Combined/Accelerated M.S. Degree
In Biochemistry and Molecular Biology (Thesis Option)
(includes changes effective Spring 2023)

The Department of Chemistry and Biochemistry offers a combined/accelerated B.S.+M.S. degree in Biochemistry and Molecular Biology. Biochemistry and Molecular Biology is the interdisciplinary study of the chemical and physical properties of living matter and the chemical changes that occur during life processes. This requires preparation in chemistry and biology as well as biochemistry and molecular biology. The B.S.+M.S. degree in Biochemistry and Molecular Biology provides excellent preparation for work in the biotechnology industries, as well as credit towards further graduate studies. Career opportunities exist in medical, pharmaceutical, food processing, and agricultural fields. Graduates will also have excellent preparation for graduate school or schools of medicine, dentistry, veterinary science, and business.

Scholarships are available from the department for highly qualified students during the undergraduate part of the program. All incoming Biochemistry undergraduate majors are considered for these awards.

The coursework for the accelerated M.S. degrees can be completed in five years. Students with curricular questions are strongly encouraged to consult their research advisor, the department's Director of Undergraduate Studies, or the department Graduate Student Progress Committee (GSPC) Chair for questions about the curriculum.

Students for the accelerated program should take special note of the following:

1) Bioc 460 or an equivalent course is a prerequisite for all other biochemistry coursework.
2) Bioc 460 has Chem 342 (organic II) and Biol 150 (general biology) as prerequisites. It is therefore important for Biochemistry majors to have completed Chem 341, 342, and Biol 150 in their first two years.
3) Course offerings: In general, most Chem and Bioc courses are offered once per year, in either Fall or Spring as shown on the curriculum sheets. Some exceptions: Chem 121, 122, and 341 are offered Fall, Spring, and Summer. Chem 342 is offered Spring and Summer.
4) Candidates for the accelerated M.S. program are expected to follow all requirements of NDSU accelerated M.S. programs (https://www.ndsu.edu/fileadmin/facultysenate/ucc/accelerated-programs.pdf). These are fulfilled by the program requirements listed below.
5) Candidates for the M.S. degree are required to have completed at least 60 credits prior to conditional admission to the Accelerated M.S. program and the College of Graduate and Interdisciplinary Studies.
6) Candidates for the Accelerated M.S. degree must have a cumulative GPA of 3.5 to be eligible for conditional graduate admission to the combined/accelerated program.
7) Candidates interested in and eligible for the Accelerated M.S. degree must, at the end of their sophomore coursework (typically their fourth semester in the program):
   (a) complete and submit a Combined/Accelerated Program Degree Program Declaration form (https://www.ndsu.edu/fileadmin/facultysenate/acadaffairs/accelerated-programs.pdf) to the Department Undergraduate program Chair. The Chair will evaluate student eligibility and approve the substitution of the graduate 600-level courses into the undergraduate program as noted in the curriculum below.
   (b) Select a M.S. research advisor if enrolling for the thesis option of the accelerated M.S. program. The selected research advisor has to indicate formal acceptance of the student to the department chair and department graduate student progress committee (GSPC) chair.
   (c) Submit the completed Combined/Accelerated Program Degree Program Declaration form to the Graduate College after receiving the necessary approvals noted above, thereby formally applying for admission to the graduate program.
8) A maximum of 15 graduate student credits may be applied to the B.S. degree.
9) No undergraduate course may be counted toward a master's degree.
10) All admissions to the Graduate College are conditional. The minimum condition is completion of the bachelor's degree prior to full standing in master's program and maintaining a 3.0 cumulative GPA in their graduate classes. Other conditions related to academic performance such as research evaluations, may be added.
11) Graduate courses that are applied toward the M.S. degree must carry a grade of B or better.
12) Graduate courses will not be considered for Dean's List or Undergraduate Graduation with Honor calculations. Enrollment verifications will be conducted at the dual-career/combined level.
13) All admissions to the Graduate College are conditional. The minimum condition is completion of the bachelor's degree prior to full standing in master's program and maintaining a 3.0 cumulative GPA in their graduate classes. Other conditions related to academic performance such as research evaluations, may be added.
14) Students must complete all baccalaureate degree requirements at least one semester prior to the term in which the graduate degree is to be conferred.

15) Before receipt of baccalaureate degree, the graduate courses/credits included on the Combined/Accelerated Degree Program Declaration Form (up to 15 credits) will be internally transferred to the undergraduate career for inclusion in undergraduate degree/record totals. They will not be detailed on the undergraduate record, but rather, will appear as NDSU transfer credit. A transcript note will be applied after the transfer cumulative strip that reads, 'Coursework displayed on the graduate record and applied to undergraduate degree requirements as part of an approved accelerated/combined plan of study.'
16) Students must meet all of the requirements that would ordinarily be expected of those enrolled in the M.S. Biochemistry program for either the thesis or non-thesis options.
17) Students for the accelerated M.S. (thesis option) are also required to earn a minimum of 3 undergraduate research credits (BIOC 493/494 or CHEM 493/494). These 3 credits of undergraduate research credits can be applied toward the undergraduate science elective credits required for the B.S. program in Biochemistry and Molecular Biology.
18) The accelerated M.S. plan of study must include at least 30 graduate-level credits which can include credits for thesis research and seminar.
19) No fewer than 16 of these shall be didactic graduate courses (courses numbered 601 to 689, 701 to 789 or 801-889). Of these 16 credits, a minimum of 10 must be from courses numbered 701 to 789 or 801-889.
20) Bioc 673, Bioc 674, and Bioc 683 are required substitutions for Bioc 473, Bioc 474 and Bioc 483 for the accelerated M.S. degree. Additional substitutions such as Bioc 660 or Bioc 661 for Bioc 460 or Bioc 461 respectively, are optional.
21) Required graduate courses for the accelerated M.S. degree, typically taken in the 5th year in the program, include Univ 720, Bioc 701, Bioc 702 and either Bioc 719 or 723. For the Accelerated M.S. (thesis option) the requirement for Bioc 701 and Bioc 702 may be waived if the students has earned a B or better in BIOC 460/660 or Bioc 461/661 respectively.
22) The plan of study must include a seminar credit (Bioc 790) that is evaluated for a grade. For the thesis option, this will constitute a thesis defense seminar.
23) The number of research credits (Bioc 798) applied to the Accelerated M.S. (thesis option) degree must equal at least 6, but cannot exceed 10, credits.
24) Students approved for the Accelerated M.S. (non-thesis option) will be advised by the departmental GSPC in their graduate studies (typically 5th year in the program). For the Accelerated M.S. (thesis option), students will, in consultation with their research advisor, select a M.S. research advisory committee, prior to starting the last (typically the fifth) year of the accelerated program. This committee will comprise of at least 3 faculty members, including the research advisor, another faculty from the department, and a faculty member external to the department. This committee will evaluate and approve the graduate plan of study.
25) Seminar credits will be evaluated by either the department GSPC for the Accelerated M.S. (non-thesis option) or by the student's M.S. advisory committee for the Accelerated M.S. (thesis option).
26) Additional didactic graduate credits, if any are required, will be selected at the discretion of the student and either the GSPC for the non-thesis option or the student's M.S. research advisory committee for the thesis option.
27) In order for Student Financial Services to review financial aid eligibility, the Graduate courses counting towards the Undergraduate Plan of Study must be detailed in the Combined/Accelerated Degree Program Declaration Form. Substitution forms to fulfill undergraduate requirements will be submitted by the department to the Office of Registration and Records
28) Graduate tuition will be assessed for graduate credits approved for double-counting toward requirements for both undergraduate and graduate programs of study. Double-counted graduate credits count toward totals for financial aid but are not covered under the tuition cap. Mandatory Student fees, however, are capped at 12 credits, regardless of program.
29) If funding permits, and at the discretion of the research advisor students may be supported as research assistants, thereby qualifying for a tuition waiver on graduate tuition in the last year of the accelerated curriculum.

Accelerated M.S. in Biochemistry and Molecular Biology (Non-thesis Option)

Recommended course schedule

		Credits	
First Year		**F**	**S**
Biol 150	General Biology I	3	
Biol 150L	General Biology Lab I	1	
Chem 150, 151 (or Chem 121, 122)	Principles of Chemistry I, II	3	3
Chem 160, 161 (or Chem 121L, 122L)	Principles of Chemistry I, II Labs	1	2
Engl. 120	College Composition	3	
Math 165, 166	Calculus I, II	4	4
Gen. Ed., Electives[1]	Wellness and General Ed. Electives		5
		15	**14**
Second Year			
Comm 110	Fund. Public Speaking		3
Chem 341, 342	Organic Chemistry I, II	3	3
Chem 353, 354	Organic Chemistry I, II Majors Labs	1	2
Zool 315	Genetics	3	
Phys 251, 252	University Physics I, II	4	4
Phys 251L, 252L	University Physics Laboratory I, II	1	1
Gen. Ed., Electives[1]	General Ed. and other Electives	3	3
		15	**16**
Third Year			
Bioc 460, 461	Biochem/Molec. Biol. I , II	3	3
Bioc 460L	Found. Biochem. I Lab	1	
Bioc 674	Recombinant DNA Tech.		3
Chem 431	Analytical Chemistry	3	
Chem 380	Junior Chem./Bioc. Seminar		1
Micr 350, 350L	Gen. Microbiol.	4	
Engl. 324	Writing in the Sciences	3	
Stat. 330	Intro. Statistics		3
Gen. Ed., Electives[1]	General Ed. and other Electives		3
Science Electives[2]			3
		14	**16**
Fourth Year			
Bioc 673	Meth. Biochem. Research	3	
Bioc 683	Cell. Sig. Trans. Metabl.		3
Chem 465	Survey of Physical Chemistry	4	
Bioc 487	Molec. Biol. Gene Expr.	3	
Chem 491	Senior Chem./Bioc. Seminar		2
Gen. Ed., Electives[1]	General Ed. and other Electives	3	6
Science Electives[2]		3	3
		16	**14**
Fifth Year			
Univ 720	Scientific Integrity	1	
Bioc 701	Comprehensive Biochemistry I	4	
Bioc 702	Comprehensive Biochemistry II		4
Bioc 719 OR	Molec. Biol. Gene Expr. OR	3	
Bioc 723	Struct. Basis Memb. Trans. & Sig.		3
700-789 level[3]	Graduate electives[3]	3	3
Bioc 790	M.S. Seminar		1
		11	**11**
Curriculum Totals		**142**	

[1]General Education Electives must include 18 credits in humanities and social sciences; 6 of these must be in humanities/fine arts, and six in social sciences. In addition, 3 credits must have a global perspective and 3 must be in the cultural diversity category.

[2]Upper Division science electives. 9 additional credits of 300- or 400- level courses in BIOL, BIOC, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (Chem 494/Bioc 494) may count towards a maximum of 3 of these credits.

[3]Graduate science electives. A minimum of 6 additional credits of graduate courses in BIOL, BIOC, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT.

Accelerated M.S. in Biochemistry and Molecular Biology (Thesis Option):

Recommended course schedule

		Credits	
First Year		**F**	**S**
Biol 150	General Biology I	3	
Biol 150L	General Biology Lab I	1	
Chem 150, 151 (or Chem 121, 122)	Principles of Chemistry I, II	3	3
Chem 160, 161 (or Chem 121L, 122L)	Principles of Chemistry I, II Labs	1	2
Engl. 120	College Composition	3	
Math 165, 166	Calculus I, II	4	4
Gen. Ed., Electives[1]	Wellness and General Ed. Electives		5
		15	**14**
Second Year			
Comm 110	Fund. Public Speaking		3
Chem 341, 342	Organic Chemistry I, II	3	3
Chem 353, 354	Organic Chemistry I, II Majors Labs	1	2
Zool 315	Genetics	3	
Phys 251, 252	University Physics I, II	4	4
Phys 251L, 252L	University Physics Laboratory I, II	1	1
Gen. Ed., Electives[1]	General Ed. and other Electives	3	3
		15	**16**
Third Year			
Bioc 460, 461	Biochem/Molec. Biol. I , II	3	3
Bioc 460L	Found. Biochem. I Lab	1	
Bioc 674	Recombinant DNA Tech.		3
Chem 431	Analytical Chemistry	3	
Chem 380	Junior Chem./Bioc. Seminar		1
Micr 350, 350L	Gen. Microbiol.	4	
Engl. 324	Writing in the Sciences	3	
Stat. 330	Intro. Statistics		3
Gen. Ed., Electives[1]	General Ed. and other Electives	3	
Science Electives[2]			3
Bioc 493/494	Research		1
		17	**14**
Fourth Year			
Bioc 673	Meth. Biochem Research	3	
Bioc 683	Cell. Sig. Trans. Metabl.		3
Chem 465	Survey of Physical Chemistry	4	
Bioc 487	Molec. Biol. Gene Expr.	3	
Chem 491	Senior Chem./Bioc. Seminar		2
Gen. Ed., Electives[1]	General Ed. and other Electives	3	6
Science Electives[2]			3
Bioc 493/494	Research	1	1
		14	**15**
Fifth Year			
Univ 720	Scientific Integrity	1	
BIOC 701[3]	Comprehensive Biochemistry I[3]	4[3]	
BIOC 702[3]	Comprehensive Biochemistry II[3]		4[3]
BIOC 719 OR	Molec. Biol. Gene Expr. OR	3	
BIOC 723	Struct. Basis Memb. Trans. & Sig.		3
700-789 level[4]	Graduate electives[4]	0-3[4]	0-3[4]
BIOC 798	M.S. Research	3-5	3-5
BIOC 790	M.S. Thesis Defense		1
		10-11	**10-11**
Curriculum Totals		**141**	

[1]General Education Electives must include 18 credits in humanities and social sciences; 6 of these must be in humanities/fine arts, and six in social sciences. In addition, 3 credits must have a global perspective and 3 must be in the cultural diversity category.

[2]Upper Division science electives. 9 additional credits of 300- or 400- level courses in BIOL, BIOC, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply.

[3] Students may be waived from the requirement of taking BIOC 701 or BIOC 702 if they have obtained a grade of B or better in BIOC 660/460 or BIOC 661/461 respectively.

[4]Graduate science electives Graduate courses in BIOL, BIOC, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. If BIOC 701 and 702 are waived, students will need to select at least 6 credits of graduate science elective courses to satisfy NDSU requirements of a total of 10 credits of didactic courses numbered 701 to 789 or 801-889.