Biotechnology A.S. Degree Program at MCTC

Curriculum and Recommended Sequence of Courses

All students declaring to major in the biotechnology program are expected to be qualified to start college level courses in Science, Math and English, and place into appropriate level Math courses in placement tests. If not, you should be aware that you will need more than two years to complete the program and therefore, plan accordingly.

The following semester sequence is based on admission to the program in Fall semester. Please be aware that certain courses are offered only once a year. Therefore, plan your course sequence accordingly. **You need to ensure you have met the pre-requisites, before registering for any course. It is strongly advised that you follow the recommended sequence shown below. Contact Rekha.Ganaganur@minneapolis.edu or Michael.Klug@minneapolis.edu or the designated Science Advisor for more information.**

Year-1: Fall	Year-1: Spring
Principles of Chemistry 1 (CHEM 1151)	Principles of Chemistry 2 (CHEM 1152)
Principles of Biology (BIOL 2200)	Microbiology Lecture (BIOL 2230)
Introduction to Bioscience (BIOT 1000)	Microbiology Lecture (BIOL 2231)
College English (ENGL 1110) (if you have not already completed this) OR other General Education Electives	Regulatory Affairs and Quality Control (BIOT 2320)
College Algebra (MATH 1110) or other MATH course higher than MATH 1110 depending on your placement	Ethics (PHIL 1171) Or Ethics in the Community (PHIL 1181)

Year-2: Fall	Year-2: Spring
Organic Chemistry-1 (CHEM 2204 lecture)	Biochemistry (CHEM 2610; lecture) ***offered only in Spring***
Analytical Chemistry and Instrumentation Lecture (CHEM 2410) ***offered only in Fall***	Biochemistry Lab (CHEM 2620) ***offered only in Spring***
Analytical Chemistry and Instrumentation Lab (CHEM 2420) ***offered only in Fall***	Molecular Biology (BIOL 2500) ***offered only in Spring***
General Education Electives **or other science electives****	General Education Electives or other **science electives****

****Depending on your transfer needs and other career interests, special electives include Tissue Culture Techniques (BIOT 2640 and 2641), Forensic Science (CHEM 1145), Undergraduate Research (BIOT 2720) , and other biology, chemistry, physics and math electives. See the full curriculum for more details.**

Program Curriculum

1) **Required Science Credits**:

Course#	Course Title	Cr.	MnTC goal	Prerequisites
BIOT 1000	Introduction to Bioscience	1		College Level Reading and Writing
CHEM 1152	Principles of Chemistry 2	5	3	CHEM 1151
BIOT 2320	Regulatory Affairs& Quality Control	4		CHEM 1151
CHEM 2410	Analytical Chemistry & Instrumentation Theory	3		Prereq; CHEM1152; Pre- or Coreq: BIOT 2320
CHEM 2420	Analytical Chemistry & Instrumentation Lab	2		Prereq: CHEM1152 Pre- or co-req CHEM 2410, BIOT 2320
CHEM 2204	Organic Chemistry 1	4		CHEM 1152
CHEM 2610	Biochemistry – Theory and Principles	3		Prereqs: CHEM 2204; CHEM 1152; BIOL 2200
CHEM 2620	Biochemistry Laboratory	2		Pre Or Co-req: CHEM 2420, CHEM 2610 and BIOT 2320
BIOL 2230	Microbiology	2	3	Prerequisite: BIOL 2200
BIOL 2231	Microbiology Lab	2	3	Prerequisite: BIOL 2200 Pre/Corequisite: BIOL 2230
BIOL 2500	Molecular Biology	4	3	Prereq: BIOL 2231; Pre or Coreq: BIOT 2320 and CHEM 2204
	Total	**32 cr**		

2) **15 required Gen Ed credits**:

Course#	Course Title	Cr.	MnTC goal	Prerequisites
CHEM 1151	Principles of Chemistry 1	5	3	MATH 80, CHEM 1020 or one year high school chemistry
BIOL 2200	Principles of Biology	4	3	Pre or Coreq: CHEM 1020, or one year of high school chemistry with grade C or above; READ 0200 or ESOL 0052 or placement into READ 1300; ENGL 0900 or ESOL 0051; or placement into ENGL 1110
ENGL 1110*	College English 1	3	1	Prerequisite: ENGL 0900 **or** placement into ENGL 1110
PHIL 1171 Or PHIL 1181	Ethics, or Ethics in the Community	3	6,9	Prerequisite: One course in MnTC Goal Area 01

If you are transferring to a four-year institution, you may have to fulfill additional ENGL course requirements or writing-intensive course requirements.

3) **One course in Mathematics in Goal Area 4**: Choose one among the following depending on your placement:

Course#	Course Title	Cr.	MnTC goal	Prerequisites
MATH 1110	College Algebra OR	4	4	Placement into MATH 1110
MATH 1150	Statistical Analysis OR	4	4	Math 1110 or placement into 1120 or above
MATH 1180	Calculus 1 ## OR	5	4	MATH 1110, MATH 1120, or placement in MATH 1180
MATH 1190	Calculus 2 ##	5	4	MATH 1180

4) **Special electives "recommended" if pursuing research or job or internhip opportunities:**

Course#	Course Title	Cr.	MnTC goal	Prerequisites
CHEM 1145	Forensic Science-1		3, 9	Math 70 completed or placement into Math 80; and 1 year of high school chemistry or CHEM 1020 or equivalent
BIOT 2640	Tissue Culture Techniques Theory*	1		Pre- or Coreqs: BIOT 2320 or equivalent industry experience; And BIOL 2500
BIOT 2641	Tissue Culture Techniques Laboratory*	2		Pre- or Coreqs: BIOT 2640 and all requirements for this course apply
BIOT 2720	Undergraduate Research Methods##	1		Pre- or Co-req: CHEM 2410 or CHEM 2610 or BIOL 2500 or Instructor Permission
BIOT 2721	Undergraduate Research Laboratory ##	2		CHEM 2720) and all pre/coreqs for this course apply; or instructor permission
BIOT 2701-06	Biotechnology Internship	1-6		Pre-req: BIOT 2320; Pre- or coreqs: CHEM 2420 OR BIOL 2500 or CHEM 2620

5) Students seeking the A.S. degree must complete coursework in 6 of the 10 goal areas of the Minnesota Transfer Curriculum (MnTC). Within the general education coursework, students must complete a minimum of 3 credits in MnTC goal area 1, and a minimum of 3 credits from MnTC goal areas 7, 8, 9, or 10. The required coursework for the A.S. degree falls within MnTC goal areas 1 (ENGL 1110, SPCH 1010 or SPCH 1011), 3 (BIOL and CHEM), 4 (MATH), 6 (HUMN 1171), 9 (HUMN 1171).
The remaining **3 elective Gen Ed credits** must be selected to fulfill the requirement to complete coursework in 6 of the 10 MnTC goal areas.

Choose from the following options:

Course#	**Electives Gen Ed courses**	**Cr.**	**MnTC goal area**
ECON 2000	Principles of Macroeconomics	3	
ECON 2200	Principles of Microeconomics[8]	3	5
SOCI 1160	Technology, Culture & Society[10]	3	
HUMN 1110	Critical Thinking Skills	3	6
CMST 1012	Intercultural Communication[1]	3	7
ECON 2200	Principles of Microeconomics[5]	3	8
ECON 2500	Contemporary Economic Problems	3	
INFS 2510	Necessary Illusions: A Critical Introduction to the Information Age	3	9
INFS 2520	Alternative Knowledge: How Radical Ideas are Communicated in Society	3	9
CHEM 1145	Forensic Science	4	9,3
BIOL 1136	Environmental Science	3	
BIOL 1137	Environmental Science Lab	1	10
PSCI 1137	Environment, Politics and Society	3	
SOCI 1160	Technology, Culture & Society[1]	3	

6.) **10 elective credits**: Choose from the following depending on your career and transfer needs.

Course#	**Course Title**	**Cr.**	**MnTC goal**
CHEM 2224	Organic Chemistry Lab 1 ##	2	
CHEM 2205	Organic Chemistry 2 ##	4	
CHEM 2225	Organic Chemistry Lab 2 ##	2	
BIOL 1100	***Introduction to Biology***	*4*	*3*
BIOL 2205	Genetics	4	
BIOL 2250	Plant Biology	4	3
BIOL 2260	Animal Biology	4	3
BIOT 2700s	**Biotechnology Internship***	**1-6**	
MATH 1180	*Calculus 1 ##*	*5*	*4*
MATH 1190	*Calculus 2 ##*	*5*	*4*

PHYS 1131	*College Physics 1 ##*	*5*	*3*
PHYS 1132	*College Physics 2 ##*	*5*	*3,10*
PHYS 1211	*Physics for Science and Engineering 1 ##*	*6*	*3,4*
PHYS 1221	*Physics for Science and Engineering2 ##*	*6*	*3,4*
	Gen Ed elective listed under #4 above		
BIOT 2640	**Tissue Culture Techniques Theory***	**1**	
BIOT 2641	**Tissue Culture Techniques Laboratory***	**2**	
BIOT 2720	**Undergraduate Research Methods##**	**1**	
BIOT 2721	**Undergraduate Research Laboratory** ##	**2**	
	Other BIOT or approved courses		

##Recommended if transfer to 4-year degree programs is desired. Different universities have different requirements even within different tracks in various programs.

The Undergraduate Research Courses are dual designation courses under both CHEM and BIOT designations.

***Recommended if pursuing research or employment**