MEDICAL LABORATORY SCIENCES, MASTER OF SCIENCE (M.S.), CATEGORICAL CONCENTRATION

Program goals

The Department of Medical Laboratory Sciences provides students with advanced theoretical and technical education and prepares them to assume roles as laboratory supervisors, educators and researchers. VCU will provide students with a superior, yet flexible, course of advanced study in medical laboratory sciences.

Student learning outcomes

1. Categorical M.S. students will demonstrate knowledge and proficiency of laboratory tests.
2. Students will demonstrate the ability to research and evaluate laboratory issues within medical laboratory sciences, formulate a research question, design a research protocol and complete a research project.
3. Students will demonstrate appropriate professional conduct and leadership characteristics to include effective communication skills, ethical conduct and problem-solving abilities.

VCU Graduate Bulletin, VCU Graduate School and general academic policies and regulations for all graduate students in all graduate programs

The VCU Graduate Bulletin website documents the official admission and academic rules and regulations that govern graduate education for all graduate programs at the university. These policies are established by the graduate faculty of the university through their elected representatives to the University Graduate Council.

It is the responsibility of all graduate students, both on- and off-campus, to be familiar with the VCU Graduate Bulletin as well as the **Graduate School website** and academic regulations in individual school and department publications and on program websites. However, in all cases, the official policies and procedures of the University Graduate Council, as published on the VCU Graduate Bulletin and Graduate School websites, take precedence over individual program policies and guidelines.

Visit the academic regulations section for additional information on academic regulations for graduate students.

Degree candidacy requirements

A graduate student admitted to a program or concentration requiring a final research project, work of art, thesis or dissertation, must qualify for continuing master's or doctoral status according to the degree candidacy requirements of the student's graduate program. Admission to degree candidacy, if applicable, is a formal statement by the graduate student's faculty regarding the student's academic achievements and the student's readiness to proceed to the final research phase of the degree program.

Graduate students and program directors should refer to the following degree candidacy policy as published in the VCU Graduate Bulletin for complete information and instructions.

Visit the academic regulations section for additional information on degree candidacy requirements.

Graduation requirements

As graduate students approach the end of their academic programs and the final semester of matriculation, they must make formal application to graduate. No degrees will be conferred until the application to graduate has been finalized.

Graduate students and program directors should refer to the following graduation requirements as published in the Graduate Bulletin for a complete list of instructions and a graduation checklist.

Visit the academic regulations section for additional information on graduation requirements.

Other information

All students will be given a handbook on policies and regulations at orientation.

Apply online today. (https://www.vcu.edu/admissions/apply/graduate/)

Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
M.S.	Fall	Jun 1	Minimum TOEFL of 600 (paper), 250 (computer) or 100 (IBT); or minimum IELTS score of 7.0 for international students whose native language is not exclusively English
	Spring	Nov 1	

Special requirements

- Applicants must possess the essential technical abilities and skills described below.

In addition to the general admission requirements of the VCU Graduate School (https://bulletin.vcu.edu/graduate/study/admission-graduate-study/admission-requirements/), the general entrance requirements for the Master of Science in Clinical Laboratory Sciences for the categorical concentration are:

1. Baccalaureate degree from an accredited college or university with a major in biology or chemistry (Other majors may be approved with 12 credits of biology and 12 credits of chemistry completed.)
2. Minimum undergraduate GPA of 3.0 on a 4.0 scale for at least the last two years of undergraduate work
3. Three letters of recommendation from recent instructors or professional references from the applicant's intended field of study

addressing the applicant's academic and professional abilities and preparation for graduate study

4. Satisfactory interview
5. Essential functions in clinical laboratory sciences
   The VCU Department of Medical Laboratory Sciences is responsible for providing education without regard to disability while assuring that academic and technical standards are met.
   a. Academic standards are met by successfully completing the curriculum for the M.S. in Clinical Laboratory Sciences degree.
   b. Technical standards represent the essential nonacademic requirements that a student must demonstrate to successfully participate in the M.S. in Clinical Laboratory Sciences degree program. The technical standards for each category identified below are consistent with the expectations of Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990 and the ADA Amendments Act of 2008. Applicants must possess the following essential technical abilities and skills for admission consideration:
      i. Manual dexterity: Ability to use hand(s) or prosthetic devices with coordination
      ii. Fine motor: Ability to manipulate small objects with fingertips or adaptive devices
      iii. Mobility: Ability to maneuver in the laboratory and around instruments and in patient-care settings
      iv. Vision: Ability to distinguish red, yellow, green and blue colors; to distinguish clear from cloudy; and to distinguish objects through a microscope
      v. Hearing: Ability to hear with assistive devices (i.e., phone receivers, hearing aid, etc.)
      vi. Speech: Ability to verbally communicate in English
      vii. Writing: Ability to communicate effectively in written form in English
      viii. Reading: Ability to read, understand and follow directions printed in English
      ix. Emotional and physical stability: Ability to work accurately and safely under stress, adapt to changing environments and prioritize tasks
      x. Personal attributes: Must demonstrate integrity, responsibility, tolerance and respect

Degree requirements

The categorical concentration of the Master of Science program provides specialized study, including a clinical practicum, in one of the following areas: clinical chemistry, hematology, microbiology or immunohematology.

In addition to the general VCU Graduate School graduation requirements (https://bulletin.vcu.edu/academic-regs/grad/graduation-info/), students in the categorical concentration are required to complete:

1. A minimum of 34 graduate credit hours to include 20 credits from core courses and 14 credits from discipline-specific science courses while completing undergraduate courses specific to their specializations
2. A six-week clinical practicum in their specialty area

In addition to the basic science requirement, each student may choose an area of secondary emphasis in biomedical research, education, management or business.

1. In lieu of 12 of the 14 credit hours of discipline-specific course, students with a secondary emphasis in education, management or business may elect to focus on courses in those areas.
2. No more than 12 credit hours in the area of the secondary emphasis may be applied toward the required curriculum minimum of 34 credits.

Upon completion of the curriculum, students are eligible to take a national certification examination in the area in which they performed their concentrated study.

Full-time candidates require a minimum of two academic years to complete the program. Part-time students must complete all work requirements within six years. An interruption in registration in excess of one semester requires prior approval of the department.

In addition to these requirements, the department faculty will review continuation in the program if:

1. A student fails to achieves a minimum GPA of 3.0
2. A student receives a D or F in a course
3. A student receives a grade of C on more than one CLLS graduate course or more than nine graduate credit hours (CLLS and non-CLLS credits)
4. A student receives a grade of U (unsatisfactory) on required graduate course work.
5. A categorical master's student receives a grade less than a B in undergraduate course
6. A student fails to demonstrate appropriate professional responsibility

Curriculum requirements

Undergraduate course work

Course	Title	Hours
Discipline-specific courses		
Select eight to 10 credit hours of the following specialties [1]		8-10
Clinical chemistry specialty		
CLLS 311	Clinical Chemistry and Instrumentation I	
CLLS 312	Clinical Chemistry and Instrumentation II	
Hematology specialty		
CLLS 301	Hematology	
CLLS 302	Abnormal Hematology	
CLLS 304	Urine and Body Fluid Analysis	
Immunohematology specialty		
CLLS 306	Immunohematology	
CLLS 310	Clinical Immunology (other immunology courses may be approved)	
Microbiology specialty		

CLLS 307	Introduction to Pathogenic Microbiology	
CLLS 308	Pathogenic Bacteriology	
Total Hours		**8-10**

[1]

Specific courses will depend on the individual student's choice of specialty. Other courses may be approved.

Total undergraduate credit hours required 8-10

Graduate curriculum

Course	Title	Hours
Core courses (20 credits)		
ALHP 594	Health Education Practicum	4
BIOS 543	Graduate Research Methods I	3
or STAT 543	Statistical Methods I	
CLLS 661	Research Methodology in Medical Laboratory Sciences	3
CLLS 690	Clinical Laboratory Sciences Seminar (one-credit course completed at least three times; four recommended)	3
CLLS 790	Research in Clinical Laboratory Sciences	4
HADM 602	Health System Organization, Financing and Performance	3
Discipline-specific courses (14 credits)		
Select 14 credit hours from the following specialties: [1]		
All specialties (required)		
CLLS 500	Concepts and Techniques in Clinical Laboratory Science	3
CLLS 580	Principles of Education/Management	3
CLLS 595	Clinical Practicum	3
Clinical chemistry specialty		
Clinical chemistry required		
CLLS 630	Advanced Concepts in Clinical Chemistry and Instrumentation	
Clinical chemistry recommended		
CHEM 633	Mass Spectrometry	
CLLS 611	Analytical Techniques for Clinical Mass Spectrometry	
CLLS 612	Mass Spectrometry Systems for Clinical Analyses	
CLLS 613	Mass Spectrometry Assay Development for In Vitro Diagnostics	
FRSC 644	Analytical Considerations in Forensic Toxicology	
Hematology specialty		
Hematology required		
CLLS 629	Advanced Concepts in Hematology	
Hematology recommended		
CLLS 605	Advanced Hematology	
HGEN 501	Introduction to Human Genetics	
Immunohematology specialty		
Immunohematology required		
CLLS 627	Advanced Concepts in Immunology and Immunohematology	
Immunohematology recommended		
CLLS 601	Theoretical Blood Banking	
HGEN 501	Introduction to Human Genetics	
Microbiology specialty		
Microbiology required		
CLLS 628	Advanced Concepts in Microbiology	
Microbiology recommended		
CLLS 608	Laboratory Diagnosis of Infectious Diseases	
MICR 515	Principles of Molecular Microbiology	
MICR 616	Mechanisms of Viral and Parasite Pathogenesis	
MICR 618	Molecular Mechanisms of Microbial Pathogenesis	
Electives for all specialties		
Select from the following (other courses may be approved):		
BIOC 503	Biochemistry, Cell and Molecular Biology	
BIOC 504	Biochemistry, Cell and Molecular Biology	
BIOL/BNFO 540	Fundamentals of Molecular Genetics	
CLLS 602	Molecular Diagnostics in Clinical Laboratory Sciences	
HGEN 502	Advanced Human Genetics	
MICR 505	Immunobiology	
PATH 601	General Pathology (Dentistry)	
Electives in business, education, management, marketing, health administration (secondary emphasis) [2]		
ACCT 507	Fundamentals of Accounting	
ADLT 601	Adult Learning and Development	
FIRE 520	Financial Concepts of Management	
GRAD 601	The Academic Profession	
GRAD 602	Teaching and Learning in Higher Education	
HADM 624	Health Economics	
HADM 638	Administration of Long-term Care Facilities and Programs	
INFO 661	Information Systems for Managers	
MGMT 656	Best Practices in Leadership	
MKTG 671	Marketing Management	

[1]

Specific courses will depend on the individual student's choice of specialty. The basic science requirement may be distributed among approved courses listed in the VCU Graduate Bulletin. Other courses may be approved.

[2]

In lieu of 12 of the 14 credits in discipline-specific courses, students with a secondary emphasis in education, management or business may elect to focus on courses in those areas. No more than 12 graduate credit

hours in the area of secondary emphasis may be applied to the required curriculum minimum of 34 credits.

The minimum number of graduate credit hours required for this degree is 34.

The department offers opportunities for qualified undergraduate students to earn both an undergraduate and graduate degree in a minimum of five years by completing approved graduate courses during the senior year of their undergraduate program. See the individual program page for concentrations in the Undergraduate Bulletin for details.

- B.S. in Biology and M.S. in Medical Laboratory Sciences, categorical concentration
- B.S. in Science with a concentration in professional science and M.S. in Medical Laboratory Sciences, categorical concentration (https://bulletin.vcu.edu/undergraduate/college-humanities-sciences/interdisciplinarydegreeprograminscience/science-bs-concentration-professional-science/)

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