

# Chemistry A.S. Degree Program at MCTC

## Curriculum and Recommended Sequence of Courses

(or contact [Rekha.Ganaganur@minneapolis.edu](mailto:Rekha.Ganaganur@minneapolis.edu) or see the science advisor)

All students declaring to major in the chemistry program are expected to be qualified to start college level courses in science, Math, Reading and English, and place into the appropriate level Math courses in placement tests.

Depending on your future Career interests and transfer necessities, **the program provides two options for physics and math courses.** In option-1, you choose calculus courses and calculus-based higher Physics courses (Physics for Science and Engineering). In option-2, lower level Physics and Math courses are included.

The following semester sequence is based on admission to the program in Fall semester. Please be aware that certain course in Physics, and organic chemistry, analytical chemistry, are all offered only once a year. Therefore, plan your program path accordingly.

**OPTION-1: If you are pursuing chemistry, pharmacy, engineering or other majors for four-year program that requires calculus and higher Physics courses:**

Year-1: Fall	Year-1: Spring
Principles of Chemistry 1 (CHEM 1151)	Principles of Chemistry 2 (CHEM 1152)
Calculus-I (MATH 1180)	Calculus-2 (MATH 1190)
College English (ENGL 1110) OR other General Education electives if you have already completed ENGL 1110	Regulatory Affairs and Quality Control (BIOT 2320) (meets ACS guidelines and industry standards)

Year-2: Fall	Year-2: Spring
Organic Chemistry-1 (CHEM 2204 lecture)	Organic Chemistry-2 (CHEM 2205 lecture)
Organic Chemistry-1 lab (CHEM 2224 lab)	Organic Chemistry-2 (CHEM 2225 lab)
Physics for Science and Engineering-1 (PHYS 1211)	Physics for Science and Engineering-2 (PHYS 1221)
Analytical Chemistry and Instrumentation Lecture (CHEM 2410) (offered only in Fall)	General Education Electives
Analytical Chemistry and Instrumentation Lab (CHEM 2420) (offered only in Fall)	

**Depending on your transfer needs and other interests, special electives include Biochemistry Lecture (CHEM 2610) and Lab (CHEM 2620); Forensic Science (CHEM 1145), Undergraduate Research (CHEM 2720/CHEM 2721). See pages 3-5 for complete curriculum and recommended general education courses.**

**OPTION-2: If you are pursuing careers that do not require calculus or calculus-based higher Physics courses**

<b>Year-1: Fall</b>	<b>Year-1: Spring</b>
Principles of Chemistry 1 (CHEM 1151)	Principles of Chemistry 2 (CHEM 1152)
College Physics-1 (PHYS 1131)	College Physics-2 (PHYS 1131)
College English (ENGL 1110) OR other Gen Ed if you have already completed ENGL 1110	Regulatory Affairs and Quality Control (BIOT 2320) (meets ACS guidelines and industry standards)
General Education Elective	

<b>Year-2: Fall</b>	<b>Year-2: Spring</b>
Organic Chemistry-1 (CHEM 2204 lecture)	Organic Chemistry-2 (CHEM 2205 lecture)
Organic Chemistry-1 lab (CHEM 2224 lab)	Organic Chemistry-2 (CHEM 2225 lab)
Analytical Chemistry and Instrumentation Lecture (CHEM 2410)	Calculus for Business and Social Sciences (MATH 1170)
Analytical Chemistry and Instrumentation Lab (CHEM 2420)	General Education Elective or Chemistry Electives
General Education Elective or Chemistry Electives	

**Depending on your transfer needs and other interests, special electives include Biochemistry Lecture (CHEM 2610) and Lab (CHEM 2620); Forensic Science (CHEM 1145), Undergraduate Research (CHEM 2720)**

**See pages 3-5 for complete curriculum and recommended general education courses.**

## Curriculum

**Associate of Science Degree in Chemistry                      Total Credits:                      60 credits**

**REQUIRED 30 Program Credits:** All CHEM courses have READ 0200 or ESOL 0052 or placement into READ 1300; ENGL 0900 or ESOL 0051 or placement into ENGL 1110 as prerequisites in addition to the ones mentioned for individual courses.

Designator Course #	Course Title	Prerequisites	Credits	MNTC Goal area
<b>CHEM 1152</b>	Principles of Chemistry-2	CHEM 1151	<b>5 Cr</b> ( includes lecture and lab)	03
<b>CHEM 2204</b> <b>CHEM 2224</b>	Organic Chemistry-1 and Organic Chemistry-1 Lab	CHEM 1151 CHEM 2204 Pre- or Co-req	<b>4 Cr</b> (lecture) <b>2 Cr</b> (lab)	03
<b>CHEM 2205</b> <b>CHEM 2225</b>	Organic Chemistry-2 <b>and</b> Organic Chemistry-2 Lab	CHEM 2204 CHEM 2224	<b>4 Cr</b> ( lecture) <b>2 Cr</b> (lab)	03
<b>BIOT 2320</b>	Regulatory Affairs and Quality Control	CHEM 1151	<b>4 cr</b> (lecture <b>and</b> lab)	
<b>CHEM 2410</b>	Analytical Chemistry and Instrumentation	Prereq; CHEM1152; Pre- or Coreq: BIOT 2320	<b>3 Cr</b> (lecture)	
<b>CHEM 2420</b>	Analytical Chemistry and Instrumentation Laboratory	Prereq: CHEM1152 Pre- or co-req CHEM 2410, BIOT 2320	<b>2 Cr</b> (lab)	
General Education Elective (Choose from goal area 01 or 09 or 10) (See page 4)			3 Cr (or 4)	01 or 09 or 10
<b>Sub Total</b>			<b>29</b>	

### **REQUIRED 5 CREDIT General Education Course:**

Designator Course #	Course Title	Prerequisites	Credits	MNTC Goal area
<b>CHEM 1151</b>	Principles of Chemistry-1	MATH 80, CHEM 1020 or one year of High School chemistry	<b>5 Cr</b> (includes lecture and lab)	03
<b>AND</b>				
<p>Students seeking A.S. Degree in Chemistry must complete coursework in Physics and Math options and at least 6 of the 10 goal areas of 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 or 3 credits from MnTC goal areas 7, 8, 9, or 10.</p> <p>The required program credits, and required Physics and Math courses (Option-1 or Option-2) fall within MnTC goal areas 01 (ENGL or SPCH), 02, (all courses), 03 (BIOT, CHEM, PHYS), 04 (MATH, PHYS ). The remaining <b>elective /Gen Ed credits</b> must be selected to fulfill the other MnTC goal area requirements. <b>See Page 4 for other Recommended Gen Ed Electives.</b></p>				

## Required Math and Physics

**Option-1:** To transfer to University of Minnesota for Chemistry Majors (all tracks) or to pursue ACS-approved Chemistry, Biochemistry or Environmental Chemistry Majors at St. Cloud State University or other colleges, higher MATH (MATH 1180 and MATH 1190) and Calculus-based Physics (PHYS 1211 and PHYS 1221) are required.

Designator Course #	Course Title	Prerequisites	Credits	MNTC Goal area
MATH 1180	Calculus 1	MATH 1110, MATH 1120, or placement into MATH 1180	5	04
MATH 1190	Calculus 2	MATH 1180	5	04
PHYS 1211* (substitutes for PHYS 1131)	Physics for Science and Engineering 1	Extensive High School Physics or PHYS 1131; Co-Req/Pre-req. MATH 1180	6 (includes lecture and lab)	03
PHYS 1221* (substitutes for PHYS 1132)	Physics for Science and Engineering 2	Extensive High School Physics including electricity, or PHYS 1211; Co/Pre-req MATH 1190	6 (includes lecture and lab)	03
<b>Subtotal of credits in Option-1</b>			<b>22</b>	

**Option-2:** To pursue a Minor in Chemistry, BA in Chemistry or B.S in Science Teaching with Chemistry Emphasis at St. Cloud State University, lower level MATH (MATH 1170), and College Physics-1 and 2 are sufficient. Students requiring two semesters of college MATH are advised to take another MATH course before or after transferring.

Designator Course #	Course Title	Prerequisites	Credits	MNTC Goal area
MATH 1170	Calculus for Business and Social Sciences	MATH 1110 or placement into higher than MATH 1110	4	04
PHYS 1131*	College Physics 1	Two years High School algebra and High School trigonometry, or MATH 1110 and MATH 1120, or MATH 1125, or placement into MATH 1180	5	03
PHYS 1132	College Physics 2	PHYS 1131	5	03
<b>Subtotal of credits in Option-2</b>			<b>14</b>	

<b>Subtotal of ALL credits including MATH/PHYS Option-1=</b>	<b>29(or 30)+5+22= 56 (or 57)credits</b>
<b>Subtotal of ALL credits including MATH/PHYS Option-2=</b>	<b>29 (or 30)+5+14= 48 (or 49) credits</b>

Please also note that for pursuing other programs such as Pharmacy, Dentistry, Veterinary, Pre-Med, Engineering, etc. individual transfer institutions may have their own requirements for all the chemistry, biology, math and physics courses. We strongly advise that you consult the counseling and advising office at MCTC and/or at the transfer institutions, early on.

**Recommended MnTC Goal Area General Education Electives relevant to this program are as follows:**

<b>Designator Course #</b>	<b>Course Title</b>	<b>Prerequisites</b>	<b>Credits</b>	<b>MNTC Goal area</b>
SPCH 1012(if already completed ENGL 1110)  <b>Or</b> ENGL 1110	Intercultural Communications Or  College English 1	READ 0200, ENGL 0900 or placement into ENGL 1110  College ready in writing	3  3	01, 07  01
PSCI 1137	Environment, Politics and Society	READ 0100 or placement into READ 0200	3	05, 10
PHIL 1171	Ethics	Any course in goal area 01 (example ENGL 1110)	3	06, 09
JOUR 1000	Intro to Mass Communications	ENGL 0900 or placement into ENGL 1110	3	09
GEOG 1102	The Physical Environment	READ 0200 or ESOL 0052 or placement into READ 1300; ENGL 0900 or ESOL 0051 or placement into ENGL 1110	3	05, 10
BIOL 1136	Environmental Science	READ 0200 or ESOL 0052 or placement into READ 1300; ENGL 0900 or ESOL 0051 or placement into ENGL 1110	3	03, 10
BIOL 1137	Environmental Science Lab	As above and Pre-/Co-Requisite BIOL 1136	1	03, 10
BIOL 2200**	Principles of Biology	CHEM 1020 or concurrent registration, 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	4	03

\*\* You must take this course for being eligible for biochemistry courses and tracks.

**Other Recommended Electives\*\*: \*\*Recommended if pursuing four-year programs in biochemistry, biological tracks, medical, pharmacy, veterinary science or other related fields that require the following courses, or if pursuing research fellowships**

<b>Designator Course #</b>	<b>Course Title</b>	<b>Prerequisites</b>	<b>Credits</b>	<b>MNTC Goal area</b>
CHEM 2610	Biochemistry-theory and Principles	Prereqs: CHEM 2204; CHEM 1152; BIOL 2200	<b>3 (lecture)</b>	
CHEM 2620	Biochemistry Laboratory	Pre OR Co-req: CHEM 2420, CHEM 2610 and BIOT 2320,	<b>2 ( lab course)</b>	
CHEM 1145	Forensic Science-1	Math 70 completed or placement into Math 80; and 1 year of high school chemistry or CHEM 1020	<b>4 (with lab)</b>	03, 09
CHEM 2720/ BIOT 2720	Undergraduate Research Methods	Pre-reqs: CHEM 2204 or BIOL 2200	1	
CHEM 2721/ BIOT 2721	Undergraduate Research-Lab	Pre or Coreq: BIOT2720/CHEM 2720	2	