Health Organization, of which five are caused by parasites and are vector-borne. Consequently, control of parasites should be integrated with the life cycle of the parasite, the host and the environment.

**INSTRUCTOR INFORMATION**
Prof. Dave D. Chadee
Natural Sciences Bldg New Wing Room 216, phone 662-2002 ext 83740
Dave.Chadee@sta.uwi.edu
Office hours: Monday and Tuesday from 9.00-1200 Noon

**LETTER TO THE STUDENT**
Dear Student,

Welcome to BIOL 3…. The journey from the first day of class to your final day will be filled with awe and wonder of how such small organisms have adapted and survived for millennia. In addition, we will study of the relationship between two specific types of organisms, i.e. the parasite and the host. We will explore the evolutionary aspects of all these interactions between organisms, that is, when there is an exchange of food and shelter. I will therefore guide you through this process and the understanding of parasitism as a way of life.

Sincerely,
Dave D. Chadee
Professor of Environmental Biology

**CONTENT:** (1) Fundamental concepts of Parasitology: morphology, lifecycle, transmission, pathology and control of selected protozoon, helminth and arthropod parasites of humans and
domesticated animals: laboratory diagnostic techniques, parasite ecology and evolution, parasite immunology; epidemiology of ectoparasite infections in the Caribbean region. These concepts will be taught through lectures on the following topics: Introduction to Protozoan parasites including Malaria, African and American Trypanosomiasis and Leishmaniasis; Parasites of the Intestines including Nematodes, Cestodes and Trematodes; Life Cycles of Parasites; Host Specificity, Parasite Immunity, Parasite Diagnosis and Control; Adaptation/ Evolution of Parasitism, Ectoparasites; Environmental Parasitology; Evidence Based Parasitology. Practical classes take place in both laboratory and field. Reading in Parasitism and the development of evolutionary adaptation hypotheses, a laboratory manual will be used to facilitate the learning process.

(2) Laboratory-based exercises will include identification/diagnosis of a range of parasite infections of humans and domesticated animals

GOALS/AIMS

The course aims to provide a solid grounding in both theory and practice of parasite biology. The goals of the Lectures and laboratory sessions are to:

1. study individual parasites, their life cycles, characteristic features as they relate to function
2. study host-parasite relationships and the role physiology, biochemistry, cell biology and pharmacology plays in establishing these relationships
3. study the immune response that is triggered in the host and the way in which these parasites attempt to evade it
4. investigate the effects of chemotherapy on both parasites and host
5. determine the susceptible stages of these parasites for developing control/intervention strategies
6. examine the spread of parasitic diseases through the study of host-parasite-vector relationships
7. examine the evolutionary processes which have lead to the success of parasites and parasitism as a way of life
8. review parasites found in the Caribbean and Latin American region.

LEARNING OUTCOMES

At the end of this course, students will be able to:

1. Characterize the global diversity of parasites and discuss putative reasons for their diversity.
2. Define and describe parasitism, mutualism, symbiosis and endosymbiosis to convey a basic understanding of these topics.
3. Describe, analyze and discuss the main features of parasite-host relationships.
4. Analyze and access the reasons for parasites success and survival.
5. Outline, analyze and evaluate the different parasites life cycle strategies.
6. Characterize the major ectoparasites found in the Caribbean region and compare them with respect to gross structure and way of life.
7. Characterize, analyze and access the immunological response that is triggered in response to parasites, the use of diagnostic methods and development of control strategies.

ASSIGNMENTS
The theory coursework, accounting for 10% of total marks, will be a Seminar and an Essay on current topics of parasitism and will be allotted in mid February. Essay submission by each student will be at the end of the semester.

COURSE ASSESSMENT
Practical coursework
Lab book ... 25%
Theory coursework
One in-course test ... 5%
Assigned Seminar/essay account ... 10%
Final theory exam ... 60%

EVALUATION
The Department of Life Sciences takes the quality control of its courses very seriously. Students who have comments on one or another aspect of a course are encouraged to communicate these to the instructors. More formal feedback is sought through the Staff-Student Liaison Committee, which meets twice per semester. This departmental committee comprises elected student representatives from each course in the given semester. In addition, the university conducts a confidential written evaluation of most courses and their instructors toward the end of each semester.

TEACHING STRATEGIES
Teaching methods
Lectures, Projects using the Team Approach, Team Oral presentations, Individual Essays, Reading materials and Seminar Style Class, Laboratory session to reinforce lectures and for hands on experience identifying, understanding form and function, and evolutionary processes.

A combination of teaching strategies will be use including

- Case studies
- Interactive Lectures
- Seminars
- Projects
- Group Discussions
Learning Strategies

- Interviews
- Internet
- Library literature search
- myeLearning.

The course comprises 18 one-hour lectures, six one-hour tutorials and eight three-hour practical sessions. Tutorials are about collective problem solving with minimal lectures-review by the instructor. However, lectures always have a certain tutorial aspect, so that the instructor will often pose questions to members of the class and will expect answers. Where a given topic arises both in a practical exercise and in lecture, every effort is made to provide answers.

Students are expected to read widely especially the materials available in the university library, on the internet and on myeLearning, as an extension of the lecture notes.

RESOURCES
Suitable reading matter can be found in the university library, on the internet and on myeLearning. The library has several relevant textbooks of general Parasitology and a good set of books on the taxonomy, ecology and behaviour of parasites.

Practical exercises in the lab will utilize a wide range of standard equipment and materials. The course manual and laboratory manual are placed on MyElearning

READINGS


COURSE CALENDAR

<table>
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<tr>
<th>Week</th>
<th>Practical</th>
<th>Lectures/tutorial</th>
<th>Assignments</th>
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<tr>
<td>1</td>
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<td>Introduction to the course, Course overview and course requirements</td>
<td>Lab report due</td>
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|   |   | The nature of parasites and their success  
|   |   | Tutorial: Estimating the global species richness of parasites |
| 2 | Morphology of the different groups of parasites | Introduction to Protozoan parasites including Malaria, African and American Trypanosomiasis and Leishmaniasis |
|   |   | Lab report due |
| 3 | Parasites of the Intestines including Nematodes, Cestodes and Trematodes  
|   |   | Tutorial: The impact of these parasites on health and wellbeing |
| 4 | Geographical distribution of parasites and their host | Life Cycles of Parasites |
|   |   | Lab report due |
| 5 | Host Specificity  
|   |   | Tutorial: Parasite Adaptation to Hosts |
| 6 | Investigate the different stages of the life cycle of parasites | Parasite Immunity |
|   |   | Lab report due |
| 7 |  | Parasite Diagnosis and Control;  
|   |   | Tutorial: What is evidence based Parasitology |
| 8 | Determine the various mechanisms of infections and special features | Ectoparasites - Ticks and Mites |
|   |   | Lab report due |
| 9 |  | Ectoparasites-Fleas and Tungiasis  
|   |   | Tutorial: Ectoparasitic insects |
| 10 | Compare and contrast the different morphological features and their adaptation to different environments | Environmental Parasitology |
|   |   | Lab report due |
Evolutionary survey of major parasite orders
Tutorial: Developing control strategies

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<td>Investigate the various diagnostic methods available for identification of parasites</td>
<td>Investigate the various diagnostic methods available for identification of parasites</td>
<td>Review of the lectures, clarifying course issues and reviewing holistically the course content.</td>
</tr>
<tr>
<td>Seminar/Lecture - Selected Topic</td>
<td>Seminar/Lecture - Selected Topic</td>
<td>Assigned Seminar/essay account</td>
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ADDITIONAL INFORMATION
Attendance is not recorded at lectures and tutorials, but missing them is not a good idea. Attendance at practical exercises is mandatory, and the student should report any excusable absence promptly (in advance, if this is feasible).

HOW TO STUDY FOR THIS COURSE
Lectures provide a necessary focus for studying, but they do not by any means provide the entirety of what should be learned. Rather, the student should take lecture material as a point of departure in extensive outside reading. This supplemental material deepens one’s understanding of principles treated rather summarily in lecture and provides illustrations of these principles.

It is a good idea to bring your copy of the course manual not only to lab but to lecture as a matter of course. It includes summaries of all lectures and a number of illustrations and appendices to which reference will be made in lecture.

ADDITIONAL INFORMATION

- Attendance is compulsory and an attendance register will be kept for these sessions. Failure to attend may result in a 10% deduction of marks from the assessment assignments.
- Monitoring time spent on the project. Students are advised to arrange exact dates with their supervisors and to keep a record of key discussion points and decisions. Time spent on the project activities should be recorded.
- Students are hereby informed that plagiarism is forbidden and all unsupervised coursework items must be accompanied by a Coursework Accountability Statement in order to be assessed.
Specific items may require submission through Turnitin on myeLearning. Refer to ‘University Regulations on Plagiarism’ available from http://sta.uwi.edu/resources/documents/Exam_Regulations_Plagiarism.pdf