

# CLINICAL LABORATORY SCIENCE (BS)

Director: Robert Grebenok, PhD (grebenor@canisius.edu)

## Introduction

Medical Laboratory Scientists perform tests to help diagnose and treat disease and maintain wellness. Medical laboratory data is the basis of up to 80 percent of all medical diagnoses. Advances in technology and prescription medical treatment, the mapping of the human genome, and the aging of America's population all contribute to the growing national demand for clinical lab professionals. Our program prepares graduates to analyze human blood, tissues and body fluids which aid in the diagnosis, treatment, and prevention of diseases. Medical Laboratory Scientists conduct such tests as typing and cross matching of blood and blood components, drug monitoring (for therapeutic and illegal drugs), identifying infectious microorganisms and their susceptibility to specific treatments, determining a patient's genetic predisposition to a variety of inherited diseases, and identifying anemias, leukemia and other blood disorders. For a more detailed description of the program, faculty, facilities, academic and co-curricular opportunities please go to the Medical Laboratory Science website (<https://www.canisius.edu/academics/programs/medical-laboratory-science/>).

The interdisciplinary curriculum of the Medical Laboratory Science major is concentrated in the natural sciences with special emphasis on biology and chemistry. Students take classes on campus for the first three years of the program and spend their senior year in either an 11-month or a 51-week hospital based clinical internship. During the clinical internship, students study the full range of clinical laboratory fields including hematology, clinical chemistry, immunology, microbiology, histology and immunohematology.

At Canisius, this learning experience is one of quality and value enhanced by small class sizes. The full-time professors you will encounter are trained professionals who hold doctoral degrees in their areas of expertise. During the clinical internship, the faculty will consist of PhDs, pathologists, clinical laboratory scientists, and others recognized for their experience in the various sub-specialties of laboratory medicine.

To be successful in the profession, you must be licensed by the New York State Office of the Professionals. To learn more information about the licensure program please go to the NYSED website (<http://www.op.nysed.gov/>).

## Qualifications

The program is a rigorous one, with very modest flexibility. The course offerings reflect the solid background in the sciences required for the internship experience. During the student's junior year, application is made to accredited hospital schools of medical technology. The burden of acceptance into a hospital program rests with the students. Canisius currently affiliates with the Rochester General Hospital School of Medical Technology (Rochester, NY.), UPMC Chautauqua WCA Hospital School of Medical Technology (Jamestown, NY.) and St. Vincent Health Center (Erie PA.). Students are enrolled as Canisius students while completing the hospital program. Because this program requires a competitive application into the hospital based clinical year, we recommend a minimum GPA of at least 3.00 with a strong performance in the upper level sciences.

## Progress Procedure (Success Procedure)

A Medical Laboratory Science student (MLS) dismissed from a clinical rotation before its logical conclusion\*, a student not accepted into a clinical rotation\*\*, or a student who fails to apply for a clinical rotation\*\*\* will be advised by a representative of Canisius University to complete the Biology degree at Canisius University or choose a different major. The MLS degree is intellectually organized based on the Biology degree, including 3 years of similar coursework and training. The completion of the Biology degree is easily accomplished within two semesters of the transfer of the student from the MLS program to the Biology major. The student can, of course, change majors entirely as well.

Upon completion of the Biology degree, the students will have several options to move forward with their education / training, including but not limited to attending a graduate program in the sciences, applying to a professional school (eg. Medical or Dental school), or attending a Masters certification program in Clinical Laboratory Sciences. These students will meet with their advisor to determine which option is best for their particular situation and their interest.

If an MLS student is no longer interested in becoming a Medical Laboratory Scientist after completion of 3 years of training, or prior to moving into their clinical rotation, a similar process will take place, in which they will be advised to transfer to the Biology major and finish a Biology degree or choose a different major (see above).

\*Students must abide by the rules and regulations of the program offering the clinical rotation – the “clinical program”. Canisius University currently maintains affiliation agreements with Rochester General Hospital Rochester, New York, UPMC Chautauqua, Jamestown, New York and St. Vincent Health Center, Erie, Pennsylvania. The affiliation agreements maintain content in which the rules and regulations of a student's continued program participation are clearly defined. Each affiliation agreement states, that the final determination of program continuation by a student lies with the Clinical Program Director. Appeals procedures of dismissal from each program exist and are contained within the programs rules and regulations of the particular clinical site.

\*\*Acceptance into a clinical rotation is competitive and completely dependent on the student's documented ability and program expectation.

The student must minimally meet grade and content requirements of the program for acceptance into that particular program. The student is solely responsible for the intellectual content and completion of the application.

\*\*\*Students are expected / required to apply for a clinical rotation during the Fall semester of their Junior year, typically during the month of September.

It is the responsibility of the student to keep track of the application due dates and arrange for letters of recommendation for their applications.

## Advisement

All students should have an advisor in the major and should contact the department directly to have an advisor assigned if they do not already have one. Meetings with academic advisors are required prior to students receiving their PIN for course registration each semester. All majors should work closely with their advisor in discussing career expectations, choosing their major electives, developing their entire academic program and planning their co-curricular or supplemental academic experiences.

## Curriculum

### An Ignatian Foundation

All undergraduate students must complete either the Canisius Core Curriculum (<http://catalog.canisius.edu/undergraduate/academics/curricular-information/core-curriculum/>) or the All-College Honors Curriculum (<http://catalog.canisius.edu/undergraduate/academics/curricular-information/all-college-honors-program/>). Many schools refer to their college-wide undergraduate requirements as "general education" requirements. We believe that the core curriculum and the honors curriculum are more than a series of required classes; they provide the basis for a Jesuit education both with content and with required knowledge and skills attributes that are central to our mission.

### Free Electives

Students may graduate with a bachelor's degree with more but not less than 120 credit hours. Free electives are courses in addition to the Canisius Core Curriculum or All-College Honors Curriculum and major requirements sufficient to reach the minimum number of credits required for graduation. The number of credits required to complete a bachelor's degree may vary depending on the student's major(s) and minor(s).

### Major Requirements

(20 courses)

Code	Title	Credits
BIO 114 & 114L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIO 111 & 111L	Introductory Biology I and Introductory Biology Laboratory I	4
BIO 112 & 112L	Introductory Biology II and Introductory Biology Laboratory II	4
BIO 211 & 211L	Biochemistry and Cell Biology I and Biochemistry and Cell Biology Lab I	4
BIO 212 & 212L	Biochemistry and Cell Biology II and Biochemistry and Cell Biology Lab II	4
BIO 307 & 307L	Microbiology and Microbiology Laboratory	4
BIO 426 & 426L	Immunochemistry and Immunochemistry Laboratory	4
CHM 111 & 111L	General Chemistry I and General Chemistry I Laboratory	4
CHM 112 & 112L	General Chemistry II and General Chemistry II Laboratory	4
CHM 227 & 227L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHM 228 & 228L	Organic Chemistry II and Organic Chemistry II Laboratory	4
MAT 141 or PSY 201	Inferential Statistics and Computers for Science Basic Statistics for Behavioral Sciences	4

Science Electives: select two upper-level science courses approved by Director 6-8

BIO 340	Physiology
BIO 404	Genetics
BIO 419	Cell Biology
BIO 430	Advanced Cellular Biochemistry and Metabolism
BIO 432	Developmental Biology
BIO 435	Developmental Neurobiology

BIO 444	Cancer Biology	
BIO 450	Molecular Biology	
MDT 380 & HRP 111	Seminar: Junior Level I and Medical Terminology	2
BIO 351	Biology Seminar I	1
BIO 353	Biology Seminar II	1
MDT 400 & MDT 401	Hospital Rotation: Med Tech I and Hospital Rotation: Med Tech II	30
<b>Total Credits</b>		<b>88-90</b>

## Learning Goals and Objectives

### Student Learning Goal 1

**Medical Laboratory Science majors will possess the scientific knowledge and laboratory skills to be competent and contributing members of the health-care delivery system. (Science)**

Students will:

- **Objective A:** Demonstrate foundational knowledge in inorganic chemistry, organic chemistry, biochemistry, anatomy and physiology, microbiology, immunology, and statistics
- **Objective B:** Understand the components of the diagnostic process and the role of the clinical laboratory; and
- **Objective C:** Perform and interpret results of clinical laboratory tests including: blood bank, urinalysis and other body fluids, chemistry, hematology, immunology, and microbiology.

### Student Learning Goal 2

**Medical Laboratory Science majors will effectively communicate audience specific medical and scientific information. (Communication)**

Students will:

- **Objective A:** Accurately record laboratory results;
- **Objective B:** Effectively communicate laboratory results to others; and
- **Objective C:** Use appropriate information to explain laboratory tests and results.

### Student Learning Goal 3

**Medical Laboratory Science majors will demonstrate professional and ethical behavior. (Professionalism)**

Students will:

- **Objective A:** exhibit appropriate patient interaction and confidentiality;
- **Objective B:** Objective B: adhere to safety guidelines and regulations; and
- **Objective C:** demonstrate positive and constructive interactions with peers, medical team, and patients.

## Courses

**MDT 280 Seminar: Sophomore Level I** 1 Credit  
Introduction to the Clinical Science Laboratory profession from variety of perspectives: history, present state of health-care delivery, job opportunities, organization of hospital laboratory. Tour of hospital laboratory.

**Prerequisite:** permission of program director.

**Offered:** occasionally.

**MDT 380 Seminar: Junior Level I 1 Credit**

Advanced discussions of Clinical Science Laboratory theory and practice designed as preparation for senior-year hospital rotation. Tour of hospital laboratory.

**Prerequisite:** permission of program director.

**MDT 400 Hospital Rotation: Med Tech I 15 Credits**

A year-long, hospital based program. Students learn to perform, develop, evaluate, correlate and assure accuracy and validity of laboratory information in areas such as Clinical Chemistry, Hematology/Hemostasis, Immunology, Immunohematology/Transfusion Medicine, Microbiology, Urine and Body Fluid Analysis; direct and supervise clinical laboratory resources and operations; and collaborate in the diagnosis and treatment of patients.

**Prerequisite:** acceptance into a hospital-based clinical program.

**MDT 401 Hospital Rotation: Med Tech II 15 Credits**

A year-long, hospital based program. Students learn to perform, develop, evaluate, correlate and assure accuracy and validity of laboratory information in areas such as Clinical Chemistry, Hematology/Hemostasis, Immunology, Immunohematology/Transfusion Medicine, Microbiology, Urine and Body Fluid Analysis; direct and supervise clinical laboratory resources and operations; and collaborate in the diagnosis and treatment of patients.

**Prerequisite:** MDT 400.