

## Minneapolis Community and Technical College

### CHEMISTRY Associate of Science Degree

Total Credits: 60 credits

**REQUIRED 30 Program Credits:** In addition to the prerequisites mentioned for individual courses, 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, Completion of MATH 80 or Placement into MATH 1100

Course #	Course Title	Semester in which it is offered at MCTC	Prerequisites	Credits	MNTC Goal area	U of M Equivalence
<b>CHEM 1152</b>	Principles of Chemistry-2	Fall, Spring and Summer; Hybrid option with lecture delivered online with evening lab sections, available	CHEM 1151	<b>5 Cr</b> ( includes lecture and lab)	03	New numbers CHEM 1062 & CHEM 1066; old number CHEM 1022
<b>CHEM 2204</b>	Organic Chemistry-1 (lecture)	Fall, Spring	CHEM 1152	<b>4 Cr</b> (lecture)	03	CHEM 2301(Lect)
<b>CHEM 2205</b>	Organic Chemistry-2 (lecture)	Fall, Spring	CHEM 2204	<b>4 Cr</b> ( lecture)	03	CHEM 2311 (Lect)
<b>CHEM 2224</b>	Organic Chemistry-1 Lab	Fall, Spring	CHEM 2204 Pre- or Co-req	<b>2 Cr</b> (lab)	03	CHEM 2311 (equivalent to MCTC's two semesters of labs courses 2224 and 2225 since at U of M it is taught as one semester course meeting two days a week)
<b>CHEM 2225</b>	Organic Chemistry-2 Lab	Fall, Spring	CHEM 2224	<b>2 Cr</b> (lab)	03	
* CHEM 2320/BIOT 2320/ (dual designation; chemistry students register under CHEM 2320; biotech or biology students register under BIOT )	Regulatory Affairs and Quality Control	Fall, Spring; Hybrid course with lecture being online; lab meets once a week	CHEM 1151	<b>4 cr</b> (lecture and lab)		<i>CHEM 2910(to CSE; proposed) and count towards transfer of Analytical Chemistry course</i>  <i>For CBS transfers as 3000 level elective</i>

Course #	Course Title	Semester in which it is offered at MCTC	Prerequisites	Credits	MNTC Goal area	U of M Equivalence
<b>CHEM 2410</b>	Analytical Chemistry and Instrumentation (lecture course)	Fall only	Prereq; CHEM1152; Pre- or Coreq: BIOT 2320	3 Cr (lecture)		CHEM 2101 (lecture)
<b>CHEM 2420</b>	Analytical Chemistry and Instrumentation Laboratory	Fall only	Prereq: CHEM1152 Pre- or co-req CHEM 2410, BIOT/CHEM 2320	2 Cr (lab)		CHEM 2111 (lab)
<b>General Education Elective</b> (Choose from goal area 01 or 09 or 10) (See page 6)		Choose general education electives in Fall, Spring or Summer		3 Cr (or 4)	01 or 09 or 10	(Gen Eds are transferable)
<b>Total Required Core Courses</b>				<b>30 credits</b>		

**REQUIRED 5 CREDIT General Education Course:**

Course #	Course Title	Semester in which it is offered at MCTC	Prerequisites	Credits	MNTC Goal area	U of M equivalence
<b>CHEM 1151</b>	Principles of Chemistry-1	Fall, Spring and Summer; Hybrid option with lecture delivered online and evening lab sections, is available	MATH 80, CHEM 1020 or one year of High School chemistry	<b>5 Cr</b> (includes lecture and lab)	03	New numbers CHEM 1061 & CHEM 1065; old number CHEM 1021

**AND**

Students seeking A.S. Degree in Chemistry must complete coursework in 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.

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 **elective /Gen Ed credits** must be selected to fulfill the other MnTC goal area requirements. **See Page 6 for other Recommended Gen Ed Electives.**

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

Course #	Course Title	Semester in which it is offered at MCTC	Prerequisites	Credits	MNTC Goal area	U of M equivalence
CHEM 2610	Biochemistry : Theory and Principles	Spring Only	Prereqs: CHEM 2204; CHEM 1152; BIOL 2200	<b>3</b> (3 cr lecture)		BioC 3021
CHEM 2620	Biochemistry Laboratory	Spring Only	Pre OR Co-req: CHEM 2610; And CHEM 2320 or CHEM 2420	<b>2 ( lab course)</b>		BioC 4025
CHEM 1145	Forensic Science-1	Fall and Spring	Math 60 completed or placement into Math 70; and a high school or college science course.	<b>4</b> (includes lab)	03, 09	CHEM 1T (towards General Education Core) and BIOL 1905 for 3 credits
CHEM 2722 (and has dual designation with BIOT 2722)	Undergraduate Research Methods	Fall	Pre-reqs: CHEM 1152 ( or BIOL 2200 for lifesceince students)	2		For CSE, proposing CHEM 3001 or other equivalent ; for CBS: BIOC/GCD 4794W for biochemistry/GCD dept; And as BIOL 1093 for others
CHEM 2723 (and has dual designation with BIOT 2723 )	Undergraduate Research-Lab	Spring	Prereq: CHEM (or BIOT 2722); Instructor Permission prior to registering; And CHEM or BIOT 2320; or BIOL 2231	4		CHEM 2094 (proposed)

## **Required Math and Physics**

**Option-1:** To transfer to engineering programs, pharmacy, and other professional programs, or 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.

<b>Course #</b>	<b>Course Title</b>	<b>Semester in which it is offered at MCTC</b>	<b>Prerequisites</b>	<b>Credits</b>	<b>MNTC Goal area</b>	<b>U of M equivalence</b>
MATH 1180	Calculus 1	Fall, Spring and Summer	MATH 1110, MATH 1120, or placement into MATH 1180	<b>5</b>	04	MATH 1271
MATH 1190	Calculus 2	Fall, Spring and Summer	MATH 1180	<b>5</b>	04	MATH 1272
PHYS 1211	Physics for Science and Engineering 1	Fall, Spring	Extensive High School Physics or PHYS 1131; Co-Req/Pre-req. MATH 1180	<b>6</b> (includes lecture and lab)	03	PHYS 1301
PHYS 1221	Physics for Science and Engineering 2	Fall, Spring	Extensive High School Physics including electricity, or PHYS 1211; Co/Pre-req MATH 1190	<b>6</b> (includes lecture and lab)	03	PHYS 1302
		<b>Subtotal of credits in Option-1</b>		<b>22</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 with the Science Advisor at MCTC and the advisors at the transfer institutions, early on.**

**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. **If taken PHYS 1211 and 1221, they substitute for PHYS 1131 and PHYS 1132**

Course #	Course Title	Semester in which it is offered at MCTC	Prerequisites	Credits	MNTC Goal area	U of M equivalence
MATH 1170	Calculus for Business and Social Sciences	Fall and Spring	MATH 1110 or placement into higher than MATH 1110	4	04	MATH 1142
PHYS 1131	College Physics 1	Fall and Spring	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 1101
PHYS 1132	College Physics 2	Fall and Spring	PHYS 1131	5	03	PHYS 1102
<b>Subtotal of credits in Option-2</b>				<b>14</b>		

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

**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 with the Science Advisor at MCTC and the advisors at the transfer institutions, early on.**

**The following are the Recommended MnTC Goal Area General Education Electives relevant to this program, for fulfilling the remaining Gen Ed requirements; choose 3 credits from the following, if pursuing Phys and Math Option-1; choose 12 credits if pursuing Phys and Math Option-2**

Course #	Course Title	Semester in which it is offered	Prerequisites	Credits	MNTC Goal area	U of M equivalence
SPCH 1012 (if already completed ENGL 1110)	Intercultural Communications	Fall, Spring and Summer	READ 0200, ENGL 0900 or placement into ENGL 1110	3	01, 07	COM 3452 W; SPCH 3451 W
<b>Or</b> ENGL 1110 **	Or College English 1	Fall, Spring and Summer	College ready in writing	3	01	ENGL 1101 (COMP 1001, 1011, 1012, 1015)
PSCI 1137	Environment, Politics and Society		READ 0100 or placement into READ 0200	3	05, 10	POL 3441
PHIL 1171	Ethics	Fall, Spring and Summer	Any course in goal area 01 (example ENGL 1110)	3	06, 09	PHIL 1003W; PHIL 3311W
JOUR 1000	Intro to Mass Communications	Fall	ENGL 0900 or placement into ENGL 1110	3	09	JOUR 1001
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	1GEOG1T Environment Theme Course
BIOL 1136	Environmental Science	Fall, Spring and Summer	READ 0200 or ESOL 0052 or placement into READ 1300; ENGL 0900 or ESOL 0051 or placement into ENGL 1110	3	03, 10	BIOL 1051; ES 1051 (with lab)
BIOL 1137	Environmental Science Lab	Fall, Spring and Summer	As above and Pre-/Co-Requisite BIOL 1136	1	03, 10	
BIOL 2200	Principles of Biology	Fall, Spring and Summer	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	BIOL 1009

\*\* Four Year institutions may also require ENGL 1111