Medical Laboratory Scientist

Metropolitan State University of Denver
Department of Biology

What is a Medical Laboratory Scientist?

Medical Laboratory Scientists, also known as medical technologist or clinical laboratory scientists, are the 3rd largest group of healthcare professionals working within hospitals. In the clinical laboratory setting, the medical laboratory scientist performs a wide range of analytical tests to identify a variety of disease processes, including infection, cancer, blood disorders, and various other diseases. Certified medical laboratory scientists are skilled in various techniques for medical diagnosis, determination of therapeutic drug levels, and safe transfusion practices. The demand for Medical Laboratory Scientists is extraordinary, with more MLS jobs available than there are certified professionals to fill these positions. The salary range for a Medical Laboratory Scientist in the Denver Metro area is approximately $46,000- $56,000 and may be more depending on experience.

How do I become a Medical Laboratory Scientist?

There are various paths to becoming a medical laboratory scientist. Individuals may complete a four-year bachelor's degree in medical laboratory science, or they may pursue post-baccalaureate training in an accredited medical laboratory science program. Medical laboratory science programs provide students with essential theoretical and clinical laboratory experience that prepares them for the ASCP MLS certification exam. There are two post-baccalaureate medical laboratory science programs in the Denver Metro area.

- Colorado Center for Medical Laboratory Sciences Program requirements can be found: https://www.msudenver.edu/medical-laboratory-science/admissions/
- Denver Health's program requirements can be found: https://www.denverhealth.org/for-professionals/office-of-education/health-professions-and-pre-health-programs/school-of-medical-laboratory-science/admission-requirements .

Minimum application requirements include:

- Cumulative GPA of 2.70 or better
- BS or BA degree in biology or chemistry
- 16 semester hours of biology, including courses in microbiology and immunology (Pathogenic Microbiology is highly recommended)
- 16 semester hours of chemistry, including one 300-level or higher course in organic and/or biochemistry. A minimum of 3 chemistry courses with a laboratory (Analytical Chemistry and laboratory are highly recommended)
- One college-level math course

Biology Faculty Advisors who can guide you for this path are:

Dr. Ford Lux - fluxiii@msudenver.edu

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REQUIREMENTS FOR B.A. IN BIOLOGY

(2020-21 or future catalogs ONLY)

A grade of "C-" or better is required for each BIO prefix course to count towards the major

Required Biology Courses

- ☐ **BIO 1080 (3 credits)** - General Biology I
- ☐ **BIO 1090 (1 credit)** - General Biology Lab I
- ☐ **BIO 1081 (3 credits)** - General Biology II
- ☐ **BIO 1091 (1 credit)** - General Biology Lab II

- ☐ **BIO 3520 (3 credits) -** General Ecology

Pick ONE Genetics option:

- ☐ **BIO 3600 (4 credits) -** General Genetics (no lab)

- ☐ **BIO 3610 (4 credits) -** Genetics: Principles & Analysis (has lab)

Pick ONE of the following options:

Option 1: BIO 2100 (5 credits) - General Botany

Option 2: BIO 2400 (5 credits) - General Microbiology

Option 3: BIO 2310 AND BIO 2320 (4 credits each) - Anatomy & Physiology I & II
(You must take both semesters to get credit for this option.)

Option 4: BIO 3200 - Invertebrate Zoology **(4 credits) OR BIO 3260 –** Vertebrate Zoology **(4 credits)**
(If you wish to take both courses, the other will count as an upper division elective.)

Pick a Senior Experience course (required):

Senior Experience Options:	
BIO 4050 (3 credits) - Advanced Cell & Molecular Biology **BIO 4230 (3 credits) –** Issues in Conservation Biology* **BIO 4300 (3 credits) -** Neurobiology **BIO 4820 (4 credits) -** Developmental Biology	**BIO 4850 (3 credits) –** Evolution* **BIO 4510 (4 credits) -** Microbial Ecology **BIO 4540 (4 credits) -** Plant Ecology* **BIO 4550 (4 credits)** Animal Ecology*

**These are the senior experience classes suggested for the zoology/wildlife biology track. You may take more than one senior experience; in that case, it may be beneficial to take both Animal Ecology and Issues of Conservation Biology.*

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Elective Biology Courses:

Biology courses from 2000, 3000, and 4000 must be completed to bring the total of biology courses approved for the major to 40 credits. ***At least 21 of these Biology credits must be 3000 or 4000 level courses taken in the Department of Biology.***

Recommended Elective Courses from which to Choose:

- BIO 2100-5 Botany
- BIO 3180-4 Vascular Plant Taxonomy
- BIO 3200-4 Invertebrate Zoology
- BIO 3220-5 Comparative Vertebrate Anatomy
- BIO 3240-4 Animal Behavior
- BIO 3260-4 Vertebrate Zoology
- BIO 3270-4 Parasitology
- BIO 3280-2 Field Ornithology
- BIO 3360-4 Animal Physiology
- BIO 39AC-3 Principles of Wildlife Biology & Management
- BIO 4000-3 Variable Field Courses Abroad (e.g. Tropical Field Biology)
- BIO 4230-3 Issues in Conservation Biology
- BIO 4250-4 Entomology
- BIO 4280-4 Ornithology
- BIO 4290-4 Mammalogy
- BIO 4540-4 Plant Ecology
- BIO 4550-4 Animal Ecology

* Most government wildlife biology jobs require (https://www.opm.gov/policy-data-oversight/classification-qualifications/general-schedule-qualification-standards/0400/wildlife-biology-series-0486/):

- At least 9 semester hours in such wildlife subjects as mammalogy, ornithology, animal ecology, wildlife management, or research courses in the field of wildlife biology; and

- At least 12 semester hours in zoology in such subjects as general zoology, invertebrate zoology, vertebrate zoology, comparative anatomy, physiology, genetics, ecology, cellular biology, parasitology, entomology, or research courses in such subjects (Excess courses in wildlife biology may be used to meet the zoology requirements where appropriate.); and

- At least 9 semester hours in botany or the related plant sciences.

** Internships and/or research credits are highly recommended

***Minor in Geographic Information Systems (GIS) or Environmental Science with at least Geospatial Sciences and Intro to GIS is recommended. If you choose one of these minors, it may make more sense for you to earn a B.A. instead of a B.S.

Total Credit Hours in Biology (minimum of 40) _____

Upper Division Biology Credit Hours (minimum of 21) _____

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Non-BIO Course Requirements:

☐ **CHE 1100 (4 credits)** - Principles of Chemistry* ☐ **CHE 2100 (4 credits)** - Intro to Organic and Biological Chemistry	**OR**	☐ **CHE 1800 (4 credits)** – General Chemistry I* ☐ **CHE 1801 (1 credit)** – General Chemistry I Lab ☐ **CHE 1810 (4 credits)** – General Chemistry II

*As of 2021-22, CHE 1100 and CHE 1800 will count toward the Natural and Physical Sciences requirement without the inclusion of the lab.

Math Requirement:

☐ One Semester of Math _____

Choose from the following math courses:

MTH 1108-1109 (Stretch College Algebra)*, MTH 1111 and MTH 1101 (College Algebra with lab), MTH 1110 (College Algebra), MTH 1112 (College Algebra through Modeling), MTH 1120 (Trigonometry), MTH 1115 and MTH 1116 (College Algebra through Modeling with lab), MTH 1210 (Intro to Statistics), MTH 1410 (Calculus I)**

Students planning to take Calculus must take MTH 1108-1109, MTH 1110, or MTH 1111

Master's programs often require you to take an Intro to Stats course, including CSU and Regis University. Other graduate programs may require you to take math up to Calculus, Physics I & Lab, and Physics II & lab. Look at possible graduate programs to see their specific requirements.

General Studies Requirements (**33 credits total**), please visit
http://www.msudenver.edu/advising/facultystaff/generalstudiesrequirements/

Total Credits (Minimum 120) _____

Total Upper Division Credits (Minimum 40 TOTAL) _____

What is your Minor? (Optional as of Fall 2024**)** _____

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REQUIREMENTS FOR B.S. IN BIOLOGY

(2024-2025 or future catalogs ONLY)

Major Requirements:

- Total of 46 total credit hours approved by the Biology Faculty must be completed in the BIO prefix
- C- or better must be earned for any BIO course to apply to your major requirements.
- 27 upper division credit hours in BIO courses must be completed
- Non-biology courses in math, chemistry and other STEM disciplines are required

❑ **Start Smart!** Have you met with a Biology Academic Advisor at least once a semester to ensure timely progression toward your degree and to avoid taking unnecessary courses.

Required Introductory Courses:

❑ BIO 1080 & 1090: General Biology I w/ Lab
❑ BIO 1081 & 1091: General Biology II w/ Lab

Two semesters of math:

❑ MTH 1109/ 1110: College Algebra, or higher
❑ Another semester of Math > MTH 1110

Choose one of the following chemistry sequences:

❑ CHE 1800 & 1801: General Chemistry I w/ Lab
❑ CHE 1810 & 1811: General Chemistry II w/ Lab

*** **OR** ***

❑ CHE 1110 & 1150: Principles of Chemistry w/ Lab
❑ CHE 2100 & 2150: Into to Organic & Biol Chem w/ Lab

Pro Tip! Biology students do not need additional General Studies coursework for Natural & Physical Sciences or Quantitative Literacy. Your required Biology, Chemistry, and Math courses will fulfill these.

Additional Required Biology courses:

Choose one of the following:

❑ BIO 2100: General Botany (5cr.)
❑ BIO 2310: Human Anatomy & Physiology I (4cr.)
❑ BIO 2400: General Microbiology (5cr.)
❑ BIO 3200: Invertebrate Zoology (4cr.)
❑ BIO 3260: Vertebrate Zoology (4cr.)

Take General Ecology and a Genetics course:

❑ BIO 3520: General Ecology (3cr.)

Choose one of the following:

❑ BIO 3600: General Genetics (4cr.)
❑ BIO 3610: Genetics: Principles & Analysis (4cr.)

❑ **Professionalize!** Have you met with a Faculty Advisor to personalize your path and ensure you select courses and extracurricular experiences that will best serve you?

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Biology Elective Course Requirement:

- At least 46 total credit hours must be completed in BIO courses.
- At least 27 total credit hours must be upper division BIO courses (3000/4000 level).
    - Includes any upper division Zoology, General Ecology, Genetics, and BIO Senior Experience

Lower Division BIO Courses (1000/2000 level)	**Credit Hours**	**Upper Division BIO Courses** (3000/4000 level)	**Credit Hours**
❑ BIO 1080/1090 – General Biology I w/Lab	4	❑ BIO 3520: General Ecology	3
❑ BIO 1081/1091 – General Biology II w/Lab	4	❑ BIO 36XX: Genetics	4
❑		❑	
❑		❑	
❑		❑	
❑		❑	
❑		❑	
❑		❑	
❑		❑ BIO Senior Experience (recommended)	
Total lower division BIO credit hours:		**Total upper division BIO credit hours:** *AT LEAST 27 UPPER DIVISION BIO CREDIT HOURS REQUIRED*	
Total BIO prefix credit hours: *LOWER DIVISION + UPPER DIVISION (AT LEAST 46 TOTAL BIO CREDIT HOURS REQUIRED)*			

Required Non-Biology Science Electives:

- 9 credits total, at least 6 of which must be upper division (3000 /4000 level).
- Any Math course selected would be in addition to the two semesters required above.

Non-Biology Science Elective Courses	**Credit Hours**
❑	
❑ (upper division)	
❑ (upper division)	
Total Non-Biology Science Elective credit hours: *At least 6 credit hours must be upper division (3000/4000 level)*	

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Senior Experience Requirement:

- A capstone course is required to graduate.
- A Biology Senior Experience is recommended.
- Courses outside Biology marked (SE) fulfill the Senior Experience requirement but would ***not*** count toward your BIO hours.

BIO 4050: Advanced Cell & Molecular Biology
BIO 4230: Issues in Conservation Biology
BIO 4271: Parasitology
BIO 4300: Neurobiology
BIO 4510: Microbial Ecology
BIO 4540: Animal Ecology
BIO 4820: Developmental Biology
BIO 4850: Evolution

Are you ready for graduation?

→ Please see your Degree Progress Report for General Studies and MSU Denver graduation requirements. ←

- ❑ Have you completed a total of 46 credit hours of BIO courses approved by the Biology Department?
- ❑ Have you completed at least 27 upper division BIO coursework (3000/ 4000 level)?
- ❑ Have you completed at least 39 total upper division credit hours?
- ❑ Have you completed a Senior Experience course?
- ❑ Have you had a final advising appointment?
- ❑ Have you submitted an application for graduation?