CHEMISTRY (B.S.)

B.S. candidates may receive certification by the American Chemical Society upon graduation. This degree offers a strong background for students interested in a career in chemistry or in a professional field with a strong reliance on chemistry. It is particularly recommended for students planning to do graduate work in chemistry and chemically-related fields. The degree is offered with three options:

1. Bachelor of Science in Chemistry
2. Bachelor of Science in Chemistry with a concentration in biochemistry
3. Bachelor of Science in Chemistry with a concentration in materials

The first option is designed primarily for those planning to enter the chemical profession and other professional fields. The second option is designed primarily for students planning careers in biochemical and biomedical areas. The third option is designed primarily for students interested in materials science. (Note: Those interested in Phi Beta Kappa should consult with the secretary of the Wayne State University Chapter in order to determine the maximum number of chemistry credits allowed.)

Admission Requirements

Admission requirements for this program are satisfied by the general requirements for undergraduate admission (http://bulletins.wayne.edu/undergraduate/general-information/admission/) to the University. Students planning to major in chemistry should consult with an advisor in the Chemistry Department not later than the beginning of their sophomore year.

Candidates must complete 120 credits in course work including satisfaction of the University General Education Requirements (http://bulletins.wayne.edu/undergraduate/general-information/general-education/) and the College of Liberal Arts and Sciences Group Requirements (http://bulletins.wayne.edu/undergraduate/college-liberal-arts-sciences/bachelors-degree-requirements/), as well as the departmental major requirements cited below. All course work must be completed in accordance with the regulations of the University (http://bulletins.wayne.edu/undergraduate/general-information/academic-regulations/) and the College (http://bulletins.wayne.edu/undergraduate/college-liberal-arts-sciences/academic-regulations/) governing undergraduate scholarship and degrees.

Chemistry B.S. - Option One

Major Requirements

Those who wish to follow the curriculum in the College for the B.S. in Chemistry degree must complete the following courses:

Code	Title	Credits
CHM 1100	General Chemistry I	4
CHM 1130	General Chemistry I Laboratory	1
CHM 1140	General Chemistry II	4
CHM 1150	General Chemistry II Laboratory	1
CHM 1240	Organic Chemistry I	4
CHM 1250	Organic Chemistry I Laboratory	1
CHM 2220	Organic Chemistry II	4
CHM 2230	Organic Chemistry II Laboratory	1
CHM 3020	Intermediate Inorganic Chemistry I	3
CHM 3120	Analytical Chemistry	3
CHM 3130	Analytical Chemistry Laboratory	1
CHM 5020	Intermediate Inorganic Chemistry II	3
CHM 5160	Instrumental Analytical Chemistry	3
CHM 5420	Physical Chemistry I	3
CHM 5440	Physical Chemistry II	4
CHM 5510	Chemical Synthesis Laboratory	3
CHM 5550	Physical Chemistry Laboratory	2
CHM 5600	Survey of Biochemistry	3
CHM 5570	Instrumental Analytical Chemistry Laboratory	2
Select one of the following:		3-4
CHM 6060	Materials Chemistry and Engineering	
CHM 6070	Advanced Bioinorganic Chemistry	
CHM 6090	Organometallic Chemistry	
CHM 6100	Theory of Analytical Chemistry	
CHM 6120	Electroanalytical Chemistry	
CHM 6160	Separation Science	
CHM 6170	Advances in Bioanalytical Chemistry	
CHM 6180	Mass Spectrometry	
CHM 6200	Organic Structures and Mechanisms	
CHM 6220	Organic Reactions and Synthesis	
CHM 6240	Organic Spectroscopy	
CHM 6270	Advanced Bioorganic Chemistry and Drug Design	
CHM 6410	Statistical Thermodynamics	
CHM 6470	Quantum Chemistry	
CHM 6440	Computational Chemistry	
CHM 6500	Modern Methods in Experimental Chemistry	
CHM 6620	Metabolism: Pathways and Regulation	
CHM 6635	Tools of Molecular Biology	
CHM 6640	Molecular Biology	
CHM 6680	Clinical and Molecular Aspects of Cancer	
CHM 6700	Green Chemistry: Mindful Design in Science, Engineering, and Medicine	
CHM 5999	Research in Chemistry [1]	2-4
or CHM 5998	Honors Thesis Research in Chemistry	
PHY 2170	University Physics I for Scientists and Engineers	4
PHY 2171	University Physics I Experimental Laboratory	1
PHY 2180	University Physics II for Scientists and Engineers	4
PHY 2181	University Physics II Experimental Laboratory	1
MAT 2010	Calculus I	4
MAT 2020	Calculus II	4
MAT 2250	Elementary Linear Algebra	3
Total Credits		**76-79**

[1] By the first semester of the senior year, the student must enroll for at least two credits in independent research (CHM 5999 or CHM 5998). The student must work under the direction of a faculty member of the Department of Chemistry. It is advised that the student consult with the faculty during the term prior to beginning work, in order to choose the area and staff member under whose direction this research will be carried out. At the conclusion of the project, the student must present a written report for approval by the Chairperson of the Department. With prior approval by the Chairperson of the Department, students may be allowed to substitute to 2 credits of an internship experience (CHM 6991) in place of a research project.

A minimum grade of C is required in prerequisite chemistry courses.

At least fifteen credits in chemistry plus Research in Chemistry (CHM 5999) must be earned at Wayne State University.

Substitutions in B.S. Curriculum (Option One ONLY): In recognition of the diverse backgrounds required for various careers in chemistry, students may petition the Chemistry Curriculum Committee for approval to substitute advanced courses numbered 5000 or above from another discipline (such as physics, mathematics, biology, engineering) for the following B.S. requirements:

Code	Title	Credits
MAT 2250	Elementary Linear Algebra	3
CHM 5510	Chemical Synthesis Laboratory	3
CHM 5570	Instrumental Analytical Chemistry Laboratory	2
Chemistry elective		

Such petitions for substitutions must be submitted in writing accompanied by a detailed statement of justification and a current transcript, and must be approved prior to registration in the alternative courses. Decisions regarding approval of such requests will be based on their legitimacy in terms of the student's professional goals. It is suggested that students consult the Chairperson of the Chemistry Curriculum Committee before filing such a petition.

Chemistry B.S. - Option Two (Biochemistry)

Major Requirements

Those who wish to follow the curriculum for the B.S. in Chemistry with a concentration in biochemistry must complete the following courses (NO substitutions are allowed in the Option Two program: B.S. in Chemistry with a concentration in biochemistry):

Code	Title	Credits
CHM 1100	General Chemistry I	4
CHM 1130	General Chemistry I Laboratory	1
CHM 1140	General Chemistry II	4
CHM 1150	General Chemistry II Laboratory	1
CHM 1240	Organic Chemistry I	4
CHM 1250	Organic Chemistry I Laboratory	1
CHM 2220	Organic Chemistry II	4
CHM 2230	Organic Chemistry II Laboratory	1
CHM 3020	Intermediate Inorganic Chemistry I	3
CHM 3120	Analytical Chemistry	3
CHM 3130	Analytical Chemistry Laboratory	1
CHM 5020	Intermediate Inorganic Chemistry II	3
CHM 5160	Instrumental Analytical Chemistry	3
CHM 5400	Biological Physical Chemistry	3
or CHM 5420	Physical Chemistry I	
CHM 5550	Physical Chemistry Laboratory	2
CHM 5570	Instrumental Analytical Chemistry Laboratory	2
CHM 6610	Biological Chemistry Laboratory	3
CHM 6620	Metabolism: Pathways and Regulation	3
CHM 6640	Molecular Biology	3
Select one of the following:		3-4
CHM 5510	Chemical Synthesis Laboratory	
MAT 2250	Elementary Linear Algebra	
CHM 5999	Research in Chemistry [1]	2-4
or CHM 5998	Honors Thesis Research in Chemistry	
PHY 2170	University Physics I for Scientists and Engineers	4
PHY 2171	University Physics I Experimental Laboratory	1
PHY 2180	University Physics II for Scientists and Engineers	4
PHY 2181	University Physics II Experimental Laboratory	1
BIO 1510 & BIO 1511	Basic Life Mechanisms and Basic Life Mechanisms Laboratory	4
Select one of the following:		4-5
BIO 2270 & BIO 2271	Principles of Microbiology and Principles of Microbiology Lab	
BIO 2600	Introduction to Cell Biology	
BIO 3250 & BIO 3251	Molecular Mechanisms of Microbiology and Molecular Mechanisms of Microbiology Lab	
BIO 3070	Genetics	4
MAT 2010	Calculus I	4
MAT 2020	Calculus II	4
Total Credits		**84-88**

[1] By the first semester of the senior year, the student must enroll for at least two credits in independent research (CHM 5999 or CHM 5998). The student must work under the direction of a faculty member of the Department of Chemistry. It is advised that the student consult with the faculty during the term prior to beginning work, in order to choose the area and staff member under whose direction this research will be carried out. At the conclusion of the project, the student must present a written report for approval by the Chairperson of the Department. With prior approval by the Chairperson of the Department, students may be allowed to substitute to 2 credits of an internship experience (CHM 6991) in place of a research project.

A minimum grade of C is required in prerequisite chemistry courses.

At least fifteen credits in chemistry plus Research in Chemistry (CHM 5999) must be earned at Wayne State University.

Chemistry B.S. - Option Three (Materials)

Major Requirements

Those who wish to follow the curriculum for the B.S. in Chemistry with a concentration in materials must complete the following courses (NO substitutions are allowed in the Option Three program: B.S. in Chemistry with a concentration in materials):

Code	Title	Credits
CHM 1100	General Chemistry I	4
CHM 1130	General Chemistry I Laboratory	1
CHM 1140	General Chemistry II	4
CHM 1150	General Chemistry II Laboratory	1
CHM 1240	Organic Chemistry I	4
CHM 1250	Organic Chemistry I Laboratory	1
CHM 2220	Organic Chemistry II	4
CHM 2230	Organic Chemistry II Laboratory	1
CHM 3020	Intermediate Inorganic Chemistry I	3
CHM 3120	Analytical Chemistry	3
CHM 3130	Analytical Chemistry Laboratory	1
CHM 5020	Intermediate Inorganic Chemistry II	3
CHM 5160	Instrumental Analytical Chemistry	3
CHM 5420	Physical Chemistry I	3
CHM 5440	Physical Chemistry II	4
CHM 5550	Physical Chemistry Laboratory	2
CHM 5570	Instrumental Analytical Chemistry Laboratory	2
CHM 5600	Survey of Biochemistry	3
CHM 6060	Materials Chemistry and Engineering	3
or MSE 5350	Polymer Science	

CHM 5999	Research in Chemistry [1]	2-4
or CHM 5998	Honors Thesis Research in Chemistry	
PHY 2170	University Physics I for Scientists and Engineers	4
PHY 2171	University Physics I Experimental Laboratory	1
PHY 2180	University Physics II for Scientists and Engineers	4
PHY 2181	University Physics II Experimental Laboratory	1
BE 1300	Basic Engineering II: Materials Science for Engineering Applications	3
BE 1310	Materials Science for Engineering: Laboratory	1
MAT 2010	Calculus I	4
MAT 2020	Calculus II	4
MAT 2250	Elementary Linear Algebra	3
MSE 5650	Surface Science	3
Total Credits		**80-82**

[1] In addition, students must enroll for at least two credits in independent research (CHM 5999 or CHM 5998) by the first semester of their senior year. Research must be conducted under the direction of a faculty member of the Department of Chemistry. It is advised that the student consult with the faculty during the term prior to beginning work, in order to choose the area and staff member under whose direction this research will be carried out. At the conclusion of the project, the student must present a written report for approval by the Chairperson of the Department. With prior approval by the Chairperson of the Department, students may be allowed to substitute to 2 credits of an internship experience (CHM 6991) in place of a research project.

A minimum grade of C is required in prerequisite chemistry courses.

At least fifteen credits in chemistry plus Research in Chemistry (CHM 5999 or CHM 5998) must be earned at Wayne State University.

Chemistry Honors (B.S. Program)

1. *All* regular requirements for the Bachelor of Science in Chemistry degree must be fulfilled (no substitutions).
2. Minimum g.p.a.: 3.3 overall; 3.3 in chemistry courses.
3. Minimum of four credits must be earned in independent research (CHM 5998); this should commence in the junior year (or earlier).
4. Completion of one semester of an HON 4200-level honors seminar.This course may be used to partially fulfill college Group Requirements and can be elected in either the junior or senior year.
5. Submission of a B.S. thesis (covering the undergraduate independent research project), or of a manuscript suitable for publication in a refereed chemical journal, to the Honors Subcommittee in Chemistry which will act to accept or reject the thesis (or manuscript).
6. An oral examination covering the B.S. Honors Research Project, by the Honors Subcommittee in Chemistry.

The AGRADE program enables highly qualified students pursuing a B.S. with a major in Chemistry or a B.S. with a major in Biochemistry and Chemical Biology to enroll simultaneously in the M.A. with a major in Chemistry. Students will be able to apply up to a maximum of 16 credits towards both the undergraduate and graduate degrees. AGRADE applicants must have a cumulative grade point average (g.p.a.) of 3.50 or better. Applicants are also expected to have performed at a superior level in the major, as determined by the department, *and the required g.p.a. in the major shall not be less than 3.6 at the time of application.* The earliest students may be admitted into the AGRADE Program is the semester in which they complete 90 credits towards the undergraduate degree. Students should consult with an undergraduate advisor in their major department to seek advice about the appropriate time to apply for AGRADE status.

Requirements

Depending on the degree, students may use up to 16 credits from the following courses to count towards their B.S. and M.A. degrees. Only those AGRADE-approved courses in which the student has earned a B or higher will transfer to the graduate transcript. Once in the master's program, students may be required to repeat an AGRADE course in which they earn less than a B grade.

Code	Title	Credits
CHM 6070	Advanced Bioinorganic Chemistry	3
CHM 6090	Organometallic Chemistry	3
CHM 6170	Advances in Bioanalytical Chemistry	3
CHM 6240	Organic Spectroscopy	3
CHM 6270	Advanced Bioorganic Chemistry and Drug Design	3
CHM 6440	Computational Chemistry	3
CHM 6610	Biological Chemistry Laboratory	3
CHM 6620	Metabolism: Pathways and Regulation	3
CHM 6635	Tools of Molecular Biology	3
CHM 6640	Molecular Biology	3