Medical Technology

General Information

The medical technology program (also called clinical laboratory science) was established at the University of Minnesota in 1922 to prepare men and women for professional work in laboratory science and advanced study. This program provides a strong foundation in the sciences together with rich experiences in the clinical laboratory. Approximately 20 percent of medical technology graduates go on to complete an advanced degree.

Clinical laboratory scientists (medical technologists) perform many and varied laboratory analyses and use critical thinking in determining the correctness of test results. They recognize the interdependency of testing information and have knowledge of physiologic and pathologic conditions affecting results in order to validate them. In many health care settings, they provide data used by physicians in determining the presence, extent, and, as far as possible, causes of disease.

Clinical laboratory scientists/medical technologists
- develop and establish procedures for collecting, processing, and analyzing biological specimens and other substances;
- perform analytical tests of body fluids, blood, serum, plasma, cells, and other substances;
- integrate and relate data generated by various clinical laboratories while making decisions regarding possible discrepancies;
- confirm abnormal results, verify and execute quality control procedures, and solve problems concerning the generation of laboratory data to maintain accuracy and precision;
- establish and perform preventive and corrective maintenance of equipment and instruments as well as identify appropriate sources for repairs;
- develop, evaluate, and select new techniques, instruments, and methods in terms of their usefulness and practicality within the context of a given laboratory’s personnel, equipment, space, and budgetary resources;
- demonstrate professional conduct through interpersonal skills with patients, laboratory personnel, other health care professionals, and the public;
- participate in continuing education for growth and maintenance of professional competence;
- provide leadership in educating other health personnel and the community;
- exercise principles of management, safety, and supervision.
- apply principles of educational methodologies.


Tests and procedures are performed or supervised by laboratory technologists in hematology, coagulation, microbiology, immunohematology, immunology, clinical chemistry, and urinalysis. Subspecialty areas in which laboratory personnel work include such fields as molecular diagnostics, cytogentic, fertility testing, flow cytometry, tissue typing, bone and skin banks, forensics, and infection control.

As complexities of clinical laboratories increase, many medical technologists specialize in immunohematology, hematology, microbiology, chemistry, immunology, virology, coagulation, administration, computer science, education, quality assurance, and other areas. There are opportunities for graduates to work in hospital laboratories, clinics, physician offices, public health agencies, research, and industry.

As a general rule, a student who has excelled in scientific subjects in high school will succeed in medical technology.

The program is fully accredited by the National Accrediting Agency for Clinical Laboratory Sciences, 8410 West Bryn Mawr, Suite 670, Chicago, IL 60631 (773-714-8880; e-mail INFO@naacls.org).

Mission Statement

The mission of the Division of Medical Technology is to be a leader in educating clinical laboratory science professionals. In accordance with the University of Minnesota’s mission, the division strives to do this in an environment that embodies the values of academic freedom, responsibility, integrity, and cooperation; that provides an atmosphere of mutual respect, free from racism, sexism, and other forms of prejudice and intolerance; that assists individuals, institutions, and communities in responding to a continuously changing world; that is conscious of and responsive to the needs of the many communities it is committed to serving; that creates and supports partnerships within the University, with other educational programs, and with communities to achieve common goals; and that inspires, sets high expectations for, and empowers the individuals within the community.

The division pursues this mission through teaching, research, and actively working with the health care community to assist in meeting the clinical laboratory needs of the state of Minnesota. Specifically, the division
- educates students to be clinical laboratory professionals who have the knowledge, skills, and values to provide competent and ethical practice in clinical laboratory science;
- develops new knowledge about the practice of clinical laboratory sciences;
- helps communities and other professionals develop an awareness and understanding of the role of the clinical laboratory professional and the work they perform;
- collaborates with other professionals within the health care community to assess the changing needs of the clinical laboratory, design solutions to meet the challenges, and monitor the quality of laboratory practice; and
- provides continuing education opportunities to practicing clinical laboratory professionals.

Facilities

Health sciences facilities are in a complex of buildings on the East Bank of the Minneapolis campus, including the Mayo Memorial Building, Malcolm Moos Health Sciences Tower, Weaver-Densford Hall, and the Phillips-Wangensteen Building. Close to or connected with the complex are University of Minnesota Medical Center, Fairview; Dwan Variety Club Cardiovascular Research Center; Veterans of Foreign Wars Cancer Research Center; and Children’s Rehabilitation Center. Extensive resources and services of the Bio-Medical Library, including the Learning Resources Center, are housed in Diehl Hall.
These facilities provide learning, research, and internship sites for many students. They are excellent research centers, not only for studying diseases, healthy physiological processes, and environmental health, but also for developing new procedures and delivering expert health care. The proximity of the Academic Health Center units to each other and to the rest of the campus facilitates interdepartmental communication and underscores the interdisciplinary nature of health care. The Academic Health Center units also maintain affiliations with many hospitals and health care facilities around the Twin Cities and greater Minnesota, which afford students access to a wide spectrum of health care situations.

Clinical experiences for University of Minnesota medical technology students are available at the Veterans Affairs Medical Center, Allina Laboratories, and Fairview Health Services; Mayo Clinic (Rochester); the North Central Blood Services of St. Paul, Regions Hospital (St. Paul), and HealthEast Hospitals (St. Paul and Maplewood), North Memorial Medical Center (Robbinsdale), Park Nicollet Health Services (St. Louis Park), Ridgeview Medical Center (Waconia), St. Cloud Hospital (St. Cloud), Immanuel-St. Joseph’s Hospital (Mankato), Lakeview Hospital (Stillwater), and Rice Memorial Hospital (Willmar).

Admission

Medical Technology sets its own standards and requirements for admission. These include a strong background in the natural sciences (specifically biology, chemistry, and physiology), as well as in the social and behavioral sciences. The Division recommends that applicants be genuinely interested in human services and sincerely committed to promoting the public's health and general welfare. Students generally enter the program at the beginning of their junior year.

Application Process

The medical technology curriculum consists of the preprofessional program at the University of Minnesota or its equivalent at another regionally accredited institution and the professional program in the Division of Medical Technology, which is part of the Academic Health Center.

Admission to the Preprofessional Program—Students who apply to enroll in a preprofessional program must meet the admission criteria and follow academic regulations of that college. The preprofessional program is pursued during the first two years of college.

The medical technology sequence is based on entrance to the professional program in the fall semester of year three or four, depending on completion of prerequisites. Admission to year three of the curriculum sequence is preferred. Space is very limited for year 4 admission.

Admission to the preprofessional program at the University of Minnesota does not assure admission to the professional program.

Admission to the Professional Program—For admission to the Division of Medical Technology, a student must have completed 60 semester credits, including required courses. The major criterion for admission is satisfactory academic performance as judged by the student’s grade point average (GPA) in prerequisite science courses and cumulative GPA. Students are admitted once each year for the fall semester. Admission to the professional program is competitive because of the limited number of students who can be accommodated in the teaching and clinical facilities.

Students in residence at the University of Minnesota who expect to complete the requirements for admission to the professional program must file an Application for Undergraduate Change of College form with the One Stop Student Services Center, 200 Fraser Hall, by March 1. (Priority deadline is March 1. Applications are accepted until the class is full.) Students with sufficient credits but have course deficiencies should consult the Division of Medical Technology adviser regarding their status. Students from other regionally accredited colleges and universities may transfer to the University of Minnesota to complete the medical technology program. Courses completed that are equivalent to those offered at the University of Minnesota are accepted to satisfy the requirements for admission to Medical Technology. Students who have a baccalaureate degree in a science curriculum and have completed required courses may finish the program in 15 months, as space is available in affiliated laboratories. Students transferring from other colleges may apply online by referring to the admissions Web site at http://admissions.tc.umn.edu. The preferred deadline to apply is March 1. It is strongly advised that transfer students ascertain their status by writing to the Adviser, Medical Technology, University of Minnesota, MMC 711, 420 Delaware Street S.E., Minneapolis, MN 55455. Required science courses must be completed by the end of spring semester.

English Proficiency—If students are not native speakers of English, they must take the Test of English as a Foreign Language (TOEFL) or the Michigan English Language Assessment Battery (MELAB). To register for the TOEFL, students should contact the agency that handles TOEFL registration in their country or write to the Educational Testing Service (Box 6151, Princeton, NJ 08541, USA). If students are already in the Twin Cities area, they may register for the MELAB with the Minnesota English Center, University of Minnesota, 315 Nolte Center for Continuing Education, Minneapolis, MN 55455, or call 612-624-4548. To register for the MELAB outside the Twin Cities area, contact the English Language Institute, Testing and Certification Division, University of Michigan, Ann Arbor, MI 48109, USA, or call 734-764-2416. Required is a TOEFL score of at least 570 (paper version), 230 (computer version), or 88 (Internet version), or a MELAB score of at least 84.

Those who have completed one year of instruction and composition at a college or university where English is the language of instruction may have the English requirement waived.

Degrees

Bachelor of Science—Medical Technology offers the bachelor of science (B.S.) degree.

Bachelor of Applied Science—The College of Continuing Education offers the bachelor of applied science (B.A.Sc.) degree in clinical laboratory science through Medical Technology for students with MLT/CLT certification from a MNSCU program.

Master of Science—Graduate work in clinical laboratory science is available for qualified candidates who wish to prepare for a career of research, teaching, or work in industry. The master of science (M.S.) program in clinical laboratory science is offered by the Graduate School. The program is offered only under Plan A (master’s degree with thesis). Each student must complete a thesis involving independent research in one of the subareas of this field under the direction of an adviser.

Admission requirements include a bachelor’s degree from an accredited institution of higher learning with sufficient scholarly attainment in medical technology or chemistry and the biological sciences to justify graduate work in these areas.

For more information, see the Graduate School Catalog or contact the Clinical Laboratory Science Graduate Program Coordinator, MMC 609, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-625-8952).
## Extended Career Paths in Medical Technology

<table>
<thead>
<tr>
<th>Hospital/Medical Center: Laboratory Areas</th>
<th>Health Care Administration</th>
<th>Health Care Agency/Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute care</td>
<td>Clinic manager/administrator</td>
<td>Administrator for Veterans</td>
</tr>
<tr>
<td>Andrology/Fertility testing</td>
<td>Coder-Abstractor (business or medical records office)</td>
<td>Affairs hospital</td>
</tr>
<tr>
<td>Blood bank</td>
<td>Consultant service specialist</td>
<td>Biometrist</td>
</tr>
<tr>
<td>Bone marrow</td>
<td>Personnel director</td>
<td>Crime laboratory scientist</td>
</tr>
<tr>
<td>Cell markers</td>
<td>Emergency medical services coordinator</td>
<td>Department of Health</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Financial manager/planner</td>
<td>- Educator</td>
</tr>
<tr>
<td>Coagulation</td>
<td>Group practice administrator</td>
<td>Department of Health</td>
</tr>
<tr>
<td>Computer science</td>
<td>Hazardous waste coordinator</td>
<td>- Department of Health</td>
</tr>
<tr>
<td>Components - Transfusion service</td>
<td>Health care administrator</td>
<td>- Proficiency test consultant</td>
</tr>
<tr>
<td>Cytogenetics</td>
<td>Health insurance administrator</td>
<td>Employee recruiter/Placement</td>
</tr>
<tr>
<td>Cytodiagnostic urinalysis</td>
<td>Health policy analyst</td>
<td>officer</td>
</tr>
<tr>
<td>Cytology/Histology</td>
<td>Health promotion coordinator</td>
<td>Environmental health specialist</td>
</tr>
<tr>
<td>Development laboratory</td>
<td>Hospital quality assurance coordinator</td>
<td>(Inspector)</td>
</tr>
<tr>
<td>Drug analysis (toxicology)</td>
<td>Infection control officer</td>
<td>Environmental pathology</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>Epidemiologist</td>
<td>technologist</td>
</tr>
<tr>
<td>Flow cytometry</td>
<td>Laboratory supervisor</td>
<td>Fraud investigator</td>
</tr>
<tr>
<td>Forensic science</td>
<td>Laboratory director</td>
<td>Health Management</td>
</tr>
<tr>
<td>Genetics</td>
<td>Laboratory utilization review coordinator</td>
<td>Organization - Health</td>
</tr>
<tr>
<td>Hematology</td>
<td>Long-term care administrator</td>
<td>educator</td>
</tr>
<tr>
<td>Immunology</td>
<td>Mental health administrator</td>
<td>JCAHO Survey team</td>
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<tr>
<td>Immunopathology</td>
<td>Purchaser (laboratory/ hospital/medical center)</td>
<td>member/CAP inspector</td>
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<tr>
<td>Immunophenotyping</td>
<td>Staffing coordinator</td>
<td>Medical examiner investigator</td>
</tr>
<tr>
<td>Infection control</td>
<td>(laboratory or home care)</td>
<td>Military service - Armed</td>
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<tr>
<td>Laboratory supervisor or administrator</td>
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<td>Forces, ROTC, National Guard</td>
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<td>NASA mission specialist</td>
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<td>Patient educator</td>
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<td>Private investigator FBI/Special agent (forensic lab)</td>
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<td>Management Information System</td>
<td>Research - Basic and Applied</td>
<td>Industry (U.S. or International)</td>
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<td>Biometrician</td>
<td>Associate scientist/Scientist</td>
<td>Adviser to or inventor of “home” or other lab tests</td>
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<td>Director - Division of Biometry</td>
<td>Clinical trial coordinator</td>
<td>Biomedical specialist - Occupational health</td>
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<td>Hospital Information Systems - Team leader</td>
<td>Director of research</td>
<td>Cell culture consultant</td>
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<td>Installer/Educator</td>
<td>Research analyst</td>
<td>Clinical trial coordinator</td>
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<td>Programmer</td>
<td>Research assistant</td>
<td>Compliance coordinator</td>
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<td>Systems analyst</td>
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<td>Computer consultant</td>
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<td>Director of marketing</td>
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<td>Documentation supervisor</td>
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<td>Editor/manager - Medical</td>
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<td>publications</td>
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<td>Food technologist - Quality</td>
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<td>assurance manager</td>
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<td>Health care reimbursement</td>
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<td>coordinator</td>
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<td>Health promotion and education</td>
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<td>specialist</td>
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<td>Industrial hygiene specialist</td>
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<td></td>
<td>Installation specialist</td>
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<tr>
<td>Other Professional Routes</td>
<td>Education</td>
<td>Humanitarian Work</td>
</tr>
<tr>
<td>Accounting</td>
<td>Academician</td>
<td>Medical missionary work</td>
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<tr>
<td>Consultant to physician</td>
<td>Allied health dean/Health sciences administrator</td>
<td>Peace Corps</td>
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<tr>
<td>office laboratories</td>
<td>Education coordinator or program director</td>
<td>Project HOPE, others</td>
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<tr>
<td>Dentistry</td>
<td>Educator of students in clinical settings</td>
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<tr>
<td>Health radiation science</td>
<td>Faculty member in CLS/CLT/Cyto/5BB program</td>
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<tr>
<td>Laboratory scientist</td>
<td>Higher education administrator</td>
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<tr>
<td>Law (e.g., patent attorney)</td>
<td>Instructor in veterinary medicine or other allied health program</td>
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<tr>
<td>Legislature - Politician, lobbyist, regulations writer</td>
<td>Medical community services program coordinator</td>
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Policies

Immunizations—Upon enrollment into the medical technology program, students are required to submit proof of the following immunizations and vaccinations:

- Measles/mumps/rubella documentation or positive titre
- Two-step tuberculosis skin test (Mantoux)
- Hepatitis B series or documented immunity
- Past DTP or diphtheria/tetanus within the last 10 years
- Varicella Zoster (chicken pox) positive history or two doses of vaccine

For the specific AHC policy and form, see www.bhs.umn.edu/services/ahc.htm on the Web. Start early to complete this requirement.

Health Insurance Coverage—Medical technology students are expected to carry health insurance to cover emergency medical situations. Specifics on the AHC health insurance policy can be located on the Web at www.bhs.umn.edu/insurance/ahc.htm. Students should carry their insurance information at all times.

Background Check—Medical technology students are placed in a variety of clinical settings during their clinical coursework. In accord with Minnesota law, a criminal background check is required of each student before clinical courses. The Division of Medical Technology arranges this check.

Satisfactory Academic Progress—Students in the professional program are subject to the regulations established by the Division of Medical Technology and must maintain satisfactory academic progress.

Satisfactory performance is considered to be not only a passing level in scientific and technical skills together with theoretical knowledge, but also complete personal integrity and honesty.

Students not achieving satisfactory progress may be placed on scholastic probation upon recommendation of the Student Scholastic Standing Committee (SSSC). This committee is composed of Division of Medical Technology faculty and student representatives, as appropriate.

Students’ work is considered unsatisfactory when they earn less than a C- grade average (1.67 grade points for each credit) for any course in a given year or semester. In addition, students must earn a minimum grade of C- in selected courses to enroll in related clinical rotations, and maintain an overall GPA of 2.00 in the professional program.

If students receive an unsatisfactory grade in a course, remedial work in the course may be provided, if possible; if not, students must repeat the course the next time it is offered. If students receive an unsatisfactory grade in more than one course, either concurrently or in different semesters, the matter is referred to the SSSC for investigation and action. If the committee decides students should not continue in the curriculum, students are notified. Unsatisfactory grades in two courses are sufficient basis for dismissal.

Medical Technology Essential Functions

To successfully complete a clinical laboratory science program, medical technology students must be able to perform the following functions.

Communication skills—Must be able to communicate effectively in written and spoken English; comprehend and respond to both formal and colloquial English—person-to-person, by telephone, and in writing; appropriately assess nonverbal as well as verbal communication.

Locomotion—Must be able to move freely from one location to another in physical settings, such as the clinical laboratory, patient areas, corridors, and elevators.

Small motor skills—Must have sufficient eye-motor coordination to allow delicate manipulations of specimens, instruments, and tools. Must be able to grasp and release small objects (e.g., test tubes, microscope slides); twist and turn dials/knobs (e.g., for a microscope, balance, or spectrophotometer); and manipulate other laboratory materials (e.g., reagents and pipettes) in order to complete tasks.

Other physical requirements—Must be able to lift and move objects of at least 20 pounds. Must have a sense of touch and temperature discrimination.

Visual acuity—Must be able to identify and distinguish objects macroscopically and microscopically; read charts, graphs, and instrument scales.

Safety—Must be able to work safely with potential chemical, radiologic, and biologic hazards and follow prescribed guidelines for working with all potential hazards, including mechanical and electrical.

Professional skills—Must be able to follow written and verbal directions; work independently and with others and under time constraints; prioritize requests and work concurrently on at least two different tasks; maintain alertness and concentration during a normal work period.

Stability—Must possess the psychological health required for full use of abilities and be able to respond to others in a collegial manner; must be able to recognize emergency situations and take appropriate actions.

Affective (valuing) skills—Must show respect for self and others and project an image of professionalism, including appearance, dress, and confidence; and have complete personal integrity and honesty. Must adhere to appropriate professional manner and conduct.

Application skills—Must be able to apply knowledge, skills, and values learned from previous coursework and life experiences to new situations.

Certification and Placement

Division of Medical Technology graduates are eligible to take national examinations for certification as medical technologists or clinical laboratory scientists. These examinations are conducted by national certifying agencies. Many organizations and institutions require certification for employment.

Program graduates are assisted in finding employment by the Division of Medical Technology adviser. Notices of employment opportunities in the field are received from all parts of the United States and are posted in the medical technology office, 15-170 Phillips-Wangensteen Building.
Licensure
The licensed medical technologist practices in accordance with the requirements of individual state laws. In some states, a medical technologist must participate in continuing education courses for license renewal. Minnesota does not require a license to practice.

Advising
Medical Technology offers centralized advising services to undergraduates currently enrolled or interested in medical technology. In addition, the medical technology adviser works closely with the College of Liberal Arts natural science advisers. For more information, contact the medical technology office, 15-170 Phillips-Wangensteen Building (612-625-9490).

Special Learning Opportunities and Resources
Minority Program—The Academic Health Center is committed to the recruitment and retention of minority persons who come from groups underrepresented in the health professions. Advising and special courses are offered through the Martin Luther King Program and the following learning resource centers: African American Learning Resource Center, American Indian Learning Resource Center, Asian/Pacific American Learning Resource Center, and Chicano-Latino Learning Resource Center.

Scholarships
Medical Technology offers seven scholarship programs for students in the professional program. Scholarships are provided on the basis of scholastic achievement, need, and professional promise. For more information, contact the Medical Technology office, 15-170 Phillips-Wangensteen Building (612-625-9490). The scholarship application deadline is April 1.

Career Paths
The Extended Career Paths in Medical Technology chart represents positions taken by University of Minnesota medical technology graduates. It shows the opportunity and versatility of a medical technology (laboratory science) degree for positions not only in hospital laboratories, but also in industry, research, public health, government, information systems, consulting, reference (private) laboratories, education, and other areas.

Student Organizations
Council for Health Interdisciplinary Participation—The Council for Health Interdisciplinary Participation (CHIP) is an interdisciplinary student service organization dedicated to enhancing the quality of life and education of all Academic Health Center students. Activities include noontime lectures, evening workshops, and weekend symposia in areas such as bioethics, international health, alternative health care, and women’s issues. CHIP publishes a newsletter featuring announcements of upcoming health sciences events, volunteer opportunities, and articles about topics of current interest to students. CHIP headquarters are located in an informal, comfortable lounge in 1-425 Malcolm Moos Health Sciences Tower. For more information, call 612-625-7100.
Medical Technology

Degree Program

Medical Technology B.S.
Requirements for this program are current for Fall 2006.
Required credits to graduate with this degree: 120.
Required credits within the major: 60.
This program requires summer terms.
Degree: Bachelor of Science.
The medical technology program prepares students to work as clinical laboratory scientists in hospital, clinical, and medical research laboratories. Students can be accepted in either the junior or senior year. All medical technology courses are taken in the fall and spring semester of the senior year, followed by 22 weeks of clinical coursework.

Admission Requirements
Students must complete 9 courses before admission to the program.
Freshmen students are usually admitted to pre-major status before admission to this major.
A GPA above 2.00 is preferred for the following:
• 2.50 for students already admitted to the degree-granting college.
• 2.50 for students transferring from another University of Minnesota college.
• 2.50 for students transferring from outside the University.
Upon admission, students are required to submit proof of certain immunizations and vaccinations.
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Required Courses for Admission
Pre-Medical Technology Courses
Students must take one math course at the level of college algebra or higher and one course in calculus or statistics. The same course may not be used to satisfy both distribution requirements.
MATH 1031 - College Algebra and Probability, MATH (3.0 cr)
or MATH 1051 - Precalculus I (3.0 cr)
or MATH 1142 - Short Calculus, MATH (4.0 cr)
or MATH 1271 - Calculus I, MATH (4.0 cr)
MATH 1142 - Short Calculus, MATH (4.0 cr)
or MATH 1151 - Precalculus II, MATH (3.0 cr)
or MATH 1271 - Calculus I, MATH (4.0 cr)
or MATH 1272 - Calculus II (4.0 cr)
or MATH 2451 - Linear Algebra I (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
BIOL 1009 - General Biology, BIOL SCUL (4.0 cr)
or BIOL 1010 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCUL, ENV (4.0 cr)
and BIOL 1002W - Introductory Biology II: Molecular, Cellular, and Developmental Perspectives, WI (5.0 cr)
CHEM 1021 - Chemical Principles I, ENV, PHYS SCUL (4.0 cr)
CHEM 1022 - Chemical Principles II, ENV, PHYS SCUL (4.0 cr)
CHEM 2301 - Organic Chemistry I (3.0 cr)
CHEM 2302 - Organic Chemistry II (3.0 cr)
PHSL 3501 - Human Physiology (4.0 cr)

Program Requirements
INMD 3001, LAMP 4177, MEDT 1010, and MICB 4131 are highly recommended but not required for students pursuing a B.S. degree in medical technology.
Students are placed in a variety of clinical settings during their clinical coursework. In accord with Minnesota law, a criminal background check is required of each student before clinical courses. The Division of Medical Technology arranges this check.

Required Courses
Junior Year Courses
BIOC 3021 - Biochemistry (3.0 cr)
BIOL 4003 - Genetics (3.0 cr)
or GCD 3022 - Genetics (3.0 cr)
BIOL 2032 - General Microbiology with Laboratory (4.0 cr)
or MICB 3301 - Biology of Microorganisms (5.0 cr)
Senior Year Courses
MEDT 4064 - Introduction to Clinical Immunohematology (2.0 cr)
MEDT 4065 - Introduction to Clinical Immunohematology: Laboratory (2.0 cr)
MEDT 4100 - Virology, Mycology, and Parasitology for Medical Technologists (2.0 cr)
MEDT 4104 - Principles of Diagnostic Microbiology: Lecture (2.0 cr)
MEDT 4105 - Principles of Diagnostic Microbiology: Laboratory (2.0 cr)
MEDT 4127W - Introduction to Management and Education I, WI (1.0 cr)
MEDT 4253 - Hemostasis (1.0 cr)
MEDT 4310 - Clinical Chemistry I: Lecture (2.0 cr)
MEDT 4311 - Clinical Chemistry I: Laboratory Applications (2.0 cr)
MEDT 4320 - Clinical Chemistry II: Lecture (2.0 cr)
MEDT 4321 - Clinical Chemistry II: Laboratory Applications (2.0 cr)
MEDT 4400 - Immunological and Molecular Basis of Laboratory Testing (1.0 cr)
MEDT 4421 - Hematology I: Basic Techniques (3.0 cr)
MEDT 4422 - Hematology II: Morphology and Correlation (2.0 cr)
Clinical Courses
These courses should be completed during the 22 weeks of clinical rotations in the summer and fall terms following the senior year, including six weeks of clinical chemistry, five weeks in hematology and coagulation, five weeks in immunohematology, five weeks in microbiology, and one week in a specialty laboratory area.
MEDT 4082 - Applied Clinical Chemistry (3.0 cr)
MEDT 4085 - Applied Clinical Hematology (2.0 cr)
MEDT 4086 - Applied Clinical Immunohematology (2.0 cr)
MEDT 4088 - Applied Diagnostic Microbiology (2.0 cr)
MEDT 4089 - Specialty Rotation (1.0 cr)