

MAJOR IN BIOCHEMISTRY, HEALTH AND MEDICAL SCIENCES CONCENTRATION

This concentration augments the ASBMB Concentration with additional coursework in anatomy and physiology, biochemistry of disease, and either a medical internship or mentored research by requiring an additional 14-15 credits of concentration-specific coursework. The Health and Medical Sciences concentration is geared toward students interested in a number of health professions including, but not limited to, medicine, veterinary, dentistry, physician assistant and physical therapy.

Requirements Effective Fall 2022

A minimum grade of C (2.000) must be earned for BC 493 and all biochemistry (BC) and LIFE subject code lecture and laboratory courses at or above the 200-level required in the biochemistry major.

Students successfully completing the program can state on their resume that they graduated from an "American Society for Biochemistry and Molecular Biology (ASBMB) accredited program." Further, students also have the option of taking a 1-hour ASBMB exam during the spring semester of their senior year. Student who pass the exam will additionally receive degree certification from ASBMB.

Freshman

| | | AUCC | Credits |
|--------------------------------------|---|------|-----------|
| BC 192 | Biochemistry Freshman Seminar | | 2 |
| CHEM 111 | General Chemistry I (GT-SC2) | 3A | 4 |
| CHEM 112 | General Chemistry Lab I (GT-SC1) | 3A | 1 |
| CHEM 113 | General Chemistry II | | 3 |
| CHEM 114 | General Chemistry Lab II | | 1 |
| CO 150 | College Composition (GT-CO2) | 1A | 3 |
| LIFE 102 | Attributes of Living Systems (GT-SC1) | 3A | 4 |
| LIFE 201B | Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2) | 3A | 3 |
| LIFE 203 | Introductory Genetics Laboratory | | 2 |
| Select one group from the following: | | | 8 |
| Group A: | | | |
| MATH 155 | Calculus for Biological Scientists I (GT-MA1) | 1B | |
| MATH 255 | Calculus for Biological Scientists II | 1B | |
| Group B: | | | |
| MATH 160 | Calculus for Physical Scientists I (GT-MA1) | 1B | |
| MATH 161 | Calculus for Physical Scientists II (GT-MA1) | 1B | |
| Total Credits | | | 31 |

Sophomore

| | | | |
|--|---|----|-----------|
| CHEM 341 | Modern Organic Chemistry I | | 3 |
| CHEM 343 | Modern Organic Chemistry II | | 3 |
| CHEM 344 | Modern Organic Chemistry Laboratory | | 2 |
| LIFE 210 | Introductory Eukaryotic Cell Biology | | 3 |
| LIFE 212 | Introductory Cell Biology Laboratory | | 2 |
| Select one course from the following: | | | 4 |
| BMS 300 | Principles of Human Physiology | | |
| BMS 360 | Fundamentals of Physiology | | |
| Select one course from the following: | | | 5 |
| PH 121 | General Physics I (GT-SC1) | 3A | |
| PH 141 | Physics for Scientists and Engineers I (GT-SC1) | 3A | |
| AUCC Category 3 courses (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#Foundations-Perspectives) ¹ | | | 6 |
| Elective | | | 3 |
| Total Credits | | | 31 |

| | | | |
|--|--|-------|------------|
| Junior | | | |
| BC 360 | Responsible Conduct in Biochemical Research | | 1 |
| BC 401 | Comprehensive Biochemistry I | 4A | 3 |
| BC 403 | Comprehensive Biochemistry II | 4B | 3 |
| Select a minimum of 2-credits from the following: | | | 2-3 |
| BC 406A | Investigative Biochemistry: Protein Biochemistry | | |
| BC 475 | Mentored Research | | |
| BC 487A | Internship | | |
| BC 495 | Independent Study | | |
| BC 496 | Group Study | | |
| Select one course from the following: | | | 4-5 |
| BMS 301 | Human Gross Anatomy | | |
| BMS 305 | Domestic Animal Gross Anatomy | | |
| Select one course from the following: | | | 5 |
| PH 122 | General Physics II (GT-SC1) | 3A | |
| PH 142 | Physics for Scientists and Engineers II (GT-SC1) | 3A | |
| Select one course from the following: | | | 3 |
| STAT 301 | Introduction to Applied Statistical Methods | | |
| STAT 307 | Introduction to Biostatistics | | |
| STAT 315 | Intro to Theory and Practice of Statistics | | |
| Advanced Writing (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing) | | 2 | 3 |
| Diversity, Equity, and Inclusion (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion) | | 1C | 3 |
| Elective | | | 2-4 |
| Total Credits | | | 31 |
| Senior | | | |
| BC 404 | Comprehensive Biochemistry Laboratory | 4B | 2 |
| BC 411 | Physical Biochemistry | | 4 |
| BC 463 | Molecular Genetics | | 3 |
| BC 465 | Molecular Regulation of Cell Function | | 3 |
| BC 467 | Biochemistry of Disease | | 3 |
| BC 493 | Senior Seminar | 4A,4C | 1 |
| Select one course from the following: | | | 3 |
| BC 499A | Thesis: Laboratory Research-Based | 4C | |
| BC 499C | Thesis: Literature-based in Health and Med Sci | 4C | |
| AUCC Category 3 courses (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#Foundations-Perspectives) ¹ | | 3B-3D | 6 |
| Elective ² | | | 2 |
| Total Credits | | | 27 |
| Program Total Credits: | | | 120 |

¹ Select from the list of courses in categories 3B-3D (six credits [two courses] must come from 3B; one course each from categories 3C and 3D) in the AUCC. Only 3 of the 6 credits required for Arts and Humanities may come from intermediate (L*** 200 and L*** 201) foreign language courses.

² Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

Major Completion Map

Distinctive Requirements for Degree Program:

TO PREPARE FOR FIRST SEMESTER: The curriculum for the Biochemistry major - Health and Medical Sciences concentration assumes students enter college prepared to begin a year-long calculus sequence (either MATH 155/MATH 255 or MATH 160/MATH 161) in the first semester of their first year. LIFE 102 requires high school chemistry as a prerequisite; CHEM 111 requires Algebra II as a prerequisite (this

prerequisite is met by having Algebra II by test credit, transfer credit, or placement out of MATH 117 and MATH 118 on Math Placement Exam).

A minimum grade of C (2.000) must be earned for BC 493 and all biochemistry (BC) and LIFE subject code lecture and laboratory courses at or above the 200-level required in the biochemistry major.

Freshman

| Semester 1 | | Critical | Recommended | AUCC | Credits |
|---------------------------------------|---|----------|-------------|------|-----------|
| BC 192 | Biochemistry Freshman Seminar | | | | 2 |
| CHEM 111 | General Chemistry I (GT-SC2) | X | | 3A | 4 |
| CHEM 112 | General Chemistry Lab I (GT-SC1) | X | | 3A | 1 |
| LIFE 102 | Attributes of Living Systems (GT-SC1) | X | | 3A | 4 |
| Select one course from the following: | | | | | 4 |
| MATH 155 | Calculus for Biological Scientists I (GT-MA1) | X | | 1B | |
| MATH 160 | Calculus for Physical Scientists I (GT-MA1) | X | | 1B | |
| Total Credits | | | | | 15 |

| Semester 2 | | Critical | Recommended | AUCC | Credits |
|---------------------------------------|---|----------|-------------|------|-----------|
| CHEM 113 | General Chemistry II | X | | | 3 |
| CHEM 114 | General Chemistry Lab II | X | | | 1 |
| CO 150 | College Composition (GT-CO2) | X | | 1A | 3 |
| LIFE 201B | Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2) | X | | 3A | 3 |
| LIFE 203 | Introductory Genetics Laboratory | X | | | 2 |
| Select one course from the following: | | | | | 4 |
| MATH 161 | Calculus for Physical Scientists II (GT-MA1) | X | | 1B | |
| MATH 255 | Calculus for Biological Scientists II | X | | 1B | |
| Total Credits | | | | | 16 |

Sophomore

| Semester 3 | | Critical | Recommended | AUCC | Credits |
|---|--------------------------------------|----------|-------------|------------|-----------|
| CHEM 341 | Modern Organic Chemistry I | X | | | 3 |
| LIFE 210 | Introductory Eukaryotic Cell Biology | X | | | 3 |
| LIFE 212 | Introductory Cell Biology Laboratory | X | | | 2 |
| AUCC Category 3 courses (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#Foundations-Perspectives) | | | | 3B, 3C, 3D | 3 |
| Elective | | | | | 3 |
| Total Credits | | | | | 14 |

| Semester 4 | | Critical | Recommended | AUCC | Credits |
|---|---|----------|-------------|------------|-----------|
| CHEM 343 | Modern Organic Chemistry II | X | | | 3 |
| CHEM 344 | Modern Organic Chemistry Laboratory | X | | | 2 |
| Select one course from the following: | | | | | 4 |
| BMS 300 | Principles of Human Physiology | | | | |
| BMS 360 | Fundamentals of Physiology | | | | |
| Select one course from the following: | | | | | 5 |
| PH 121 | General Physics I (GT-SC1) | | X | 3A | |
| PH 141 | Physics for Scientists and Engineers I (GT-SC1) | | X | 3A | |
| AUCC Category 3 courses (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#Foundations-Perspectives) | | | | 3B, 3C, 3D | 3 |
| Total Credits | | | | | 17 |

Junior

| Semester 5 | | Critical | Recommended | AUCC | Credits |
|---------------------------------------|--|----------|-------------|------|---------|
| BC 401 | Comprehensive Biochemistry I | X | | 4A | 3 |
| Select one course from the following: | | | | | 5 |
| PH 122 | General Physics II (GT-SC1) | | X | 3A | |
| PH 142 | Physics for Scientists and Engineers II (GT-SC1) | | X | 3A | |

| | | | | |
|--|--|-----------------|--------------------|-------------|
| Select one course from the following: | | X | | 3 |
| STAT 301 | Introduction to Applied Statistical Methods | | | |
| STAT 307 | Introduction to Biostatistics | | | |
| STAT 315 | Intro to Theory and Practice of Statistics | | | |
| Advanced Writing (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing) | | | 2 | 3 |
| Diversity, Equity, and Inclusion (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion) | | | 1C | 3 |
| Total Credits | | | | 17 |
| Semester 6 | | Critical | Recommended | AUCC |
| BC 360 | Responsible Conduct in Biochemical Research | | X | 1 |
| BC 403 | Comprehensive Biochemistry II | X | | 4B |
| Select a minimum of 2-credits from the following: | | | X | 2-3 |
| BC 406A | Investigative Biochemistry: Protein Biochemistry | | | |
| BC 475 | Mentored Research | | | |
| BC 487A | Internship | | | |
| BC 495 | Independent Study | | | |
| BC 496 | Group Study | | | |
| Select one course from the following: | | | X | 4-5 |
| BMS 301 | Human Gross Anatomy | | | |
| BMS 305 | Domestic Animal Gross Anatomy | | | |
| Elective | | | | 2-4 |
| PH 122 or PH 142 must be completed by the end of Semester 6. | | X | | |
| Total Credits | | | | 14 |
| Senior | | | | |
| Semester 7 | | Critical | Recommended | AUCC |
| BC 404 | Comprehensive Biochemistry Laboratory | | X | 4B |
| BC 411 | Physical Biochemistry | X | | 4 |
| BC 463 | Molecular Genetics | X | | 3 |
| BC 493 | Senior Seminar | X | | 4A,4C |
| AUCC Category 3 courses (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#Foundations-Perspectives) | | X | | 3B, 3C, 3D |
| Total Credits | | | | 13 |
| Semester 8 | | Critical | Recommended | AUCC |
| BC 465 | Molecular Regulation of Cell Function | X | | 3 |
| BC 467 | Biochemistry of Disease | X | | 3 |
| Select one course from the following: | | X | | 3 |
| BC 499A | Thesis: Laboratory Research-Based | | | 4C |
| BC 499C | Thesis: Literature-based in Health and Med Sci | | | 4C |
| AUCC Category 3 courses (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#Foundations-Perspectives) | | X | | 3B, 3C, 3D |
| Elective | | X | | 2 |
| The benchmark courses for the 8th semester are the remaining courses in the entire program of study. | | X | | |
| Total Credits | | | | 14 |
| Program Total Credits: | | | | 120 |