

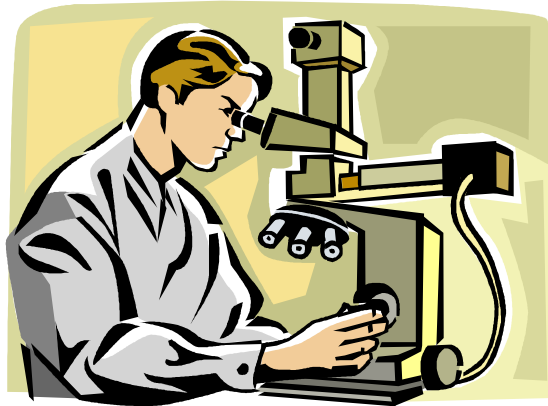


UNIVERSITY *of* NEW HAMPSHIRE
COLLEGE OF LIFE SCIENCE AND AGRICULTURE

MEDICAL LABORATORY SCIENCE

BACHELOR OF SCIENCE DEGREE
PROGRAM

STUDENT HANDBOOK



Revised 2009

Subject to Change

WELCOME TO THE MEDICAL LABORATORY SCIENCE PROGRAM



This handbook has been prepared as an additional resource for UNH Medical Laboratory Science students. Other important student information may be obtained in the current editions of the UNH Undergraduate Catalog and the Student Rights, Rules and Responsibilities publication. Your advisor is also an excellent source of information and can help you find answers to your questions or refer you to resources to help you with problems, whether personal or academic in nature.

This handbook should be kept throughout your undergraduate years as a Medical Laboratory Science student. It contains a great deal of useful and important information that you will need to refer to in the future. You will be held responsible for knowing the policies and information found in this handbook. After reading the handbook, **you are required to sign the Statement of Acknowledgement on page 49 and turn it in to the MLS Program office in Kendall Hall, Room 210.**



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PROGRAM INFORMATION

CONTACT INFORMATION

MLS Program Office: 210 Kendall Hall (603) 862-1376
MLS Program Laboratory: G-27 Spaulding Life Science (603) 862-1176
Department Fax: 203 Kendall Hall (603) 862-3758
Website: www.mls.unh.edu

FACULTY

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Clinical Assistant Professor

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Clinical Assistant Professor

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ADVISING

During your first semester you will be assigned to one of the MLS faculty members as your advisor. You are encouraged to make an appointment with your advisor at any time during the semester if you have academic or other concerns. Your advisor will provide counseling for problems that may interfere with your progress and advise you on professional and career issues. While your advisor will assist you in selecting appropriate courses each semester, it is your responsibility to make certain that you meet all of the UNH general education course requirements (gen-eds), writing intensive course requirements (WIs), MLS course requirements, and the completion of 128 credits prior to your expected graduation date.

MISSION STATEMENT AND GOALS

Mission Statement: The Medical Laboratory Science Program will educate students to be highly qualified medical laboratory scientists who possess entry level knowledge, skills and attitudes to perform proficiently in workplaces such as clinical diagnostic laboratories, research settings and in the biomedical industry. The program will also prepare students to continue their education in a variety of master's and Ph.D. level programs and professional degree programs.

Goals of the Program: The program will provide students with a quality education in the fundamentals of biomedical laboratory science and laboratory skills in addition to a broad-based university general education.

Educational Goals: The Medical Laboratory Science Program graduates competent Medical Laboratory Scientists by providing each graduate with:

- ❖ Advanced skills and knowledge in routine laboratory methods
- ❖ Familiarity with and opportunities for safe practice of analytical laboratory procedures in the university and clinical settings
- ❖ Comprehensive experience to achieve the standards set by the program's accrediting agency

BACHELOR OF SCIENCE COMPETENCIES

Upon completion of the Medical Laboratory Science degree requirements, the graduate will be prepared to:

- ❖ Apply the fundamental scientific concepts of medical laboratory science.
- ❖ Utilize the scientific method and academic background to perform laboratory analyses, evaluate laboratory data, and solve problems.
- ❖ Perform all laboratory tests efficiently, accurately, and independently and correlate laboratory data with health and disease states.
- ❖ Apply basic concepts and skills in education, management, and research design.
- ❖ Develop, recognize, and accept personal, professional and community responsibility.
- ❖ Appreciate the need for self improvement through continuing education.
- ❖ Adhere to the highest level of medical ethics.
- ❖ Effectively communicate with medical professionals.
- ❖ Apply critical decision making skills.

STUDENT SERVICES AND OPPORTUNITIES

COUNSELING CENTER

The Counseling center helps students fully benefit from their time at UNH through individual counseling, group counseling, psychological testing, psychiatry, and campus outreach. The center is located at Schofield House and can be reached at 862-2090. Appointments can be made over the phone or in person and emergency services are offered during regular business hours or by calling the Counseling Center after hours. Learn more at www.unhcc.unh.edu.

CENTER FOR ACADEMIC RESOURCES (CFAR)

The Center for Academic Resources (CFAR) offers a wide range of academic support services available to all undergraduate students enrolled in a least one course. Services include learning skills instruction, peer support, and drop-in tutoring for selected courses. CFAR is located at Wolff House and may be reached at 603-862-3698. Learn more at www.cfar.unh.edu

DISABILITY SERVICES FOR STUDENTS

Disability Services for Students provides services to students with documented disabilities to ensure that all University activities and programs are accessible. They provide services, special accommodations or aid that may be necessary to promote “equal access” to the classroom as mandated by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Disability services is located in Memorial Union Building (MUB) room 118. Any student with a documented disability would be advised upon enrollment to contact them at 603-862-2648 or 603-862-2607. Learn more at www.unh.edu/disabilityservices.

HEALTH SERVICES

UNH Health Services provides comprehensive primary medical care, laboratory testing, radiology, and pharmacy services and is located at the Health Services Center. The phone number is 862-1530. Learn more at www.unh.edu/health-services.

UNDERGRADUATE RESEARCH OPPORTUNITIES PROGRAM (UROP)

Students are encouraged to enhance their undergraduate education through collaborative research projects with UNH faculty members. Students may apply to the UROP program to receive awards and fellowships to support their research. Contact the UROP Office at Hood House, 862-4323, and speak with your faculty advisor about available opportunities. Learn more at www.unh.edu/urop.

WRITING CENTER

The Connors Writing Center is more than just a proofreading service. It also provides individual help from trained consultants on all issues involving writing and English as a Second Language (ESL) issues. The center is located in Hamilton Smith, room 7, and may be reached at 603-862-3272. Learn more at www.unh.edu/writing.

STUDENT TEACHING ASSISTANTS

Once a student has successfully completed an MLS laboratory course they may be eligible to be a laboratory teaching assistant for that course the following year. This is a great opportunity for the student to review the course material and demonstrate their interpersonal, organizational, and problem solving skills as well as their dependability, resourcefulness, and self-confidence. Another benefit of being a teaching assistant is the professional working relationship the student develops with the course instructor. Due to the nature of this working relationship, the instructor should be better able to provide relevant recommendations for future internships, jobs, or graduate or professional school.

PROFESSIONAL ORGANIZATIONS

Students planning on becoming certified Medical Laboratory Scientists are encouraged to join a professional organization. One is sponsored by the American Society for Clinical Pathology (ASCP) and student membership is free. Another is sponsored by The American Society for Clinical Laboratory Science (ASCLS) and student membership is approximately \$25.00.

American Society for Clinical Pathology (ASCP)

33 West Monroe St., Suite 1600

Chicago, IL 60603

Phone: 800-267-ASCP (2727) or 312-541-4999 Fax: 312-541-4998

Email: General information - info@ascp.org, Communications – ascp@ascp.org, or

Board of Registry – bor@ascp.org, Website: www.ascp.org

The American Society for Clinical Laboratory Science (ASCLS)

6701 Democracy Boulevard, Suite 300

Bethesda, Maryland 20817

Phone: 301-657-2768 Fax: 301-657-2909

Email: ascls@ascls.org, Website: www.ascls.org

STUDENT EXPECTATIONS

ACADEMIC HONESTY

According to the UNH Student Rights, Rules and Responsibilities Handbook any attempt to deviate from principles of academic honesty will be dealt with according to the rules of due process explained in section 09.7 of the handbook. Below are just some of the examples academic dishonesty as provided in the handbook.

09.1 Written Classroom Examinations

- Using oral, written, visual, or other forms of communication intended to give or receive assistance
- Looking at or copying another's work
- Using unauthorized materials (texts, notes, etc.)
- Having a surrogate take the exam
- Altering your work after an exam has been returned and resubmitting it
- Obtaining and/or using an upcoming exam ahead of time

09.2 Out-of-Class Work

- Receiving outside help on take home exams
- Consulting with others about homework, laboratory reports, etc
- Copying another's homework, laboratory reports, etc. and submitting them as your own

09.3 Plagiarism

- The acquisition by purchase or otherwise of a part or the whole of a piece of work which is represented as the student's own.
- The representation of the ideas, data, or writing of another person as the student's own work, even though some wording, methods of citation, or arrangement of evidence, ideas, or arguments have been altered
- Concealment of the true sources of information, ideas, or argument in any piece of work.

09.4 Misrepresentation

- Having another person represent or stand in for oneself in circumstances where the student's attendance and/or performance is required
- Leaving a class, laboratory, etc. without permission but after attendance has been taken
- Having another person author one's written work
- Submitting work originally submitted for one course to satisfy the requirements of another course, without prior consent of the instructor
- Forging or using another's signature
- Altering or destroying academic records and documents
- Presenting false data, experimental results, or physical results

09.5 Academic Policy

- Infringing on the rights of other students to fair and equal access to academic resources
- Duplicating course materials expressly forbidden by the instructor
- Ignoring or willfully violating class or laboratory instructions or policies

ATTENDANCE

Students are expected to be present for all scheduled classes. Make-up laboratory sessions are not given. In case of an absence from a lab due to circumstances beyond your control (illness, death in the immediate family, or court date) students should notify their instructor by phone as soon as possible. Students missing 3 or more laboratory sessions in an MLS course will receive an academic F and will need to repeat the laboratory section of the course for credit the following year.

COMMUNICATION

Students are expected to check their UNH email account daily. This is the most widely used communication system between faculty and students. Students who do not check their email on a daily basis may miss receiving information that is critical to their academic progress.

CONDUCT

Students are expected to abide by the UNH Code of Conduct found in the UNH Student Rights, Rules and Responsibilities Handbook. They are also expected to behave professionally in both academic and internship settings. Honesty, strict adherence to established procedures, and confidentiality are important qualities in any profession in the health field. You will be evaluated informally in your laboratory classes on these qualities using the MLS Laboratory Course Student Evaluation form based on the Standards for Evaluation of Student Competencies. These informal evaluations are placed in your student file. The MLS faculty use these evaluations to assist them in the completion of recommendations for student internships, scholarships, employment or graduate school. The Laboratory Course Student Evaluation form and Standards are all located on pages 40 – 45 of this handbook.

CONFIDENTIALITY

When dealing with patients or patient information students are expected to maintain patient confidentiality. Maintaining confidentiality means that the student must not discuss patient information outside of the learning environment including test results, conditions, or diagnoses. Breaches of this policy will lead to dismissal from the program.

TEXTBOOK PURCHASE

Students are expected to purchase all required textbooks. MLS majors planning on a clinical internship should retain their MLS course textbooks for use during their internship experience. Any student unable to purchase a required textbook in any MLS course should notify the instructor immediately.

STUDENT ACTIVITIES

Students will be notified of the following activities via their UNH email account:

Student Welcome - The celebration to welcome students takes place at the beginning of the fall semester. It is at this celebration that the CLMA scholarships are awarded. All MLS students should plan on attending the Student Welcome Celebration each year.

UNH Day at DHMC - This is a visit to Dartmouth Hitchcock Medical Center in Lebanon, NH. Students planning on a clinical internship should attend this event during their sophomore or junior years.

National Medical Laboratory Professionals Celebration - The annual National Medical Laboratory Professionals week celebration is scheduled during the last week in April. It is at this celebration that the four major MLS clinical student scholarships are awarded and student volunteers are recognized. All MLS students should plan on attending this celebration each year.

Student Volunteer Events – There are annual events requiring student volunteers – one of which is the Admitted Student’s Day in the spring. Volunteering to assist with these events is an excellent way to demonstrate your leadership potential.

OPPORTUNITIES FOR GRADUATES

BACHELOR’S DEGREE CAREER OPPORTUNITIES

Medical Research Technologist/Biotechnologist: MLS graduates completing the general curriculum are well prepared to work in laboratories in medical research and biotechnology related fields. The Medical Laboratory Scientist’s analytical, scientific, and technical skills are a valuable and desired asset in industrial, research, public health or in vitro fertilization laboratories, as well as in forensic or pharmaceutical laboratories. Manufacturers of home diagnostic testing kits, and laboratory equipment and supplies also seek Medical Laboratory Scientists to work in product development, marketing, and sales.

Certified Medical Laboratory Scientist: MLS graduates completing the general curriculum including all of the clinical requirements, and passing a national certification exam certifying them as a Medical Laboratory Scientist (MLS) may work in a hospital clinical laboratory in the areas of immunohematology, chemistry, hematology, immunology, and microbiology. Most MLSs are generalists and are certified in all areas of the clinical laboratory; however, some are certified in just one area of the lab. Medical Laboratory Scientists are vital healthcare professionals providing information from laboratory analyses that assist physicians in patient diagnosis and treatment, as well as in disease monitoring or prevention. They assist doctors in choosing the correct lab tests and ensure proper collection methods. MLSs receive the patient specimens, recognize factors that could introduce error and reject sub-standard specimens. They analyze specimens determined to be acceptable using techniques available to the clinical laboratory such as manual white blood cell differentials, bone marrow counts, and analysis via microscopy and advanced analytical equipment. MLSs are also responsible

for confirming the accuracy of tests and must recognize anomalies in their test results. They monitor, screen, and troubleshoot analyzers. MLSs also perform equipment validations, calibrations, quality controls, statistical control of observed data, and record normal operations. Once a result is deemed acceptable, MLSs will interpret and report the results. Often they are responsible for communicating critical patient results to the physician. MLSs perform a full range of laboratory tests – from simple premarital blood tests, to more complex tests to uncover diseases such as HIV/AIDS, diabetes, and cancer. Common tests performed are the complete blood count (CBC), the comprehensive metabolic panel (CMP), electrolyte panel, liver function tests (LFT), renal function tests (RFT), thyroid function test (TFT), urinalysis, coagulation profile, lipid profile, blood type, semen analysis (for fertility and post-vasectomy studies), serological studies and routine cultures. In some facilities that have few phlebotomists MLSs may perform phlebotomy on patients, as this skill is part of their clinical training.

The United States is currently experiencing a shortage of Medical Laboratory Scientists as well as virtually all other healthcare professionals. The number of job openings in hospital and clinical laboratories for certified Medical Laboratory Scientists is expected to continue to exceed the number of job seekers. According to the U.S. Department of Labor, Bureau of Labor Statistics, employment in clinical laboratories is expected to grow faster than average through the year 2014, as the volume of laboratory tests continues to increase with population growth and age, and the development of additional tests to assist physicians in patient diagnosis, treatment and monitoring of disease processes.

Histotechnologist: MLS graduates completing the histology curriculum have an unlimited choice of practice settings. For-profit laboratories, clinics, and public health, industrial research, veterinary pathology, marine biology and forensic pathology facilities all employ histotechnologists. Histology is a structural science concerned with the demonstration of cellular morphology, chemical composition and function of normal and abnormal tissue. Certified Histotechnologists may be employed in a hospital pathology lab working closely with the pathologist to process tissue biopsies.

Histotechnology has many diverse specializations. The frozen section technique, which assists surgeons during patient surgery, requires the histotechnologist to perform STAT preparations of suspicious tissues sent from the operating room. Speed, accuracy and cooperation are critical. The surgeon, anesthesiologist and other operating room personnel await histologic diagnosis before proceeding with surgery. With specialized training, histotechnologists may choose a career in electron microscopy. There, tissues are much smaller than those used in histology and are actually cut with the use of a microscope. Specific techniques and precise skills produce sections thin enough to allow the transmission of an electron beam to reveal tissue and cellular ultrastructure. Another highly specialized area, immunohistochemistry, includes the staining of antigenic sites to identify tumor cell lines within the tissue using various stains and antibodies.

Today, there are more jobs for histotechnologists than educated people to fill those jobs and future long-term employment looks bright. The need is great everywhere throughout the country.

FURTHER EDUCATIONAL OPPORTUNITIES

The B.S in Medical Laboratory Science is also an excellent foundation for those students planning to go on to professional schools (medical, physicians assistant, pathologists' assistant) or to earn an advanced degree in a wide variety of science disciplines including Microbiology, Biochemistry, Genetics, and Molecular Biology, or in non-science disciplines such as Health Management and Policy, Business Administration, and Education.

Physician Assistants (PAs): MLS graduates completing Pre-professional curriculum A with the recommended GPA and hands-on health care experience have been highly successful in master's level Physician Assistants programs. PAs are formally trained to provide diagnostic, therapeutic and preventive health care services, as delegated by a physician. They should not be confused with medical assistants, who perform routine clinical and clerical tasks. PAs take medical histories, examine and treat patients, order and interpret laboratory tests, prescribe medication, and make diagnoses. In rural or inner city clinics where a physician is present for only one or two days each week the PA may be the principal care provider. In such cases, the PA confers with the supervising physician and other medical professionals as needed and as required by law. Many PAs work in primary care specialties, such as general internal medicine, pediatrics, and family medicine. Other specialty areas include general and thoracic surgery, emergency medicine, orthopedics, and geriatrics. PAs specializing in surgery provide preoperative and postoperative care and may work as first or second assistants during major surgery.

Employment of Physician Assistants is expected to grow 27 percent from 2006 to 2016, much faster than the average for all occupations. Projected rapid job growth reflects the expansion of health care industries and an emphasis on cost containment, which results in increasing use of PAs by health care establishments. Telemedicine – using technology to facilitate interactive consultations between physicians and physician assistants – also will expand the use of physician assistants.

Students interested in Physician Assistants programs should consult the *American Association of Physician Assistants* web site, www.AAPA.org to research the requirements of specific PA programs. Additionally, many Physician Assistants programs expect applicants to have had hands-on health care experience. Expectations range from 500 to 2,000 hours of experience. Many MLS students get hands-on health care experience by obtaining a part-time phlebotomist position at an area hospital after completing the phlebotomy theory course (MLS 640) and internship (MLS 641).

Pathologists' Assistant: MLS graduates completing Pre-professional curriculum A with alternative course selections and the recommended GPA are well prepared for master's level Pathologists' Assistant Programs. Pathologists' Assistants are intensively trained health professionals who provide anatomic pathology services under the direction of a pathologist in surgical pathology and/or autopsy pathology. Pathologists' assistants are qualified to do complex surgical resections and autopsies including gross, PAD/FAD, and clinical summary. Many Pathologists' assistants are former histotechnologists, medical

laboratory scientists, and autopsy technicians. The majority of Pathologists' Assistants work in community hospitals, with others working in government hospitals, reference laboratories, the medical examiner's system, and academic centers, such as medical schools or university hospitals. Students interested in Pathologists' Assistant programs should consult the *American Association of Pathologists' Assistants* web site, www.pathologistsassistants.org. There are currently seven NAACLS accredited Pathologists' Assistant programs in the U.S.

Medical Doctor, Pharmacist and other Medical Professions: MLS graduates completing Pre-professional curriculum B with the recommended GPA and additional qualities and proficiencies outlined on page 19 are prepared for medical school (MD or DO) and other medical professional programs. Students interested in Medical School should, as soon as possible, not only consult with their Medical Laboratory Science advisor but also with a pre-health professions advisor through the University Advising and Career Center (UACC) about additional requirements for application to specific professional programs. The UACC is located in Hood House, Room 102. Contact them at (603) 862-2064 or premed.advising@unh.edu.

PROGRAM STRUCTURE

Medical Laboratory Science majors may pursue a Bachelors of Science degree in MLS by following a general, histology, or pre-professional curriculum.

GENERAL CURRICULUM (See suggested curriculum on page 14)

Students interested in working in the field of biomedical research follow the general curriculum. They complete eight semesters of on-campus courses including courses that emphasize theory and techniques for analysis of blood, cells, and tissues utilized in biomedical research.

Students interested in becoming certified Medical Laboratory Scientists also follow the general curriculum. They complete seven semesters of on-campus course work and an 18 to 26 week clinical internship based on the theoretical and practical competencies established by The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).

After completing their on-campus course work, students interested in becoming certified in all areas of the clinical lab must complete a 22 - 26 week, full-time internship experience at a clinical affiliate which includes all of the following clinical courses:

| | | |
|----------------|---|------------|
| MLS 751 | Advanced Clinical Microbiology Internship | 5.0 |
| MLS 752 | Advanced Hematology Internship | 5.0 |
| MLS 753 | Advanced Immunohematology Internship | 5.0 |
| <u>MLS 754</u> | <u>Advanced Clinical Chemistry Internship</u> | <u>5.0</u> |
| | | 20.0 |

Alternatively, after completing their on-campus course work, students interested in becoming certified in just one area of the clinical lab (Microbiology, Hematology, Chemistry or Immunohematology) must complete an 18 week, full-time internship experience at a clinical affiliate and one of the following courses:

| | | |
|---------|--------------------------------------|------|
| MLS 761 | Clinical Microbiology Internship | 20.0 |
| MLS 762 | Clinical Hematology Internship | 20.0 |
| MLS 763 | Clinical Immunohematology Internship | 20.0 |
| MLS 764 | Clinical Chemistry Internship | 20.0 |

Acceptance to a clinical internship is not guaranteed and is competitive based on the applicant's grade point average, personal and faculty recommendations, and positive interviews. For more information on clinical internships see the MLS Student Internship Handbook. Students successfully completing the clinical program are eligible to take the national Board of Certification (BOC) examination administered by the American Society for Clinical Pathology (ASCP).

The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) accredits the clinical program. This accreditation ensures that the program at UNH is meeting the standards set forth by national agencies for the highest quality professional programs.

National Accrediting Agency for Clinical Laboratory Sciences
8410 W Bryn Mawr Ave. Suite 670
Chicago, IL 60631
Telephone: (773) 714-8880 Fax: (773) 714-8886
<http://www.naacls.org>

HISTOLOGY CURRICULUM (See suggested curriculum page 15):

Students following the histology curriculum may complete eight semesters of on-campus course work or seven semesters of required courses and an 18 week, full-time anatomic pathology internship. After 34 - 52 weeks of employment under the supervision of a board certified pathologist these graduates are eligible to sit for a national certification exam through the American Society for Clinical Pathology (ASCP) certifying them as a histotechnologist (HTL).

PRE-PROFESSIONAL CURRICULA (See suggested curricula pages 16 & 17):

Students following a pre-professional curriculum will complete required courses and additional courses required by master's-level Physician Assistants programs or Pathologists' Assistants programs or Medical Schools (MD or DO).

The **Pre-Professional Curriculum (A)** on page 16 is suggested for MLS majors planning to apply to Physician Assistants or Pathologists' Assistant master's-level programs. Students complete MLS requirements and additional courses including:

- An additional semester of English (typically ENGL 502 or 503)
- An additional semester of Math, such as college level algebra

Students planning on applying to Physician Assistants programs are advised to take a Psychology course in addition to their required #7 Social Science gen-ed course.

Students planning on applying to Pathologists' Assistant programs are advised to take Routine Histological Technique, Special Histological Technique and Stains, and Comparative Histology.

The **Pre-Professional Curriculum (B)** on page 17 is suggested for MLS majors planning to accommodate courses required for application to medical school. Students complete MLS requirements and additional courses including:

- One year of Physics with lab (PHYS 401 and 402 or 407 and 408)
- A minimum of one Calculus course (Math 424a, 424b or 425)
- An additional semester of English (typically ENGL 502 or 503)
- A full year of Organic Chemistry with lab (CHEM 651/653 and 652/654) in place of the one semester Organic Chemistry with lab (CHEM 545/546)

Note: Advanced Placement credit, though accepted by UNH, is generally not accepted by medical schools. If you have placed out of any courses, you will need to take additional upper level courses in that subject area at the college level.

Study Abroad Curriculum

Students following the general curriculum must inform their advisor prior to sophomore spring registration if they wish to complete a semester of study abroad as this requires some curriculum adjustments. Students following a pre-professional curriculum must inform their advisor prior to sophomore fall registration if they wish to complete a semester of study abroad and these students should anticipate completing some required courses during summer session. To study abroad you must have a minimum of a 2.5 cumulative grade point average (gpa) at the time of application to and at the time of departure for the study abroad program. MLS majors may complete a study abroad during the spring semester of their junior year. MLS majors also must have successfully completed all of their required freshman, sophomore, and fall junior year courses prior to departure. Students following one of the MLS pre-professional curricula will also need to take an additional summer course in the summer of their sophomore year. During their study abroad MLS majors must receive credit for two UNH general education requirements. Students should begin to plan which general education requirements they will complete during their study abroad as early as their freshman year in order to avoid duplication of general education requirements.

For more information on the UNH Study Abroad policies and restrictions visit the Center for International Education in Hood House, room 223, or their webpage at www.unh.edu/cie/studyabroad/ for more information. Students may also consider summer study www.unhitaly.unh.edu or research abroad through the International Research Opportunities Program www.unh.edu/undergradresearch/irop.html.

Medical Laboratory Science - General Curriculum

FRESHMAN YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|--------------------------------------|----------|--------------------------------|----|
| MLS 401 Intro. to MLS | 1 | CHEM 404 General Chem. | 4 |
| ZOOL 507 Anatomy & Phys ^a | 4 | ZOOL 508 Anatomy & Phys | 4 |
| CHEM 403 General Chem. | 4 | MATH – Statistics ^b | 4 |
| ENGL 401 Freshmen English | 4 | Gen-Ed (Group 4,5,6,7, or 8) | 4 |
| <u>Gen-Ed (Group 4,5,6,7, or 8)</u> | <u>4</u> | | |
| | 17 | | 16 |

SOPHOMORE YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|---------------------------------|----------|---|----------|
| MICR 503 Gen Microbiology | 5 | MICR 602 Pathogenic Micro | 5 |
| CHEM 545/6 Organic Chem. | 3/2 | MLS 660/1 Body Fluids | 2/1 |
| BIOL 604 Genetics | | BCHM 658/9 Biochemistry | 3/2 |
| <u>or Gen-ed (4,5,6,7 or 8)</u> | <u>4</u> | <u>MLS 640 Phlebotomy Theory ^c</u> | <u>2</u> |
| | 14 | | 15 |

JUNIOR YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|--|----------|------------------------------|----------|
| MLS 644/5 Hematology | 3/3 | MLS 642/3 Basic Immunology | 2/1 |
| MLS 658/9 Med. Biochemistry | 3/2 | MLS 720/1 Mycology/Parasit | 3/2 |
| MLS 755 Molecular Diagnostics ^d | | Gen-Ed (Group 4,5,6,7, or 8) | 4 |
| <u>or Gen-Ed (Group 4,5,6,7,8)</u> | <u>4</u> | Gen-Ed (Group 4,5,6,7, or 8) | |
| | 15 | <u>or BIOL 604 Genetics</u> | <u>4</u> |
| | | | 16 |

SENIOR YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|--|-------------|--|--|
| Elective | | Additional elective courses | |
| <u>or MLS 656/657 ^e</u> | <u>Var.</u> | <u>or Clinical Internship ^e</u> | |
| Gen-Ed (Group 4,5,6,7, or 8) | | | |
| <u>or Molecular Diag. ^d</u> | <u>4</u> | | |
| Elective | | | |
| <u>or MLS 750 Seminar ^e</u> | <u>Var.</u> | | |
| <u>MLS 610 Lab Management</u> | <u>4</u> | | |
| | 15 - 17 | | |
| | | Variable credits | |
| | | 128 total credits required | |

^a BIOL 411 may be substituted for ZOOL 507.

^b The Math requirement may be filled by the following Statistics courses: BIO 528, PSYCH 402, SOC 502, or HHS 540.

^c MLS 641 Phlebotomy Internship (1 credit) is required for clinical students and is usually taken in the summer of the sophomore year.

^d Molecular Diagnostics is only offered in odd numbered years.

^e Alternative required for clinical students.

Medical Laboratory Science – Histology Curriculum

FRESHMAN YEAR

Fall

| | |
|--------------------------------------|----------|
| MLS 401 Intro. to MLS | 1 |
| ZOOL 507 Anatomy & Phys ^a | 4 |
| CHEM 403 General Chem. | 4 |
| ENGL 401 Freshmen English | 4 |
| <u>Gen-Ed (Group 4,5,6,7, or 8)</u> | <u>4</u> |
| | 17 |

Spring

| | |
|------------------------------|----|
| CHEM 404 General Chem. | 4 |
| ZOOL 508 Anatomy & Phys | 4 |
| Statistics ^b | 4 |
| Gen-Ed (Group 4,5,6,7, or 8) | 4 |
| | 16 |

SOPHOMORE YEAR

Fall

| | |
|---------------------------|----------|
| MICR 503 Gen Microbiology | 5 |
| CHEM 545/6 Organic Chem. | 3/2 |
| <u>BIO 604 Genetics</u> | <u>4</u> |
| | 14 |

Spring

| | |
|-----------------------------------|------------|
| MICR 602 Pathogenic Micro | 5 |
| MLS 660/1 Body Fluids | 2/1 |
| BCHM 658/9 Biochemistry | 3/2 |
| <u>MLS 642/3 Basic Immunology</u> | <u>2/1</u> |
| | 16 |

JUNIOR YEAR

Fall

| | |
|--|----------|
| MLS 610 Lab Management | 4 |
| Routine Histological Technique | 4 |
| MLS 755 Molecular Diagnostics ^c | 4 |
| <i>or Gen-Ed (4,5,6,7 or 8)</i> | 4 |
| <u>Gen-Ed (Group 4,5,6,7 or 8)</u> | <u>4</u> |
| | 16 |

Spring

| | |
|-------------------------------|----------|
| Pathogenic Basis of Disease | 4 |
| Special Histological Tech. | 4 |
| MLS 720 Mycology/Parasit/Vir. | 5 |
| <u>Electron Microscopy</u> | <u>5</u> |
| | 18 |

SENIOR YEAR

Fall

| | |
|--|----------|
| Gen-Ed (Group 4,5,6,7 or 8) | 4 |
| <i>or Molecular Diagnostics ^c</i> | 4 |
| Gen-Ed (Group 4,5,6,7, or 8) | 4 |
| Comparative Histology | 4 |
| <u>Advanced Histological Tech.</u> | <u>4</u> |
| | 16 |

Spring

| | |
|--------------------------------|------------------------------------|
| Additional elective courses | |
| <i>or Histology Internship</i> | |
| | Variable Credits |
| | 128 credits total credits required |

^a BIOL 411 may be substituted for ZOOL 507.

^b The Math requirement may be filled by the following Statistics courses: BIO 528, PSYCH 402, SOC 502, or HHS 540.

^c Molecular Diagnostics is offered in odd numbered years.

Medical Laboratory Science - Pre-Professional Curriculum (A)

For students planning on applying to a Physician Assistant or Pathologists' Assistant Program

FRESHMAN YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|-------------------------------------|----------|------------------------------|----|
| MLS 401 Intro. to MLS | 1 | CHEM 404 General Chem. | 4 |
| ZOOL 507 Anatomy & Phys | 4 | ZOOL 508 Anatomy & Phys | 4 |
| CHEM 403 General Chem. | 4 | MATH Statistics ^a | 4 |
| ENGL 401 Freshmen English | 4 | Gen-Ed (Group 4,5,6,7, or 8) | 4 |
| <u>Gen-Ed (Group 4,5,6,7, or 8)</u> | <u>4</u> | | |
| | 17 | | 16 |

SOPHOMORE YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|---|----------|-------------------------------------|----------|
| MICR 503 Gen Microbiology | 5 | MICR 602 Pathogenic Micro | 5 |
| CHEM 545/6 Organic Chem. | 3/2 | MLS 642/3 Basic Immunology | 2/1 |
| BIO 604 Genetics | 4 | BCHM 658/9 Biochemistry | 3/2 |
| <u>MLS 640 Phlebotomy Theory ^b</u> | <u>2</u> | <u>Gen-Ed (Group 4,5,6,7, or 8)</u> | <u>4</u> |
| | 16 | | 17 |

JUNIOR YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|--|---------------|---|----------|
| MLS 644/5 Hematology | 3/3 | MLS 660/1 Body Fluids | 2/1 |
| BIOL 411 Principles of Bio I | 4 | BIOL 412 Principles of Bio II | |
| MLS 755 Molecular Diagnostics ^c | | or Pathogenic Basis of Disease | 4 |
| or Gen-Ed (Group 4,5,6,7,8) | 4 | MLS 720/1 Mycology/Parasit | 3/2 |
| MLS 656/7 Immunohematology | | Gen-Ed (Group 4,5,6,7, or 8) | |
| or <u>Histological Techniques ^d</u> | <u>3 or 4</u> | or <u>Special Histological Tech. ^d</u> | <u>4</u> |
| | 17- 18 | | 16 |

SENIOR YEAR

| <u>Fall</u> | | <u>Spring</u> | |
|--|-------------|---|---------------|
| MLS 658 Medical Biochem ^e | 3 or 5 | MATH College Algebra | 4 |
| Gen-Ed (Group 4,5,6,7, or 8) | | ENGL 502 or 503 | 4 |
| or <i>Molecular Diagnostics ^c</i> | 4 | PSYCH course | |
| MLS 750 MLS Seminars or | | or Gen-Ed (4,5,6,7, or 8) ^d | 4 |
| <i>Comparative Histology ^d</i> | Var. or 4 | Elective or | |
| HMP 501 – Epidemiology or | | <u>Electron Microscopy ^d</u> | <u>4 or 5</u> |
| <u>MLS 610 Lab Management ^d</u> | <u>4</u> | | 16-17 |
| | 14/16 or 15 | | |

^a The Math requirement may be filled by the following Statistics courses: BIO 528, PSYCH 402, SOC 502, or HHS 540.

^b MLS 641 Phlebotomy Internship (1 credit) for students planning on applying to Physician Assistants program is usually taken during the summer of the sophomore year.

^c Molecular Diagnostics is only offered in odd numbered years.

^d Alternative courses students applying to a Pathologists' Assistant program.

^e Student wishing to complete a clinical internship must also complete MLS 659 Med Biochem Lab.

Medical Laboratory Science - Pre-Professional Curriculum (B)
Curriculum for MLS majors planning on attending Medical School

FRESHMAN YEAR

| <u>Fall</u> | | | <u>Spring</u> | | |
|-------------------------------------|----------|--|----------------------------------|---|----|
| MLS 401 Intro. to MLS | 1 | | CHEM 404 General Chem. | 4 | |
| BIO 411 Principles of Biol I | 4 | | BIO 412 Principles of Biology II | 4 | |
| CHEM 403 General Chem. | 4 | | MATH -Statistics ^a | 4 | |
| ENGL 401 Freshmen English | 4 | | Gen-Ed WI (Group 4,5,6,7 or 8) | 4 | |
| <u>Gen-Ed (Group 4,5,6,7, or 8)</u> | <u>4</u> | | | | |
| | 17 | | | | 16 |

SOPHOMORE YEAR

| <u>Fall</u> | | | <u>Spring</u> | | |
|----------------------------------|----------|--|----------------------------------|----------|----|
| MICR 503 Gen Microbiology | 5 | | MLS 642/3 Basic Immunology | 2/1 | |
| CHEM 651/3 Organic Chem. | 3/2 | | MLS 660/1 Body Fluids | 2/1 | |
| BIO 604 Genetics | 4 | | CHEM 652/4 Organic Chem. | 3/2 | |
| <u>MLS 640 Phlebotomy Theory</u> | <u>2</u> | | <u>MICR 602 Pathogenic Micro</u> | <u>5</u> | |
| | 16 | | | | 16 |

JUNIOR YEAR

| <u>Fall</u> | | | <u>Spring</u> | | |
|---|---------------|--|---|-----|----|
| MLS 644/5 Hematology | 3/3 | | BCHM 658/9 Biochemistry | 3/2 | |
| Math 418 or Calculus I | 4 | | Math 424B or Calculus II | 4 | |
| MLS 755Molecular Diagnostics ^b | | | Gen-Ed (Group 4,5,6,7, or 8) ^c | 4 | |
| <i>or MLS 656/7 Immunoheme</i> | <i>4 or 3</i> | | PHYS 402 Physics ^c | | |
| PHYS 401 Physics | 4 | | <i>or ZOOL 508</i> | 4 | |
| | 18 or 17 | | | | 17 |

SENIOR YEAR

| <u>Fall</u> | | | <u>Spring</u> | | |
|--|---------------|--|----------------------------|----------|----|
| MLS 656/7 Immunohematology | | | ENGL WI 502 or 503 | 4 | |
| <i>or Molecular Diagnostics ^b</i> | <i>3 or 4</i> | | Gen-Ed (Group 4,5,6,7,or8) | 4 | |
| MLS 750 Seminars | Var. | | MLS 720/1 Myc/Parasit/Vir. | 5 | |
| Gen-Ed (Group 4,5,6,7, or 8) | 4 | | <u>Elective</u> | <u>4</u> | |
| MLS 658 Medical Biochem ^c | 3 | | | | 17 |
| <u>Elective ^c</u> | <u>4</u> | | | | |
| | 16 -18 | | | | |

^aThe Statistics requirement may be filled by one of the following: BIO 528, PSYCH 402, SOC 502 or HHS 540

^bMolecular Diagnostics is only offered in odd numbered years

^cStudents switching to the clinical curriculum take ZOOL 508 and MLS 720/1 instead of the gen-ed in the Junior spring semester and MLS 659 Med Biochem lab instead of the elective in the Senior fall semester inst. If the student then takes a gen-ed over the summer they may participate in a clinical internship in their senior spring semester if they meet eligibility requirements.

Pre-professional students must consult with an MLS advisor AND with a UACC pre-health professions advisor.

MLS COURSE DESCRIPTIONS

MLS 401. Introduction to Medical Laboratory Science

This course is designed for students interested in the study of medical laboratory science. Program and career options and certification requirements are covered as well as medical ethics and professionalism. *Credit/Fail*. 1 cr. Fall.

Required for all freshman and external transfer students.

444B. The Unseen Menace: The Impact of Microbial Disease on History

This course explores and analyzes the significant, and at times catastrophic, effect of viral, bacterial, fungal and parasitic infections on human societies, cultures, economies and religions world-wide from some of the earliest recorded events to the present. The latter portion of the course focuses on the impact of microbial diseases on colonization, exploration, territorial expansion and growth of the United States, including its impact on Native American populations, and the known and potential threats of current, emerging, and re-emerging microbial diseases to our American Society.

Writing Intensive. Fulfills a History gen-ed #4. 4 cr. Spring. Not required.

MLS 610. Biomedical Laboratory Management

This course offers an overview of laboratory management, supervision, and education. Lectures, discussions, and student projects cover financial operations, personnel management, marketing, information management, and teaching skills.

Writing Intensive. 4 cr. Spring. Required for General (clinical and research), Histology and Pre-Professional A students.

MLS 640. Phlebotomy Theory

This course offers in depth coverage of all procedural and psychosocial aspects of phlebotomy. Areas of emphasis include safety, anatomy and physiology, professionalism, and ethics. Discussion of HIPAA and Patient's Bill of Rights is included. This course is recommended preparation for any healthcare professional including pre-med, pre-vet, nursing, and research students.

2 cr. Fall and Spring. Required for clinical students.

MLS 641. Phlebotomy Clinical Internship

This course is an 80-120 hour clinical phlebotomy internship. The student has hands-on phlebotomy practice in a local hospital or out-patient setting. Under the supervision of the health care facility's phlebotomist, the student attains a defined level of proficiency with all routine phlebotomy procedures. This internship affords the opportunity for direct patient contact for those students considering a career in patient care.

Prereq: MLS 640. 1-2 cr. Arranged with instructor. Required for clinical students only.

MLS 642. Basic Immunology and Serology

This course introduces the student to the immunologic basis of selected disease states. Topics covered include the immune systems, both innate and acquired, and the specific changes that occur when the immune systems are challenged. Emphasis is placed on the

correlation between the disease process, whether hereditary or acquired, and the current laboratory testing available for diagnosis.

2 cr. Spring. Required for all majors.

MLS 643. Clinical Serology Lab

This laboratory provides hands-on experience with clinical laboratory testing for immune system disorders. Detailed coverage of principles behind currently available test procedures as well as clinical application for immune dysfunction detection is included. The student will perform analyses on patient specimens, with emphasis on quality control, technical proficiency, and interpretation of test results. Test methodologies covered include precipitation and agglutination reactions, agglutination inhibition, ELISA, electrophoresis, Western Blot, and flow cytometry.

Co or prereq: MLS 642. 1 cr. Spring. Required for all majors.

MLS 644. Hematology – Blood Cells and Coagulation

This course covers human blood cell physiology in both health and disease. After introduction to normal blood cell functions, biochemistry, and cellular/plasma interactions, there is an extensive etiologic evaluation of human systemic dysfunction in blood cell disorders. Included are clinically significant benign and malignant conditions of red blood cells, white blood cells, platelets, and hemostasis factors. Morphologic changes seen in infectious disease states, including bacterial, viral, and parasitic infections, are included. Each disease state is evaluated in terms of cellular or protein abnormality, its effect on the body, and specific methods for detection and monitoring of disease process. Emphasis is placed upon current diagnostic paradigms.

3 cr. Fall. Required for General (clinical and research), Pre-Professional A and Pre-Professional B students.

MLS 645. Clinical Hematology Laboratory

This laboratory includes the analysis of whole blood for cellular components and plasma for hemostatic evaluation. Proficiency with capillary specimen collection, enumeration and identification of cells, routine hematology and coagulation procedures and result interpretation are included. Special emphasis is placed on differentiating benign from malignant processes and will focus on cellular identification by morphologic, cytochemical, and CD marker abnormalities. The course stresses comprehension of principles behind all tests performed, adherence to specified guidelines for quality control and quality assurance, precision of test results, and recognition of appropriate protocols when abnormal values are obtained.

Co or prereq: MLS 644. 3 cr. Fall. Required for General (clinical and research), Pre-Professional A and Pre-Professional B students.

MLS 656. Immunohematology and Transfusion Science

Immunohematology is the study of the immunology of blood and includes principles and practices that are known collectively as blood banking. Basic concepts of genetics, immunology and antiglobulin testing are presented as a foundation for the understanding of the blood group systems and antibody detection and identification. Current transfusion practices are also included, with an overview of blood collection and component use.

Various clinical conditions with related blood banking implications are discussed, including hemolytic disease of the newborn, autoimmune hemolytic anemia, drug-induced hemolytic anemia as well as transfusion reactions. A comprehensive overview of transfusion-transmitted infections is an additional component of the course. Students will gain a basic understanding of the blood group systems and the critical role they play in safe transfusion medicine as well as disease states that have a direct implication in transfusion medicine.

2 cr. Fall. Required for clinical and Pre-Physician Assistant students only.

MLS 657. Blood Banking Laboratory

This laboratory provides hands-on experience in testing for different blood groups, screening for and identification of specific antibodies, confirmatory testing, and general blood banking practices that will provide students with basic confidence and skills used in routine blood banking. The students will also attain confidence in reading test results, problem solving and interpreting data. Students will become proficient in maintaining universal precautions and laboratory safety practices in all aspects of the student laboratory.

Co or prereq: MLS 656. 1 cr. Fall. Required for clinical and Pre-Physician Assistant students only.

MLS 658. Medical Biochemistry

This course emphasizes the assessment of disease states through the analytical assessment of amino acids, proteins, enzymes, tumor markers, non-protein nitrogen metabolites, carbohydrates, lipids, electrolytes, blood gases, hormones, vitamins and trace elements. Therapeutic drug monitoring and drugs of abuse testing are also discussed.

Prereq: CHEM 403 – 404, BCHM 658/9. 3 cr. Fall. Required for General (clinical and research), Pre-professional A and Pre-professional B student.

MLS 659. Clinical Chemistry Laboratory

Utilizing analytical methodologies students will analyze blood analytes such as glucose, BUN, creatine, electrolytes, enzymes, cholesterol, bilirubin and serum protein and evaluate their clinical significance.

Co or prereq: MLS 658. 2 cr. Fall. Required for General (clinical and research students).

MLS 660. Body Fluids

This course involves the study of diseases and disorders through the analysis of extra-vascular body fluids. Changes in these fluids in certain conditions of the kidney, liver, intestine, blood brain barrier, and vasculature, as well as those caused by malignancy (tumors), infection, inflammation and trauma are examined. Emphasis is on renal anatomy and physiology and diseases and metabolic disorders affecting renal function. The student will achieve an understanding of the function that extra-vascular body fluids play in the diagnosis and treatment of various conditions.

2 credits. Spring. Required for all majors.

MLS 661. Body Fluids Laboratory

The laboratory provides practical experience in the performance and clinical correlation of urinalysis and selected body fluid procedures. The emphasis is on the principles and clinical significance of testing performed in the routine physical, chemical and microscopic analysis. The student will attain a thorough knowledge of the theory of the clinical assays performed, the dexterity and confidence to perform procedures that attain acceptable reproducibility, as well as the ability to evaluate laboratory data and the clinical significance of test results. Co or prereq: MLS 660. 1 cr. Spring. Required for all majors.

MLS 720. Mycology/Parasitology/Virology

This course includes the study human fungal and parasitic infections as well as human viral infections. The mechanism of infection is studied as well as diseases caused by the various fungi, parasites and viruses. Life cycles and infectious stages of the organisms are thoroughly examined. Disease progression caused by the specific organisms within the host is studied, including diagnostic stages and species identification. The student will achieve an understanding of the pathogenicity and role of studied organisms in human infections, as well as diagnostic tests typically utilized and specific identifying characteristics of the organisms.

3 cr. Spring. Required for all majors.

MLS 721. Mycology/Parasitology/Virology Laboratory

This laboratory provides the student with practical experience in diagnosing and identifying specific organisms as well as correlating test results with the studied fungal or parasitic disease. Students will learn the growth requirements and practice unique techniques for fungal culture. Prepared slides will also be used to identify fungi that cause human infections. Both wet samples and prepared slides will be examined to identify parasites that cause human infestation. The student will attain the knowledge and confidence to identify fungal and parasitic organisms from direct specimens, culture and prepared slides and correlate findings with disease states. The student will become proficient in maintaining universal precautions and laboratory safety procedures.

Co or prereq: MLS 720. 2 cr. Spring. Required for all majors.

MLS 755. Molecular Diagnostics

This course introduces the student to the concepts of infectious disease detection and human genetic screening used in the clinical lab. This includes covering the major methods to go from nucleic acid extraction to analysis (DNA extraction, PCR, hybridization and sequencing). The course reviews what clinically relevant pathogens (bacteria, virus and fungi) are ideal targets for molecular identification in the clinical lab and what methods are currently being used in this application. It will also highlight molecular methods applied in human health and disease, including identity testing, molecular oncology, chromosome analysis, and screening for inherited diseases.

4 cr. Fall – odd numbered years. Required for all majors.

MLS 750. Medical Laboratory Seminars – Case Studies

This course is a senior Medical Laboratory Science capstone course in which analysis of patient case studies is required. Each case analysis includes correlation of patient history and current symptoms with pertinent hematology, microbiology, chemistry and immunohematology laboratory results and specific questions to be addressed. For some of the cases patient specimen analysis is required. The student must correctly interpret all given information, recognize all normal and abnormal results and their clinical significance, and generate etiologic possibilities. Each possibility is analyzed and the student arrives at a diagnosis for the patient condition incorporating details of appropriate treatment and recommended follow-up testing when necessary.

Writing Intensive. Prereq: MLS 644/5, 656/7, 658/9, and MICR 602. 1 - 4 cr. Required for clinical students only.

MLS 751 – Advanced Clinical Microbiology Internship

Advanced clinical bacteriological procedures, fluorescent techniques, and special procedures as well as mycology and parasitology identification and testing at a clinical affiliate. Prereq: senior MLS clinical students only. 5 cr.

MLS 752 – Advanced Hematology Internship

Advanced hematology procedures including diagnostic staining, advanced hemostasis studies and evaluation of blood cells in disease states at a clinical affiliate.

Prereq: senior MLS clinical students only. 5 cr.

MLS 753 – Advanced Immunohematology Internship

Principles and procedures for detecting disorders of cellular and humoral immunity.

Advanced blood-banking procedures, including antibody identification, and component therapy at a clinical affiliate.

Prereq: senior MLS clinical students only. 5 cr.

MLS 754 – Advanced Clinical Chemistry Internship

Theory, operation, evaluation, and maintenance of automated chemistry systems.

Advanced laboratory analysis of body fluid chemistries including enzymology, hormones, blood gases, and toxicology at a clinical affiliate.

Prereq: senior MLS clinical students only. 5 cr.

MLS 761 – Clinical Microbiology Internship

Instruction in advanced clinical bacteriology, mycology, parasitology, and virology at a clinical affiliate. Isolation, identification, and antibiotic sensitivities for common pathogens are emphasized.

Prereq: senior MLS clinical students only. 20 cr.

MLS 762 – Clinical Hematology Internship

Instruction in advanced hematology and hemostasis at a clinical affiliate. Specialized test such as automated cell counts, cytochemical analyses, cell markers, and specialized hemostasis are covered.

Prereq: senior MLS clinical students only. 20 cr.

MLS 763 – Clinical Immunohematology Internship

Instruction in advanced clinical Immunohematology at a clinical affiliate. Pretransfusion testing, donor screening and component therapy are emphasized.

Prereq: senior MLS clinical students only. 20 cr.

MLS 764 – Clinical Chemistry Internship

Instruction in advanced clinical chemistry at a clinical affiliate. Analysis of carbohydrates, proteins, enzymes, lipids, hormones, electrolytes, blood gases, and drugs.

Prereq: senior MLS clinical students only. 20 cr.

REGISTRATION INSTRUCTIONS

SCHEDULE YOUR REGISTRATION ADVISING APPOINTMENT

Each semester, at least one week prior to your specific class (FR, SO, JR, SR) registration period, you must contact your advisor to schedule the required registration meeting. MLS advisor's contact information is listed on the first page of this handbook. The best way to contact your advisor is via email. For registration advising appointments some advisors prefer that you sign-up on a posted appointment sign-up sheet on their office door. Your advisor will usually notify you of their preference at the beginning of the registration period.

PREPARE FOR YOUR REGISTRATION ADVISING MEETING

Prior to your advising registration meeting, please check the Time and Room Schedule for complete registration information at MyUNH.unh.edu under UNH. Juniors, and Seniors should also check their Degree Evaluation on WEBCAT to see the status of their general education (gen-eds), writing intensive (WIs), and other graduation requirements. Also check your specific MLS curriculum requirements for the upcoming semester. The MLS curricula are located on pages 14 - 17. If your curriculum plan suggests that you take a gen-ed in the coming semester, please select one(s) that fulfill a gen-ed category which you have not already fulfilled from gen-ed categories 4, 5, 6, 7, or 8. Also select one(s) that will not conflict with your other required courses.

DURING YOUR REGISTRATION ADVISING MEETING

Your advisor will review your semester progress either via the report prepared for 1st semester freshmen and transfer students or via your own assessment of your progress. They will also assess your current goals and make recommendations as to your ability to achieve those goals based on your current gpa, any student evaluations from your MLS courses, and the recommendations on page 18 and 19 of this handbook. At your registration meeting you will receive your registration access code (RAC #) assignment sheet with the date/time of your specific registration eligibility. **RACs are not given out over the telephone.** Your RAC allows you to register during your appointed time and cannot be changed. You will be issued a new RAC every semester. Please keep your RAC assignment sheet in a safe place or enter your RAC number into your cell phone and keep it until the start of the next semester. You will need the RAC number should you need to change your registration for any reason. If you lose your RAC, contact your adviser or the MLS Program Director. Obtain permission slips for any MLS **“Permission Required”** courses from your advisor during your registration meeting and turn them in to Celeste Dietterle, the department Administrative Assistant, in Kendall Hall room 203. You must turn the permission slip into the department office before you will be able register for permission required courses.

In general, Freshmen and Sophomores may not register for 700-level courses. It is your responsibility to meet all prerequisites or other requirements for classes. If you do not meet prerequisites, or if you attempt to register for courses not approved by your adviser, those courses may be deleted from your schedule.

PRIOR TO THE OPENING OF YOUR REGISTRATION WINDOW (~1 WEEK)

Login to MyUNH.unh.edu at least one week before your registration time to make sure your account is active and to make sure there are no holds on your account that would prevent registration. To check for holds:

1. Select Webcat/Student Services tab
2. Select Student Services and Financial Aid
3. Select Student Records
4. Select View Holds

Immediately correct any situations, such as unpaid bills or parking tickets, which have caused the hold on your account as you will not be able to register until you do so.

PRIOR TO THE OPENING OF YOUR REGISTRATION WINDOW (~1 HOUR)

Since course sections often fill up between the time of your registration meeting and the opening of your registration window completing the Registration Worksheet found on page 29 too far in advance will only lead to confusion. Approximately 1 hour prior to the opening of your registration window is the best time to complete the registration worksheet. Login to MyUNH.unh.edu and select the WebCat/Student Services tab. Select registration. Select look up classes to add. Select the program and enter the course number to check for availability. To ensure that seats will be available when your registration window opens select course sections which have more than a few seats still available. Enter your course selections on a copy of the registration worksheet found on page 29. List your courses in priority order, with single section courses listed first. Select alternate sections and/or alternate courses in advance to save time while you are registering. You should also check to make sure there are no time conflicts between any of the courses you have selected by filling in a copy of the time sheet found on page 30.

ONCE YOUR REGISTRATION WINDOW OPENS

Register at or as close as possible to your “First Time to Register” (this information is on your RAC notice). When you register, you should use the information on your completed worksheet and follow the instructions to complete your registration.

Please note the following:

- **Registration is limited to a maximum of 18 credits until classes begin.**
If you will be registering for more than 18 credits, you must bring a

Registration Override form to the Dean's Office prior to your registration period and then bring the signed form to the Registration Office in Stoke Hall. Alternatively, if you are registering for an MLS lab section and turned the permission into Celeste Dietterle at the time of your advising appointment you may hold off registering for the lab to prevent you from going over the 18 credit maximum and then register for the lab with a Change of Registration (add/drop) form on the first day of the lab. Your place in the lab will be held by your permission slip. Registering for more than 20 credits will add additional charges to your tuition bill.

- **You must bring a signed [Registration Override form](#) to the Registration Office if you are:**
 - Repeating a lecture without the required lab.
 - Seeking permission to take a major, class, college restricted course.
 - Overriding a time conflict within your schedule with permission from the conflicting course instructors.
- If you are having difficulties registering please review the instructions on the back of your RAC sheet noting in particular any error messages. If a course has multiple sections and you can't get into your first choice of sections try to get into your alternate choice instead. If you can't get into your first choice for a gen-ed try to get into your alternate choice.

If you are unable to register for a complete schedule, please contact your adviser immediately for assistance.

Print your schedule by returning to the Registration menu and selecting Printable Schedule or Student Detail Schedule.

STUDENT HEALTH AND SAFETY

HEALTH AND LIABILITY INSURANCE

UNH students are required to have proof of health insurance coverage. Liability insurance for students participating and enrolled in internships is provided by the University.

IMMUNIZATIONS

All MLS majors are strongly urged to receive a completed series of three Hepatitis B Virus immunizations. If you have not already received HBV immunizations you should begin the series as soon as possible. The initial immunization should be received prior to the start of any MLS course (excluding MLS 401). UNH Student Health Services offers the immunizations at a cost of approximately \$65.00 each for students that have paid the student health fee. Proof of immunization must be submitted to the MLS office in Kendall 210. A waiver of liability form must be signed by a student who chooses not to receive the vaccine, however, students should be aware that internship sites generally require HBV immunization. Forms for HBV documentation or declination are located on pages 33 and 34. If you have already received the HBV vaccine you may submit a copy of your immunization record instead. Documentation of additional immunizations may be required prior to participating in phlebotomy or other clinical internships.

UNIVERSAL (STANDARD) PRECAUTIONS

The Medical Laboratory Science Program is committed to developing procedures and promoting practices that support prevention of the spread of infections by blood, body fluids and tissues. Laboratory practices are based on the assumption that all body fluids and tissues are potentially infectious and that blood is the single most important source of the Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and other bloodborne pathogens.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Students enrolled in MLS laboratory classes will be required to purchase a disposable lab coat from the UNH Chemistry Stockroom at the start of **each** year. These lab coats must be purchased by the end of the first week of classes, and must remain in the MLS laboratory. In addition, safety goggles with side shields are required for designated procedures as indicated in the Laboratory Safety Manual. Students with a known allergy to latex are required to inform their instructor at their first laboratory session.

SAFETY TRAINING REQUIREMENTS

Faculty members are responsible for ensuring that their employees and students receive proper training as stipulated in the **UNH Laboratory Safety Plan**. MLS student training records are kept in the MLS office, Kendall 210.

In order to participate in any Medical Laboratory Science (MLS) lab course or work in the MLS lab, students are required to complete the following:

Read and sign the MLS Safety Manual

All students participating in MLS labs are required to read the main text pages up to appendix A of the MLS Safety Manual on reserve in the Biological Science Library located on the first floor of Kendall Hall. The student should then sign the signature pages located in Appendix A for every MLS course in which they are registered. This must be completed by the beginning of the third week of classes each semester. After the third week of classes, the student will be denied further participation in laboratory procedures until they have read and signed the MLS Safety Manual.

Complete the required on-line OEHS Training modules

In addition, all students must complete the Office of Environmental Health and Safety on-line BSL-1/BSL-2 Biological Safety AND the Bloodborne Pathogens training modules each fall semester or the spring semester should the student not have any fall semester MLS lab courses. MLS 659 (clinical chemistry lab) students must also complete the Chemical Safety Training module. Your course instructor will hand out the directions on how to access these modules on the first day of classes. Proof of completion of all on-line OEHS training must be printed out and submitted by the beginning of the third week of classes to an MLS course instructor or to the MLS office in Kendall 210 where it will be kept on file. After the third week of classes, the student will be denied further participation in laboratory procedures until they have submitted proof of completion. Students who complete the modules in the fall will not need to repeat the modules for Spring MLS courses. They only need to submit a signed statement that they completed the modules in the fall.

To access these modules go to your Blackboard MyUNH webpage and click on the tab at the top of the page entitled “Orgs & Depts”. Then select “Office of Environmental Health and Safety Training”. If this is not listed contact your course instructor ASAP.

- For **BSL-1/BSL-2 Biological Safety Training** click on “Biological Safety” on the left bar and then on “BSL-1/BSL-2 Training”.
- For **Bloodborne Pathogens Training** click on “Occupational Safety” on the left bar and then on “Bloodborne Pathogens Training” and finally on “Students Working in Laboratories – Bloodborne Pathogens Training”.
- For **Chemical Safety Training** click on “Chemical Safety” on the left bar and then on “Chemical Safety Training”.

University of New Hampshire

Medical Laboratory Science Program

Hepatitis B Vaccination Documentation

Students may submit this form or a copy of their immunization records that includes their hepatitis B vaccinations to the MLS Program Director in order to verify that they have received the completed series of hepatitis B vaccination or complete the waiver on the reverse side.

Student Name (please print): _____

Health Care Facility Address: _____

Health Care Facility Telephone: _____

The student named above is has received the hepatitis B vaccination on the following dates:

- First of three _____
-
- Second of three _____
-
- Third of three _____

Signature of health care provider: _____

Printed name of health care provider: _____

Adele Marone MS, MLS(ASCP)
Program Director, Medical Laboratory Science
210 Kendall Hall
129 Main Street
Durham, NH 03824

University of New Hampshire
Medical Laboratory Science Program

Hepatitis B Vaccine Declination Statement

I understand that, due to potential exposure to blood or other potentially infectious materials as a University of New Hampshire Medical Laboratory Science student, I may be at risk of exposure to the hepatitis B virus (HBV) infection. UNH Student Health Services provides students the opportunity to be vaccinated with the Hepatitis B vaccine series at cost. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine I am at risk of acquiring hepatitis B, a serious disease. If in the future I wish to be vaccinated with the Hepatitis B vaccine, I understand that I may receive the vaccination series at the UNH Student Health Services.

I, _____ decline to receive
(print student name)

the Hepatitis B vaccine and absolve UNH Health Services from any liability

regarding the outcome of my decision.

Student Signature: _____

Date: _____

The student should return this form to the MLS Program Director:

Adele Marone MS, MLS(ASCP)
Program Director, Medical Laboratory Science
210 Kendall Hall
129 Main Street
Durham, NH 03824

ACADEMIC POLICY GUIDELINES

GRADING

The following grading scale is used in the lecture and laboratory sections of all MLS classes:

| | | | | | |
|------------|--------|------------|--------|------------|--------|
| 93-100 = A | (4.00) | 80-82 = B- | (2.67) | 67-69 = D+ | (1.33) |
| 90-92 = A- | (3.67) | 77-79 = C+ | (2.33) | 63-66 = D | (1.00) |
| 87-89 = B+ | (3.33) | 73-76 = C | (2.00) | 60-62 = D- | (0.67) |
| 83-86 = B | (3.00) | 70-72 = C- | (1.67) | <60 = F | (0.00) |

Grading policies will be handed out in each class at the start of the semester. Every instructor is responsible for discussing and explaining the basis for her or his evaluation of students (Students Rights, Rules and Responsibilities). MLS students planning on a clinical internship must earn a grade of C or better in all MLS specific courses. If a student earns below a C, including a C-, they may repeat the course once to raise their grade to a C. If, on the second attempt the student fails to obtain a C or better they will no longer be eligible to apply for a clinical internship. Refer to the MLS Internship Handbook for more information.

HONORS IN MAJOR

Students who complete at least 12 credits in one semester and earn at least a 3.20 grade point average are designated honors students for that semester. Students who have a minimum of a 3.20 grade point average may complete the Honors in Major in Medical Laboratory Science. Honors work in a major requires that a minimum of 16 credits in the major be completed as “Honors”, four of which will be devoted to a senior thesis project (MLS 799). For MLS courses taken as “Honors” an additional course project is completed to earn the honors credit which may be in the form of a research paper, class presentation and/or poster preparation for a professional meeting. In order for graduate schools or future employers to recognize the quality of student work, transcripts will designate completion of an honors-in-major-program.

Learn more at www.unh.edu/honors-program.

TRANSFER CREDITS

The Admissions Office evaluates credits transferred from another institution. If you wish to take a course at another institution, you will need to speak with your advisor about your plans and complete a Course Credit Transfer Prior Approval Form. Forms are located in the Registrar’s Office in Stoke Hall or the MLS office in Kendall Hall room 210.

DEGREE AUDIT AND GRADUATION

When the student passes the 80 credit hour point during his or her junior year a degree audit is completed by the graduation department. A degree audit is a listing of what

general education courses and writing intensive courses a student has left to fill before graduating. This degree audit should be reviewed and used to determine unmet UNH general education and writing intensive requirements necessary for graduation. It is the student's responsibility to make sure all the requirements necessary for graduation are met. Prior to the start of their last semester, the student must complete their online intent to graduate via WebCat by the posted deadline.

GRIEVANCE AND COMPLAINT PROCEDURE

Refer to section 28 in the Students Rights, Rules and Responsibilities Handbook for academic and non-academic grievance and complaint procedures available to any student who believes that a faculty or staff member has not acted according to the policies outlined.

UNDERSTANDING AND USING OBJECTIVES

All MLS courses follow the principles of objective based learning. Objectives are statements that specify what the student will be able to do via observable knowledge, skills, or attitudes after successfully completing a particular instructional activity. Instructional activities may be lectures, laboratory exercises, demonstrations, reading and homework assignments, or computer modules. Objectives make the testing process easier for the student because the criteria for success are specified in writing. There are three classifications of objectives and three simplified levels of difficulty within each classification. The three classifications are cognitive, affective and psychomotor. The cognitive domain includes intellectual learning outcomes such as the recall of information, the comprehension of that information, and the processes of analysis, synthesis, and evaluation. The affective domain includes those objectives that emphasize values, attitudes, and interests. The psychomotor domain includes those behaviors that require neuromuscular coordination, such as the procedures covered in lab. The levels are simplified by grouping them into three general levels with level I being the lowest level and level III being the highest level.

Students who master the use of course objectives as study guides are generally successful in their MLS classes. If you are having difficulty in any of your MLS classes please see your instructor. They may instruct you as to how you can utilize the objectives for greater success in their class.

The table below gives a simplified grouping of objective classifications and levels.

| <i>Domain</i> | <i>Level</i> | <i>Description of Levels</i> |
|--------------------|-----------------------------|--|
| <i>Cognitive</i> | I. Recall | Remembering learned information. |
| | II. Application | Understanding information and applying it to other material or new situations. |
| | III. Problem Solving | Analyzing, reorganizing, and synthesizing information. Making decisions and judgments based on information. |
| <i>Affective</i> | I. Awareness | Awareness of an activity, situation, or phenomenon. Compliance with existing values. |
| | II. Valuing | Attachment of worth to an activity, situation, or phenomenon. |
| | III. Commitment | Ability to defend or justify values and resolve conflicts between values resulting in a consistent value system. |
| <i>Psychomotor</i> | I. Readiness | Awareness of stimulus and readiness to perform motor skill. |
| | II. Proficiency | Practice in motor skills with increasing proficiency and confidence. |
| | III. Adaptation | Ability to alter procedures or create new movements. |

GRADE CALCULATIONS

The majority of professors will post your grades in the on-line Blackboard course. You should check your grades frequently and make sure there are no discrepancies in the posted grades. Do not assume that all grades in a class are equal. Many professors weight grades by assigning each grade category a specific percentage weight. Some students assume that if they get good grades on weekly homework assignments that will override poor grades on a few exams. This would only be true if the homework was weighted the same as the exams. If the exam category is weighted higher than the homework category then the poor exam grades will count more towards the final grade and the good grades on the weekly homework will not override the poor exam grades. In order to determine your actual grade in a course during the semester you must know how much each component of the grade is weighted.

Here's an example of grade weighting:

| <u>Weighted percent</u> | <u>Category</u> | <u>Average</u> | | <u>% fraction</u> | | <u>% earned</u> |
|-------------------------|-----------------|----------------|---|-------------------|---|-----------------|
| 20% | Homework (10) | 90% | x | .20 | = | 18% |
| 25% | Quizzes (4) | 80% | x | .25 | = | 20% |
| 30% | Exams (2) | 60% | x | .30 | = | 18% |
| <u>25%</u> | Final exam (1) | 68% | x | .25 | = | <u>17%</u> |
| 100% | | | | | | 73% |

In the example above if a student achieved an average of 90% on homework the 90% would be multiplied by the weighted % expressed as a fraction (.20). The student will then receive 18% out of the possible 20% credit for homework. If the student achieved an average of 80% on the quizzes this would be multiplied by the weighted % expressed as a fraction (.25). The student will then receive 20% out of the possible 25% for quizzes. If the student achieved an average of 60% on the exams, the 60% would be multiplied by the weighted % expressed as a fraction (.30). The student will receive 18% out of the possible 30% for exams. If the student achieved a 68% on the final exam this would be multiplied by the weighted % expressed as a fraction (.25). The student will then receive 17% out of the possible 25% for the final exam. Adding up the percentages that the student achieved in each category will determine the student's final grade. In this example: $18\% + 20\% + 18\% + 17\% = 73\%$ final grade. Because the student was doing well on homework and quizzes and were receiving these grades more frequently (14 times over the course of the semester) than exam grades (only 2 times over the semester) they may falsely believe that they are doing very well in the course. However, since the exam and final make up more than 50% of the final grade the student's poorer performance in these two categories lowered the final grade more than the student might have anticipated if they had not accounted for the weighting of the grades. So be aware of the weighting of grades in your courses. You should also be aware of the class average for all assignments and exams. If your grades are above the class average, chances are you will pass the class. If your grades are below the class average, you should see your professor to determine how you can do better in their class.

Your grade point average (gpa) is posted on your grade report sent out at the end of each semester. However, you might wish to calculate your gpa for a particular group of courses. For example if you are applying to Med School you will want to calculate your Biology, Chemistry, Physics and Math gpa or if you are applying for an internship you will want to calculate your MLS course gpa. In order to do this you must convert the letter grade to the numerical gpa equivalent. See page 35 for the gpa numerical equivalents to letter grades at UNH. Then you will multiply each numerical gpa grade by the number of credits earned in order to determine your grade point for the course. For example if you had a B or the equivalent of a 3.0 in a 4 credit course you would multiply 3.0 (grade) by 4 (credits) for a grade point of 12.

Here's an example:

| <u>Course</u> | <u>Grade</u> | | <u>Credits</u> | | <u>Grade points</u> |
|---------------|--------------|---|----------------|---|---------------------|
| Biology | A (4.0) | x | 4 | = | 16 |
| Chemistry | C (2.0) | x | 8 | = | 16 |
| Physics | B (3.0) | x | 4 | = | 12 |
| Math | B (3.0) | x | <u>8</u> | = | <u>24</u> |
| | | | 24 | | 68 |

Now you add up the total of grade points ($16 + 16 + 12 + 24 = 68$) and divide by the total number of credits attempted ($4+8+4+8 = 24$). Your cumulative gpa for these courses would be $68 \div 24$ or a 2.83.

If your gpa at the end of your second year is a 3.0, the highest gpa you would be able to obtain even if you received all A's in your remaining coursework would be a 3.5. Students with a 3.0 at the end of their second year generally do not raise their gpa to more than a 3.4 by graduation.

If your gpa at the end of your second year is a 2.5, the highest gpa you would be able to obtain even if you received all A's in your remaining coursework would be a 3.25. Students with a 2.5 at the end of their second year generally do not raise their gpa to more than a 2.9 by graduation.

If your gpa at the end of your second year is a 2.0, the highest gpa you would be able to obtain even if you received all A's in your remaining coursework would be a 3.0. Students with a 2.0 at the end of their second year generally do not raise their gpa to more than a 2.4 by graduation.

Generally, the average MLS major raises their gpa only slightly (0.25 points) between the end of their second year and graduation.

Medical Laboratory Science Program
Evaluation of Student Competencies

Student: _____ Course: _____ FR SO JR SR

Instructors: Evaluate students at mid-term and semester end on each of the bold-faced competencies based on one or more of the modifiers listed beneath it using the Standards for Evaluation of Student Competencies found on pages 42 – 45 of the student handbook.
Students: Goal is to more than minimally meet the standards by semester end.

| | | | | | |
|--------------|--|-----------------------------|--|-----------------------------|---------------------------------|
| Unacceptable | Does not meet standard Needs Improvement | Minimally meets standard | Sufficiently meets standard Satisfactory | Maximally meets standard | Exceeds standard Superior |
| 0 | 1 | 2 | 3 | 4 | 5 |

N = Not observed

| | Midpoint | Final |
|---|----------|-------|
| Communication Skills Ability to initiate communications, listen effectively and convey information verbally and in writing | _____ | _____ |
| Industriousness Preparation for lab/practicum Independence in seeking out additional information | _____ | _____ |
| Interpersonal Skills Establishment of cooperative and respectful relationships | _____ | _____ |
| Learning Ability Ability to understand verbal and written instruction Ability to master concepts/skills after normal instruction/practice | _____ | _____ |
| Organization Organization of workflow/assignments | _____ | _____ |
| Problem-solving Skills Ability to select, justify and interpret diagnostic tests Ability to solve “unknowns”, problem based learning or case studies Ability to articulate reasoning process | _____ | _____ |
| Reliability & Dependability Consistent attendance and attention | _____ | _____ |
| Resourcefulness Ability to handle difficult/complex/stressful situations | _____ | _____ |

Self-confidence

Appropriate for level of knowledge

Team Player

Ability to work in group settings/Willingness to help others

Time Management

Completion of lab work/assignments in a timely fashion

Promptness of arrival

Honesty, Integrity, Ethics and Confidentiality

Ability to admit mistakes and correct them

Adherence to UNH Honor Code and program policies

Lab Work Performed with Precision and Accuracy

Ability to perform diagnostic tests from simple
to complex with accuracy and precision

Follows Lab Regulations and Protocols

Adherence to laboratory safety protocols

Use of quality control procedures when required

Handling of laboratory supplies and equipment

Maintenance of a clean work area

Average Score

Narrative Comments:

Date Midpoint Signatures: _____

Faculty: _____ Student: _____

Date Final Signatures: _____

Faculty: _____ Student: _____

Standards for Evaluation of Student Competencies

“Rarely” indicates < 25% of the time or 1 or 2 times

“Occasionally” indicates < 50% of the time or 3 or 4 times

“Frequently” indicates > 50% of the time or 5 or 6 times

“Most of the time” indicates > 75% of the time or greater than 7 times

COMPETENCY LEVEL 0

Unacceptable

Communication Skills

Student never initiates communication.

Student always has difficulty conveying information verbally or in writing.

Industriousness

Student is always unprepared for lab/practicum.

Student never seeks out additional information above what is required.

Interpersonal Skills.

Student is uncooperative or disrespectful to others.

Learning Ability

Student always needs help in understanding verbal or written instruction.

Student always has difficulty mastering concepts/skills after normal instruction/practice.

Organization

Student demonstrates disorganized work flow or assignments.

Problem-solving Skills

Student always needs help selecting, justifying and interpreting diagnostic tests.

Student always needs help in solving “unknowns”, problem based or case studies.

Student always is unable to articulate reasoning process.

Reliability & Dependability

Student always misses or is inattentive in class/lab.

Resourcefulness

Student always is unable to handle difficult, complex, or stressful situations.

Self-confidence

Student always displays a confidence level over or under his/her abilities.

Team Player

Student never participates in group activities or helps others.

Time Management

Student always is late in turning in assignments or in arriving to lab/practicum.

Honesty, Integrity, Ethics, and Confidentiality

Student never admits mistakes or corrects them.

Student violates UNH Honor Code or fails to follow program policies.

Lab Work Performed with Precision and Accuracy

Student always demonstrates inaccurate or imprecise lab work.

Follows Lab Regulations and Protocols

Student always fails to observe laboratory safety protocols.

Student always skips necessary quality control procedures.

Student always mishandles lab supplies or equipment.

Student always fails to clean their work area.

COMPETENCY LEVEL 1

Does not meet standard

Communication Skills

Student rarely initiates communication.

Student frequently has difficulty conveying information verbally or in writing.

Industriousness

Student frequently is unprepared for lab/practicum.

Student rarely seeks out additional information above what is required.

Interpersonal Skills.

Student frequently is uncooperative or disrespectful to others.

Learning Ability

Student frequently needs help in understanding verbal or written instruction.

Student frequently has difficulty mastering concepts/skills after normal instruction/practice.

Organization

Student frequently demonstrates disorganized work flow or assignments.

Problem-solving Skills

Student frequently needs help selecting, justifying and interpreting diagnostic tests.

Student frequently needs help in solving “unknowns”, problem based or case studies.

Student frequently is unable to articulate reasoning process.

Reliability & Dependability

Student frequently misses or is inattentive in class/lab.

Resourcefulness

Student frequently is unable to handle difficult, complex, or stressful situations.

Self-confidence

Student frequently displays a confidence level over or under his/her abilities.

Team Player

Student rarely participates in group activities or helps others.

Time Management

Student frequently is late in turning in assignments or arriving to lab/practicum.

Honesty, Integrity, Ethics, and Confidentiality

Student rarely admits mistakes or corrects them.

Student violates UNH Honor Code or frequently fails to follow program policies.

Lab Work Performed with Precision and Accuracy

Student frequently demonstrates inaccurate or imprecise lab work.

Follows Lab Regulations and Protocols

Student frequently fails to observe laboratory safety protocols.

Student frequently skips necessary quality control procedures.

Student frequently mishandles lab supplies or equipment.

Student frequently fails to clean their work area.

COMPETENCY LEVEL 2 = Minimally Meets Standard

Student performance of “frequently” and “rarely” is now “occasionally”

COMPETENCY LEVEL 3
Sufficiently meets standard

Communication Skills

Student frequently initiates communication.

Student rarely has difficulty conveying information verbally or in writing.

Industriousness

Student rarely is unprepared for lab/practicum.

Student frequently seeks out additional information above what is required.

Interpersonal Skills.

Student is rarely uncooperative or disrespectful.

Learning Ability

Student rarely needs help in understanding verbal or written instruction.

Student rarely has difficulty mastering concepts/skills after normal instruction/practice.

Organization

Student rarely demonstrates disorganized work flow or assignments.

Problem-solving Skills

Student rarely needs help selecting, justifying and interpreting diagnostic tests.

Student rarely needs help in solving “unknowns”, problem based or case studies.

Student rarely is unable to articulate reasoning process.

Reliability & Dependability

Student rarely misses or is inattentive in class/lab.

Resourcefulness

Student rarely is unable to handle difficult, complex or stressful situations.

Self-confidence

Student rarely displays a confidence level over or under his/her abilities.

Team Player

Student frequently participates in group activities or helps others.

Time Management

Student rarely is late in turning in assignments or arriving to lab/practicum.

Honesty, Integrity, Ethics, and Confidentiality

Student frequently admits mistakes and corrects them.

Student adheres to UNH Honor Code and rarely fails to follow program policies.

Lab Work Performed with Precision and Accuracy

Student rarely demonstrates inaccurate or imprecise lab work.

Follows Lab Regulations and Protocols

Student rarely fails to observe laboratory safety protocols.

Student rarely skips necessary quality control procedures.

Student rarely mishandles lab supplies or equipment.

Student rarely fails to clean their work area.

COMPETENCY LEVEL 4 – Maximally Meets Standard

Student performance of “frequently” becomes “most of the time” and “rarely”
becomes “never”

COMPETENCY LEVEL 5

Exceeds standard

Communication Skills

Student readily initiates communication.

Student has superior verbal and writing skills.

Industriousness

Student is prepared above what is required for lab/practicum.

Student always seeks out additional information above what is required.

Interpersonal Skills.

Student is always cooperative and respectful and has a positive impact on peers.

Learning Ability

Student always understands verbal or written instruction.

Student easily masters concepts/skills with very little instruction or practice.

Organization

Student has superior organizational skills.

Problem-solving Skills

Student consistently selects, justifies and interprets diagnostic tests correctly.

Student consistently solves “unknowns”, problem based or case studies correctly.

Student is always able to articulate his/her reasoning process.

Reliability & Dependability

Student has perfect attendance, is always attentive and can be depended upon to follow through on all matters related to lab/practicum.

Resourcefulness

Student handles difficult, complex, or stressful situations with ease.

Self-confidence

Student always displays an appropriate confidence level for his/her abilities.

Team Player

Student always helps others or organizes group learning experiences.

Time Management

Student has superior time management skills.

Honesty, Integrity, Ethics, and Confidentiality

Student has superior ethics and integrity.

Student always adheres to the UNH Honor Code and program policies.

Lab Work Performed with Precision and Accuracy

Student performs work with superior precision and accuracy.

Follows Lab Regulations and Protocols

Student observes all laboratory safety protocols and reports unsafe situations.

Student always performs necessary QC, conserves reagents whenever possible, and always carefully handles equipment.

Student always leaves work area clean and takes responsibility for the lab beyond their personal work area.

FUNCTIONAL EXPECTATIONS

Students should review the following list of essential functions that encompass the cognitive, psychomotor, and affective domain competencies by which you will be assessed. Should you require accommodations to meet these essential functions, please contact the program director.

OBSERVATION – The applicant/student must possess functional use of the senses of smell, vision, hearing, and somatic sensation.

The applicant/student should be able to:

- Accurately observe demonstrations and exercises in which biological fluids and products are being tested for their biochemical, hematological, immunological, microbiological, and histochemical components.
- Characterize color, odor, clarity, and viscosity of biologicals, reagents, or chemical reaction products.
- Differentiate microscopic cells, formed elements, and artifacts using a microscope.
- Hear timers, instrument warning alarms and fire alarms.

COMMUNICATION – The applicant/student must have sufficient communication skills in both verbal and written English to perform all tasks that are normally expected within the scope of practice for the practitioner in the workplace.

The applicant/student should be able to:

- Read and comprehend written material in order to correctly and independently perform laboratory test procedures.
- Communicate effectively and efficiently both verbally and in writing in a positive and tactful manner with faculty and peers at UNH and with patients, physicians, nurses, health care and other personnel at clinical sites.
- Listen effectively and follow verbal instructions.

BEHAVIORAL AND SOCIAL ATTRIBUTES – The applicant/student must possess the emotional health required to perform all tasks that are normally expected within the scope of practice for the practitioner in the workplace.

The applicant/student should be able to:

- Exercise sound judgment.
- Complete all assignments and responsibilities by the assigned time.
- Work in a changing and stressful environment.
- Display flexibility and function independently in the face of uncertainties or problems that might arise.
- Efficiently organize work.
- Assume responsibility for one's work.
- Work in group settings.

PSYCHOMOTOR SKILLS - The applicant/student must have sufficient motor function to perform all tasks that are normally expected within the scope of practice for the practitioner in the workplace.

The applicant/student should be able to:

- Manipulate instruments that require eye-hand coordination.
- Perform manual laboratory procedures with dexterity.
- Operate computers and equipment in accordance with stated protocols.
- Collect blood specimens.

INTELLECTUAL AND COGNITIVE ABILITIES – The applicant/student must have sufficient intellectual and cognitive abilities to perform all tasks that are normally expected within the scope of practice for the practitioner in the workplace.

The applicant/student should be able to:

- Think logically.
- Measure, calculate, analyze, synthesize, integrate and apply information.
- Use sufficient judgment to recognize and correct errors and problem solve unexpected observations or outcomes of laboratory test procedures.

ACADEMIC PERFORMANCE – The applicant/student must be able to obtain relevant information from lectures, seminars, laboratory sessions or exercises, clinical laboratory practicums and independent study assignments.

The applicant/student should be able to:

- Take written, oral and computer based examinations.
- Complete written assignments.
- Deliver presentations.
- Perform required laboratory practice with and without supervision.

ETHICAL STANDARDS – The applicant/student must demonstrate professional demeanor and behavior and must perform in an ethical manner in dealing with peers, faculty, staff and patients.

The applicant/student should be able to:

- Maintain patient confidentiality.
- Exercise ethical judgment, integrity, honesty, dependability and accountability in the performance of one's laboratory responsibilities.
- Admit mistakes and correct them.
- Adhere to the UNH honor code.

PROGRAM SCHOLARSHIPS

Scholarships awards are based on GPA, MLS course grades, and faculty recommendations. They are presented at the Medical Laboratory Professionals Week celebration, the last week in April or at the Fall Student Welcome. Additional external scholarships for which MLS majors may qualify are listed in Appendix A.

Evelyn Nixon-Jardine Award: Evelyn Nixon Jardine was one of the founders of the Medical Technology Program. In 1937, under the guidance of Dr. R. E. Miller, she established the Mary Hitchcock Memorial Hospital Medical Technology Program. Since 1954, UNH and Mary Hitchcock Memorial Hospital have jointly sponsored this program, and Ms. Jardine was active in the program until the late 1970's. This scholarship was established by Ms. Jardine's many friends as a memorial to her and to continue her many years of support for students in the Medical Laboratory Science field. It is awarded to a junior planning on a clinical internship who has demonstrated excellence in the field of Medical Laboratory Science.

Martha Hopkins Scholarship: This scholarship was established in memory of Martha Hopkins, alumna of the UNH Class of 1964. She was a professor of Medical Technology at UNH teaching Clinical Chemistry from 1982 until 1987, when she sadly died of cancer. As a faculty member, Martha Hopkins demonstrated enthusiasm for her subject and a commitment to excellence which she expected in her students as well. It is awarded to an MLS senior applying for a clinical internship based on overall academic achievement in chemistry.

Dr. Elizabeth French Scholarship: Dr. Elizabeth "Betty" French studied Medical Technology at Mary Hitchcock Memorial Hospital, and was soon the Chief Technologist in the hospital's laboratory. In 1946 she entered medical school at McGill University and eventually became the first woman member of the Hitchcock Clinic, and a professor at the Dartmouth Medical School. She was the Medical Director of the Mary Hitchcock Memorial Hospital Medical Technology Program for nearly 30 years. This scholarship was established in her memory by her former students, friends, and coworkers whose lives she touched. It is awarded to an MLS senior applying for a clinical internship based on academic achievement in Hematology.

Pam Low Scholarship: Pam Low earned her degree at UNH in 1951, and went on to a varied career in Microbiology, which included work for the Arthur D. Little Company where she worked as a flavorist and helped to develop Captain Crunch cereal. She remained very active in UNH Alumni Affairs and in the state of New Hampshire. Ms. Low established this award to recognize academic achievement in the area of clinical microbiology. It is awarded to seniors based on academic achievement in Microbiology, Pathogenic Microbiology, and Mycology, Parasitology, Virology.

Clinical Laboratory Management Association (CLMA) New Hampshire: CLMA plays a leadership role in enhancing the image and increasing the viability of Medical Laboratory Scientists. The CLMA scholarships are awarded to MLS juniors planning on applying for a clinical internship based on a minimum gpa of 2.5 and demonstration of leadership potential within the Medical Laboratory Science Program.

**University of New Hampshire
Medical Laboratory Science
Statement of Acknowledgement**

Please complete and return to your advisor or the MLS program office in Kendall Hall room 210.

Please print.

Student Name: _____

Year of UNH Admission: _____

Local Campus Address: _____

Home Address: _____

Local Phone: _____ E-mail Address: _____

Place a check the following:

_____ I have read and agree to all the policies outlined in the MLS Student Handbook.

Please check ONE of the following:

_____ I have read and understand the functional expectations for progression in and completion of the MLS program on pages 46 and 47 and I am able to perform the essential functions safely, reliably, and efficiently without accommodations.

OR

_____ I have read and understand the functional expectations for progression in and completion of the MLS program on pages 46 and 47 and I am able to perform the essential functions safely, reliably and efficiently with the accommodations outlined by UNH Disability Services.

Student Signature: _____

Date: _____

APPENDIX A

EXTERNAL SCHOLARSHIPS

Application deadlines (*in italics*) are estimated. Students should confirm application deadlines with the scholarship organization

Prior to November 1st:

ASCP - www.ascp.org

ASCP Scholarship – Approximately \$2,500

Senior with a minimum GPA of 3.0, U.S citizen or permanent resident

Based on academic achievement, professional goals, leadership abilities and community activities.

Dade Behring Scholarship - Approximately \$2,500

Same basis as above except for a junior or senior with a minimum GPA of 2.5

Benjamin Cummings Allied Health - Approximately \$1,000

www.aw-bc.com/scholarships/allied.html

Prior to February 1st:

The Foundation for Seacoast Health - Up to \$5,000 - www.ffsh.org

Steven Cutter Award for Outstanding Undergraduate Student

Must be a resident of Portsmouth, North Hampton, Greenland, Rye, Newington, or New Castle, NH OR Kittery, Eliot, or York, Maine.

Greatest consideration will be given to academic achievement as exemplified by class rank, GPA and test scores; also considered are course difficulty, work shortage areas of need in Seacoast, job experience, community service, evidence of dedication to chosen field of study, and financial need.

Prior to March 1st:

UNH Parents Association Scholarships - Approximately \$3,500 - www.edu/parents

Must demonstrate financial need and academic achievement (GPA >2.8)

Incoming freshmen may apply

Clinical Laboratory Science Society of Central New England –

www.ASCLS-CNE.ORG

Margaret Kenney, Scholarship Chairperson

30 Humbert Avenue

Cranston, RI 02910

Prior to April 1st:

ASCLS– www.ascls.org/leadership/awards/amt.asp

Alpha Mu Tau Scholarships – must be US citizen or permanent resident

One application for all of the following scholarships:

AMTF Memorial Scholarship – up to \$3,000
Ruth M. French – up to \$3,000
Dorothy Morrison Scholarship – up to \$2,000
Ida and May Reilly Scholarships – up to \$2,500
Martha Winstead Scholarship – up to \$1,500
AMTF Undergraduate Scholarship – up to \$1,500
ASCLS Education and Research Fund, Inc. Scholarships – up to \$1,500
By email – www.alphamutaujoe@yahoo.com
Mail – Joe Briden, AMTF Scholarship coordinator, 7809 S. 21st Drive, Phoenix,
AZ 85041-7736

Forum for Concerns of Minorities Scholarship –

www.ascls.org/leadership/awards/fcm.asp

Student must be a minority and demonstrate evidence of financial need

Student Paper Award – www.ascls.org/leadership/awards/studentpaper.asp

Student must be a current member of ASCLS

American Medical Technologist (AMT) Scholarships – \$500 - www.amt1.com

Application must be typed, evidence of financial need or career goal.

Prior to mid-April:

Yarnold Trust scholarships - Approximately \$1,000 - \$5,000

New Hampshire residents pursuing studies in the fields of nursing, medicine or social work (our program qualifies).

Alice M. Yarnold and Samuel Yarnold Scholarship Trust

c/o Stephen H. Roberts, trustee

180 Locust St.

Dover, NY 03820-3777

University Community Scholarship - Approximately \$3,500

holly.young@unh.edu

Based on academic merit and community involvement beyond paid employment and efforts on behalf of academic requirements.

Terri Winters, Scholarship Fund Chair

862-4639

Holly Young, Scholarship Selection Committee Chair

862-1564

Business and Professional Women's Foundation – www.bpwusa.org

Click on BPW Foundation or email at bpwfoundation@act.org

Student must be a woman 25 years of age or older, a US citizen and demonstrate critical need for financial assistance and clear career plans. Student must be graduating within 12-24 months from the date of grant.

APPENDIX B

ASCLS CODE OF ETHICS

The following is the American Society for Clinical Laboratory Sciences Code of Ethics of the American Society for Medical Technology taken from Case Studies in Allied Health Ethics, by R. Veatch and H. Flack, Prentice Hall, Upper Saddle River, NJ, 1997:

Preamble

The Code of Ethics of the American Society of Medical Technology (ASMT) sets forth the principles and standards by which clinical laboratory professionals practice their profession.

The professional conduct of clinical laboratory professionals is based on the following duties and principles:

I. Duty to the patient

Clinical laboratory professionals are accountable for the quality and integrity of the laboratory service they provide. This obligation includes continuing competence in both judgment and performance as individual practitioners, as well as in striving to safeguard the patient from incompetent or illegal practice by others.

Clinical laboratory professionals maintain high standards of practice and promote the acceptance of such standards at every opportunity. They exercise sound judgment in establishing, performing and evaluating laboratory testing.

Clinical laboratory professionals perform their services with regard for the patient as an individual, respecting his or her right to confidentiality, the uniqueness of his or her needs and his or her right to timely access to needed services. Clinical laboratory professionals provide accurate information to others about the services they provide.

II. Duty to Colleagues and the Profession

Clinical laboratory professionals accept responsibility to individually contribute to the advancement of the profession through a variety of activities. These activities include contributions to the body of knowledge of the profession; establishing and implementing high standards of practice and education; seeking fair socioeconomic working conditions for themselves and other members of the profession, and holding their colleagues and the profession in high regard and esteem.

Clinical laboratory professionals actively strive to establish cooperative and insightful working relationships with other health professionals, keeping in mind their primary objective to ensure a high standard of care for the patients they serve.

III. Duty to Society

Clinical laboratory professionals share with other citizens the duties of responsible citizenship. As practitioners of an autonomous profession, they have the responsibility to contribute from their sphere of professional competence to the general well-being of the community, and specifically to the resolution of social issues affecting their practice and collective good.

Clinical laboratory professionals comply with relevant laws and regulations pertaining to the practice of clinical laboratory science and actively seek, within the dictates of their consciences, to change those which do not meet the high standards of care and practice to which the profession is committed.

As a clinical laboratory professional, I acknowledge my professional responsibility to:

Maintain and promote standards of excellence in performing and safeguarding the art and science of my profession;

Safeguard the dignity and privacy of patients;

Hold my colleagues and my profession in high esteem;

Contribute to the general well-being of the community; and

Actively demonstrate my commitment to these responsibilities throughout my professional life.

