



## Course Syllabus

### **MLAB 1231 – Parasitology/Mycology**

**Catalog Description:** A study of the taxonomy, morphology, and pathogenesis of human parasites and fungi, including the practical application of laboratory procedures, quality control, quality assurance, and safety.

**Prerequisites:** Enrollment in this course and the Medical Laboratory Technology Program require department head approval and successful completion of the admissions process. Students must be accepted into the MLT Program.

**Semester Credit Hours:** 2

**Lecture Hours per Week:** 1

**Lab Hours per Week:** 4

**Contact Hours per Semester:** 80

**State Approval Code:** 5110040000

**Instructional Goals and Purposes:** The purpose of this course is to introduce parasitology and mycology to the student. The student will learn to identify and classify fungi and parasites, as well as correlate their presence with disease states.

#### **Learning Outcomes:**

1. Apply principles of safety, quality assurance, and quality control.
2. Evaluate specimen acceptability.
3. Describe basic morphology and physiology of parasites and fungi.
4. Classify parasites and fungi.
5. Perform appropriate laboratory techniques used in the processing of specimens and identification of parasites and fungi.
6. Evaluate and correlate test results with patient condition(s).

#### **Specific Course Objectives (includes SCANS):**

After studying all materials and resources presented in the course, the student will be able to:

(Lab objectives are listed in *italics*.)

1. **Chapter 1 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Define parasite, obligatory parasite, vector, commensalism, symbiosis, infective stage, diagnostic stage, host, life cycle.
  - b. List the body areas that may be affected by parasites.
  - c. Describe the most common symptom of a parasitic infection.
  - d. *Identify the three groups of clinically significant parasites*
2. **Chapter 2 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Explain the role of patient information in the diagnosis of malaria.
  - b. Identify the specimen used and the procedures included in an O&P.
  - c. *Describe the procedures used in the microscopic examination of stool.*
  - d. *Discuss the purpose of a wet prep examination.*
  - e. *Describe the cellophane tape preparation and the organism it is used to detect.*

3. **Chapter 3 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Identify and describe the characteristic structures of the trophozoite form of *Entamoeba histolytica*.
  - b. Identify the associated symptoms, diseases, route of transmission, and specimen of choice for *Naegleria fowleri*.
  - c. Identify the associated symptoms, diseases, route of transmission, and specimen of choice for *Acanthamoeba* sp.
  - d. Describe the differentiating characteristic(s) of *Iodamoeba butschlii*.
  - e. Explain the feature that differentiates amebas from other unicellular protozoa.
  - f. Compare and contrast trophozoites and cysts.
  - g. Describe the common ways humans acquire amebic infections.
  - h. Differentiate between pathogenic and non-pathogenic amebas.
  - i. *Identify internal features of amebic cysts on a slide: cell wall, nucleus, chromatid bars, ingested red cells, and glycogen mass.*
4. **Chapter 4 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. *Determine the specimen of choice and alternative specimen types as well as appropriate diagnostic technique for the recovery of *Trichomonas vaginalis*.*
  - b. List the disease states and symptoms associated with *Giardia intestinalis* (lambia).
  - c. Discuss the lifecycle of flagellates (in general).
  - d. List the flagellate(s) associated with crowded living conditions, poor sanitation, and poor personal hygiene.
  - e. *Describe the general features of flagellates.*
5. **Chapter 5 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. List the diagnostic form *Leishmania* sp and *Trypanosoma* sp.
  - b. *Describe the appearance of hemoflagellates on blood smears.*
  - c. *Differentiate between amastigotes, promastigotes, epimastigotes, and trypomastigotes.*
  - d. *Identify the specimen of choice for the isolation of hemoflagellates.*
6. **Chapter 6 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Explain the role of patient information in the diagnosis of malaria.
  - b. Describe the similarities between *Plasmodium vivax* and *Plasmodium ovale*.
  - c. List the disease states and symptoms associated with *Plasmodium falciparum*.
  - d. Describe the various vectors for the transmission of malaria.
  - e. Identify the vector of transmission for *Babesia*.
  - f. *Identify the ring forms of Plasmodium.*
7. **Chapter 7 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Discuss the vector of transmission for toxoplasma.
  - b. Name the specimen of choice for identifying *Blastocystis* sp.
  - c. *Discuss the distinctive feature (and motility) of the *Blantidium coli* trophozoite and cyst form.*
  - d. Discuss the symptoms of Toxoplasmosis and the groups at high risk.
8. **Chapter 8 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Describe the mechanism of human infection of the following: pinworms, round worms, hookworms, and whipworms.
  - b. Describe the characteristic shape of adult nematodes.
  - c. *Describe the lifecycle and specimen used for diagnosis of the *Trichina* worms and Guinea worms.*
  - d. Give the Genus and species for each of the following: Pinworm, Hookworm, Whipworm, Guinea worm.
9. **Chapter 9 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Define nocturnal, subperiodic, and diurnal periodicity.
  - b. Compare and contract Calabar swellings and elephantiasis.
  - c. *Describe how filarial disease is diagnosed in the laboratory.*
10. **Chapter 10 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Describe how humans are infected by *Taenia saginata* and *Taenia solium*.
  - b. Describe the common physical characteristic shared by Cestoda.
  - c. Define the common geographic locations of Cestodes.

11. **Chapter 11 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Describe the physical characteristics of *Fasciolopsis buski*.
  - b. Explain common problems/infections caused by *Fasciola hepatica*.
  - c. Explain the reason *Clonorchis* has become endemic in China.
12. **Chapter 12 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. List parasites that are commonly mistaken for white blood cells due to their size and shape.
  - b. Explain the similarities and differences between vegetable spirals and helminth larvae.
13. **Chapter 13 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Define arthropod and list their characteristics.
  - b. Name the organism that causes scabies.
  - c. Define the infection that may be caused by the brown recluse spider.
  - d. Describe how to defend yourself against malaria-carrying arthropods in endemic areas.
  - e. Describe how cockroaches may affect the health of humans.
14. **Mycology (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv, v. 2a-i, iii. 2c-i, ii, iii, iv.)**
  - a. Discuss the characteristics of the fungi.
  - b. Correctly identify and describe the following:
    - i. Hyphae
    - ii. Mycelium
    - iii. Septate hyphae
    - iv. Aseptate hyphae
  - c. Discuss stains used for fungus: Cellulose, Lactophenol blue, gram stain, India ink, etc
  - d. Describe and recognize the following types of asexual reproductive structures (pg. 399 chart):
    - i. Blastospores
    - ii. Chlamydoconidia
    - iii. Arthroconidia
    - iv. Sporangiospores
  - e. Describe and recognize the following types of sexual reproductive structures:
    - i. Ascospores
    - ii. Basidiospores
    - iii. Zygospores
  - f. Describe typical colonial textures and topographies.
  - g. List and describe four general considerations for proper fungal specimen collection.
  - h. Justify the importance of the direct examination of clinical specimens of fungi.
  - i. State the purpose and describe the process of each:
    - i. Saline Wet Mount
    - ii. Lactophenol cotton blue
    - iii. Potassium hydroxide (KOH) preparation
  - j. List three types of primary fungal isolation media and state the purpose of each.
  - k. Identify the following dermatophytes that cause superficial mycoses from prepared slides or pictures (pg 410-411 chart):
    - i. *Microsporum gypseum*
    - ii. *Microsporum canis*
    - iii. *Microsporum audouinii*
    - iv. *Trichophyton mentagrophytes*
    - v. *Trichophyton rubrum*
    - vi. *Trichophyton tonsurans*
    - vii. *Epidermophyton floccosum*
  - l. Describe the different types of tinea and the organisms associated with each.
  - m. Describe the clinical significance and identify yeast and budding yeast from slides or pictures.
  - n. Discuss the clinical significance and identify from pictures or slides these fungi that cause subcutaneous mycoses:
    - i. *Cladosporium carrionii*
    - ii. *Fonsecaea pedrosoi*
    - iii. *Phialophora verrucosa*
    - iv. *Sporothrix schenckii*

- o. Discuss the clinical significance and identify from pictures or slides the fungi that cause systemic mycoses:
    - i. *Blastomyces dermatitidis*
    - ii. *Coccidioides immitis*
    - iii. *Histoplasma capsulatum*
    - iv. *Penicillium marneffie*
  - p. Discuss the significance and identify the opportunistic fungi from prepared slides or pictures:
    - i. *Rhizopus*
    - ii. *Asbidia*
    - iii. *Mucor*
    - iv. *Aspergillus*
    - v. *Penicillium*
  - q. Define the following: Superficial, Subcutaneous, systemic, rhizoids
- 15. Lab #1 Objectives (1a-i,ii,iii,iv,v. 1b-ii,iii,iv,v,vi. 1c-i,ii,iv,v. 2a-iii. 2c-i,ii,iii,iv)**
- a. Define parasite.
  - b. Describe the appearance of *Trichomonas vaginalis*.
  - c. Name the definitive host of *Toxoplasma gondii*.
  - d. Describe how *Trichomonas vaginalis* is transmitted.
  - e. Name the causative agent of "Montezuma's revenge."
  - f. Define the trophozoite stage of sporozoan parasites.
  - g. Describe the transmittance of *Plasmodium* (malaria) including the vector.
  - h. Describe the appearance of *Giardia lamblia*.
  - i. Describe the appearance of the four different forms of Hemoflagellates (*Promastigote*, *Epimastigote*, *Trypomastigote*, and *Amastigote*).
- 16. Lab #2 Objectives (1a-i,ii,iii,iv,v. 1b-ii,iii,iv,v,vi. 1c-i,ii,iv,v. 2a-iii. 2c-i,ii,iii,iv)**
- a. Identify eggs of worms that have a "spine."
  - b. Identify the egg form of *Enterobius vermicularis* (pin worms).
  - c. Describe the infection cycle of *Enterobius vermicularis*.
  - d. Identify the simple test used to detect pin worms.
  - e. Describe the appearance of *Sarcoptes Scabiei* (itch mites/scabies).
  - f. Name the "artifact" commonly mistaken for *Taenia* eggs in stool.
  - g. Name and define the three distinct features common to all adult tapeworms.
  - h. Name and describe the appearance of Nematoda worms in their juvenile state.
  - i. Name the transparent covering on some filariae.
  - j. Describe common symptoms of *Ascaris lumbricoides* infection.
  - k. Describe the characteristics of filariae.
- 17. Lab #3 (Mycology) Objectives (1a-i,ii,iii,iv,v. 1b-ii,iii,iv,v,vi. 1c-i,ii,iv,v. 2a-iii. 2c-i,ii,iii,iv)**
- a. Name the stain commonly used to identify fungi.
  - b. Describe the appearance and significance of budding yeast.
  - c. Identify and/or differentiate *Aspergillus*, *Penicillium*, and *Rhizopus* on a slide.
  - d. Name the benefits of doing a direct mount for fungus in the clinical laboratory.
  - e. Identify the reason for using KOH on skin specimens for fungi.
  - f. Define "opportunistic pathogen."
  - g. Define "pseudohyphae."
  - h. Differentiate between yeast and mold (fungi).

#### Course Content:

A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

**Methods of Instruction/Course Format/Delivery:** This is a mainly online course so it will require a lot of outside proactive work by the student. The instructor will provide guidance as needed.

The student will be evaluated by assignments, quizzes, cases, and exams as assigned by the instructor outside of the classroom.

The student will be required to complete *proctored examinations*. This may require the student to come to a Panola College testing Center or take the exam online with a proctoring program as directed in the course by the instructor.

Laboratories will take place on three pre-determined Saturdays during the semester and will be mandatory. During the laboratories the students will be evaluated by case studies, in-lab assignments, and lab practicals as assigned by the instructor.

### **Major Assignments / Assessments:**

The following items will be assigned and assessed during the semester and used to calculate the student's final grade.

#### **Assignments**

1. Homework Assignments
2. Pre-Lab quizzes
3. Case Assignments
4. In lab assignments
5. Quizzes

#### **Assessment(s):**

1. Major Exams
2. Final Exam
3. Practical

### **Course Grade:**

The grading scale for this course is as follows:

#### **Lecture Grade = 2/3 of grade**

- Major Exams 50%
- Quizzes 15%
- Homework Assignments 20%
- Final Exam 15%

#### **Laboratory = 1/3 of grade**

- Pre-Lab Quizzes 10%
- Case Assignments 20%
- In-Lab Assignments 20%
- Practical 50%

### **Texts, Materials, and Supplies:**

- Zeibig, Elizaeth A., *Clinical Parasitology: A Practical Approach*, Elsevier, 2nd Ed. ISBN: 978-1-4160-6044-4
- Delost, Maria (2015). *Introduction to Diagnostic Microbiology for the Laboratory Sciences*. 15th Edition. Jones & Bartlett. ISBN: 9781284032314 or new edition (9781284199734)

### **Required Readings:**

- Zeibig, Elizaeth A., *Clinical Parasitology: A Practical Approach*, Elsevier, 2nd Ed. ISBN: 978-1-4160-6044-4
- Delost, Maria (2015). *Introduction to Diagnostic Microbiology for the Laboratory Sciences*. 15th Edition. Jones & Bartlett. ISBN: 9781284032314 or new edition (9781284199734)

**Recommended Readings:**

- NONE

**Other:**

- For current texts and materials, use the following link to access bookstore listings: <http://www.panolacollegestore.com>
- For testing services, use the following link: <http://www.panola.edu/elearning/testing.html>
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Administration Building or go to <http://www.panola.edu/student-success/disability-support-services/> for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook, *The Pathfinder*: <http://www.panola.edu/student-success/documents/pathfinder.pdf>

**More Information:****Laboratory Dress Code**

The student will be expected to attend class clean and neatly dressed in long pants or scrubs and wear closed-toe shoes. A laboratory coat will must be worn snapped or buttoned up during all laboratory sessions. Hair that is shoulder length or longer must be worn up or securely tied back. Gloves must be worn when handling biological materials.

**Behavioral Conduct**

While a student is representing Panola College as a Medical Laboratory Technology student, they will be expected to conduct themselves in such a manner as to reflect favorably on themselves and on the Program. If a student acts in such a manner as to reflect immature judgment or disrespect for others, the student will be called before the MLT Department Chair for determination of their status in the Program. Inappropriate conduct is grounds discipline and may be cause for immediate probation or dismissal from the Program.

**Academic Dishonesty**

Under no circumstances shall a student submit work that is not their own. Copying answers for study questions, cheating on exams and/or submitting laboratory results which are not your own are expressly prohibited.

**Time Commitment**

According to "Hints on How to Succeed in College Classes"

<http://astrosociety.org/edu/resources/success.html> you should budget your time per week for this three hour credit course as follows:

1. Reading assigned text 1 to 2 hours
2. Homework assignments 3 to 5 hours
3. Time for review and test preparation 2 hours
4. Total study time per week 6 to 9 hours PER WEEK

## SCANS CRITERIA

### 1) **Foundation skills are defined in three areas: basic skills, thinking skills, and personal qualities.**

- a) **Basic Skills:** A worker must read, write, perform arithmetic and mathematical operations, listen, and speak effectively. These skills include:
  - i) Reading: locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules.
  - ii) Writing: communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.
  - iii) Arithmetic and Mathematical Operations: perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
  - iv) Listening: receive, attend to, interpret, and respond to verbal messages and other cues.
  - v) Speaking: Organize ideas and communicate orally.
- b) **Thinking Skills:** A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively. These skills include:
  - i) Creative Thinking: generate new ideas.
  - ii) Decision Making: specify goals and constraints, generate alternatives, consider risks, and evaluate and choose the best alternative.
  - iii) Problem Solving: recognize problems and devise and implement plan of action.
  - iv) Visualize ("Seeing Things in the Mind's Eye"): organize and process symbols, pictures, graphs, objects, and other information.
  - v) Knowing How to Learn: use efficient learning techniques to acquire and apply new knowledge and skills.
  - vi) Reasoning: discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.
- c) **Personal Qualities:** A worker must display responsibility, self-esteem, sociability, self-management, integrity, and honesty.
  - i) Responsibility: exert a high level of effort and persevere toward goal attainment.
  - ii) Self-Esteem: believe in one's own self-worth and maintain a positive view of oneself.
  - iii) Sociability: demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
  - iv) Self-Management: assess oneself accurately, set personal goals, monitor progress, and exhibit self-control.
  - v) Integrity and Honesty: choose ethical courses of action.

### 2) **Workplace competencies are defined in five areas: resources, interpersonal skills, information, systems, and technology.**

- a) **Resources:** A worker must identify, organize, plan, and allocate resources effectively.
  - i) Time: select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
  - ii) Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
  - iii) Material and Facilities: Acquire, store, allocate, and use materials or space efficiently. Examples: construct a decision time line chart; use computer software to plan a project; prepare a budget; conduct a cost/benefits analysis; design an RFP process; write a job description; develop a staffing plan.
- b) **Interpersonal Skills:** A worker must work with others effectively.
  - i) Participate as a Member of a Team: contribute to group effort.
  - ii) Teach Others New Skills.
  - iii) Serve Clients/Customers: work to satisfy customer's expectations.

- iv) **Exercise Leadership:** communicate ideas to justify position, persuade and convince others, responsibly challenge existing procedures and policies.
- v) **Negotiate:** work toward agreements involving exchange of resources, resolve divergent interests.
- vi) **Work with Diversity:** work well with men and women from diverse backgrounds.

Examples: collaborate with a group member to solve a problem; work through a group conflict situation, train a colleague; deal with a dissatisfied customer in person; select and use appropriate leadership styles; use effective delegation techniques; conduct an individual or team negotiation; demonstrate an understanding of how people from different cultural backgrounds might behave in various situations.

- c) **Information:** A worker must be able to acquire and use information.

- i) **Acquire and Evaluate Information.**
- ii) **Organize and Maintain Information.**
- iii) **Interpret and Communicate Information.**
- iv) **Use Computers to Process Information.**

Examples: research and collect data from various sources; develop a form to collect data; develop an inventory record-keeping system; produce a report using graphics; make an oral presentation using various media; use on-line computer data bases to research a report; use a computer spreadsheet to develop a budget.

- d) **Systems:** A worker must understand complex interrelationships.

- i) **Understand Systems:** know how social, organizational, and technological systems work and operate effectively with them.
- ii) **Monitor and Correct Performance:** distinguish trends, predict impacts on system operations, diagnose deviations in systems' performance and correct malfunctions.
- iii) **Improve or Design Systems:** suggest modifications to existing systems and develop new or alternative systems to improve performance.

Examples: draw and interpret an organizational chart; develop a monitoring process; choose a situation needing improvement, break it down, examine it, propose an improvement, and implement it.

- e) **Technology:** A worker must be able to work with a variety of technologies.

- i) **Select Technology:** choose procedures, tools or equipment including computers and related technologies.
- ii) **Apply Technologies to Task:** understand overall intent and proper procedures for setup and operation of equipment.
- iii) **Maintain and Troubleshoot Equipment:** Prevent, identify, or solve problems with equipment, including computers and other technologies.

Examples: read equipment descriptions and technical specifications to select equipment to meet needs; set up and assemble appropriate equipment from instructions; read and follow directions for troubleshooting and repairing equipment.