University of Colorado **Boulder**

MCDB Major Requirements (B.S.)

MCDB Courses

First-Year MCDB Sequence

MCDB 1150 or EBIO 1210

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MCDB 2150 - Principles of Genetics

MCDB 1161, 1171, 1181, or 2171 (2 cr. Lab)

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Molecular and Cellular Biology

MCDB 3135 Molecular Biology ← MCDB 3140 Cell Biology Lab (can be taken with either MCDB 3135 or 3145)

Pre-requisites: Genetics and Gen Chem 1

AND

MCDB 3145 Cell Biology ←

Pre-requisites: Genetics and Gen Chem 1

Additional Requirements

Can be taken in any order

Developmental Biology: MCDB 4650
(Pre-requisites = C- in MCDB 3135 & 3145)

Advanced requirement: MCDB 4150, 4300, 4312, 4520, 4777
(Recommended pre-requisites = C- in MCDB 3135 & 3145)

2 MCDB Scientific Reasoning courses (See next page)
(Recommended prereqs = C- in MCDB 3135 & 3145)

6 hours Upper Division MCDB Electives (See next page)

Ancillary Courses

-CHEM 1021 Introduction to Chemistry** (see endnote on page 3)

-CHEM 1113 & 1114 General Chemistry 1 and Lab

-CHEM 1133 & 1134 General Chemistry 2 and Lab

-Statistics (EBIO 1010, SOCY 2061, MATH 2510, IPHY 3280, or EBIO 4410) *OR* Calculus (MATH 1300 or APPM 1350)

Required Chemistry courses

-CHEM 3311 & 3321 Organic Chemistry 1 and Lab

-BCHM 4611 Principles of Biochemistry

**Students double-majoring in CHEM or BCHM should speak with their advisor about the BCHM requirement*

*These courses will appear under required coursework and will count toward MCDB credit hours as well as MCDB GPA

Updated December 2025

MCDB Scientific Reasoning Courses

MCDB students will complete two Scientific Reasoning courses. Typically 3-5 courses are offered each semester. Below is a list of some potential Scientific Reasoning courses. Please refer to your degree audit for a complete list.

- MCDB 4350 - Microbial Diversity and the Biosphere
- MCDB 4361 - Evolution and Development
- MCDB 4410 - Human Molecular Genetics
- MCDB 4420 - Genetics of Brain and Behavior
- MCDB 4422 - Molec. Biol. of Free Radicals: Role(s) in Oxidative Stress, Signaling, Disease, Aging
- MCDB 4425 - Topics in Membrane Biology: Cell Biology, Physiology and Disease
- MCDB 4426 - Cell Signaling and Developmental Regulation
- MCDB 4427 - Biology of the Visual System
- MCDB 4444 - Cellular Basis of Disease
- MCDB 4471 - Mechanisms of Gene Regulation in Eukaryotes
- MCDB 4550 - Cells, Molecules and Tissues: A Biophysical Approach
- MCDB 4615 - Biology of Stem Cells
- MCDB 4680 - Mechanisms of Aging
- MCDB 4750 - Animal Virology
- MCDB 4790 - Oocytes, Stem Cells, Organisms: Experiments to Discoveries
- MCDB 4810 - Insane in the Membrane: The Biology and Biophysics of the Membrane
- MCDB 4811 - Teaching and Learning Biology

MCDB Electives

Six hours of MCDB upper-division electives are required for the MCDB major. Any 3000 or 4000 level MCDB course will count, including up to six hours of MCDB independent study (MCDB 4840), Honors Research (MCDB 4980), or Honors Thesis (MCDB 4990).

Electives from other departments: A maximum of five credit hours can be from the list of approved courses. When choosing to take courses from this list, check for prerequisites.

- BCHM 4720 - Metabolic Pathways and Human Disease
- BCHM 4761 - Biochemistry Laboratory
- CHEM 3331 - Organic Chemistry 2 lecture
- CHEM 3341 - Organic Chemistry 2 lab
- EBIO 3400 - Microbiology
- EBIO 3410 - Microbiology lab
- EBIO 4290 - Phylogenetics and Comparative Biology
- EBIO 4370 - Genetically Engineered Organisms
- EBIO 4800 - Topic: “Development, Genes and Evolution”
- EDUC 5215 - Elementary Science Theory and Methods
- EDUC 5315 - Perspectives on Science
- EDUC 5385 - Project-Based Science Instruction
- IPHY 3430 - Human Physiology
- IPHY 3435 - Human Physiology Lab
- NRSC 4072 - Clinical Neuroscience

MCDB Major (B.S.) Curriculum Sample 4-Year Plan

FIRST SEMESTER - FALL

- MCDB 1020 - 1 credit *recommended*
- First Semester Introduction to Biology (MCDB 1150 or EBIO 1210) - 3 credits
- MCDB 2 credit hour lab - 2 credits*
- Coseminar (MCDB 1152) - 1 credit *recommended*
- General Chemistry 1 and Lab (CHEM 1113 & 1114) - 5 credits**
- A&S Lower-Division Writing - 3 credits

SECOND SEMESTER - SPRING

- Genetics (MCDB 2150) - 3 credits
- Coseminar (MCDB 2152) - 1 credit *recommended*
- General Chemistry 2 and Lab (CHEM 1133 & 1134) - 5 credits
- A&S Gen Ed (Social Science) - 3 credits
- A&S Gen Ed (Diversity: Global Perspective) or Elective - 3 credits

THIRD SEMESTER - FALL

- Molecular Biology (MCDB 3135) - 3 credits
- Cell Biology Lab (MCDB 3140)*** - 2 credits
- Organic Chemistry 1 and Lab (CHEM 3311 and 3321) - 5 credits
- A&S Gen Ed (Arts & Humanities) - 3 credits
- Elective - 3 credits****

FOURTH SEMESTER - SPRING

- Cellular Biology (MCDB 3145) - 3 credits
- Statistics OR Calculus - 3-5 credits
- Biochemistry (BCHM 4611) - 3 credits
- A&S Gen Ed (Social Science) - 3 credits
- A&S Gen Ed (Arts & Humanities) - 3 credits

FIFTH SEMESTER - FALL

- Developmental Biology (MCDB 4650) - 3 credits
- A&S Gen Ed (Arts & Humanities) - 3 credits
- A&S Gen Ed (Social Science) - 3 credits
- A&S Gen Ed (Diversity: US Perspective) or Elective - 3 credits****
- Elective - 3 credits****

SIXTH SEMESTER - SPRING

- Upper-Division MCDB Elective - 3 credits
- MCDB Scientific Reasoning (1st) - 3 credits
- A&S Gen Ed (Arts & Humanities) - 3 credits
- A&S Gen Ed (Social Science) - 3 credits
- Elective - 3 credits****

SEVENTH SEMESTER - FALL

- Advanced MCDB course - 3 credits
- A&S Upper-Division Writing - 3 credits
- Upper Division Elective - 3 credits
- Elective - 3 credits****
- Elective - 3 credits****

EIGHTH SEMESTER - SPRING

- Upper-Division MCDB Elective - 3 credits
- MCDB Scientific Reasoning (2nd) - 3 credits
- Elective - 3 credits****
- Elective - 3 credits****
- Elective - 3 credits****

*MCDB 2 credit hour lab may be taken with MCDB 1150 or MCDB 2150. Options include MCDB 1161, 1171, 1181, or 2171.
**A student who has not had chemistry or struggled with chemistry is recommended to take Introduction to Chemistry (CHEM 1021) first. Please take the Chemistry Placement exam to determine the most appropriate class.
***MCDB 3140 may be taken with MCDB 3135 or MCDB 3145.
****Depending on credit hour requirements, some of the electives may need to be upper-division electives.