

2+2 Articulation Agreement for Carroll Community College and Towson University

Associate's Degree: A.S. in Biology

Bachelor's Degree: B.S. in Biology, Cell and Molecular Biology Concentration

Effective Term: Fall 2019

Section 1: Course Completion Plan for Carroll CC Degree

This section outlines the courses to take for the Carroll CC general education and program requirements in order to complete both Carroll CC and TU degrees within a total of 4 years and 120 credits. The following tables do not include any nontransferable coursework or program prerequisites.

Table 1: General Education Courses Applied to TU Core Curriculum

Carroll CC Requirement	Carroll CC Course to Take	Credits	Towson University Equivalent Course
English Composition	ENGL 101 College Writing	3	ENGL 102 Writing for a Liberal Education
Mathematics	Choose one course: <ul style="list-style-type: none"> ▪ MATH 123 Precalculus 1 ▪ MATH 130 Precalculus 	4 or 5	Equivalency varies by course: <ul style="list-style-type: none"> ▪ MATH 115 College Algebra ▪ MATH 119 Pre-calculus
Arts & Humanities	Any arts & humanities course.	3	Equivalency will vary by course.
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Social & Behavioral Sciences	Any social & behavioral sciences course.	3	Equivalency will vary by course.
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Biological & Physical Sciences	CHEM 105 Principles of General Chemistry 1	4	CHEM 131 & CHEM 131L General Chemistry I Lecture & Lab
Biological & Physical Sciences	BIOL 101 Fundamentals of Biology 1	4	BIOL 200 & BIOL 200L Intro Cell Biology & Genetics Lecture & Lab
English Literature	ENGL 102 Writing about Literature	3	ENGL TLL Lower Level Elective
Program Requirement	BIOL 102 Fundamentals of Biology 2	4	BIOL 202 Intro to Ecology & Evolution

Total general education courses applied to TU Core Curriculum: 34-35 credits

Students will transfer with a Core Package 3, which indicates that they must only complete the Advanced Writing Seminar (Core 9) and Ethical Perspectives (Core 14) requirements at TU. If a student takes an ethics course as an Arts & Humanities general education course, they will be required to complete another Core Curriculum requirement. The Towson Seminar (Core 1) requirement is waived for all incoming transfer students.

Table 2: Program Requirements and Electives Applied to TU Degree

Carroll CC Requirement	Carroll CC Course to Take	Credits	Towson University Equivalent Course
Program Requirement	BIOL 215 Microbiology	4	BIOL 215 Essentials of Microbiology
Program Requirement	BIOL 240 Genetics	4	BIOL T09 Genetics
Program Requirement	CHEM 106 Principles of General Chemistry 2	4	CHEM 132 & CHEM 132L General Chemistry II Lecture & Lab
Program Requirement	CHEM 201 Organic Chemistry 1	5	CHEM T31 Organic Chemistry I
Program Requirement	CHEM 202 Organic Chemistry 2	5	CHEM T32 Organic Chemistry II
Program Requirement	Choose one course: <ul style="list-style-type: none"> ▪ MATH 132 Applied Calculus ▪ MATH 135 Calculus of a Single Variable 1 	3 or 4	Equivalency varies by course: <ul style="list-style-type: none"> ▪ MATH 211 Calculus for Applications ▪ MATH 273 Calculus I
General Elective	Any course (if needed for 60 credits)	0-2	Equivalency will vary by course.

Total program requirements applied to the TU degree: 25-26 credits

Total transferred to TU: 60 credits

Students may transfer a maximum of 64 credits. If students do not adhere to the courses outlined above, they are not guaranteed completion of the bachelor's degree in 2 years.

Section 2: Carroll CC Course Selection Details

This section explains any specific course selections made in section 1 and provides transfer planning guidance specific to this degree plan. Students must follow the course selections outlined in this document. If students do not complete any or all of the courses outlined in this agreement, they will be required to complete outstanding requirements at TU.

COURSE PLANNING

Certain courses at Carroll CC are only offered in the fall or spring term. Students must be mindful of course availability and plan accordingly to complete a course in fall or spring when it is offered. The Carroll CC catalog provides a recommended sequence of courses for students to follow based on course availability.

GENERAL EDUCATION

The program requirement BIOL 102 is counted toward the total of General Education credits completed at Carroll CC. This enables TU to apply a core package and recognize the completion of the associate's degree's general education requirements without course-by-course placement in the Core Curriculum.

PROGRAM REQUIREMENTS

For the **required math course**, students must take either **MATH 132 Applied Calculus** or **MATH 135 Calculus of a Single Variable 1** to satisfy the Cell and Molecular Biology concentration's requirement for MATH 273 Calculus I or MATH 211 Calculus for Applications.

LOWER-LEVEL EQUIVALENTS OF UPPER-LEVEL COURSES

A course number beginning with T indicates that it is a lower-level equivalent of an upper-level TU course. CHEM T31, CHEM T32, and BIOL T09 satisfy major requirements but do not count toward the TU degree requirement for 32 upper-level units.

Section 3: Degree Requirements to Be Completed at TU

This section outlines the requirements students will complete upon transferring into the Cell and Molecular Biology concentration. This concentration is designed for students who will pursue advanced studies in cell biology, molecular biology, genetics, microbiology, immunology, or other fields that involve molecular tools in research. It can also prepare students for professional degree programs in medicine, dentistry, or veterinary medicine or careers in biology education, biomedical research, and fields which integrate biology with other fields such as business or law. Refer to section 4 for additional major requirements, recommendations, and university-wide degree requirements.

CORE CURRICULUM REQUIREMENTS: 6 UNITS

Core 9 Advanced Writing Seminar

Core 14 Ethical Perspectives

BIOLOGY MAJOR FOUNDATION COURSES: 1 UNIT

BIOL 204 Educational and Career Planning for the Biologist (1 unit)

BIOLOGY MAJOR BREADTH COURSES: 14-24 UNITS

Select one of the following for 3-8 units:

- BIOL 205 General Botany & BIOL 207 General Zoology (8 units)
- BIOL 208 Biodiversity (3 units)

Select two of the following for 8 units:

- BIOL 405 Molecular Ecology, Evolution, and Conservation (4 units)
- BIOL 408 Cell Biology (4 units)
- BIOL 409 Molecular Biology (4 units)

Select one of the following for 3-8 units:

- BIOL 221 & 221L Human Anatomy & Physiology I Lecture & Lab and BIOL 222 & 222L Human Anatomy & Physiology II Lecture & Lab (8 units)
- BIOL 325 Animal Physiology (4 units)
- BIOL 436 Plant Physiology (3 units)

BIOLOGY MAJOR ELECTIVE COURSES: 8-10 UNITS

Select one of the following for 2 units:

- BIOL 312 Genetics Laboratory
- BIOL 410 Molecular Biology Laboratory
- BIOL 412 Cell Biology Laboratory
- CHEM 356 Biochemistry Laboratory

Select two of the following for 6-8 units:

- BIOL 315 Medical Microbiology or BIOL 318 Microbiology (4 units)

- BIOL 355 Animal Parasitology (3 units)
- BIOL 360 Histology (4 units)
- BIOL 411 Cancer Biology (3 units)
- BIOL 415 Biotechnology (3 units)
- BIOL 419 Environmental Microbiology (3 units)
- BIOL 420 Microbiology of Infectious Disease (3 units)
- BIOL 421 Immunology (4 units)
- BIOL 428 Virology (3 units)
- BIOL 463 Developmental Biology (3 units)
- CHEM 351 Biochemistry I (3 units)
- MBBB 301 Intro to Bioinformatics (4 units)
- MBBB 315 Genomics (3 units)

BIOLOGY MAJOR FREE ELECTIVE: 0-4 UNITS

If BIOL 325 or BIOL 436 is taken for the breadth requirement, take one of the following courses for 3-4 units:

- One biology elective from the list of electives in any major concentration
- BIOL 491 Elective in Independent Research
- BIOL 499 Honors Senior Thesis in Biology (for Honors College students only)

BIOLOGY MAJOR ANCILLARY COURSES: 8 UNITS

Select one of the following physics course sequences for 8 units:

- PHYS 211 General Physics I Non Calculus-Based & PHYS 212 General Physics II Non Calculus-Based
- PHYS 241 General Physics I Calculus-Based & PHYS 242 General Physics II Calculus-Based

GENERAL ELECTIVES: 11-19 UNITS

The total number of elective units required will be determined by the total units completed within the major. Elective credit can be satisfied by additional major electives or courses of personal interest. Students may also consider adding a minor if they have room for 18-24 units of coursework.

Section 4: Additional Requirements & Recommendations for TU Degree Completion

ADDITIONAL BIOLOGY MAJOR REQUIREMENTS AND RECOMMENDATIONS:

- Students in this concentration are encouraged to take at least two upper-level labs in their major electives.
- A research experience or internship (e.g. BIOL 491, 493, or 499) is strongly encouraged for students in this concentration.
- Students preparing for a career in medical fields should take BIOL 221/221L and BIOL 222/222L for the breadth requirement.
- All Biology majors must complete a minimum of 19 units of biology major courses as TU credit. At least 10 of these units must be at the upper-level. This does not include ancillary coursework outside of the biology subject.

BACHELOR'S DEGREE REQUIREMENTS FOR ALL STUDENTS:

- A C (2.0) or higher is required in all major courses and prerequisites.
- A cumulative grade point average (GPA) of 2.0 is required.
- 32 units of the bachelor's degree must be completed at the upper level (courses numbered 300 or above).

Degree Completion Summary

TOTAL UNITS REQUIRED FOR B.S. DEGREE	120 UNITS
Carroll CC A.S. Degree in Biology	60
Completion of Core Curriculum at TU	6
Major in Biology – Cell and Molecular Biology Concentration Coursework at TU	35-43
General Electives Taken at TU	11-19