Proposal Title: CLS Infectious Disease Laboratories

**Department Chair: M. Lorraine Torres**
I have read the enclosed proposal and approve this proposal on behalf of the department.

Signature

4/26/17

**College Curriculum Committee Chairperson: Lorraine Torres**
I have read the enclosed documents and approve the proposal on behalf of the college curriculum committee.

Signature

5-17-17

**College Dean: Osama Mikhail**
I have read the enclosed documents and approve the proposal on behalf of the college. I certify that the necessary funds will be allocated by the college in support of this proposal.

Signature

5-18-17

**Graduate Council/Undergraduate Curriculum Committee**
Council Action:
- [ ] Approved
- [ ] Returned to the College

Date of Action Report:

Signature, Chairman

Date
Undergraduate Curriculum Committee Memo

Date: 4/26/2017
From: M. Lorraine Torres, Clinical Laboratory Science Program Director
Through: Lori Torres, College of Health Sciences Academic Affairs Committee
Through: Osama Mikhail, College of Health Sciences, Interim Dean
To: Jacen Moore, Chair, Undergraduate Curriculum Committee
Subject: CLS Infectious Disease laboratory additions

The UTEP CLS Program is a NAACLS accredited program. NAACLS accreditation standards require all CLS accredited programs to demonstrate and document the pre-analytical, analytical and post analytical operations in all courses especially the student diagnostic laboratories. During our accreditation process it was recommend that we divide the infectious disease laboratory into two sections so as to be compliant with NAACLS standards. Thus, the CLS Department is requesting the addition of two infectious disease laboratories, CLSC 3167 and 3168, to replace the current infectious disease laboratory 3268. CLSC 3167 will focus on presenting the essential and the applied pre-analytical operations required in the field of diagnostic clinical bacteriology and CLSC 3168 will focus on presenting the essential and applied analytical and post-analytical operations required in the field of diagnostic clinical bacteriology.

These additions do not increase the total credits on the degree plan nor effect degree progression of CLS students or students wishing to apply to the upper division CLS Program.

The CLS Program is also updating the on-line course catalog to reflect changes in clinical affiliate requirements (titers and finger printing) and corrections that were made but were not updated.
Course Information

Subject Prefix and #: CLSC 3167
Subject: Infectious Dis Lab: Pre-Anal Oper

Title (29 characters or fewer): Infectious Dis Lab: Pre-Anal Oper

Dept. Administrative Code
CIP Code

Course Level (UG, GR, DR, or SP): UG

Will this course be taught during a part of term in addition to a full 16-week term? No
If so, what term length will this course be taught in? (e.g., 8 weeks) N/A

How many times may the course be taken for credit? (Please indicate 1-9 times): 1

Should the course be exempt from the “Three Repeat Rule?” (Y/N): N

Grading Mode: x Standard Pass/Fail Audit

Description (600 characters maximum):
This lab presents the essential and applied pre-analytical operations required in the field of clinical bacteriology. This course presents an overview of laboratory procedures used in pre-analytical bacteriology such as, but not limited to, specimen collection and processing, media selection, specimen inoculation and direct microscopic smears including evaluation and interpretation. Students will learn and understand the importance of communication with health professionals to ensure quality patient specimens for submission and recognize potential errors and resolve according to predetermined criteria. This course is presented as a co-requisite course with CLSC 3168 and CLSC 3366.

Contact Hours (per week): Lecture Hours Lab Hours Other

Types of Instruction (Schedule Type): (Underline all types of instruction which reflect how the course should be scheduled in Banner): A Lecture H Thesis B Laboratory I Dissertation C Practicum K Lecture/Lab Combined D Seminar O Discussion or Review (Study Skills) E Independent Study P Specialized Instruction F Private Lesson Q Student Teaching

Equivalent Courses

<table>
<thead>
<tr>
<th>Course Number</th>
<th>N/A</th>
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</table>

Prerequisite Course(s)
<table>
<thead>
<tr>
<th>Course Number</th>
<th>Concurrent Enrollment Permitted? (Y/N)</th>
<th>Minimum Grade Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLSC 3357</td>
<td>N</td>
<td>C</td>
</tr>
<tr>
<td>CLSC 3351</td>
<td>N</td>
<td>C</td>
</tr>
<tr>
<td>MICR 2440</td>
<td>N</td>
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Corequisite Course(s):

<table>
<thead>
<tr>
<th>Course Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLSC 3366</td>
</tr>
<tr>
<td>CLSC 3168</td>
</tr>
</tbody>
</table>

Restrictions

Indicate which of the following registration restrictions should be implemented:

<table>
<thead>
<tr>
<th>Restriction</th>
<th>Yes/No</th>
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<tbody>
<tr>
<td>Departmental Approval</td>
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<table>
<thead>
<tr>
<th>Restriction</th>
<th>Yes/No</th>
<th>Test Name</th>
<th>Minimum Score</th>
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<tbody>
<tr>
<td>Placement Test</td>
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<td></td>
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<table>
<thead>
<tr>
<th>Restriction</th>
<th>Yes/No</th>
<th>Majors Permitted</th>
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<tbody>
<tr>
<td>Major</td>
<td>Yes</td>
<td>Clinical Laboratory Science</td>
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</table>

<table>
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<tr>
<th>Restriction</th>
<th>Yes/No</th>
<th>Classes Permitted</th>
</tr>
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<tbody>
<tr>
<td>Classification</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Rationale for Adding the Course

Briefly describe the rationale for adding this course.

The UTEP CLS Program is a NAACLS accredited program. NAACLS accreditation standards require all accredited programs to demonstrate and document the pre-analytical, analytical and post analytical operations in all courses especially the laboratories. During our accreditation process it was recommend that we split up the infectious disease laboratory into two sections so as to be compliant with NAACLS standards.
Infectious Diseases Laboratory: Pre-Analytical Operations

CLSC 3167

Course Syllabus

Instructor: Laurencia Almeida, MT (ASCP)
Location: CHS 137
Credit Hours: 1
Email: lalmeida@utep.edu
Phone: (915) 238-6436
Office Hours: I will be available after every laboratory session to help out with any questions or by appointment


Course Description: This course focuses on presenting the essential and the applied pre-analytical operations required in the field of clinical bacteriology. This course will present an overview of laboratory procedures used in pre-analytical bacteriology such as, but not limited to, specimen collection and processing, media selection, specimen inoculation and direct microscopic smears of specimens including evaluation and interpretation. Students will learn and understand the importance of communication with health professionals to ensure quality patient specimens for submission and recognize potential errors and resolve according to predetermined criteria. This course is presented as a co-requisite course with CLSC 3168 and CLSC 3366.

Course Goal: This course is designed to provide students with clinical laboratory experience and present the basics of the pre-analytical operations in the clinical bacteriology laboratory. Taken in conjunction with CLSC 3366 and 3168, the student will learn to competently perform basic clinical bacteriology and, given adequate clinical data, correctly interpret the findings. The student will review “Lab notes” posted on blackboard which cover a review on theory, protocols and procedures.

Laboratory Schedule: CLSC 3167: Tuesday 2:00 – 5:00 p.m.

NO ONE WILL BE ALLOWED IN THE LABORATORY WITHOUT PROPER PERSONAL PROTECTIVE COVERING. UNIVERSAL PRECAUTIONS WILL BE OBSERVED AT ALL TIMES. AT THE INSTRUCTORS DISCRESION, A STUDENT WHO DOES NOT HAVE THE PROPER PERSONAL PROTECTION EQUIPMENTS MAY BE DISMISSED.
**Students with Disabilities:** If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

**Affective Student Objectives:** Students should be able to show the appropriate responsible behaviors by demonstrating

1. A positive attitude by being prepared for lecture and laboratory sessions, completing assigned tasks on time and displaying self-motivation.

2. Organization by utilizing time effectively, sequencing and prioritizing tasks for completion with time constraints and maintaining a neat clean work.

3. Attention to detail by diligently pursuing accuracy and documenting data accurately and legibly.

4. Problem solving ability by explaining purpose of each step in diagnosis, interpretation, procedure, recognizing discrepancies in techniques or procedures and repeating necessary lab tests when necessary.

5. Dependability by following directions, working independently after being given directions.

6. Stability and self-confidence by approaching and performing routine tasks confidently without assistance and maintaining composure.

7. Appropriate interpersonal skills by cooperating and communicating effectively with classmates and instructors and displaying courteous, considerate behavior and appropriate appearance.

8. Ethical behavior and integrity by respecting confidentiality of patient information, complying with professional standards and code of ethics, adhering to safety policies and abiding by all rules and regulations of the institution.

**Cognitive and Psychomotor Objectives:** Upon successful completion of this laboratory course, and after demonstrating 100% accuracy of laboratory procedures, the student should be able to:

**A. Basic principles**

1. Differentiate among microorganisms
   a. Bacteria
   b. Yeasts, molds
   c. Viruses
   d. Parasites
   e. Prions

2. Describe the classification of bacteria
a. Taxonomy
b. Nomenclature
c. Identification

3. Describe the phenotypic characterization of bacteria
   a. Cell growth and reproduction
   b. Metabolism and nutrition

4. Describe the staining characteristics of bacteria
   a. Gram-positive, Gram-negative and Gram-variable
   b. Acid-fastness

5. Differentiate microscopic morphologies of bacteria
   a. Cocci in chains, clusters, tetrads, pairs
   b. Diplococci and coccobacilli
   c. Bacilli/Rods
   d. Lancet
   e. Fusiform
   f. Pleomorphic
   g. Branching
   h. Palisading
   i. Endospores
   j. Capsules
   k. Flagella
   l. Spirochetes
   m. Intra- and extra-cellular

6. Demonstrate proper use of the microscope
   a. Use
   b. Maintenance
   c. Troubleshooting

**B. Laboratory examination of specimens for bacterial culture**

1. Properly identify specimen type
   a. CSF
   b. Blood and bone marrow
   c. Pleural
   d. Synovial
   e. Peritoneal
   f. Pericardial
   g. Amniotic
   h. Gastric
   i. Genital
   j. Eye/ear/throat
k. Nasopharynx/sinuses
l. Sputum/Bronchial
m. Tissue, skin, and bone
n. Catheter tips
o. Urine
   i. Catheterized
   ii. Clean voided midstream
   iii. Suprapubic
p. Wound
   i. Abscess aspiration/purulent material
   ii. Surgical
   iii. Soft tissue
q. Gastrointestinal
r. Autopsy

2. Provide proper accession of specimens
   a. Log in
   b. Request form information/Laboratory information system orders
   c. Labeling

3. Determine acceptability of the specimen
   a. Collection method/site preparation/aspectic technique
   b. Collection time
   c. Container/sampling device
   d. Transport system (temperature, atmosphere, media)
   e. Time in transit
   f. Patient therapy
   g. Number
   h. Quality/Rejection criteria
   i. Quantity
   j. Contamination/spillage

4. Select appropriate storage temperature/environment if delay in processing Level 2

C. Growth and Media
1. Select appropriate growth media and tests
   a. Select proper routine primary isolation media
      i. Enriched
      ii. Selective (differential/enrichment)
      iii. Nutrient/general purpose
b. Describe the purpose of each media
   i. Nutrients/constituents/supplements
   ii. Antibiotics
   iii. pH
   iv. Antibiotic removal
   v. Environment
c. Select special isolation media
d. Select special stains/direct tests

2. Prepare specimen for inoculation
   a. Centrifugation
   b. Homogenization

3. Select proper inoculation of media
   a. Order of media for inoculation
   b. Quantitative
   c. Semi-quantitative
   d. Standard inoculation and streaking techniques
   e. Swab
   f. Loop sterilization
      i. Reusable metal
      ii. Plastic/disposable
      iii. Calibrated
   g. Streaking for isolation
   h. Stab
   i. Pipette
   j. Automated plater

4. Incubate media
   a. Select appropriate atmosphere
      i. Aerobic-ambient
      ii. Capneic (3-5%,5-10%,microaerophilic)
      iii. Anaerobic
   b. Temperature
      i. 4 C
      ii. 25 C
      iii. 30 C
      iv. 35 C
      v. 42 C
   c. Humidity
d. Length of incubation

5. Prepare direct microscopic smears of specimen
   a. Prepare smear (one cell thick, dry, fixed)
   b. Stain smear appropriately
      i. Wet mounts
         1) Saline
         2) Iodine
         3) KOH
         4) Methylene Blue
      ii. Gram
      iii. Spore
      iv. Acid-fast
         1) Ziehl-Neelsen
         2) Kinyon
         3) Modified Kinyons
      v. Fluorescent
         1) Acridine orange
         2) Auramine-rhodamine
         3) Calcofluor white
         4) Fluorescein conjugated (FITC)

6. Evaluate and interpret direct microscopic smears of specimen
   a. Wet mounts and Vaginal wet preps
      i. Saline
      ii. Iodine
      iii. KOH
   b. Gram

7. Evaluate and quantitate microscopically
   a. Bacteria
      i. Structures
      ii. Capsule
      iii. Spores
   b. Yeasts and hyphal elements
   c. White and red cells
   d. Epithelial cells - columnar and squamous, i.e. Clue cells
   e. Artifacts and background material

8. Quantitate organisms and cells

9. Evaluate quality of specimen and assess clinical significance of findings
according to guidelines

10. Differentiate normal flora from potentially pathogenic organisms based on body site and specimen type

Psychomotor Objectives: Upon successful completion of this laboratory course, and demonstrating 100% accuracy, the student should be able to:

1. Abide by safety regulations of the University by wearing protective equipment, discarding biohazard materials in the appropriate container, disinfecting bench, following the safety instructions for a chemical spill, fire hazard, biohazard spill, and/or contaminated/non-contaminated broken glass.

2. Work productively with his partner(s) to produce laboratory results for the samples provided.

3. Divide the tasks evenly among the members of the group when required.

4. Apply specimen rejection criteria to the samples provided.

5. Select reagents, assemble the correct equipment, perform procedures, interpret results and evaluate the significance of the tests listed above (cognitive objectives).

6. Describe the procedure (refer to examples provided), correctly calibrate and operate equipment, interpret results, and evaluate the significance of results for the procedures described under the tentative laboratory schedule and as listed above (cognitive objectives).

7. Define terms and describe quality control procedures as they relate to all chemical analysis.

8. Record data in the appropriate form.

9. Discuss and analyze data obtained on the samples provided.

10. Interpret if the result is the sample is abnormal or normal by comparing sample values with the control values.

11. Report laboratory values for the clinical samples provided on a timely manner.

12. Display organization by utilizing time effectively, multitask when needed, sequencing and prioritizing tasks for completion with time constraints and maintaining a neat clean work.

13. Select reagents, perform procedures, interpret results, perform quality control procedures, and evaluate clinical significance for all determinations listed below:
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Minimum # performed with 100% accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram staining</td>
<td>25</td>
</tr>
<tr>
<td>Four Quadrant Streak</td>
<td>25</td>
</tr>
<tr>
<td>Throat Culture</td>
<td>2</td>
</tr>
<tr>
<td>Blood Culture</td>
<td>2</td>
</tr>
<tr>
<td>Urine Culture</td>
<td>5</td>
</tr>
<tr>
<td>Colony Counts (Quantitative and Semi-quantitative)</td>
<td>5</td>
</tr>
<tr>
<td>Cultivation &amp; Isolation of microorganisms</td>
<td>50</td>
</tr>
<tr>
<td>Describe colony morphology</td>
<td>50</td>
</tr>
<tr>
<td>Read and interpret plates</td>
<td>20</td>
</tr>
<tr>
<td>Catalase test</td>
<td>10</td>
</tr>
<tr>
<td>Bacitracin inhibition test</td>
<td>5</td>
</tr>
<tr>
<td>Coagulase test - Tube and slide</td>
<td>5</td>
</tr>
<tr>
<td>Staph latex agglutination test</td>
<td>10</td>
</tr>
<tr>
<td>Novobiocin test</td>
<td>5</td>
</tr>
<tr>
<td>Microdase test for Micrococcus identification</td>
<td>2</td>
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<tr>
<td>Optochin disc</td>
<td>2</td>
</tr>
<tr>
<td>PYR test</td>
<td>4</td>
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<tr>
<td>Lancefield grouping for Beta Strep</td>
<td>2</td>
</tr>
<tr>
<td>Oxidase test</td>
<td>10</td>
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<tr>
<td>Bacitracin</td>
<td>3</td>
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<tr>
<td>CAMP</td>
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<tr>
<td>Bile solubility</td>
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<tr>
<td>Bile esculin</td>
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<tr>
<td>Salt Tolerance</td>
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<tr>
<td>Evaluation of Sputum specimens (gram stain)</td>
<td>5</td>
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<tr>
<td>Beta Lactamase Test</td>
<td>2</td>
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<tr>
<td>Carbohydrate usage by Neisseria species</td>
<td>4</td>
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<tr>
<td>Catarrhalis disk</td>
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<tr>
<td>X/V Factor set up for Haemophilus</td>
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<tr>
<td>Satellitism</td>
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<td>Biochemical biosets</td>
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<td>Indoles test</td>
<td>10</td>
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<tr>
<td>Kirby Bauer Susceptibility Testing</td>
<td>2</td>
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<tr>
<td>Oxacillin and Vancomycin Screen agar</td>
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<tr>
<td>ESBL screen</td>
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<tr>
<td>D-test</td>
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<tr>
<td>E-test</td>
<td>2</td>
</tr>
<tr>
<td>Inoculate and read API 20E, API-Corynebacterium and APIstrep strips</td>
<td>2</td>
</tr>
<tr>
<td>Inoculate and read Microscan panels for Gram negatives and</td>
<td>3</td>
</tr>
<tr>
<td>Haemophilus Neisseria</td>
<td>2</td>
</tr>
<tr>
<td>Inoculate and read Rapid NH and Rapid ANA panels</td>
<td>2</td>
</tr>
</tbody>
</table>

Minimum # performed with 100% accuracy:
Latex agglutination for Salmonella, Shigella and E.coli 0157:H7, bacterial meningitis, Immunoassays for Campylobacter, Strep. Pyogenes and E.coli 0157:H7 ANIDENT discs for Presumptive identification of Anaerobic bacteria

Teaching/Learning Methods: Class combines a review on Lab procedures and methods, mastering of psychomotor skills, reading and interpretation of laboratory tests that are recorded on worksheets due on the following laboratory session. Laboratory includes many different challenges to work on speed and accuracy of test results. Weekly quizzes provide us with a review on material covered on previous labs. Students are also given 3 unknowns that they need to complete on their own, all tests done on unknown are to be recorded in the order that they were done so that I can provide with critiques on why identification was successful or not. Student will be competent to perform the procedure or not, whenever desired results are not obtained students are encouraged to let instructor know; test is repeated until successful. Students work in groups to complete most tasks. All laboratory lectures and supplemented materials will be posted in blackboard. It is responsibility of the student to download the materials. Three theory exams and 3 practical exams are given throughout the semester.

Attendance Policy: It is a university policy that all students attend ALL scheduled classes. Attendance will be taken at each class. When a student registers for a course, it is assumed that she/he has made prior arrangements to avoid time conflicts. If a laboratory is missed due to an excused absence an alternative assignment will be given at the discretion of the instructor's judgement. Laboratories missed due to an unexcused absence will not be made up and any graded exercise will be assigned a grade of zero. There will be no make ups for the 2 major proficiency examinations nor the final lab. Please note that it is the responsibility of the student to notify the instructor of any absence. The instructor reserves the right to drop a student due to tardiness of absentee when in the judgment of the instructor, a student has been absent to a degree as to impair his or her status relative to credit for the course. The instructor may drop the student form the class with a W before the course drop deadline or with an F after the course drop deadline. If a student is 10 minutes late this will be recorded as a tardy and two tardies will count as an absence (grade of zero will be awarded for that lab).

Evaluation and Course Grade: Student performance will be evaluated as follows:
Graded Assignments/weekly proficiency/attendance (15%)
- Total of 12 lab assignments 1% give for each assignment completed
- 3% awarded for attending all scheduled labs
- 2% awarded if 1 lab is missed
- 1% awarded if 2 labs missed
- If more than 2 labs missed I will deduct 3% from your final grade
Practical/Theory Exam 1 (20%)
Practical/Theory Exam 2 (20%)
Unknowns 1 (5%)
Unknowns 2 (5%)
Unknowns 3 (5%)
Final exam (30%)
Grading Scheme:  
A: > 90%  
B: 80-89%  
C: 75-79%  
D: 70-74%  
F: < 69%

The final average must be 75% in order to pass the laboratory.

General Safety Precautions: This laboratory course will include the handling of bacterial pathogens. These are not attenuated strains but organisms with their full pathogenic potential, please follow universal precautions when handling them. The use of lab coat, gloves and closed shoes is mandatory. Also please remember that it is important to keep personal property on designed areas, there will be no eating, drinking, or applying makeup in lab. At the end of each lab please cleanup work area with 10% bleach & dispose of contaminated material in appropriate containers. All laboratory accidents must be reported to instructor immediately.

Policy on Electronic Devices in Class: Use of personal laptops, cell phones, and other wireless devices (i.e. PDAs, iPhones, MP3 players, SmartPhones) is not permitted during this laboratory. The use of personal laptops and other electronic devices is also distracting to your classmates and Instructor, so do not bring these to class or turn them off before coming to class. Otherwise, you will be asked to leave the class by the instructor.

Policy on Cheating: There is zero tolerance level for academic dishonesty. Students who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and dismissal from the university. “Scholastic dishonesty includes but is not limited to cheating, plagiarism, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another student, any act designed to give unfair advantage to a student or the attempt to commit such acts. Regent’s Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22. Since scholastic dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced.
Tentative Course Schedule
Course outline may be modified as needed at discretion of instructor

**Week 1:** Set up: Introduction to Infectious Diseases Lab, Safety, Microscope, QC, Gram Stain procedure

**Week 2:** Set up: Culture media, Cultivation and isolation of microorganisms, Colony morphology

**Week 3:** Set up: Urine Culture, Sputum Gram Stain, Throat culture

**Week 4:** Set up: Catalase-Positive: Aerobic Gram-Positive Bacteria (Micrococcaceae)

**Week 5:** Set up: Catalase-Negative Aerobic Gram-Positive Bacteria (Streptococcaceae)

**Week 6:** Set up: Haemophilus/Neisseria

**Week 7:** Theory Exam #1, Unknowns #1

**Week 8:** Set up: Enterobacteriaceae

**Week 9:** SPRING BREAK

**Week 10:** Continuation set up: Enterobacteriaceae

**Week 11:** Set up: Susceptibility testing

**Week 12:** Theory Exam #2, Unknowns #2

**Week 13:** Set up: Unusual gram negatives/Vibrios/Non-fermenters

**Week 14:** Set up: Gram Positive Rods

**Week 15:** Set up: Anaerobes

**Week 16:** Final Exam
Advice to Students in Clinical and Teaching Microbiology Laboratories

- Be aware that bacteria used in microbiology laboratories can make you or others who live in your household sick, especially young children, even if they have never visited the laboratory.
  - If you work in a laboratory, it is possible for you to bring bacteria home through contaminated lab coats, pens, notebooks, and other items that you use in the microbiology laboratory.
  - Avoid taking laboratory supplies outside of the laboratory to limit contamination.

- Persons working with any infectious agents, including *Salmonella* bacteria, must be aware of potential hazards, and must be trained and proficient in biosafety practices and techniques required for handling such agents safely, in particular, to:
  - Wash hands frequently while working in and immediately before leaving the microbiology laboratory and follow proper hand washing practices. This is especially important to do before preparing food or baby bottles, before eating and before contact with young children.
  - Leave food, drinks or personal items like car keys, cell phones and mp3 players outside of the laboratory. These items may become contaminated if you bring them into the laboratory or touch them while working in the laboratory.

- Wear a lab coat or other protective garment over personal clothing when working in a microbiology laboratory. Remove protective garment before leaving for non-laboratory areas (e.g., cafeteria, library, or administrative offices). Dispose of protective garment appropriately or deposit it for laundering. Lab coats should be removed from the laboratory only when they are to be laundered by the institution.

- If you work with *Salmonella* bacteria in a microbiology laboratory, be aware that these bacteria can make you sick. Watch for symptoms of *Salmonella* infection, such as diarrhea, fever, and abdominal cramps. Call your health care provider if you or a family member has any of these symptoms.
SAFETY RULES FOR LABORATORY WORKERS

Protect yourself from infection. Follow these precautions recommended by the U.S. Centers for Disease Control:

1. Avoid contaminating the outside of containers during specimen collection. The lids should be tight. (Enclose specimen in a second container such as a sealed bag when transferring to a reference lab.)

2. Wear vinyl or latex gloves when processing specimens, especially if you are fairly new at the job, or have any cuts or scratches on your hands. Dispose of, rather than disinfect, gloves after use.

3. No mouth pipetting.

4. Use precautions when handling needles. No bending, breaking, recapping, or removing needles from disposable syringes. Place in puncture-resistant containers.

5. Use masks and eye wear if splashing or aerosolization is anticipated. (A tube in a centrifuge could cause this.)

6. Use biological safety cabinets for blending, sonicating and vigorous mixing.

7. Decontaminate work surfaces with a chemical germicide after spills and when work is completed. (A one to ten dilution of household bleach is effective.)

8. Dispose of contaminated materials in bags and in accordance with institutional policies for disposal of infective waste.

9. Decontaminate equipment before repair or shipping.

10. Wash hands and remove protective clothing before leaving laboratory.

**Course Add Form**

**Course Information**

Subject Prefix and #  CLSC 3168  
TCCN (If applicable)  

Title (29 characters or fewer): Infect Dis Lab: Anal / Post-Ana Opr

Dept. Administrative Code  
CIP Code  

Course Level (UG, GR, DR, or SP): UG  

Will this course be taught during a part of a term in addition to a full 16-week term?  
No  
If so, what term length will this course be taught in? (e.g., 8 weeks)  
N/A  

How many times may the course be taken for credit? (Please indicate 1-9 times):  
1  

Should the course be exempt from the “Three Repeat Rule?” (Y/N):  
N  

Grading Mode:  
_x_ Standard  
Pass/Fail  
Audit  

Description (600 characters maximum):
CLSC 3168 is the sequel to CLSC 3167. The laboratory focuses on presenting the essential and applied analytical and post-analytical operations required in the field of clinical bacteriology. This laboratory emphasizes practical case-study driven analysis of clinical bacteriology specimens presented in CLSC 3167. Students will learn how to accurately perform appropriate and timely testing in a cost effective manner (analytical) and provide accurate and timely results to health professionals (post analytical). This course is presented as a co-requisite course with CLSC 3167 and CLSC 3366.

Contact Hours (per week):  
Lecture Hours  
Lab Hours  
Other  

Types of Instruction (Schedule Type): (Underline all types of instruction which reflect how the course should be scheduled in Banner.):

A  Lecture  
B  Laboratory  
C  Practicum  
D  Seminar  
E  Independent Study  
F  Private Lesson  
H  Thesis  
I  Dissertation  
K  Lecture/Lab Combined  
L  Discussion or Review (Study Skills)  
M  Specialized Instruction  
N  Student Teaching  

Equivalent Courses

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<tr>
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Prerequisite Course(s)
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<tr>
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<th>Concurrent Enrollment Permitted? (Y/N)</th>
<th>Minimum Grade Required</th>
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<tbody>
<tr>
<td>CLSC 3357</td>
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<tr>
<td>CLSC 3351</td>
<td>N</td>
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<tr>
<td>MICR 2440</td>
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Corequisite Course(s):

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<th>Course Number</th>
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<tbody>
<tr>
<td>CLSC 3366</td>
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<tr>
<td>CLSC 3167</td>
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Restrictions

Indicate which of the following registration restrictions should be implemented:

<table>
<thead>
<tr>
<th>Restriction</th>
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<tr>
<td>Departmental Approval</td>
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<tr>
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<th>Majors Permitted</th>
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<tr>
<td>Major</td>
<td>Yes</td>
<td>Clinical Laboratory Science</td>
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</tbody>
</table>

Rationale for Adding the Course

Briefly describe the rationale for adding this course.

The UTEP CLS Program is a NAACLS accredited program. NAACLS accreditation standards require all accredited programs to demonstrate and document the pre-analytical, analytical and post analytical operations in all courses especially the laboratories. During our accreditation process it was recommend that we split up the infectious disease laboratory into two sections so as to be compliant with NAACLS standards.
The University of Texas at El Paso
College of Health Sciences
Clinical Laboratory Science Program

Infectious Diseases Laboratory: Analytical and Post-analytical Operations
CLSC 3168

Course Syllabus Semester

Instructor: Laurencia Almeida MT (ASCP)
Location: CHS 137
Credit Hours: 1
Email: lalmeida@utep.edu
Phone: (915) 238-6436
Office Hours: I will be available after every laboratory session to help out with any questions or by appointment


Course Description: CLSC 3168 is the sequel to CLSC 3167. The laboratory focuses on presenting the essential and applied analytical and post-analytical operations required in the field of diagnostic clinical bacteriology. This laboratory emphasizes practical case-study driven analysis of clinical bacteriology specimens presented in CLSC 3167. Students will learn how to accurately perform appropriate and timely testing in a cost effective manner (analytical) and provide accurate and timely results to health professionals (post analytical). This course is presented as a co-requisite course with CLSC 3167 and CLSC 3366.

Course Goal: This course is designed to provide students with clinical laboratory experience and present the basics of analytical and post-analytical operations in the clinical bacteriology laboratory. Taken in conjunction with CLSC 3366 and 3168, the student will learn and discuss the significance and the current practical and impracticality of bacteriological test results. The outcome of varied procedures will be discussed including, but not limited to, why particular test are better than others, discrepancies observed, plate contamination, incorrect incubation procedures, use of inappropriate ATCC strain of organism for CAMP tests, suspensions heavier than a 0.5 McFarland and nonviable organisms. Accurate and timely post-analytical records of test results will be emphasized. Students will be given "Challenge Quizzes" at the beginning of the laboratory. Students will work in teams and be given unknown organisms from differing body sites (e.g. blood culture, CSF, wounds, feces, etc.) and presented with case studies with the aim of identifying the organism with 100% accuracy. The challenge is to have cost effective analyses and utilized laboratory supplies prudently.

Laboratory Schedule: CLSC 3168: Thursday 2:00 – 5:00 p.m.

NO ONE WILL BE ALLOWED IN THE LABORATORY WITHOUT PROPER PERSONAL PROTECTIVE COVERING. UNIVERSAL PRECAUTIONS WILL BE OBSERVED AT ALL TIMES. AT THE INSTRUCTORS DISCRESSION, A STUDENT WHO DOES NOT HAVE THE PROPER PERSONAL PROTECTION EQUIPMENTS MAY BE DISMISSED.
**Students with Disabilities:** If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

**Affective Student Objectives:** Students should be able to show the appropriate responsible behaviors by demonstrating

1. A positive attitude by being prepared for lecture and laboratory sessions, completing assigned tasks on time and displaying self-motivation.

2. Organization by utilizing time effectively, sequencing and prioritizing tasks for completion with time constraints and maintaining a neat clean work.

3. Attention to detail by diligently pursuing accuracy and documenting data accurately and legibly.

4. Problem solving ability by explaining purpose of each step in diagnosis, interpretation, procedure, recognizing discrepancies in techniques or procedures and repeating necessary lab tests when necessary.

5. Dependability by following directions, working independently after being given directions.

6. Stability and self-confidence by approaching and performing routine tasks confidently without assistance and maintaining composure.

7. Appropriate interpersonal skills by cooperating and communicating effectively with classmates and instructors and displaying courteous, considerate behavior and appropriate appearance.

8. Ethical behavior and integrity by respecting confidentiality of patient information, complying with professional standards and code of ethics, adhering to safety policies and abiding by all rules and regulations of the institution.

**Cognitive and Psychomotor Objectives:** Upon successful completion of this laboratory course, and after demonstrating 100% accuracy of laboratory procedures, the student should be able to:

**A. Organism identification**

1. Apply principles of identification  
   a. Limitations and sources of errors  
   b. Troubleshooting according to set guidelines  
   c. Sensitivity and specificity  
   d. Environmental requirements atmosphere, growth temperature, etc.

2. Evaluate confirmatory identification tests (including rapid tests)

3. Perform confirmatory identification tests (including rapid tests)
   a. Catalase

**Level 2**

**Level 3**
b. Oxidase/DMSO modified
c. Coagulase
d. TSI and KIA slants
e. Methyl Red
f. Phenylalanine deaminase (PAD)
g. Amino acid (ornithine and lysine) decarboxylase and arginine dihydrolase, i.e., lysine iron agar (LIA)
h. Acid production from carbohydrates
   i. Fermentation/oxidation
i. Indole
   i. Tube
   ii. Spot
r. Porphyrine (Delta aminolevulinic acid) (ALA)
s. Pyrrolidonyl arylamidase (PYR)
t. Salt tolerance
u. Esculin hydrolysis
   i. Rapid
   ii. Bile esculin slant
v. Hippurate hydrolysis
w. H2S production
x. Nitrate reduction
y. Citrate utilization
z. Urease
aa. Butyrate esterase
bb. Voges-Proskauer
cc. Bile solubility
dd. Growth factor requirement (X, V and XV)

4. Perform Disk identification tests
   Level 2
   a. Novobiocin
   b. Optochin (ethylhydrocurepaine hydrochloride)
   c. Special potency disks
   d. Bacitracin
e. Beta lactamase
f. Growth factors (X, V, and XV)
g. Colistin, Kanamycin, Vancomycin

5. Other testing
   Level 1
   a. Satellitism, i.e., Staphylococcus aureus streak
   b. Motility
   c. Aerotolerance
d. Colony fluorescence
6. Identify basic concepts of commercial identification systems
   a. Non-automated
      i. Miniaturized
      ii. Rapid
         3) Substrate based
         4) Spot tests
   b. Automated
      i. Nucleic acid detection
         1) Nonamplified
            a) Hybridization probes
         2) Amplified, including but not limited to real time polymerase chain reaction (PCR)
         3) Maldi-TOF
         4) Microarray

7. Identify basic concepts of serological identification
   a. Coagglutination
   b. Latex agglutination
   c. Urine antigen detection
   d. Toxin detection
   e. Immunofluorescent assays (Direct-DFA/Indirect-IFA)
   f. Enzyme linked immunoabsorbant assay (ELISA)
   g. Serotype

8. Utilize established algorithms and databases to establish identification

B. Clinically Significant Organisms

1. Isolate organisms at the identification levels
   a. Staphylococci
      i. *Staphylococcus aureus* (Level 3)
      ii. Methicillin-resistant *Staphylococcus aureus* (MRSA) (Level 3)
      iii. Vancomycin-intermediate *S. aureus* (VISA) (Level 3)
      iv. Vancomycin-resistant *S. aureus* (VRSA) (Level 3)
      v. *Staphylococcus epidermidis* (Level 1)
      vi. *Staphylococcus saprophyticus* (Level 2)
      vii. *Staphylococcus lugdunensis* (Level 1)
      viii. Other coagulase-negative Staphylococci (Level 2)
   b. Micrococcus spp.
   c. Streptococci
      i. *Streptococcus pyogenes* (Group A) (Level 3)
      ii. *Streptococcus agalactiae* (Group B) (Level 3)
      iii. Other beta-hemolytic Streptococci (Level 3)
iv. *Streptococcus pneumoniae* (Level 3)
v. Viridans group (Level 3)
vi. Alpha and non-hemolytic Streptococci (Level 2)
d. Enterococcus, VRE,  
   i. *Enterococcus faecalis* (Level 3)  
   ii. *Enterococcus faecium* (Level 3)  
   iii. Vancomycin resistant Enterococcus (VRE)
e. Group D Streptococcus ie *S. galolyticus* (previously *S. bovis*) (Level 3)
f. Nutrionally variant streptococci (NVS) (Level 2)
g. Abiotrophia (Level 2)
h. Aerobic Gram-positive cocci  
   i. Leuconostoc spp (Level 1)  
   ii. Lactococcus spp. (Level 1)  
   iii. Gemella spp (Level 1)  
   iv. Stomatococcus spp (Level 1)  
   v. Pediococcus spp (Level 1)  
   vi. Aerococcus (Level 1)
i. Aerobic Gram-negative cocci  
   i. Neisseria gonorrhoeae (Level 3)  
   ii. Neisseria meningitidis (Level 3)  
   iii. Moraxella catarrhalis (Level 3)
j. Enterobacteriaceae  
   i. *Escherichia coli* (Level 3)  
      1) Enterohemorrhagic *E. coli* due to Shiga toxin  
      2) Other diarrheagenic *E. coli*  
   ii. *Shigella* sp. (Level 3)  
   iii. *Edwardsiella tarda* (Level 2)  
   iv. *Klebsiella* sp. (Level 3)  
      1) *K. pneumoniae*  
      2) *K. oxytoca*  
   iv. *Enterobacter* sp. (Level 3)  
      1) *E. aerogenes*  
      2) *E. cloacae*  
v. *Serratia* sp. (Level 3)  
vi. *Hafnia* (Level 1)  
vii. *Citrobacter* sp. (Level 3)  
viii. *Salmonella* spp., i.e., *Salmonella enterica biovar typhi* (Level 3)  
ix. *Proteus* sp. (Level 3)  
   1) *P. mirabilis*  
   2) *P. vulgaris*  
x. *Providencia* sp.(Level 1)  
xii. *Morganella* morganii (Level 1)
xii. Yersinia enterocolitica (Level 3)

k. Other facultative Gram negative rods
   i. Vibrio spp (Level 3)
      6) V. cholera
      7) V. alginolyticus
      8) V. parahaemolyticus
      9) V. vulnificus
   ii. Aeromonas sp. (Level 3)
   iii. Campylobacter jejuni (Level 3)
   iv. Helicobacter sp. (Level 1)

l. Glucose non-fermenting Gram-negative rods
   i. Pseudomonas aeruginosa (Level 3)
   ii. Other Pseudomonas spp
   iii. Stenotrophomonas maltophilia (Level 2)
   iv. Burkholderia spp (Level 2)
   v. Acinetobacter spp (Level 2)
   vi. Alcaligenes (Level 2)
   vii. Flabobacterium (Level 2)
   viii. Moraxella sp. (Level 2)

m. HACEK and other fastidious Gram negative rods
   i. Aggregatibacter aphrophilus (previously known as Haemophilus aphrophilus/H. paraphrophilus) (Level 1)
   ii. Aggregatibacter actinomycetemcomitans (previously known as Actinobacillus actinomycetemcomitans) (Level 1)
   iii. Cardiobacterium hominis (Level 1)
   iv. Eikinella corrodens (Level 1)
   v. Kingella sp. (Level 1)

n. Other delicate/fastidious Gram-negative coccobacilli
   i. Bartonella spp.(Level 1)
   ii. Bordetella sp.(Level 1)
   iii. Brucella sp. (Level 1)
   iv. Francisella tularensis (Level 1)
   v. Haemophilus influenzae (Level 3)
      1) Serotypes b and non-b
      2) Biovar aegyptius
   vi. Other Haemophilus sp. (Level 2)
   vii. Legionella pneumophila (Level 1)
   viii. Pasteurella multocida (Level 2)
   ix. Capnocytophaga (Level 1)
   x. Steptobacillus moniliformis (Level 1)
o. Aerobic Gram-positive rods
   i. Gardnerella vaginalis (Level 1)
   ii. Corynebacterium diphtheriae (Level 1)
   iii. Other Corynebacterium species (Level 2)
   iv. Listeria monocytogenes (Level 1)
   v. Bacillus anthracis (Level 1)
   vi. Bacillus cereus (Level 2)
   vii. other Bacillus sp. (Level 2)
   viii. Erysipelothrix rhusiopathiae (Level 1)
   ix. Nocardia spp. (Level 1)
   x. Rhodococcus spp. (Level 1)
   xi. Arcanobacterium heamolyticum (Level 1)
   xii. Mycobacterium spp. (Level 2)
   xiii. Streptomyces (Level 1)

p. Anaerobic Gram-positive rods
   i. Clostridium perfringens (Level 3)
   ii. Clostridium difficile (Level 2)
   iii. Other Clostridia (Level 1)
   iv. Propionibacterium acnes (Level 2)
   v. Mobiluncus spp. (Level 1)
   vi. Actinomyces spp. (Level 2)
   vii. Lactobacillus spp. (Level 2)
   viii. Eggerthella spp. (Level 1)

q. Anaerobic Gram-positive cocci
   i. Peptococcus (Level 1)
   ii. Peptostreptococcus sp. (Level 2)

r. Anaerobic Gram-negative rods and cocci
   i. Bacteroides fragilis group (Level 3)
   ii. Bacteroides sp. (Level 2)
   iii. Fusobacterium sp. (Level 2)
   iv. Prevotella sp. (Level 2)
   v. Veillonella sp. (Level 1)
   vi. Porphyromonas spp. (Level 2)

s. Miscellaneous bacteria and organisms
   iii. Treponema pallidum (Level 1)
   iv. Borrelia spp. (Level 1)
   v. Leptospira interoogens (Level 1)
   vi. Mycoplasma (Level 1)
   vii. Ureaplasma (Level 1)
   viii. Chlamydia (Level 3)
   ix. Rickettsia spp. (Level 1)
   x. Orientia tsutsugamushi (Level 1)
xi. Ehrlichia spp. *(Level 1)*

xii. Anaplasma phagocytophilum *(Level 1)*

xiii. Coxiella burnetii *(Level 1)*

xiv. Spirillum spp *(Level 1)*

C. Antimicrobials

1. Describe the mechanism of action of commonly used antimicrobials  
   Level 1

2. Apply standard performance principles and quality control to antimicrobial susceptibility tests  
   Level 2
   
   a. Principles
   b. Limitations and sources of errors
   c. Troubleshooting according to set guidelines
   d. Sensitivity and specificity
   e. Quality control

2. Disk diffusion (Kirby Bauer) and antimicrobial gradient method (E-test)  
   Level 2
   
   a. Media
      i. Depth
      ii. Supplements
      iii. Storage
   b. Inoculum
      i. Organism
      ii. Standardized suspension
      iii. Time limit for inoculation
      iv. Pattern of inoculation
      v. Time limit for application of disks
      vi. Disk placement
   c. Incubation
      i. Time
      ii. Temperature
      iii. Atmosphere
   d. Disk potency and storage
   e. Reading
   f. Interpretation
      i. Qualitative
      ii. Quantitative
   g. Reporting
   h. Special techniques
      i. Error detection and resolution according to predetermined criteria

3. Beta-lactamase detection  
   Level 2

4. Identify organisms using Minimum inhibitory concentration (MIC) – micro-broth and automated systems  
   Level 2
   
   a. Inoculum
   b. Selection of appropriate organism for method
c. Incubation
d. Reading
e. Interpretation
f. Reporting
g. Supplements and special techniques
h. Error detection and resolution according to predetermined criteria
i. Minimum bactericidal concentration (MBC)

5. Perform molecular detection of resistance Level 2
6. Utilize Clinical and Laboratory Standards Institute (CLSI) guidelines Level 2
7. Perform susceptibility testing and special resistance detection methods on appropriate organisms Level 2
   a. Oxacillin resistance for Staphylococcus spp.
   b. Inducible clindamycin resistance for Staphylococcus, beta-hemolytic Streptococcus spp. and Streptococcus pneumoniae
   c. Vancomycin resistance for Staphylococcus and Enterococcus spp.
   d. High level aminoglycoside resistance for Enterococcus spp.
   e. Penicillin resistance for Streptococcus pneumoniae
   f. Extended spectrum beta-lactamas (ESBL) for Enterobacteriaceae
   g. ampC enzymes for Gram-negative rods
   h. Carbapenemase resistant Enterobacteriaceae (CRE)
8. Interpret susceptibility testing results according to set guidelines Level 3
   a. Qualitative
   b. Quantitative
9. Review susceptibility data and recognize unusual antimicrobial profiles according to set guidelines Level 2
10. Recognize “predictor” antimicrobial agents used to detect specific resistance mechanisms Level 2
11. Recognize multidrug-resistant organisms (MDRO) Level 2
12. Report data according to set guidelines and utilizing cascade and selective reporting Level 2
13. Relate antimicrobial agents to mode of action and spectrum of activity Level 1
14. Explain the common mechanisms of bacterial resistance Level 1
15. Recognize antimicrobials within each major class and by generic and brand name Level 1
16. Describe the function of other professionals to select appropriate drugs for testing Level 1
   a. Antibiotic usage committee
   b. Pharmacy
   c. Infectious disease clinicians
   d. Hospital epidemiologist/infection control committee
   e. Antibiogram data

D. Results
1. Prioritize reporting of direct smears Level 3
2. Prepare (Level 2) culture reports and assure (Level 3) quality of results based on predetermined criteria
   a. Culture correlation with
      i. Direct Gram stain
ii. Body site/specimen type
iii. Patient history/population
iv. Identification testing results
v. Susceptibility testing results
vi. Clinical significance of organisms
vii. Other significant information

b. Selective reporting of antimicrobials

3. Report normal flora appropriately
4. Designate preliminary or finalized status
5. Recognize (Level 2) and resolve (Level 3) issues according to predetermined criteria
6. Report cultures concisely, clearly and in a timely fashion
7. Document work performed
8. Appropriately bill charges

Psychomotor Objectives: Upon successful completion of this laboratory course, and demonstrating 100% accuracy, the student should be able to:

1. Abide by safety regulations of the University by wearing protective equipment, discarding biohazard materials in the appropriate container, disinfecting bench, following the safety instructions for a chemical spill, fire hazard, biohazard spill, and/or contaminated/non-contaminated broken glass.

2. Work productively with his partner(s) to produce laboratory results for the samples provided.

3. Divide the tasks evenly among the members of the group when required.

4. Apply specimen rejection criteria to the samples provided.

5. Select reagents, assemble the correct equipment, perform procedures, interpret results and evaluate the significance of the tests listed tentative laboratory schedule.

6. Describe the procedure (refer to examples provided), correctly calibrate and operate equipment, interpret results, and evaluate the significance of results for the procedures described under the tentative laboratory schedule.

7. Define terms and describe quality control procedures as they relate to all chemical analysis.

8. Record data in the appropriate form.

9. Discuss and analyze data obtained on the samples provided.

10. Interpret if the result is the sample is abnormal or normal by comparing sample values with the control values.

11. Report laboratory values for the clinical samples provided on a timely manner.

12. Display organization by utilizing time effectively, multitask when needed, sequencing and prioritizing tasks for completion with time constraints and maintaining a neat clean work.

13. Select reagents, perform procedures, interpret results, perform quality control procedures, and evaluate clinical significance for all determinations listed below:
Procedure

Gram staining
Four Quadrant Streak
Throat Culture
Blood Culture
Urine Culture
Colony Counts (Quantitative and Semi-quantitative)
Cultivation & Isolation of microorganisms
Describe colony morphology
Read and interpret plates
Catalase test
Bacitracin inhibition test
Coagulase test - Tube and slide
Staph latex agglutination test
Novobiocin test
Microdase test for Micrococcus identification
Optochin disc
PYR test
Lancefield grouping for Beta Strep
Oxidase test
Bacitracin
CAMP
Bile solubility
Bile esculin
Salt Tolerance
Evaluation of Sputum specimens (gram stain)
Beta Lactamase Test
Carbohydrate usage by Neisseria species
Catarrhalis disk
X/V Factor set up for Haemophilus
Satellitism
Biochemical biosets
Indoles test
Kirby Bauer Susceptibility Testing
Oxacillin and Vancomycin Screen agar
ESBL screen
D-test
E-test
Inoculate and read API 20E, API-Corynebacterium and
APIstrep strips
Inoculate and read Microscan panels for Gram negatives
and Haemophilus Neisseria
Inoculate and read Rapid NH and Rapid ANA panels
Latex agglutination for Salmonella, Shigella and E.coli
0157:H7, bacterial meningitis
Immuoassays for Campylobacter, Strep. Pyogenes and
E.coli 0157:H7ANIDENT discs for Presumptive
identification of Anaerobic bacteria

Minimum number performed with 100% accuracy
25
25
2
2
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50
50
20
10
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2
2
4
2
2
5
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5
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4
**Teaching/Learning Methods:** Class combines a review on Lab procedures and methods, mastering of psychomotor skills, reading and interpretation of laboratory tests that are recorded on worksheets due on the following laboratory session. Laboratory includes many different challenges to work on speed and accuracy of test results. Weekly quizzes provide us with a review on material covered on previous labs. Students are also given 3 unknowns that they need to complete on their own, all tests done on unknown are to be recorded in the order that they were done so that I can provide with critiques on why identification was successful or not. Student will be competent to perform the procedure or not, whenever desired results are not obtained students are encouraged to let instructor know; test is repeated until successful. Students work in groups to complete most tasks. All laboratory lectures and supplemented materials will be posted in blackboard. It is responsibility of the student to download the materials. Three theory exams and 3 practical exams are given throughout the semester.

**Attendance Policy:** It is a university policy that all students attend **ALL** scheduled classes. Attendance will be taken at each class. When a student registers for a course, it is assumed that she/he has made prior arrangements to avoid time conflicts. **If a laboratory is missed due to an excused absence an alternative assignment will be given at the discretion of the instructor’s judgement.** Laboratories missed due to an unexcused absence will not be made up and any graded exercise will be assigned a grade of zero. There will be no make ups for the 2 major proficiency examinations nor the final lab. Please note that it is the responsibility of the student to notify the instructor of any absence. The instructor reserves the right to drop a student due to tardiness of absentees when in the judgment of the instructor, a student has been absent to a degree as to impair his or her status relative to credit for the course. The instructor may drop the student form the class with a W before the course drop deadline or with an F after the course drop deadline. If a student is 10 minutes late this will be recorded as a tardy and two tardies will count as an absence (grade of zero will be awarded for that lab).

**Evaluation and Course Grade:** Student performance will be evaluated as follows:
Graded Assignments/weekly proficiency/attendance (15%)
- Total of 12 lab assignments 1% give for each assignment completed
- 3% awarded for attending all scheduled labs
- 2% awarded if 1 lab is missed
- 1% awarded if 2 labs missed
- If more than 2 labs missed I will deduct 3% from your final grade

Practical/Theory Exam 1 (20%)
Practical/Theory Exam 2 (20%)
Unknowns 1 (5%)
Unknowns 2 (5%)
Unknowns 3 (5%)
Final exam (30%)

**Grading Scheme:**

<table>
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<th>Grade</th>
<th>Percentage</th>
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<td>A</td>
<td>&gt; 90%</td>
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<td>B</td>
<td>80-89%</td>
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<td>C</td>
<td>75-79%</td>
</tr>
<tr>
<td>D</td>
<td>70-74%</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 69%</td>
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</table>

The final average must be 75% in order to pass the laboratory.
General Safety Precautions: This laboratory course will include the handling of bacterial pathogens. These are not attenuated strains but organisms with their full pathogenic potential, please follow universal precautions when handling them. The use of lab coat, gloves and closed shoes is mandatory. Also please remember that it is important to keep personal property on designed areas, there will be no eating, drinking, or applying makeup in lab. At the end of each lab please clean up work area with 10% bleach & dispose of contaminated material in appropriate containers. All laboratory accidents must be reported to instructor immediately.

Policy on Electronic Devices In Class: Use of personal laptops, cell phones, and other wireless devices (i.e.PDAs, iPhones, MP3 players, SmartPhones) is not permitted during this laboratory. The use of personal laptops and other electronic devices is also distracting to your classmates and Instructor, so do not bring these to class or turn them off before coming to class. Otherwise, you will be asked to leave the class by the instructor.

Policy on Cheating: There is zero tolerance level for academic dishonesty. Students who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and dismissal from the university. “Scholastic dishonesty includes but is not limited to cheating, plagiarism, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another student, any act designed to give unfair advantage to a student or the attempt to commit such acts. Regent’s Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22. Since scholastic dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced.

Course outline may be modified as needed at discretion of instructor.

Tentative Course Schedule

Course outline may be modified as needed at discretion of instructor.

Week 1: Read and interpret week 1 assignment.

Week 2: Read/Interpret / Week 2 Assignment: Culture media, Cultivation and isolation of microorganisms, Colony morphology

Week 3: Read / Interpret Week 3 assignment: Urine Culture, Sputum Gram Stain, Throat culture

Week 4: Read/Interpret Week 4 Assignment: Catalase-Positive: Aerobic Gram-Positive Bacteria (Micrococcaceae)

Week 5: Read/Interpret / Week 5 Assignment: Catalase-Negative Aerobic Gram-Positive Bacteria (Streptococcaceae)
Week 6: Read/Interpret / Week 6 Assignment: Haemophilus/Neisseria

Week 7: Practical Exam #1

Week 8: Read/Interpret / Week 8 Assignment: Enterobacteriaceae

Week 9: SPRING BREAK

Week 10: Enterobacteriaceae continuation: Read/Interpret / Week 10 Assignment:

Week 11: Read/Interpret / Week 11 Assignment: Susceptibility testing

Week 12: Practical Exam #2

Week 13: Read/Interpret / Week 13 Assignment: Unusual gram negatives/Vibrios/Non-fermenters

Week 14: Read/Interpret / Week 14 Assignment: Gram Positive Rods

Week 15: Read/Interpret / Week 15 Assignment: Anaerobes

Week 16: Final Exam

Advice to Students in Clinical and Teaching Microbiology Laboratories

- Be aware that bacteria used in microbiology laboratories can make you or others who live in your household sick, especially young children, even if they have never visited the laboratory.
  - If you work in a laboratory, it is possible for you to bring bacteria home through contaminated lab coats, pens, notebooks, and other items that you use in the microbiology laboratory.
  - Avoid taking laboratory supplies outside of the laboratory to limit contamination.

- Persons working with any infectious agents, including *Salmonella* bacteria, must be aware of potential hazards, and must be trained and proficient in biosafety practices and techniques required for handling such agents safely, in particular, to:
Wash hands frequently while working in and immediately before leaving the microbiology laboratory and follow proper hand washing practices. This is especially important to do before preparing food or baby bottles, before eating and before contact with young children.

Leave food, drinks or personal items like car keys, cell phones and mp3 players outside of the laboratory. These items may become contaminated if you bring them into the laboratory or touch them while working in the laboratory.

- Wear a lab coat or other protective garment over personal clothing when working in a microbiology laboratory. Remove protective garment before leaving for non-laboratory areas (e.g., cafeteria, library, or administrative offices). Dispose of protective garment appropriately or deposit it for laundering. Lab coats should be removed from the laboratory only when they are to be laundered by the institution.

- If you work with Salmonella bacteria in a microbiology laboratory, be aware that these bacteria can make you sick. Watch for symptoms of Salmonella infection, such as diarrhea, fever, and abdominal cramps. Call your health care provider if you or a family member has any of these symptoms.

SAFETY RULES FOR LABORATORY WORKERS

Protect yourself from infection. Follow these precautions recommended by the U.S. Centers for Disease Control:

1. Avoid contaminating the outside of containers during specimen collection. The lids should be tight. (Enclose specimen in a second container such as a sealed bag when transferring to a reference lab.)

2. Wear vinyl or latex gloves when processing specimens, especially if you are fairly new at the job, or have any cuts or scratches on your hands. Dispose of, rather than disinfect, gloves after use.

3. No mouth pipetting.

4. Use precautions when handling needles. No bending, breaking, recapping, or removing needles from disposable syringes. Place in puncture-resistant containers.

5. Use masks and eye wear if splashing or aerosolization is anticipated. (A tube in a centrifuge could cause this.)
6. Use biological safety cabinets for blending, sonicating and vigorous mixing.

7. Decontaminate work surfaces with a chemical germicide after spills and when work is completed. (A one to ten dilution of household bleach is effective.)

8. Dispose of contaminated materials in bags and in accordance with institutional policies for disposal of infective waste.

9. Decontaminate equipment before repair or shipping.

10. Wash hands and remove protective clothing before leaving laboratory.

BS in Clinical Laboratory Science

- **Home**
- **2016-2017 Undergraduate Catalog**
- **College of Health Sciences**
- **Clinical Laboratory Science**
- **BS in Clinical Laboratory Science**

The Clinical Laboratory Science Program (CLS), formerly Medical Technology, is designed to prepare graduates to function as professional members of the health care team. Their services are utilized in hospitals, clinics, and private laboratories, as well as in business and industry. Clinical Laboratory Scientists perform a variety of immunological, biochemical, molecular, and microbiological procedures that aid in the diagnosis, treatment, and prevention of disease. Computerized databases, electronic charting, and sophisticated laboratory techniques such as flow cytometry, DNA fingerprinting, PCR, and two-dimensional electrophoresis help ensure the accuracy and precision of their work. The University of Texas at El Paso's Clinical Laboratory Science Program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (5600 N. River Rd., Suite 720, Rosemont, IL 60018-5119).

Students completing core and pre-professional courses must apply for the professional phase of the program in the spring semester (by February 28th). All prerequisite courses must be completed before entering the professional phase of the program. Students are not allowed to take other courses concurrently with upper division, professional-phase CLS courses. Applicants must have a minimum CGPA of 2.5 and a 2.75 GPA in math and sciences and must pass a drug screen and background check. University and clinical faculty interview all applicants.

A limited number of clinical sites are available; therefore, students are selected in the spring semester to enter the professional phase once a year beginning in the Fall semester. Depending on the number of clinical affiliates available in any one year, a student might be required to attend clinical preceptorships outside the El Paso area at the student's expense.

Students must complete all lower-division course work prior to enrolling in the professional Clinical Laboratory Science courses. Before enrolling in the clinical practicum, all students must show evidence of professional liability insurance, health insurance, current CPR certification, a recent physical examination, and current immunizations (titers), including hepatitis and influenza vaccinations. Some clinical affiliates may require students to provide proof of immunizations for varicella, hepatitis B, measles, rubella, and rubeola, and proof of medical insurance. To engage in clinical practicums, which are crucial to the curriculum, CLS students must undergo and pass a background check and drug screening. **In addition, some clinical practicums require fingerprinting.**

A grade of C (75%) or higher must be earned in each CLS class. If a student earns less than a C (75%), the student must withdraw from the program and reapply the following year.
All students must perform within limits of safe practice. Students who are deemed unsafe by faculty will be dropped and will receive an F in the clinical course. All work performed by students during the clinical practicum is under the direct supervision of clinical faculty and countersigned by them.

As a professional, the student must exhibit a commitment to the welfare of patients. The faculty in the program reserves the right to refuse the opportunity of a student to perform tests or procedures on patients if the student gives evidence of unsafe and/or ineffective laboratory techniques.

Students graduating from The University of Texas at El Paso are eligible to take the national certification exam from the American Society for Clinical Pathology Board of Certification (BOC). Students passing the exam can use the initials MLS after their names.

**Degree Plan**

Required Credits: **120.133**

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<tr>
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<td>PHIL 2306</td>
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<td>Genetics</td>
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<td>CLSC 2111</td>
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Select one of the following:

- MICR 2141 Gen Microbiology Laboratory
- & MICR 2240 and General Microbiology
- MICRO 2440 General Microbiology

Clinical Lab Science Core (Courses require a grade of C or better.)

**Sophomore Year-Summer:**

- CLSC 3357 Opportunistic and Parasitic Infections 3
- CLSC 3252 Body Fluids 2
- CLSC 3153 Body Fluids Lab 1
- CLSC 3351 Concepts in Immunodiagnostics 3

**Junior Year-Fall Semester:**

- CLSC 3354 Clinical Chemistry I 3
- CLSC 3155 Clinical Chemistry I Lab 1
- CLSC 3356 Hematology I 3
- CLSC 3252 Body Fluids 2
- CLSC 3153 Body Fluids Lab 1
- CLSC 3257 Hematology I Lab 2
- CLSC 3260 Serology 2
- CLSC 3161 Serology Lab 1

**Junior Year-Spring Semester:**

- CLSC 3262 Clinical Chemistry II 2
- CLSC 3164 Clinical Chemistry II Lab 1

**Junior Year-Fall Semester:**

- CLSC 3364 Hematology II 3
- CLSC 3266 Infectious Diseases 3
- CLSC 3268 Infectious Diseases Lab 2
- CLSC 3167 Infectious Diseases Lab: Pre-Anal Oper 1
- CLSC 3168 Infectious Diseases Lab: Anal/Post-Ana Opr 1
- CLSC 3368 Immunohematology 3
- CLSC 3269 Immunohematology Lab 2

**Senior Year-Fall Semester:**

- CLSC 4471 Preceptorship I 4
- CLSC 4472 Preceptorship II 4
- CLSC 4273 Clinical Education 2
- CLSC 4274 Clinical Investigation 2

**Senior Year-Spring Semester:**
## Course List

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<td>CLSC 4476</td>
<td>Preceptorship III</td>
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C  Courses require a grade of C or better.

### University Core Curriculum

NOTE: The department may make specific suggestions for courses which are most applicable towards your major.

**Psychology and Criminal Justice majors and minors** are required to take **MATH 1320** Math for Social Sciences I (C) or a higher level Calculus course.

**Business majors** are required to take **MATH 1320** Math for Social Sciences I (C) or a higher level Calculus course.

NOTE: All courses require a C or better
The University of Texas at El Paso  
College of Health Sciences  
Clinical Laboratory Science Program

**PROPOSED** Degree Plan

## PRE-PROFESSIONAL COURSES

### Freshman

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<td>CHEM 1305 General Chemistry</td>
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<td>MATH 1411 Calculus</td>
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<td>HIST 1302 History of US Since 1865</td>
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<td>HIST 1301 History of US</td>
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<tr>
<td>RWS 1302 or ENGL 1313 or ESOL 1311</td>
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<td>BIOL 1305 General Biology</td>
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<td>BIOL 1107 Topics in the study of Life II</td>
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<td>CHEM 1306 General Chemistry II</td>
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### Sophomore

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<tr>
<td>POLS 2310 Intro to Politics</td>
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<td>BIOL 2313 Human Anatomy/Phys II</td>
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<td>CHEM 2324 Organic Chemistry</td>
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<td>CLSC 2210 Intro to CLS</td>
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<tr>
<td>Humanities Core PHIL ethics 2306 (Required)</td>
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<td>Visual &amp; Performing Arts Core (Select one)</td>
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<tr>
<td>POLS 2311 American Gov &amp; Politics</td>
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<td>Social &amp; Behav Science PSYC 1301 (suggested)</td>
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<td>CLSC 2310 Molecular Diagnostics</td>
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<td>CLSC 2212 Clinical Laboratory Statistics</td>
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### Junior

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<td>CLSC 3155 Clinical Chemistry I Lab</td>
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<td>CLSC 3356 Hematology I</td>
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<td>CLSC 3257 Hematology I Lab</td>
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<td>CLSC 3252 Body Fluids</td>
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<td>CLSC 3153 Body Fluids Lab</td>
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<td>CLSC 3260 Serology</td>
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<td>CLSC 3368 Infectious Diseases</td>
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### Senior

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<td>MATH 1314</td>
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**Total hours:** 128