Medical Technology

Department of Biotechnical and Clinical Laboratory Sciences

Medical Technology
School of Medicine and Biomedical Sciences
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Overview

Medical technology, also known as clinical laboratory science, deals with the diagnosis and treatment of disease. It is a field of applied biology and chemistry and is appropriate for students interested in the delivery of health-care services. The course of study is interdisciplinary, drawing heavily upon the resources of both the natural sciences and the health sciences faculties. Once admitted into the program, students spend three academic semesters at the university taking program courses covering the areas of biochemistry, immunology, instrumentation, clinical chemistry, microbiology, blood banking, hematology, coagulation, parasitology, mycology, urinalysis, biomolecular techniques, medical genetics, and management. The last semester of the senior year is spent rotating through laboratories in area hospitals with which the program has affiliation agreements.

About our Degrees

Medical technology, also known as clinical laboratory science, deals with the diagnosis and treatment of disease. It is a field of applied biology and chemistry and is appropriate for students interested in the delivery of health-care services. The course of study is interdisciplinary, drawing heavily upon the resources of both the natural sciences and the health sciences faculties. Generally, medical technologists perform complex medically-related laboratory tests--chemical, immunological, hematological, biomolecular, and bacteriological.

Acceptance Criteria

Completion of all prerequisite science and math courses (some exceptions considered).
Minimum GPA of 2.0 overall.
Minimum GPA of 2.0 in prerequisite science and math courses.
Submission of a departmental application and a current copy of the UB DARS report to the department.

Acceptance Information

Application deadline is February 1st. This date may be extended based on space availability. Applications are available at the department office, 26 Cary Hall, South Campus, or online at http://medicine.buffalo.edu/education/undergraduate. Up to thirty-five full-time students are admitted each fall semester; part-time study is also available.

Degree Requirements

Please see Degrees and Policies.

About our Courses

The curriculum for the program in Medical Technology is very structured. Students spend three academic semesters at the university taking program courses covering the areas of biochemistry, immunology, instrumentation, clinical chemistry, microbiology, blood banking, hematology, coagulation, parasitology, mycology, urinalysis, biomolecular techniques, medical genetics, education, and management. The last semester of the senior year is spent in guaranteed rotations in area hospital laboratories with which the program has affiliation agreements.

The typical size of lecture classes for required program courses is 25-60 students, with a smaller number in each associated laboratory section. Hospital rotations usually have an instructor/student ratio of 1/1.

In the medical technology program, what do teaching assistants (TAs) do?
TAs in required program courses assist professors in laboratory teaching and preparation. Some may present several lectures in their specialty. All teaching assistants are required to have weekly office hours for student assistance.
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Suggested introductory courses:

- MT 201 Medical Terminology
- BIO 200 Evolutionary Biology
- BIO 201 Cell Biology
- CHE 101 - CHE 102 General Chemistry I - II

For course descriptions, please see Courses.

About our Faculty

The UB program in Medical Technology is ranked among the top 15 medical technology programs in the nation in terms of faculty research productivity. Faculty research interests include measurement of oxidative stress, methods evaluation protocols, environmental pollutants and disease outcomes in humans, carbohydrate immunology, cellular and molecular biology of erythropoiesis, and organ and tissue donation. The faculty also excels at teaching and has received several student, university, and state-wide teaching awards. The undergraduate advisor schedules individual advising meetings on the South Campus by appointment only.

See a list of our Undergraduate Faculty.

Transfer Policy

Transfer students must first be accepted by the university and must complete an application from the Office of Admissions and submit official transcripts. These documents must be received well in advance by the university to meet the program deadline of February 1. These dates may be extended based on space availability. Upon university admission, the evaluated transcripts are sent to the program for further review.

The program in medical technology has transfer agreements with SUNY Morrisville, Niagara County Community College, and the medical laboratory technology program at Erie Community College North, and prerequisite course equivalencies have been established. Students with an AAS in medical laboratory technology are encouraged to have their transcripts evaluated by the program advisor. Students from other institutions should contact the undergraduate program advisor for prerequisite course equivalencies. Course descriptions and syllabi may be required in order to establish equivalencies.

Courses from other institutions may not be used to satisfy any upper-division program course requirements.

Extracurricular Activities

Every fall semester the department hosts an introductory pizza party for all faculty, staff, graduate and undergraduate students.

An awards banquet is held in the spring semester to recognize graduating seniors.

See the UB Student Association.

Practical Experience and Special Academic Opportunities

Undergraduate Research and Practical Experience

Internships
Hospital clinical rotations completed during the final semester of the senior year are a guaranteed part of the program. Placement is made by the clinical education coordinator. Below is a listing of hospital and clinical affiliates.

- Bertand Chaffee Hospital (Springville, NY)
- Brooks Memorial Hospital (Dunkirk, NY)
- Buffalo Medical Group
- Catholic Health System (Sisters of Charity Hospital and Mercy Hospital of Buffalo)
- Erie County Medical Center, including the Public Health Lab
- FF Thompson Health (Canandaigua, NY)
- Jones Memorial Hospital (Wellsville, NY)
- Kaleida Health System (Buffalo General Hospital, Center for Laboratory Medicine, Women's and Children's Hospital of Buffalo, Millard Fillmore
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Health System
Noyes Memorial Hospital (Dansville, NY)
Roswell Park Cancer Institute
Strong Memorial Hospital (Rochester, NY)
UB Student Health Services
United Memorial Medical Center (Batavia, New York)
Veterans Affairs Western New York Healthcare System
Wyoming County Community Hospital (Warsaw, New York)

Honors, Awards, and Scholarships

Scholarships are available from the national and state chapters of the American Society for Clinical Laboratory Science (ASCLS). The American Society for Clinical Pathology (ASCP), in a partnership with Siemens Healthcare Diagnostics, offers scholarships to MT students in their senior year of study; students must be members of the ASCP. Students must be members of the organization. The Sara Marie Cicarelli Memorial Scholarship, offered by the Department of BCLS, is available to a full-time student entering the senior year of the program. The Mary Cecina Riforgiato Memorial Scholarship, offered by the Department of BCLS, is awarded to a senior upon completion of the MT program.

Career Information and Further Study

Opportunities for medical technologists are extremely varied, and employment is available in both the public and private sectors.

Career Choices

- Graduate school: Scientific specialty, forensics, computer science, business
- Hospital or private laboratories
- Instrument manufacturers
- Laboratory management
- Management or regulatory affairs
- Professional school: Medical, dental, chiropractic, optometry, veterinary, physician's assistant
- Research or industrial laboratory careers
- Sales or technical representation
- Scientific writing or editing

Degrees Offered

Undergraduate: BS

Links to Further Information About this Program

- Undergraduate Catalog
- Undergraduate Admissions
- Graduate Admissions
- School of Medicine and Biomedical Sciences
- Department of Biotechnical and Clinical Laboratory Sciences

Medical Technology - B.S.

Acceptance Criteria

Completion of all prerequisite courses (some exceptions considered).
Minimum GPA of 2.0 overall.
Minimum GPA of 2.0 in prerequisite courses.
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Advising Notes

Application deadline is February 1. This date may be extended based on space availability. Applications are available at the department office, 26 Cary Hall, South Campus, or online at http://medicine.buffalo.edu/education/undergraduate. Up to thirty-five full-time students are admitted each fall semester; part-time study is also available.
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Prerequisite Courses

- BIO 200 Evolutionary Biology
- BIO 201 Cell Biology
- CHE 101 General Chemistry
- CHE 102 General Chemistry
- CHE 201 Organic Chemistry
- CHE 202 Organic Chemistry
- CSE 101 Computers: A General Introduction
- MIC 301 Biomedical Microbiology
- PGY 300 Human Physiology
- PSY 207 Psychological Statistics or STA 119 Statistical Methods
  One of: PHI 337 Social and Ethical Values in Medicine, PHI 107 Ethics or PHI 217 Professional Ethics

Required Courses

- MT 302 Instrumental Analysis
- MT 401 Clinical Biochemistry
- MT 402 Clinical Immunology Lab
- MT 405 Clinical Immunohematology
- MT 407 Clinical Chemistry
- MT 408 Hospital Chemistry
- MT 409 Clinical Microbiology
- MT 410 Hospital Microbiology
- MT 411 Clinical Hematology
- MT 412 Hospital Hematology
- MT 413 Clinical Elective
- MT 414 Hospital Blood Bank
- MT 416 Clinical Parasitology
- MT 417 Laboratory Education and Seminar
- MT 419 Phlebotomy
- MT 420 Clinical Correlations
- MT 421 Clinical Urinalysis and Body Fluids
- MT 422 Biomolecular Technology and Diagnostics
- MT 423 Laboratory Management
- MT 425 Clinical Mycology
- MT 431 Clinical Hemostasis
- MT 432 Introduction to Medical Genetics

Summary

Total required credit hours for the major...105

See Baccalaureate Degree Requirements for general education and remaining university requirements.

Recommended Sequence of Program Requirements

FIRST YEAR
Fall BIO 200, CHE 101
Spring BIO 201, CHE 102

SECOND YEAR
Fall CHE 201
Spring CHE 202, MIC 301
Fall or Spring CSE 101, PGY 300; PSY 207 or STA 119; and PHI 337, PHI 107, or PHI 217

THIRD YEAR
Fall MT 302, MT 401, MT 402
Spring MT 405, MT 407, MT 409

FOURTH YEAR
Fall MT 411, MT 416, MT 417, MT 421, MT 422, MT 429, MT 431, MT 432
Spring MT 408, MT 410, MT 412, MT 413, MT 414, MT 419, MT 420, MT 423

Electives and Course Groupings

Courses Recommended but Not Required
- ANA 113 Human Anatomy
- APY 248 Human Genetics
- MT 101 Introduction to Medical Technology I
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MT 201 Medical Terminology or CL 151 Medical Terminology

MT 101: Introduction to Medical Technology I

Credits: 1
Semester(s): Fall
Type: SEM

Includes visits to local hospital laboratories to view medical technologists at work in the various specialty areas, and discussion of current topics guided by senior students under faculty supervision.

MT 201: Medical Terminology

Credits: 1
Semester(s): Fall
Type: SEM

Includes medical terminology and discussion of current topics.

MT 302: Instrumental Analysis

Credits: 4
Semester(s): Fall
Type: LEC/LAB

Covers principles and operation of a variety of instruments used in clinical laboratories and medical research. Discusses physical and chemical properties of matter that make measurement possible. Presents theoretical and practical aspects of spectral, electrochemical, chromatographic, colligative and nuclear instrumentation. Also presents relevant calculations and applies them in lab experiments.

MT 401: Clinical Biochemistry

Credits: 4
Semester(s): Fall
Pre-requisites: CHE 202 Or PGY 300
Type: LEC/REC

Presents basic biochemistry, emphasizing human metabolic pathways and their relationship to health and disease. Case studies and problem-solving illustrate the applications of biochemistry to human disease and its diagnosis in the clinical laboratory.

MT 402: Clinical Immunology Lec

Credits: 3
Semester(s): Fall
Pre-requisites: BIO 201 Or MIC 301
Co-requisites: Students must enroll in MT 402LAB and MT 402LEC in the same term.
Type: 

Lab open only to biotechnology and medical technology majors.

Explores functions and mechanisms of the human immune system, including antigen-antibody reactions and their application to serological testing. Autoimmune diseases, syphilis, hepatitis, AIDS, infectious mononucleosis, cytomegalovirus infections and toxoplasmosis are among the disease states studied.

MT 405: Clinical Immunohematology

Credits: 4
Semester(s): Spring
Pre-requisites: MT 402
Type: LEC/LAB/REC

Studies human blood group antigens and antibodies; also examines compatibility testing for blood transfusions and problem solving involving case studies.

MT 407: Clinical Chemistry

Credits: 6
Semester(s): Spring
Pre-requisites: MT 302 Or MT 401
Type: LEC/LAB

Discusses pathological and physiological implications of electrolytes, blood gases, metabolites, enzymes, hormones, and drugs. Emphasizes developing technical competencies in analytical methods and computer-based data reduction and interpretation. Covers introductory methods of evaluation, quality control and basic statistical decision-making procedures.

MT 408: Hospital Chemistry

Credits: 3
Semester(s): Spring
Pre-requisites: MT 407
Type: LAB

Assignment in a clinical laboratory that provides supervised practicum in clinical chemistry.

MT 409: Clinical Microbiology

Credits: 2
Semester(s): Spring
Pre-requisites: MIC 301 Or MT 401
Type: LAB

Lab is open only to medical technology majors.

Involves a comprehensive study of the classification, etiology, pathogenicity, laboratory identification, diagnosis, and treatment of bacterial infections. Emphasizes techniques and methods used to identify and isolate bacterial pathogens. Provides an overview of the classification and pathogenicity of viral infections. The laboratory consists of microscopic, biochemical and immunological procedures to identify pathogens from clinical specimens.
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MT 410: Hospital Microbiology
Credits: 3
Semester(s): Spring
Pre-requisites: MT 409 or MT 429
Type: LAB
Assignment in a clinical laboratory that provides supervised practicum in clinical bacteriology.

MT 411: Clinical Hematology
Credits: 4
Semester(s): Fall
Pre-requisites: MT 405
Type: LEC/LAB/REC
Comprehensive study of clinical hematology. The lecture focuses on the components of blood and their specific role, hematopoiesis, and the incidence, etiology, diagnosis and treatment of hematologic disorders. The laboratory complements the lecture and provides the opportunity to develop a working knowledge of the basis for hematologic laboratory testing, the development of the technical skills for the performance of a variety of laboratory procedures and the interpretation of laboratory results.

MT 412: Hospital Hematology
Credits: 3
Semester(s): Spring
Pre-requisites: MT 411 or MT 431
Type: LAB
Assignment in a clinical laboratory that provides supervised practicum in clinical hematology.

MT 413: Clinical Elective
Credits: 3
Semester(s): Spring
Type: LAB
Involves rotations designed to provide depth and enrichment of students' experience in particular health-care areas pertinent to medical technology (e.g., virology, histocompatibility, toxicology, tissue pathology, andrology and forensics).

MT 414: Hospital Blood Bank
Credits: 3
Semester(s): Spring
Pre-requisites: MT 405
Type: LAB
Assignment in a clinical laboratory that provides supervised practicum in blood banking.

MT 416: Clinical Parasitology
Credits: 1
Semester(s): Fall
Pre-requisites: MT 409
Type: LEC
Surveys the distribution, pathogenesis, identification and life cycles of clinically significant parasites, emphasizing the infective and diagnostic stages. The laboratory features identifying characteristics of parasites using fixed and fresh clinical specimens.

MT 417: Laboratory Education and Seminar
Credits: 2
Semester(s): Fall
Type: LEC/REC
Examines clinical and classroom instructional design, evaluation strategies, statistical tools, and teaching skills; seminar portion features student presentations about topics relevant to medical technology.

MT 419: Phlebotomy
Credits: 1
Semester(s): Spring
Type: LEC/LAB
Assignment in a clinical laboratory that provides instruction and supervised practicum in blood-collection techniques.

MT 420: Clinical Correlations
Credits: 1
Semester(s): Spring
Type: SEM
Discusses case studies using problem-solving techniques to analyze and interpret relevant clinical and laboratory data. A comprehensive examination covers all program coursework.

MT 421: Clinical Urinalysis and Body Fluids
Credits: 1
Semester(s): Fall
Pre-requisites: MT 407
Type: LEC
Explores theoretical and applied aspects of urinalysis and body fluids.

MT 422: Biomolecular Technology and Diagnostics
Credits: 1
Semester(s): Fall
Pre-requisites: BCH 403 or MIC 301 or MT 401
Co-requisites: Students must enroll in MT 422LAB and MT 422LEC in the same term.
Type: LAB
Lab open only to biotechnology and medical technology majors.
Discusses the basic biochemistry needed to understand Mendelian genetics, basic techniques used in molecular biology, practical uses of molecular biotechnology in diagnosis, research and industry, and ethical issues surrounding the use of biotechnology. Laboratory consists of hands-on and demonstration exercises illustrating techniques used in biomolecular technology and diagnosis.
MT 423: Laboratory Management
Credits: 1
Semester(s): Spring
Type: LEC

Covers managerial theory and practice, resume writing and interviewing, influence of regulatory agencies, and current issues affecting health care.

MT 426: Technical Communications for the Scientific Professional
Credits: 3
Semester(s): Spring
Type: LEC

Covers the multiple styles of presentation that are required for effective technical communication, emphasizing the ability to accurately analyze and present data and technical information. Formats that are emphasized include writing abstracts, materials and methods, introductions with references, standard operating protocols, figure legends, and patent applications. Additional lectures cover avoiding common errors in grammar and usage, accessing library resources, and use of molecular biology databases. Expects graduate students to complete a grant application and generate a completed bibliography to be used in their thesis research. The course also covers the correct usage of multiple software packages used in science writing, including Adobe Phtotshop, SPSS, and EndNote.

MT 428: Forensic Science
Credits: 3
Semester(s): Fall
Pre-requisites: CHE 202 or CHE 252
Type: LEC

Introduces the field of forensic science, including the general areas of forensic serology, DNA analysis, chemistry/drug analysis, firearms/tool marks, arson, and trace evidence.

MT 429: Clinical Mycology
Credits: 1
Semester(s): Fall
Pre-requisites: MT 409
Type: LEC/LAB

Comprehensive study of the classification, etiology, pathogenicity, diagnosis and treatment of fungal infections. Emphasizes techniques and methods used to isolate and identify fungal pathogens. The laboratory consists of microscopic and biochemical procedures to identify molds and yeasts from clinical specimens.

MT 430: Bioseparation Techniques
Credits: 2
Semester(s): Spring
Pre-requisites: MT 302
Type: LAB/REC

Introduces the biochemistry of selected laboratory experiments designed to provide the student experience with common analytical techniques associated with the isolation, quantification, and characterization of biomolecules emphasizing instrumentation. Practices multiple bioseparation techniques including thin layer, classical column, high performance liquid, and gas chromatography as well as electrophoretic separation. Also employs automated and semi-automated chemistry systems.

MT 431: Clinical Hemostasis
Credits: 2
Semester(s): Fall
Pre-requisites: MT 411
Type: LEC/LAB/REC

Comprehensive study of hemostasis including an in-depth examination of the components of coagulation and fibrinolytic systems and related disorders. Emphasizes the clinical and diagnostic features of the disorders of coagulation and fibrinolysis, and the selection and performance of appropriate laboratory tests.

MT 432: Introduction to Medical Genetics
Credits: 1
Semester(s): Fall
Type: LEC

Discusses the basic principles of medical genetics, including basic Mendelian genetics, the molecular and biochemical basis of genetics, developmental genetics, genetics of complex diseases, genetics of cancer, genetic counseling, and prenatal diagnosis.

MT 434: Cell and Tissue Culture Techniques
Credits: 4
Semester(s): Spring
Pre-requisites: MT 402
Type: LEC/LAB

Undergraduate biotechnology majors only

Introduces the concepts of cell and tissue culture, with specific laboratory exercises designed to expose the student, through the use of primary and established cell lines, to sterile technique, media preparation, quality control and cell line validation, passaging of nonadherent and adherent cells, cryopreservation, and microscopy and digital photography. Cellular assays for viability, proliferation, invasion, and apoptosis are performed.

MT 437: Applications of Molecular Biotechnology
Credits: 3
Pre-requisites: MT 401
Type: LEC

Discussions of the application of recombinant DNA technology to create various products and to solve problems. Topics include the manipulation of prokaryotic and eukaryotic cells to produce recombinant proteins, directed mutatgenesis/protein engineering, production of therapeutic agents and vaccines, gene therapy, commercial product production by recombinant microorganisms, bioremediation and biomass utilization, genetic engineering of plants, transgenic animals and the regulation and patenting of molecular biotechnology.

MT 445: Biotechnology Career Preparation
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Credits: 1
Semester(s): Spring
Type: SEM

Undergraduate biotechnology majors only

Explores the various careers in biotechnology with participation by individuals from various biotechnology companies. Discusses career options such as research and development, quality control and quality assurance, regulatory affairs, marketing, management, patent development, and sales. Teaches written skills including preparation of a resume and a curriculum vitae. Oral skills include preparing for and experiencing a mock interview.

MT 447: Introduction to Microbial Genome Annotation

Credits: 2
Pre-requisites: MT 401
Type: LEC

Application of the Integrated Microbial Genomics Annotation Collaboration Toolkit (IMG-ACT) to perform annotation of genes in a microbe with a sequenced genome. A series of online modules will be demonstrated by the instructor, followed by student application of the modules to genes assigned to them for analysis.

MT 496: Internship in Biotechnology

Credits: 1-12
Semester(s): Fall, Spring, Summer
Type: TUT

A one-semester, variable credit internship at a biotechnology site. Includes participation in one or more projects selected to integrate the materials learned in academic courses. Placement is accomplished by the program director, based on the coursework completed and interest of the student. Generally requires an interview at the biotechnology site before placement.

MT 499: Independent Study

Credits: 1-4
Semester(s): Fall, Spring, Summer
Type: TUT

The content of this course is variable and therefore it is repeatable for credit. The University Grade Repeat Policy does not apply.

Involves method and equipment evaluations or other short-term projects, arranged in consultation with individual faculty members.