Medical Technology Program, B.S.
Department of Biology
College of Staten Island/CUNY
Program Curriculum

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I. MDT-BS Program at CSI/CUNY: An Overview

The Medical Technology (MDT) Program at the College of Staten Island/CUNY is a Bachelor of Science (B.S.) program accredited by NAACLS and approved by the New York State Education Department (NYSED). The program is designed to equip students with a solid knowledge base in core disciplines of clinical laboratory medicine, strong analytical capabilities, and clinical experience with the goal of not only preparing them to take ASCP State Licensure Exam and ASCP Certification Exam, but also, and more importantly, to become able and responsible clinical laboratory scientists.

Medical Technology Management Team:

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II. Program Goals, Curriculum, and Course Description

Program Goals:

1. To provide a comprehensive learning experience to students in the field of Medical Laboratory Science;
2. To ensure that students graduate with skills that allow them to become responsible professionals as they perform procedures with precision and accuracy;
3. To ensure that graduates have the skills in manual procedures to be able to succeed in large institutions as well as point of care testing sites;
4. To provide students with the appropriate knowledge to qualify for national certification examinations.

Program Curriculum:
Per our current standards for admission, retention, and graduation, students of the Bachelor of Science Medical Technology Program at CSI/CUNY must complete a 128-credit course requirement and maintain a GPA of 3.0 for the MDT major. The program requires 3 ½ years of course work and 6 months of clinical training. The breakdown of academic years is described below:

- First and Second Year: Freshman and sophomore students who wish to major in MDT have the status of “Undeclared Health Science Major with a Medical Technology Concentration”.
- Third Year: Upon successful completion of required courses for the first two years, all students must undergo a formal MDT application process in which they must submit (1) An essay describing their interest in the field of MDT, (2) Three letters of recommendation, (3) A transcript indicating a pre-major GPA of minimal 3.0. Annual application ends May 28.
- Fourth Year: Upon successful completion of Third-Year MDT courses and maintaining 3.0 of GPA, students are to apply for clinical training. The selection criteria are based on GPA ranking. Current hospital affiliations with suggested duration of training in each disciplinary area are listed in the Appendix. Clinical training is completed in hospitals approved by the New York State Department of Health. Prior to be admitted for clinical training, student candidates are interviewed, where applicable, by a
clinical site advisory committee. Upon completion of each of the seven disciplinary area, students are required to (1) Complete and pass a proficiency test, (2) Undergo a rotation evaluation by clinical supervisors, and (3) Submit a comprehensive summary paper for each area of training.

THE COLLEGE OF STATEN ISLAND
DEPARTMENT OF BIOLOGY

Bachelor of Science
Medical Technology

Total Credits Required 128

Suggested course flow:
I. Required Pre-Major Courses
- BIO 150 HUMAN ANATOMY & PHYSIOLOGY I (4 CREDITS)
- BIO 160 HUMAN ANATOMY & PHYSIOLOGY II (4 CREDITS)
- BIO 170 GENERAL BIOLOGY I (3 CREDITS)
- BIO 171 GENERAL BIOLOGY I LAB (1 CREDIT)
- BIO 314 GENERAL MICROBIOLOGY (4 CREDITS)
- MTH 123 COLLEGE ALGEBRA & TRIGNOMETRY (4 CREDITS*)
- MTH 214 APPLIED STATISTICS USING COMPUTERS or BIO 272 BIOMETRICS (4 CREDITS EACH)
- CHM 141 GENERAL CHEMISTRY I (3 CREDITS)
- CHM 121 GENERAL CHEMISTRY I LAB (1 CREDIT)
- CHM 142 GENERAL CHEMISTRY II (3 CREDITS)
- CHM 127 GENERAL CHEMISTRY II LAB (1 CREDIT)
- CHM 250 ORGANIC CHEMISTRY I (4 CREDITS)
- CHM 256 ORGANIC CHEMISTRY II (4 CREDITS)
- PHY 116 INTRODUCTORY PHYSICS I (4 CREDITS)
- PHY 156 INTRODUCTORY PHYSICS II (4 CREDITS)
- ENG 111 INTRODUCTION TO COLLEGE WRITING (3 CREDITS)
- ENG 151 COLLEGE WRITING (4 CREDITS)
- TEXTUAL, AESTHETIC & LINGUISTIC ANALYSIS (4 CREDITS)
- PHL 130 INTRODUCTION TO ETHICS (3 CREDITS)
- CORE 100 UNITED STATES ISSUES, IDEAS, & INSTITUTIONS (4 CREDITS)
- CORE 200 CONTEMPORARY WORLD / PLURALISM AND DIVERSITY (4 CREDITS)
- PED 190 FITNESS FOR LIFE (1 CREDIT)
II. Medical Technology Major’s Courses

- MDT 100 HEMATOLOGY (4 CREDITS)
- MDT 160 CLINICAL CHEMISTRY (4 CREDITS)
- CHM 240 ANALYTICAL CHEMISTRY (4 CREDITS)
- MDT 310 BLOOD TRANSFUSION TECHNOLOGY (4 CREDITS)
- MDT 316 CLINICAL MICROBIOLOGY (4 CREDITS)
- BIO 318 HISTOLOGY (4 CREDITS)
- BIO/MDT 325 DIAGNOSTIC MOLECULAR BIOLOGY (4 CREDITS)
- BIO/MDT 442 IMMUNOLOGY (4 CREDITS)
- MDT 371 CLINICAL PARASITOLOGY (3 CREDITS)
- MDT 372 MEDICAL MYCOLOGY (3 CREDITS)
- MDT 346 GENERAL VIROLOGY (3 CREDITS)
- MDT 375 MEDICAL TECHNOLOGY COMPREHENSIVE REVIEW (2 CREDITS**)
- MDT 380 / MDT 480 CLINICAL TRAINING (22 CREDITS)
- MDT 384 LABORATORY OPERATIONS AND MANAGEMENT (2 CREDITS**)

* MTH 123 MAY BE WAVERED IF A STUDENT SUCCESSFULLY PASSED CUNY MATH ASSESSMENT TEST

** NON-MANDATORY COURSES

Course Description:

1. MDT 100 (Hematology): 3 class hours, 3 laboratory hours; 4 credits:
   Introduction to the study of hematology with emphasis on the formation and function of normal blood cells; identification of normal and abnormal blood cell types, variations in blood picture associated with hematologic disorders, and hemostasis and coagulation. Laboratory practice includes complete blood counts, studies of peripheral blood and bone marrow smears, special tests for hematologic disorders, and basic coagulation procedures.

2. MDT 160 (Clinical Chemistry): 3 class hours, 3 laboratory hours; 4 credits:
   Introduction to clinical chemistry and fundamentals of body fluid and urinalysis. Emphasis on theory and practice of both manual and automated techniques used in clinical chemistry laboratories. Students will learn to operate the autoanalyzer, spectrophotometer, electrophoresis, and other instruments. Normal metabolism, abnormal metabolism, and the clinical significance of laboratory tests are discussed.

3. CHM 240 (Analytical Chemistry): 2 class hours, 4 laboratory hours, 4 credits.
   A study of the quantitative aspects of chemical changes chemical equilibria, the stoichiometry and energetics of chemical reactions, theory and laboratory in volumetric, optometric, electrostatic, and kinetic methods of chemical analyses. Also included is an introduction to instrumental methods of analysis.

4. MDT 310 (Blood Transfusion Technology): 2 class hours, 4 laboratory hours; 4 credits:
   An introduction to the nature, significance, and distribution of blood groups antigens and antibodies; fundamentals of basic immunology, compatibility testing, and other procedures associated with a clinical blood
Laboratory practice includes duplicate testing for blood groups, cross-matching, antibody screening, hepatitis antigen testing, component preparation, and other significant tests.

5. MDT 316 (Clinical Microbiology): 4 class hours, 4 laboratory hours, 4 credits. With the focus on medical and diagnostic microbiology, this course is a study of host-microbe interactions, the principles and applications of immune response, the epidemiology of infectious disease, and the pathogenesis of the major microbial diseases. In the laboratory class, the procedures used in laboratory diagnosis are applied.

6. BIO 318 (Histology): 4 class hours, 4 laboratory hours, 4 credits. A study of the microscopic structure of the mammalian cells, tissues, and organs with emphasis on functional correlations. Laboratory sessions include technical procedures for fixing, sectioning, staining, and mounting tissue specimens, and examination of prepared microscopic slides of human/mammalian tissues and organs.

7. BIO/MDT 325 (Diagnostic Molecular Biology): 3 class hours, 3 laboratory hours; 4 credits. This course will address the theoretical and practical framework for the understanding and application of molecular biology techniques in the clinical laboratory. The course material will cover the principles and applications of recombinant DNA technology including DNA-DNA hybridization, DNA amplification and nonradioactive in situ hybridization (HISH) for the detection and identification of microorganisms associated with infectious diseases.

8. MDT 346 (General Virology): 3 class hours, 3 credits. A study of major groups of viruses which includes structural and biochemical characteristics, cell-virus interactions, and viral diseases.

9. MDT 371 (Clinical Parasitology): 3 class hours, 3 credits. As a survey of clinically relevant parasites, this course is designed to expose students to the identification and clinical relevance of a variety of microscopic and macroscopic vectors of diseases.

10. MDT 372 (Clinical Mycology): 3 class hours, 3 credits. A survey of morphology, cultural characteristics and taxonomy of pathogenic fungi and their role in human diseases.

11. MDT 375 (MDT Comprehensive Review): A non-mandatory course for 2 class hours, 2 credits. A review of key concepts of each MDT disciplinary area with weekly practice tests to prepare MDT students to take the ASCP NYS Licensure Exam and the ASCP Certification Exam.

12. MDT 380 / MDT 480 (Clinical Training): 22 credits. Hospital clinical laboratory rotation in the seven core disciplinary areas including Clinical Chemistry, Hematology, Immunohematology, Immunology/Serology, Microbiology, Parasitology/Mycology, and Urinalysis/Body Fluids. MDT 480, a companion course to MDT 380, requires submission of comprehensive rotation summary papers in the core disciplinary areas.
13. MDT 384 (Laboratory Operations and Management): 2 hours, 2 credits. A non-mandatory online course on laboratory operations and management to help prepare students for career advancement in the laboratory, beyond entry-level employment. Students will have a comprehensive understanding of principles of laboratory management, financial management, and strategies for career success.

14. BIO/MDT 442 (Immunology): 2 class hours, 4 laboratory hours, 4 credits. This course guides students through key components and interface of the two arms of immunity: innate and adaptive immunities. Special attention is given to antibody-antigen interactions, self versus non-self distinctions, immune disorders, and cancer immune response. The laboratory class is authentic-research based with emphasis on the role of cytokines in signaling pathways in cancer.

Appendices:

A. Hospital Affiliations (*indicates affiliation establishment in progress)

- Staten Island University Hospital/NSHS
- New York Community Hospital/NYPH
- Empire City Laboratories
- Elmhurst City Hospital
- NYU-Lutheran Medical Center (NYU-LMC)
- Hackensack University Medical Center
- InterFaith Medical Center (IMC)
- *Harlem Hospital (HH)
- *Columbia University Medical Center/NYPH
- *Memorial Sloan Kettering Cancer Center (MSKCC)

B. Suggested duration of clinical training by discipline:

- Blood Bank: 6 weeks
- Clinical Chemistry: 5 weeks
- Hematology/Coag: 5 weeks
- Immunology: 2 weeks
- Microbiology/Parasitology/Mycology: 6 weeks
- Urinalysis/Body Fluids: 2 weeks

C. Clinical proficiency tests to be administered by hospital supervisors in the seven areas of discipline

- Chemistry
- Clinical Microscopy, Body Fluid, and Urinalysis
- Hematology
E. Clinical Rotation Papers (Grading Criteria)

To be Submitted for Each MDT Clinical Training Rotation  (Clinical Chemistry, Hematology, Blood Bank, Serology)

1. Give an overview of the laboratory in which you are training.

2. Provide a description of the tests that are performed in the laboratory and indicate the expected normal range values for each test when possible. Indicate what medical conditions would be suspected when values are abnormal (high and low).

3. For the tests routinely performed indicate the sensitivity and specificity for each and factors that affect the appropriate test method selection.

4. Indicate all quality control methods that must be considered with respect to sample processing and reagents.

5. Using the website http://www.nih.gov/od/ors/ds/pubs/bmbl/contents.htm or any other that you can identify, indicate some of the safety considerations necessary for the laboratory rotation.

6. Identify the sound laboratory operations required for this rotation.

To be Submitted for Microbiology Laboratory Rotation

1. Indicate the general requirements that must be met to ensure the quality of the specimens to be cultured for A) pathogenic bacteria B) mycobacteria and C) fungi.

2. Indicate procedures that are designed to promote biosafety in the microbiology laboratory. Indicate the Occupational Safety and Health Administration (OSHA) standard practices and BSL facility practices employed in handling specimens and cultures for enteric bacteria, mycobacteria and viruses.

3. Describe the general and specific staining for different samples types when bacteria and fungi are considered.
4. Indicate the appropriate quality control procedures used for biochemical diagnostic tests conducted in the microbiology laboratory.

5. For primary isolation of microorganisms indicate the bacteriological media employed for blood, respiratory, wound, and gynecological specimens.

F. FACULTY:
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Mike Pesce, Ph.D. – CUMC/NYPH
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Arthur Phillips, MS, MT (ASCP) BB – CSI/CUNY
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Linda Panyu, MT (ASCP) – CSI/CUNY

G. Advisory Board
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Acronyms:

CSI/CUNY: College of Staten Island/City University of New York
CUMC/NYPH: Columbia University Medical Center/New York Presbyterian Hospital
EHC: Elmhurst Hospital Center
HH: Harlem Hospital (Affiliated with Columbia University)
HUMC: Hackensack University Medical Center
IDL: InterScience Diagnostics Laboratory
IMC: Interfaith Medical Center
MSKCC: Memorial Sloan Kettering Cancer Center
NS/LIJ: North Shore/Long Island Jewish Hospital
NYCH: New York Community Hospital
NYU-LMC: New York University-Lutheran Medical Center
SIUH/NSHS: Staten Island University Medical Center/North Shore Health Systems