



HANDBOOK FOR BIOLOGY MAJORS

SCHOOL OF BIOLOGICAL SCIENCES



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CONTENTS

Preamble	3
Institute policies, rules, and regulations.....	4
39-hour rule.....	4
Grade substitution	5
Problems with a professor.....	5
B.S. degree requirements: 2025-2026 catalog year	6
Bachelor of Science in Biology 2025-2026 degree requirements	9
Student/advisor work sheet	11
B.S. degree enhancements	13
Coursework allowed to count toward a minor	14
Biological Sciences certificates	14
5-year BS/MS program (BSBIO/MSBIO).....	14
5-year BS/MS program (BSBIO/MSBINF).....	16
Undergraduate research in the School of Biological Sciences	18
Biological sciences course listings.....	18
Non-biological sciences courses that are approved for Biology breadth electives.....	19

PREAMBLE

Welcome to the Biology BS degree at Georgia Tech. This handbook contains the rules and regulations for BS Biology degree for the specific catalog year shown on the cover page. The information contained in this document is supplemental to Degreeworks, the Georgia Tech catalog, and Georgia Tech's Academic rules.

Full details about how to navigate the Biology degree, the benefits of the degree, and access to other program, academic, and student resources can be found on our program website:
<https://biosciences.gatech.edu/undergrad/>

For questions and concerns about any academic policy, please consult with your academic advisor: <https://biosciences.gatech.edu/undergrad/biology-advising>

INSTITUTE POLICIES, RULES, AND REGULATIONS

TRANSFER CREDIT AND THE RESIDENCY RULE

Transfer credit confirmation is a three-step process to determine whether: 1) Georgia Tech has an equivalent approved course 2) the student has not already completed the equivalent course at Georgia Tech, and 3) no more than 7 transfer credits are applied once the student is taking their last 45 hours at Georgia Tech.

First, confirm that a course will transfer using the transfer equivalency table on OSCAR (http://oscar.gatech.edu/pls/bprod/wwsktrna.P_find_location). If the course is not listed, upload a course description and syllabus to transfercredit.gatech.edu for evaluation by the appropriate department. We suggest that you seek transfer credit approval *before* you take the course. In general, transfer Biological Sciences courses will be allowed as Biology electives if the course is a 3XXX or 4XXX level course from an accredited institution.

Second, be aware that Georgia Tech will not award transfer credit for courses taken at another institution if the course was previously taken at Georgia Tech, unless the final grade received at Georgia Tech is a W (withdrawal). Please see the full transfer credit policies here:

<https://catalog.gatech.edu/academics/undergraduate/credit-tests-scores/transfer-credit/>

Third, be aware that once a student has only 45 credit hours remaining to complete their degree, then they are allowed to complete a MAXIMUM of 7 credit hours of transfer credit; 38 credit hours of the final 45 credit hours required for an undergraduate degree must be completed “in residence” at Georgia Tech. This policy is known as the “Residency Rule” (<https://registrar.gatech.edu/info/residency-rule>). Note that Georgia Tech ARCHE (Atlanta Regional Council for Higher Education) cross-enrollment, exchange credit, and GT faculty-led study abroad programs are considered “in residence” and do not violate the Residency rule. Exceptions to the Residency Rule may be granted by approval of a petition to the Institute Undergraduate Curriculum Committee; *however, approval of this type of petition is rare*. It is recommended to petition for an exception BEFORE violating the rule. Additionally, some medical schools only accept prerequisite courses taken at four-year institutions. Georgia Tech students cannot be enrolled in Georgia Tech and another institution during the same semester *except* during the Summer Term (<https://registrar.gatech.edu/info/georgia-tech-students-attending-other-schools>). However, Georgia Tech, students are allowed to *cross-enroll* at other area schools through the ARCHE program during any semester that they are enrolled in at least three billable credit hours at Georgia Tech. For additional information, refer to the ARCHE website at <https://registrar.gatech.edu/registration/cross-registration> and consult with the ARCHE advisor at crossregistration@registrar.gatech.edu.

UPPER DIVISION COURSEWORK RULE (“39-HOUR RULE”)

A minimum of 39 hours of upper division coursework (3000-level or higher) is required for all Georgia Tech undergraduate degrees. The 39 hours of upper division coursework can fulfill any category of degree requirements, including free electives and “fall-through” courses. DegreeWorks has a credit counter that indicates the number of hours remaining to complete the 39-hour rule. The BS-Biology degree has 34 upper division credits included in the degree, leaving 5 additional credits for the student to identify and obtain as they select their courses. These 5 additional credits typically fit into a student’s free electives, humanities, or social sciences.

GRADE SUBSTITUTION

All students are eligible to repeat two courses for grade substitution by following the instructions at <https://catalog.gatech.edu/policies/grading-gpa/grade-substitution/>. The original grade of D or F remains visible on the student transcript and will be used in most scholarship calculations and by medical schools and other professional schools to calculate student GPA.

The benefit to grade substitution is that grade substitution allows GT to calculate a GPA without the original grade to determine GT academic standing of good standing, warning, or probation. These standings determine whether a student is allowed to remain at Georgia Tech as a college student. However, the credits and grades issued for both the original and retaken course are used to calculate eligibility for the HOPE and Zell scholarships.

As an alternative to earning a low grade and retaking the course if you are in a situation where an enrolled course load is unmanageable, consult an academic advisor before the withdrawal deadline to discuss your options, which can include a strategic course withdrawal. A withdrawal will leave a W on your transcript and be neutral in your GPA. In most circumstances, a course withdrawal does not affect how many hours you attempted, so you'll still be considered a full-time student for financial aid / scholarship, GT Housing, and insurance purposes.

If you decide to use grade substitution, follow all the guidelines and set a calendar reminder to complete the grade substitution form after the final grade for your retaken course grade has been released, and before the withdrawal deadline of your next enrolled semester.

PROBLEMS WITH A PROFESSOR

There may come a time when you get upset with a professor. When this happens, you should understand two things: 1) conflicts may occur when people work closely together, and 2) there is usually a satisfactory way to resolve the conflict.

As a student you will develop a working relationship with the faculty of Georgia Tech. This relationship is not symmetrical because faculty members evaluate your performance and decide about your grades. That system is not likely to change, probably for very good reasons. After all, professors have already demonstrated their advanced academic qualifications, and you came to Tech to learn some of the things that they know.

Any relationship that is emotionally and intellectually close, especially an asymmetrical one, may generate stresses. Therefore, we need to anticipate those stresses and find a way to deal with them. The solution you find will almost certainly be imperfect, but there is no reason that it need be unsatisfactory. The more unrealistic your initial expectations are, the more imperfect the solution will be to you. So, start out with this dose of reality; *most problems can be solved, but you may have to compromise*. Talk to your professor about the problem. If you are not satisfied with the result, talk to your advisor and if you still need help, consult the Associate Chair for Undergraduate Affairs. All of these points of contact can be found here:

<https://www.biosci.gatech.edu/undergrad/biology-undergraduate-program-points-contact>

If you wish to pursue a formal grievance procedure, you should consult the Georgia Tech Registrar's website at <https://catalog.gatech.edu/rules/19/>. In step B2, the unit level point of contact is the Associate Chair for Undergraduate Affairs.

B.S. DEGREE REQUIREMENTS: 2026-2027 CATALOG YEAR

A Bachelor of Science in Biology requires a minimum of 122 credit hours; 39 of these must be at the 3000-level or higher. All courses must be taken for a letter grade, except for Free Electives, which can include pass/fail courses. All letter grades of D and higher are accepted in the Biology degree.

Required Biology Core Courses

BIOS 1207	Majors Biological Principles (credit also accepted for BIOS 1107)
BIOS 1207L	Biological Principles Project Lab (credit also accepted for BIOS 1107L)
BIOS 1208	Majors Organismal Biology (credit also accepted for BIOS 1108)
BIOS 1208L	Organismal Biology Project Lab (credit also accepted for BIOS 1108L)
BIOS 2300 or 2310	Ecology or Problem-Based Ecology
BIOS 2600 or 2610	Genetics or Integrative Genetics
BIOS 3450	Cell and Molecular Biology
BIOS 3600	Evolutionary Biology
BIOS 4460	Communicating Biological Research

Two of these three labs: Ecology or Problem-Based Ecology Lab (BIOS 2301 or 2311); Genetics or Integrative Genetics Lab (BIOS 2601 or 2611); or Cell and Molecular Biology Lab (BIOS 3451). While the preference is for students to complete each lab concurrent with the associated lecture course, this is not always possible. Students may request a permit from the instructor to enroll in the lab in a later semester after completing the lecture. For BIOS 3451 only, a permit is not needed to take the lab separate from lecture if the lecture has already been completed.

Required Quantitative Biology Course

One of the following:

BIOS 3400	Mathematical Models in Biology
BIOS 4150	Genomics & Applied Bioinformatics
BIOS 4401	Experimental Design & Statistical Methods

Other advanced quantitative courses may be appropriate depending on your interests and strengths. If you wish to enroll in a course other than BIOS 3400, BIOS 4401, or BIOS 4150 to fulfill your quantitative requirement, you must discuss with your advisor to petition for approval from the School of Biological Sciences Undergraduate Committee.

Required Senior Research Experience

One of the following:

BIOS 4590	Research Project Lab
BIOS 4690	Independent Research Project

Required Non-Biology Science Courses

CHEM 1211K	Chemical Principles I
CHEM 1212K	Chemical Principles II
CHEM 2311	Organic Chem I, Principles (sections P and higher)
CHEM 2312	Organic Chem II
CHEM 2380	Synthesis Lab
MATH 1551	Differential Calculus
MATH 1552	Integral Calculus
MATH 1553	Linear Algebra
PHYS 2211*	Intro Physics I (Life Sciences section LS or C recommended)
PHYS 2212*	Intro Physics II (Life Sciences section LS or C recommended)

*PHYS 2211 and PHYS 2212 are Biology degree requirements and serve as prerequisites for other required courses in the degree. It is highly recommended that students complete these

courses as the Lab Sciences courses for Core IMPACTS. If they are not taken as Core IMPACTS courses, they are still required and must be taken for a letter grade and may count towards Free Electives.

Biology Electives: Students are required to complete 21 credits of Biology electives, defined as follows: 12 "depth" credit hours must be courses with a "BIOS" prefix, excluding BIOS 4694-BIOS 4699. Biology Elective courses that are cross-listed with other departments are included in these 12 depth credit hours. The remaining 9 "breadth" credit hours can be selected from: other BIOS 3000-level and higher courses, BIOS 4695, BIOS 4697, BIOS 4699, VIP courses with a Biological Sciences instructor, and the list of approved courses offered in the other departments (See Appendix.)

Core IMPACTS Requirements: Every student in the University System of Georgia engages in a General Education curriculum designed to provide a foundation of knowledge, skills and competencies to promote academic success and lifelong learning. This curriculum, "Core IMPACTS", introduces the different ways of knowing the world and connects students to the big questions that will drive their future and provide the essential skills needed to succeed. Core IMPACTS is structured across seven areas: Institutional Priority; Mathematics and Quantitative Skills; Political Science and U.S. History; Arts, Humanities and Ethics; Communicating in Writing; Technology, Mathematics and Sciences; Social Sciences. Each of these seven areas of the general education core curriculum is structured around an "orienting question" and includes learning outcomes and career-ready competencies.

For more information, see "Core Curriculum," Information for Undergraduate Students on the Registrar's website (<http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/>)

Institutional Priority (Computing Requirement): Fulfilled for Biology majors by completing CS 1301, CS 1315, CS 1371, or CS 13X1 (transfer course).

Mathematics & Quantitative Skills: Fulfilled for Biology majors by MATH 1552* (Specified above in the list of Required Non-Biology Science Courses).

Political Science & US History: Students must select one of the following courses: HIST 2111, HIST 2112, INTA 1200, POL 1101, PUB 3000. See details below under "Georgia Legislative Requirements (GLRs)"

Arts, Humanities & Ethics (Humanities): Students must select 6 credits of coursework from the list of approved Humanities courses (see link for course and caveats):
<https://catalog.gatech.edu/academics/undergraduate/core-curriculum/humanities/>
Biology majors are encouraged to select 3000- or 4000-level Humanities courses to help fulfill the **39 hour rule**. Biology majors are not required to take a course carrying the Ethics attribute.

Communication in Writing (English): Students must take ENGL 1101* and 1102*.

Technology, Mathematics, & Science: Fulfilled for Biology majors by MATH 1551*, MATH 1553*, PHYS 2211, and PHYS 2212 (Specified above in the list of Required Non-Biology Science Courses).

Social Sciences: Students must select 9 credits of coursework from the list of approved Social Science courses (see link for course and caveats):

<https://catalog.gatech.edu/academics/undergraduate/core-curriculum/social-sciences/>

Biology majors are encouraged to select 3000- or 4000-level Social Sciences courses to help fulfill the **39-hour rule**.

*Timing: Students must complete a MATH course[†] and ENGL 1101 and 1102 courses within their first 30 credit hours as part of the state's required Communication and Quantitative Outcomes. After reaching 30 credit hours, a student must enroll in the next course necessary to make progress toward completing this requirement in every semester in which they take classes.

[†]Consult the registrar's website and your academic advisor for the exact MATH sequence required by the 30 credit hour mark.

Wellness Requirement: Georgia Tech requires students to complete APPH 1040 or APPH 1050 or APPH 1060.

Free Electives: The remaining 11 credits beyond those listed above are free electives, which can include pass/fail courses.

Georgia Legislative Requirements (GLRs)/US and Georgia Constitution and History

Requirements: See "[Core IMPACTS Curriculum](#)" and the [Catalog](#) for and more information. Students must satisfy four legislative requirements to graduate. Requirements must be fulfilled before completing 90 or more credit hours:

1. United States history: fulfilled by HIST 2111, HIST 2112, equivalent transfer/AP/IB credit (see the transfer equivalency catalog to confirm), or passing the [United States History Module Examination](#). Note that the examination does not carry any academic credit.
2. Georgia history: fulfilled by HIST 2111, HIST 2112, equivalent transfer/AP/IB credit (see the transfer equivalency catalog to confirm), or passing the [Georgia History Module Examination](#). Note that the examination does not carry any academic credit.
3. United States Constitution: fulfilled by INTA 1200, POL 1101, PUBP 3000, equivalent transfer/AP/IB credit, equivalent transfer/AP/IB credit (see the transfer equivalency catalog to confirm), or passing the [United States Constitution Module Examination](#). Note that the examination does not carry any academic credit.
4. Constitution of Georgia: fulfilled by INTA 1200, POL 1101, PUBP 3000, equivalent transfer/AP/IB credit, equivalent transfer/AP/IB credit (see the transfer equivalency catalog to confirm), or passing the [Constitution of Georgia Module Examination](#). Note that the examination does not carry any academic credit.

All students must complete one of these five courses (HIST 2111, HIST 2112, INTA 1200, POL 1101, or PUBP 3000) to fulfill [Political Science & US History requirements](#); courses may be completed at GT or via AP/IB/Transfer credit.

Students may *not* fulfill all four of the requirements through the Canvas Module Examinations.

BACHELOR OF SCIENCE IN BIOLOGY 2026-2027 DEGREE REQUIREMENTS

FIRST YEAR-FALL	HOURS
GT 1000 FRESHMAN SEMINAR*	1
ENGL 1101 ENGLISH COMPOSITION I	3
MATH 1551 DIFFERENTIAL CALCULUS	2
BIOS 1207 AND 1207L MAJORS BIOLOGICAL PRINCIPLES ¹	4
CHEM 1211K CHEMICAL PRINCIPLES I	4
TOTAL SEMESTER HOURS	14

SECOND YEAR-FALL	HOURS
BIOS 2300 ECOLOGY, BIOS 2600 GENETICS, OR BIOS 2610 INTEGRATIVE GENETICS ³	3
BIOS 2301 ECOL LAB, BIOS 2601 GEN LAB, OR BIOS 2611 INTEGRATIVE GEN LAB ³	1
CHEM 2311 ORGANIC CHEMISTRY I	3
MATH 1553 LINEAR ALGEBRA	2
COMPUTING REQUIREMENT OR HUM OR SOC SCI ELECTIVE	3
HUM OR SOC SCI OR POL/HIST (GLR ⁴) ELECTIVE	3
TOTAL SEMESTER HOURS	14 or 15

THIRD YEAR-FALL	HOURS
PHYS 2211 INTRODUCTORY PHYSICS I FOR LIFE SCIENCES ⁶	4
BIOS 3450 CELL & MOLECULAR BIOLOGY OR BIOS 3600 EVOLUTION ⁷	3
BIOS 3451 CELL & MOLECULAR BIOS LAB ³	1
BIOLOGY ELECTIVE	3
QUANTITATIVE BIOLOGY REQUIREMENT ⁵ OR HUM OR SOC SCI ELECTIVE	3
WELLNESS	2
TOTAL SEMESTER HOURS	15 or 16

FOURTH YEAR-FALL	HOURS
BIOLOGY ELECTIVES	6
FREE ELECTIVE	3
HUM OR SOC SCI ELECTIVE	3
SENIOR RESEARCH EXPERIENCE ⁸	3
BIOS 4460 COMMUNICATING BIOLOGICAL RESEARCH	1
TOTAL SEMESTER HOURS	16

FIRST YEAR-SPRING	HOURS
ENGL 1102 ENGLISH COMPOSITION II	3
MATH 1552 INTEGRAL CALCULUS	4
BIOS 1208 AND 1208L MAJORS ORGANISMAL BIOLOGY ^{1,2}	4
CHEM 1212K CHEMICAL PRINCIPLES II	4
TOTAL SEMESTER HOURS	15

SECOND YEAR-SPRING	HOURS
BIOS 2600 GENETICS, BIOS 2300 ECOLOGY OR BIOS 2310 PROBLEM-BASED ECOLOGY ³	3
BIOS 2601 GENETICS LAB, BIOS 2301 ECOL LAB, OR BIOS 2311 PROB-BASED ECOL LAB ³	1
CHEM 2312 ORGANIC CHEMISTRY II	3
CHEM 2380 SYNTHESIS LAB	2
QUANTITATIVE BIOLOGY REQUIREMENT ⁵ or COMPUTING REQUIREMENT	3
HUM OR SOC SCI OR POL/HIST (GLR ⁴) ELECTIVE	3
TOTAL SEMESTER HOURS	14 or 15

THIRD YEAR-SPRING	HOURS
PHYS 2212 INTRODUCTORY PHYSICS II FOR LIFE SCIENCES ⁶	4
BIOS 3450 CELL & MOLECULAR BIOLOGY OR BIOS 3600 EVOLUTION ⁷	3
BIOLOGY ELECTIVE	3
HUM or SOC SCI ELECTIVE	3
FREE ELECTIVE	3
TOTAL SEMESTER HOURS	16

FOURTH YEAR-SPRING	HOURS
BIOLOGY ELECTIVES	9
FREE ELECTIVE	5
HUM OR SOC SCI ELECTIVES	3
TOTAL SEMESTER HOURS	17

TOTAL DEGREE REQUIREMENT HOURS

122⁹

See important notes on next page

*Not required for graduation, another free elective may be substituted

Important notes regarding degree requirements

Pass-fail allowed for Free Electives only. Refer to Institute rules for maximum pass-fail credits allowed.

¹BIOS 1107 and 1107L may be substituted for BIOS 1207 and 1207L; BIOS 1108 and 1108L may be substituted for BIOS 1208 and 1208L.

²Four credit hours of Biology elective may be substituted for BIOS 1208 and 1208L if a score of 5 was achieved on the AP Biology test. A maximum of 1 of these credits may be BIOS 4697 or BIOS 4699. Please discuss this option with your advisor. It is important to note that substituting for BIOS 1208 and 1208L often results in a student needing to take more than a single Biology elective class, because most Biology electives are only 3 credit hours.

³Biology lab courses: Students are required to complete two of these three lab categories: Ecology or Problem-Based Ecology Lab (BIOS 2301 or 2311); Genetics or Integrative Genetics Lab (BIOS 2601 or 2611); Cell and Molecular Biology Lab (BIOS 3451).

⁴The four Georgia Legislative Requirements (GLRs) must be completed before 90 credit hours and may be completed as follows: US HISTORY fulfilled by HIST 2111, HIST 2112, equivalent transfer/AP/IB credit, or passing the United States History Module Examination*; GA HISTORY fulfilled by HIST 2111, HIST 2112, equivalent transfer/AP/IB credit, or passing the Georgia History Module Examination; US CONSTITUTION fulfilled by INTA 1200, POL 1101, PUBP 3000, equivalent transfer/AP/IB credit, equivalent transfer/AP/IB credit, or passing the United States Constitution Module Examination*; GA CONSTITUTION fulfilled by INTA 1200, POL 1101, PUBP 3000, equivalent transfer/AP/IB credit, equivalent transfer/AP/IB credit, or passing the Georgia Constitution Module Examination*. Note that all students must complete one of these five courses (HIST 2111, HIST 2112, INTA 1200, POL 1101, or PUBP 3000) to fulfill the Political Science & US History requirement; courses may be completed at GT or via AP/IB/Transfer credit. *Note that the Module Examinations do not carry any academic credit.

⁵The following courses meet the Quantitative Biology Course requirement (Note that MATH 1551 and MATH 1553 are pre-requisites for most of the Quantitative Requirement courses): BIOS 3400 Mathematical Models in Biology, BIOS 4150 Genomics & Applied Bioinformatics, BIOS 4401 Experimental Design & Statistics (meets MCAT statistics requirement).

⁶PHYS 2211 and PHYS 2212 are Biology degree requirements and serve as prerequisites for other required courses in the degree. It is highly recommended that students complete these courses as the Lab Sciences courses for Core IMPACTS. If they are not taken as Core IMPACTS courses, they are still required and must be taken for a letter grade and may count towards Free Electives.

⁷The prerequisite for BIOS 3600 is either BIOS 2300, BIOS 2310, BIOS 2600, or BIOS 2610.

⁸The Senior Research Experience can be met during the fourth year fall or spring semester with either BIOS 4590 Research Project Lab or BIOS 4690 Independent Research Project (requires at least one previous semester of BIOS 4699).

⁹A minimum of 39 hours of upper division coursework (3000-level or higher) is required for all Georgia Tech undergraduate degrees. The 39 hours of upper division coursework can fulfill any category of degree requirements, including free electives, and "fall-through" courses.

**STUDENT/ADVISOR WORK SHEET
2026-2027**

Student Name: _____

ID number: _____

General Biology (Required)	Credits	✓	Other Required Courses	Credits	✓
BIOS 1107 and 1107L or BIOS 1207 and 1207L Biol Principles	4		CHEM 1211K Chem Principles I	4	
BIOS 1108 and 1108L or BIOS 1208 and 1208L Organismal Bio	4		CHEM 1212K Chem Principles II	4	
BIOS 2300 or 2310 Ecology	3		MATH 1551 Differential Calculus	2	
BIOS 2600 or 2610 Genetics	3		MATH 1552 Integral Calc	4	
BIOS 3600 Evolution	3		MATH 1553 Linear Algebra	2	
BIOS 3450 Cell & Molecular Bio	3		CHEM 2311 Organic Chem I	3	
BIOS 4460 Comm Biol Research	1		CHEM 2312 Organic Chem II	3	
Core lab requirement Choose 2 from:			CHEM 2380 Synthesis Lab	2	
BIOS 2301 or 2311 Ecology Lab	1		PHYS 2211 Physics I ³	4	
BIOS 2601 or 2611 Genetics Lab	1		PHYS 2212 Physics II ³	4	
BIOS 3451 Cell & Molec Bio Lab	1		CS 1301 or 1315 or 1371	3	
Quantitative requirement Choose 1 from:			APPH 1040 or 1050 Wellness	2	
BIOS 3400 Math Models Bio	3		Total	37	
BIOS 4150 Genomics & App Binf	3		English & Humanities	Credits	✓
BIOS 4401 Exp Des and Stat	3		ENGL 1101	3	
Senior Research requirement Choose 1 from:			ENGL 1102	3	
BIOS 4590 Research Project Lab	3		Humanities	3	
BIOS 4690 Ind. Research Project	3		Humanities	3	
Total	29		Total	12	
Biology Electives (21 hrs req)	Credits	✓	Social Sciences/Constitution & History Requirements	Credits	✓
Depth Electives (min 12 cr)¹			Political Science & US History (includes 1-2 GLR ⁴ requirements)	3	
			Social Science	3	
			Social Science	3	
			Social Science	3	
			GLR: US History ⁴	(0-3)	
			GLR: US Constitution ⁴	(0-3)	
			GLR: GA History ⁴	(0-3)	
Breadth Electives (max 9 cr)²			GLR: GA Constitution ⁴	(0-3)	
			Total	12	
			Free Electives	Credits	✓
			GT1000 (recommended)	1	
Total	21				
			Total	11	
			Total for Graduation	122⁵	

SEE IMPORTANT NOTES ON FOLLOWING PAGE

NOTES

Pass-fail allowed for Free Electives only. Note that PHYS 2211 and PHYS 2212 are Biology degree requirements and serve as prerequisites for other required courses in the degree. It is highly recommended that students complete these courses as the Lab Sciences courses for Core IMPACTS. If they are not taken as Core IMPACTS courses, they are still required and must be taken for a letter grade and may count towards Free Electives. Refer to Institute rules for maximum pass-fail credits allowed.

¹Depth electives can be fulfilled with BIOS 3000 and higher courses excluding 4595, 4697, or 4699.

²Breadth electives can be fulfilled with any BIOS 3000 and higher courses or with approved non-BIOS courses; see the Biology Major Handbook for an approved list of non-BIOS courses.

³PHYS 2211 and PHYS 2212 are Biology degree requirements and serve as prerequisites for other required courses in the degree. It is highly recommended that students complete these courses as the Lab Sciences courses for Core IMPACTS. If they are not taken as Core IMPACTS courses, they are still required and must be taken for a letter grade and may count towards Free Electives.

⁴The four Georgia Legislative Requirements (GLRs) must be completed before 90 credit hours and may be completed as follows: US HISTORY fulfilled by HIST 2111, HIST 2112, equivalent transfer/AP/IB credit, or passing the United States History Module Examination*; GA HISTORY fulfilled by HIST 2111, HIST 2112, equivalent transfer/AP/IB credit, or passing the Georgia History Module Examination; US CONSTITUTION fulfilled by INTA 1200, POL 1101, PUBP 3000, equivalent transfer/AP/IB credit, equivalent transfer/AP/IB credit, or passing the United States Constitution Module Examination*; GA CONSTITUTION fulfilled by INTA 1200, POL 1101, PUBP 3000, equivalent transfer/AP/IB credit, equivalent transfer/AP/IB credit, or passing the Georgia Constitution Module Examination*. Note that all students must complete one of these five courses (HIST 2111, HIST 2112, INTA 1200, POL 1101, or PUBP 3000) to fulfill the Political Science & US History requirement; courses may be completed at GT or via AP/IB/Transfer credit. *Note that the Module Examinations do not carry any academic credit.

⁵A minimum of 39 hours of upper division coursework (3000-level or higher) is required for all Georgia Tech undergraduate degrees. The 39 hours of upper division coursework can fulfill any category of degree requirements, including free electives, and "fall-through" courses.

B.S. DEGREE ENHANCEMENTS

Bachelor of Science in Biology – Research Option: The Research Option enables students to conduct 9 credit hours of supervised research with a Biological Sciences faculty member over multiple semesters. With faculty guidance, students write a brief proposal, perform independent, original research, and write a thesis about their work. The thesis is evaluated by two Biological Sciences faculty members. The first 6 credit hours of the research option are taken as BIOS 4699 (research for credit) or BIOS 4698 (research for pay). Students then take BIOS 4690 (Independent Research Project; 3 hr) and two one-credit-hour writing courses, LMC 4701 and 4702. These writing courses can be counted as Biology electives for students completing the Research Option. Note that LMC 4701 should be taken in the semester PRIOR to enrolling in BIOS 4690. The student's research is presented in BIOS 4460 Communicating Biological Research. Completing this program gives students a "Research Option" designation on their transcripts. Students can consult the School of Biological Sciences (<http://biosci.gatech.edu/undergrad/bachelor-science-biology-research>) and the Undergraduate Research Opportunities Program (<http://uop.gatech.edu/research-option>) for more details.

Bachelor of Science in Biology – Business Option: The B.S. in Biology with a Business Option is a good fit for students interested in the business of biology, who intend to manage their own clinic or practice after professional school, or who may want to pursue an M.B.A. upon graduation. Students in the biology business option must complete 15 credits of approved coursework covering the principles of accounting, economics, and management. Two electives allow students to take advanced coursework in these areas, or to explore the legal, international, entrepreneurial, technological, or financial aspects of the business world. Six of the credit hours from the list of management (MGT) courses will fulfill requirements for Biology electives, and another 3 credit hours of management courses count as free electives. Additional courses within the Business Option may satisfy Social Science electives. Biology majors in this option must still fulfill the other requirements for the Biology undergraduate degree and should note that the MGT courses used as Biology electives reduce the approved Biology electives from outside Biology. Students interested in the Business Option should visit biosci.gatech.edu/undergrad/business-option for specific details on the courses available.

Bachelor of Science in Biology – International Plan: Georgia Tech offers an International Plan through the Office of International Education (<https://ip.oie.gatech.edu/home>). Successful completion of this plan earns students an International Plan designation on their Georgia Tech degree. The primary purpose of the plan is to offer a challenging and coherent academic program for students to develop global competence within the context of a Biology degree. The specific requirements of the International Plan can be found at the OIE website. For more details, contact Dr. Emily Weigel (emily.weigel@biosci.gatech.edu), advisor for Biology majors in the International Program.. Study abroad programs which offer courses relevant to Biology majors are described on the School of Biological Sciences website (biosci.gatech.edu/undergrad/international-opportunities). In addition, many Biological Sciences courses are available through Georgia Tech partner universities abroad. Some of these universities teach Biological Sciences courses in English. To learn more, consult the Office of International Education (<https://ea.oie.gatech.edu/>).

COURSEWORK ALLOWED TO COUNT TOWARD A MINOR

Biology majors are eligible for discipline-focused or multi-discipline minors to broaden the scope of your undergraduate degree. Note that some minors have specific breadth requirements that may limit double-counting of credits between the minor and the major program. Students may complete up to two minors per undergraduate degree, and up to three credits may be shared with another minor or certificate. See <https://catalog.gatech.edu/academics/minors/> for more information. We encourage you to work with your Undergraduate Advisor to integrate your minor into your undergraduate studies. Minors which may be of particular interest to Biology majors are listed on the Biological Sciences website: <https://biosciences.gatech.edu/undergrad/other-programs-interest>

BIOLOGICAL SCIENCES CERTIFICATES

Certificate programs in Biological Sciences are available to Biology majors as an option to focus your elective coursework around a specific biological subdiscipline. Certificates are awarded by the School of Biological Sciences and do not appear on the transcript or diploma. Each certificate requires 12 credit hours of approved courses from that certificate's list, at least 9 of which must be at the 3000 level or higher. All courses counting toward the certificate must be taken on a letter-grade basis with a C or higher. Only courses that fulfill biology electives, free electives, or are in fallthrough may be counted toward a certificate. Students may complete more than one certificate, and up to three credits may be shared with another certificate or minor. Further information is available here biosci.gatech.edu/undergrad/biology-certificates and from School of Biological Sciences advisors.

5-YR BS/MS programs:

5-YEAR BS/MS PROGRAM (BSBIO/MSBIO)

Biology majors can add a 5-year combined BS/MS program in Biology (BSBIO/MSBIO). Students who wish to participate in the BSBIO/MSBIO will complete their undergraduate BS degree in Biology and then spend one year completing their MS in Biology. Details and points of contact are available at: <http://biosci.gatech.edu/undergrad/5-year-bsms-program-bsbiomsbio-0>

The BSBIO/MSBIO is aimed at students who have a strong interest in biological research. In particular, students on a path to take the Independent Research Project (BIOS 4690) as their capstone research experience in Biology may have an interest in the program. Students will be in a particularly strong position to complete the BSBIO/MSBIO if they have taken several semesters of undergraduate research (BIOS 4698, 4699, 4690) focused on a cohesive scientific research project.

The following is a list of application requirements and how to apply:

- Be enrolled in the Biology BS program.
- Identify a research advisor with whom you have discussed completing a Master's thesis, preferably one with whom you have already performed undergraduate research.
- Apply after completion of 30 semester credit hours but before completion of 90 semester credit hours, including transfer and advanced placement credits. Students with more than 90 credits will be considered for the program on a case-by-case basis.
- Have a GPA of 3.3 or higher in courses required for the BS in Biology. Students with a GPA less than 3.3 will be considered for the program on a case-by-case basis.
- Seek the advice of a research advisor, academic advisor, and the graduate office before applying.
- Apply by submitting a standard graduate application at <http://www.grad.gatech.edu/apply-now>.

Requirements for BSBIO/MSBIO

	REQUIREMENT	CLASSES	TYPICAL TIMELINE	FULFILLED
COMPLETE BEFORE APPLYING TO BS/MS				
1	GPA > 3.3	Minimum GPA for Application	Apply after completion of 30 credit hours but before completion of 90 credit hours	Y
COMPLETE BEFORE FINISHING BSBIO				
1	Graduate Biology Course	3 hour graduate-level course (6000 and above) *	4 th year - Fall	Y
2	Graduate Biology Course	3 hour graduate-level course (6000 and above) *	4 th year - Spring	Y
3	Capstone research	BIOL 4690	4 th year - Spring	Y
4	Thesis committee	Identify and contact faculty to serve on your thesis committee for your MS degree	4 th year -Spring	Y
5	GPA > 3.0	Minimum GPA for graduation with BSBIO to continue into MSBIO		Y
COMPLETE DURING MSBIO				
1	Committee meeting	Discuss plans for MS research	5 th year – Fall (beginning of semester)	Y
2	Masters Research	8 hours (BIOL 8901 + BIOL 7000)	5 th year - Fall	Y
3	Graduate Biology courses	BIOL 6000 and above (6 hours)	5 th year – Fall	Y
4	Biology Seminar	1 hour	5 th year – Fall	Y
5	Committee meeting	Update committee on research progress and expected results	5 th year – Spring (beginning of semester)	Y
6	Masters Research	8 hours (BIOL 8901 + BIOL 7000)	5 th year – Spring	Y
7	Graduate Biology courses	BIOL 6000 and above (6 hours)	5 th year – Spring	Y
8	Biology Seminar	BIOL 8003 (1 hour)	5 th year – Spring	Y
9	Thesis defense	Defend MS thesis	5 th year – Spring (end of semester)	
10	GPA > 2.70	Minimum GPA for graduation with MSBIO		Y

* Requires a level permit from the Registrar's Office. This will be granted with senior standing or a petition to the faculty.

5-YEAR BS/MS PROGRAM (BSBIO/MSBINF)

Biology majors can add a 5-year combined BS/MS program in Biology/Bioinformatics (BSBIO/MSBINF) aimed at students who have a strong interest in computational biology and genomics. Students who wish to participate in the BSBIO/MSBINF will complete their undergraduate BS degree in Biology and then spend one year completing their MS in Bioinformatics. Details and points of contact are available here <http://biosci.gatech.edu/undergrad/5-year-bsms-program-bsbiolmsbinf-0>.

The following is a list of application requirements and how to apply:

- Be enrolled in the Biology BS program.
- Apply after completion of 30 semester credit hours but before completion of 90 semester credit hours, including transfer and advanced placement credits. Students with more than 90 credits will be considered for the program on a case-by-case basis.
- Have a GPA of 3.3 or higher in courses required for the BS in Biology. Students with a GPA less than 3.3 will be considered for the program on a case-by-case basis.
- Before the time of application, have completed CS1301 or CS1371 and either completed or registered for Multivariable Calculus (MATH 2550, 2551, 2561, or 2605).
- Complete the BS requirements with an overall GPA of 3.0 or higher to continue into the MS degree, and complete the MS requirements (37 credits) with an overall GPA of 2.7 or higher.
- Seek the advice of a research advisor, academic advisor, and the graduate office before submitting an application.
- Apply by submitting a standard graduate application at <http://www.grad.gatech.edu/apply-now>. Applicants will need to write a short essay explaining their purpose in obtaining an MS degree.
- Note that several courses (BIOL 6150 and BIOL 6000+) required for the 5-year degree can be used as Biology and Free Electives toward the BSBIO.

Requirements for BSBIO/MSBINF

	REQUIREMENT	CLASSES	TYPICAL TIMELINE	FULFILLED
COMPLETE BEFORE APPLYING TO BS/MS				
1	Computing	CS 1301 or CS 1371 (CS 1315 not allowed)	2 nd year - Fall	Y
2	Multivariable Calculus	MATH 2550, 2551, 2561, or 2605; must be completed or in-progress at time of application. MATH 2550 is approved only for students who completed MATH 1552 and not MATH 1555.	3 rd year - Fall	Y
3	GPA > 3.3	Minimum GPA for Application	Apply after completion of 30 credit hours but before completion of 90 credit hours	Y
COMPLETE BEFORE FINISHING BSBIO				
1	Bioinformatics	BIOL 6150 *	4 th year - Fall	Y
2	Statistics for Bioinformatics	BIOS 4401, MATH 3215, or ISYE 3770 (or comparable statistics course approved by advisor)	4 th year - Spring	Y
3	Graduate Biology Course	3 hour graduate-level course (6000 and above)*	4 th year - Spring	Y
4	GPA > 3.0	Minimum GPA for graduation with BSBIO to continue into MSBINF		Y
COMPLETE DURING MSBINF				
1	Programming for Bioinformatics	BIOL 7200	5 th year - Fall	Y
2	Bioinformatics Capstone Course	BIOL 8803F or alternate	5 th year – Fall	Y
3	Bioinformatics Research or other graduate elective	BIOL 8901	5 th year – Fall	Y
4	Approved Electives	13 hours - No more than 6 hours below 6000-level	5 th year – Fall; 5 th year – Spring	Y
5	Computational Genomics	BIOL 7210	5 th year – Spring	Y
6	Intro Databases	CS 4400	5 th year – Spring	Y
7	Machine Learning in Computational Biology	CX 4803 MLB	5 th year - Spring	Y
8	Bioinformatics Research or other graduate elective	BIOL 8902	5 th year – Spring	Y
9	GPA > 2.70	minimum GPA for graduation with MSBINF		Y

* Requires a level permit from the Registrar's Office. This will be granted with senior standing or a petition to the faculty.

UNDERGRADUATE RESEARCH IN THE SCHOOL OF BIOLOGICAL SCIENCES

Undergraduate research is an excellent way to enhance your biology degree and make yourself stand out among other candidates for internships, jobs, or graduate or professional school. All Biology majors complete a Senior Research Experience consisting of a research course (either BIOS 4590 or 4690) and BIOS 4460 Communicating Biological Research. BIOS 4590 Research Project Lab is a lab course taught by Biological Sciences faculty members. Topics in BIOS 4590 vary depending upon the faculty teaching the course. For BIOS 4690 Independent Research Project, the student arranges to conduct research under the supervision of a faculty member in their research laboratory. This typically involves multiple semesters in the same research group. The second course in the Senior Research Experience is BIOS 4460, which should be taken concurrently with BIOS 4590 and either concurrently or in the semester after taking BIOS 4690.

Summary of Biology Research Courses:

Course descriptions are available at <https://biosciences.gatech.edu/undergrad/courses>

BIOS 4460 – Communicating Biological Research: Senior Biology students present seminars on recent research topics based on their own research experience and literature research. This course is structured similar to an academic lab meeting, where effective participation and the ability to provide constructive criticism to colleagues are fundamental. 1 credit hour. BIOS 4590 or 4690 is a prerequisite with concurrency—one of these courses must be taken before or in the same term as BIOS 4460. Grade assigned by faculty teaching the course.

BIOS 4590 – Research Project Lab: Experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research. 3 credit hours. Prerequisites: BIOS 1107 or 1207 and 1107L or 1207L or equivalent. Grade assigned directly by faculty teaching the course. Students must obtain a permit to take BIOS 4590. To request a permit, complete the Senior Research Permit Request form at this link: <https://www.biosci.gatech.edu/undergrad/undergraduate-research#Senior%20Research>

BIOS 4690 – Independent Research Project: Independent research with proposal and manuscript writing, conducted with the guidance of a faculty member. 3 credit hours. Prerequisites: 1 credit hour of BIOS 2698 or 2699 or 4698 or 4699. Faculty may accept a student without the 1 credit hour prerequisite at their discretion by signing a prerequisite override form for the student. The letter grade assigned by the faculty research mentor is sent to the instructor of record of BIOS 4690 for the semester in question. Students must obtain a permit to take BIOS 4690. To request a permit, complete the Senior Research Permit Request form at this link: <https://www.biosci.gatech.edu/undergrad/undergraduate-research#Senior%20Research>.

BIOS 4698 – Research Assistantship: Independent research conducted under the guidance of a faculty member. 1-12 credit hours. Audit-only course.

BIOS 4699 – Undergraduate Research: Independent research conducted under the guidance of a faculty member. 1-12 credit hours. Grade assigned directly by research advisor.

BIOLOGICAL SCIENCES COURSE LISTINGS

Refer to the catalog for current course listings and to our program website for select course descriptions. Special topics courses are typically offered each semester but are not listed in the catalog. All prerequisite courses require a minimum grade of D unless otherwise specified.

**NON-BIOLOGICAL SCIENCES COURSES THAT ARE APPROVED FOR BIOLOGY
BREADTH ELECTIVES
(9 credits maximum)**

Note that all non-BIOS Experiential Learning courses are excluded from Breadth electives even if not explicitly listed above, including non-BIOS Seminars, Special Problems, Research, Internship, Teaching, and Reading courses.

LMC: Applicable only for students pursuing the Research Option

LMC 4701 Undergraduate Research Proposal Writing
LMC 4702 Undergraduate Research Thesis Writing

All BMED 3XXX and higher courses EXCEPT:

BMED 4698	Research Assistantship
BMED 4699	Undergraduate Research
BMED 4900-4903	Special Problems

All CHEM 3XXX and higher courses EXCEPT:

CHEM 4601	Chemistry Seminar
CHEM 4695	Undergraduate Internship
CHEM 4698	Research Assistantship
CHEM 4699	Undergraduate Research
CHEM 4901- 4903	Special Problems in Chemistry

All EAS 3XXX and higher courses EXCEPT:

EAS 4651	Practical Internship
EAS 4698	Research Assistantship
EAS 4699	Undergraduate Research
EAS 4900	Special Problems

All MATH 3XXX and higher courses EXCEPT:

MATH 4080	Senior Project I
MATH 4090	Senior Project II
MATH 4695	Undergraduate Internship
MATH 4698	Research Assistantship
MATH 4699	Undergraduate Research
MATH 4999	Special Problems

All NEUR 3XXX and higher courses EXCEPT:

NEUR 4697	Undergraduate Teaching
NEUR 4698	Research Assistantship
NEUR 4699	Undergraduate Research
NEUR 4901	Special Problems

All PHYS 3XXX and higher courses EXCEPT:

PHYS 4601	Senior Seminar I
PHYS 4602	Senior Seminar II
PHYS 4698	Research Assistantship
PHYS 4699	Undergraduate Research

All PSYC 3XXX and higher EXCEPT:

PSYC 4600	Senior Thesis I
PSYC 4601	Senior Thesis II
PSYC 4695	Undergraduate Internship
PSYC 4697	Undergraduate Teaching
PSYC 4698	Research Assistantship
PSYC 4699	Undergraduate Research
PSYC 4900-4910	Special Problems