CHEMISTRY

Majors:

- Bachelor of Arts, Chemistry (p. 1)
- Bachelor of Science, Biochemistry (p. 2)
- Bachelor of Science, Chemistry (p. 4)
- Bachelor of Science, Medicinal-Pharmaceutical Chemistry (p. 5)

Minor:

- Chemistry (p. 7)

The B.S. in Chemistry (BS-CHM) program is approved by the American Chemical Society for the training of professional chemists, and provides students with the opportunity to perform an original research project under the direction of a faculty mentor. BS-CHM majors electing to perform research typically select their faculty mentor and project during the first term of their junior year. The research project may be conducted over the entire senior year, but is more commonly conducted over a ten-week period during the summer following the junior year. In either case, the project culminates in the senior year with enrollment in CHM 498, the submission of an acceptable thesis, and the presentation of a seminar in CHM 490 . Additional research work to a maximum total of six semester hours may be elected provided the work extends beyond two semesters.

The B.S. in Biochemistry (BCM) program prepares students for careers in the biochemical and life sciences. BCM majors may elect to conduct an original research project in biochemistry or a related chemical sub-discipline. In all other respects these biochemically-related research projects are identical to those detailed for the BS-CHM program above.

The B.S. in Medicinal-Pharmaceutical Chemistry (MCM) program is designed for students pursuing careers in medicine, pharmacy or forensic chemistry, and provides a focused preparation in the analysis and synthesis of compounds of pharmacological significance. MCM majors may elect to conduct an original research project, typically in synthetic or analytical chemistry. In all other respects these research projects are identical to those detailed for the BS-CHM program above.

The B.A. in Chemistry (BA-CHM) program prepares students for a wide range of interdisciplinary professions, and consists of a curriculum in which the traditional B.S. curriculum has been modified, most notably in mathematics, physics, and advanced chemistry. The BA-CHM program is accordingly somewhat flexible, and affords students a wide selection of courses in the humanities and social sciences. BA-CHM majors are free to choose courses which prepare them for careers in medicine, dentistry, optometry, veterinary medicine, biochemistry, education, law, and other professions which require a science background.

A minor in chemistry consists of twenty semester hours. Typically these consist of 8 credit hours of general chemistry (CHM 123, 123L, 124, 124L), 8 credit hours of organic chemistry (CHM 313, 313L, 314, 314L), 3 credit hours of physical chemistry (CHM 302, 303 or 304), and one credit hour in basic molecular spectroscopy (CHM 317). Of these, the physical chemistry course is the only requirement.

FACULTY LISTING (https://udayton.edu/artssciences/academics/chemistry/facstaff/)

Bachelor of Arts, Chemistry (CHM) minimum 124 hours

The Common Academic Program (CAP) is an innovative curriculum that is the foundation of a University of Dayton education. It is a learning experience that is shared in common among all undergraduate students, regardless of their major. Some CAP requirements must be fulfilled by courses taken at UD (e.g., Capstone and Diversity and Social Justice). Some major requirements must also be fulfilled by courses taken at UD. Students should consult with their advisor regarding applicability of transfer credit to fulfill CAP and major program requirements.

Common Academic Program (CAP) [1]		
First-Year Humanities Commons [2]		12 cr. hrs.
HST 103	Introduction to Global Historical Studies	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Introduction to Philosophy	
ENG 100	Writing Seminar I [3]	
Second-Year Writing Seminar [4]		0-3 cr. hrs.
ENG 200	Writing Seminar II	
Oral Communication		3 cr. hrs.
CMM 100	Principles of Oral Communication	
Mathematics		3 cr. hrs.
Social Science		3 cr. hrs.
Arts		3 cr. hrs.
Natural Sciences [5]		7 cr. hrs.
Crossing Boundaries		up to 12 cr. hrs.
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		
Philosophy and/or Religious Studies (6 cr. hrs.)		
Historical Studies (3 cr. hrs.) [6]		

Diversity and Social Justice [7]	3 cr. hrs.
Major Capstone [8]	0-6 cr. hrs.

1. The credit hours listed reflect what is needed to complete each CAP component. However, they should not be viewed as a cumulative addition to a student's degree requirements because many CAP courses are designed to satisfy more than one CAP component (e.g., Crossing Boundaries and Advanced Studies) and may also satisfy requirements in the student's major.
2. May be completed with ASI 110 and ASI 120 through the Core Program.
3. May be completed with ENG 100A and ENG 100B, by placement.
4. May be completed with ENG 114 or ENG 198 or ASI 120.
5. Must include two different disciplines and at least one accompanying lab.
6. May be completed with ASI 110 and ASI 120 through the Core Program.
7. May not double count with First-Year Humanities Commons, Second-Year Writing, Oral Communication, Social Science, Arts, or Natural Sciences CAP components, but may double count with courses taken to satisfy other CAP components and/or courses taken in the student's major.
8. The course or experience is designed by faculty in each major; it may, or may not, be assigned credit hours.

Liberal Studies Curriculum

Creative and Performing Arts (May include CAP Arts)		3
L2 Proficiency (Proficiency in a language other than English)		0-11
Literature (May include CAP Components)		3
Mathematics (Satisfies CAP Mathematics)		9
MTH 148 & MTH 149	Introductory Calculus I and Introductory Calculus II	
MTH 367	Statistical Methods I	
Natural Sciences (Applies to CAP Natural Science)		8
PHY 201 & 201L	College Physics I and College Physics Laboratory I	
PHY 202 & 202L	College Physics II and General Physics Laboratory	
Social Sciences (Includes CAP Social Science)		12

Major Requirements [1] 38

CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CHM 124 & 124L	General Chemistry and General Chemistry Laboratory	4
CHM 201 & 201L	Quantitative Analysis and Quantitative Analysis Laboratory	4
CHM 302	Physical Chemistry	3-6
or CHM 303 & CHM 304	Physical Chemistry and Physical Chemistry	
CHM 313 & 313L	Organic Chemistry and Organic Chemistry Laboratory	4
CHM 314 & 314L	Organic Chemistry and Organic Chemistry Laboratory	4
CHM 480	Professional Practices Seminar	1
CHM 490	Seminar IV (Satisfies CAP Major Capstone)	1
Select four courses from: [2]		10-13
CHM 317	Spectroscopic Identification of Organic Compounds	
CHM 341	Environmental Chemistry	
CHM 404	Special Topics in Physical Chemistry	
CHM 412	Intermediate Organic Chemistry	
CHM 415	Analytical Chemistry	
CHM 415L	Analytical Chemistry Laboratory	
CHM 417	Inorganic Chemistry	
CHM 418L	Inorganic Chemistry Laboratory	
CHM 420	Biochemistry	
CHM 426	Biosynthetic Organic Chemistry	
CHM 427	Medicinal Chemistry	
CHM 451	General Biochemistry I	
CHM 452	General Biochemistry II	
CHM 462L	Biochemistry Laboratory	
CHM 477 & CHM 478	Honors Thesis Project and Honors Thesis Project	
CHM 497 & CHM 498	Research Seminar and Research & Thesis	
CHM 499	Research & Thesis	

Breadth

ASI 150	Introduction to the University Experience	1
Total Hours to total at least		124

1. Advanced placement is permitted.
2. May substitute two upper level courses from other science departments with permission of chairperson.

Bachelor of Science, Biochemistry (BCM) minimum 120 hours

The Common Academic Program (CAP) is an innovative curriculum that is the foundation of a University of Dayton education. It is a learning experience that is shared in common among all undergraduate students, regardless of their major. Some CAP requirements must be fulfilled by courses taken at UD (e.g., Capstone and Diversity and Social Justice). Some major requirements must also be fulfilled by courses taken at UD. Students should consult with their advisor regarding applicability of transfer credit to fulfill CAP and major program requirements.

Common Academic Program (CAP) [1]

First-Year Humanities Commons [2]		12 cr. hrs.
HST 103	Introduction to Global Historical Studies	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Introduction to Philosophy	
ENG 100	Writing Seminar I [3]	
Second-Year Writing Seminar [4]		0-3 cr. hrs.
ENG 200	Writing Seminar II	

Oral Communication		3 cr. hrs.
CMM 100	Principles of Oral Communication	
Mathematics		3 cr. hrs.
Social Science		3 cr. hrs.
Arts		3 cr. hrs.
Natural Sciences [5]		7 cr. hrs.
Crossing Boundaries		up to 12 cr. hrs.
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		
Philosophy and/or Religious Studies (6 cr. hrs.)		
Historical Studies (3 cr. hrs.) [6]		
Diversity and Social Justice [7]		3 cr. hrs.
Major Capstone [8]		0-6 cr. hrs.

1. The credit hours listed reflect what is needed to complete each CAP component. However, they should not be viewed as a cumulative addition to a student's degree requirements because many CAP courses are designed to satisfy more than one CAP component (e.g., Crossing Boundaries and Advanced Studies) and may also satisfy requirements in the student's major.
2. May be completed with ASI 110 and ASI 120 through the Core Program.
3. May be completed with ENG 100A and ENG 100B, by placement.
4. May be completed with ENG 114 or ENG 198 or ASI 120.
5. Must include two different disciplines and at least one accompanying lab.
6. May be completed with ASI 110 and ASI 120 through the Core Program.
7. May not double count with First-Year Humanities Commons, Second-Year Writing, Oral Communication, Social Science, Arts, or Natural Sciences CAP components, but may double count with courses taken to satisfy other CAP components and/or courses taken in the student's major.
8. The course or experience is designed by faculty in each major; it may, or may not, be assigned credit hours.

Science Breadth Requirements

MTH 168	Analytic Geometry & Calculus I	
MTH 169	Analytic Geometry & Calculus II	
MTH 218	Analytic Geometry & Calculus III	
MTH 219	Applied Differential Equations	
or MTH 367	Statistical Methods I	
PHY 206	General Physics I - Mechanics	
PHY 207	General Physics II - Electricity & Magnetism	
PHY 210L	General Physics Laboratory I	
Select courses from:		10
CHM 319L	Advanced Organic Synthesis Laboratory	
BIO 312	General Genetics	
BIO 314	Plant Biology	
BIO 403	Physiology I	
BIO 404	Physiology II	
BIO 411	General Microbiology	
BIO 427	Immunology	
BIO 440	Cell Biology	
BIO 462	Molecular Biology	
BIO 466	Biology of Infectious Disease	
CHM 404	Special Topics in Physical Chemistry	
CHM 410	Biological Inorganic Chemistry	
CHM 412	Intermediate Organic Chemistry	
CHM 415 & 415L	Analytical Chemistry and Analytical Chemistry Laboratory	
CHM 417	Inorganic Chemistry	
CHM 418L	Inorganic Chemistry Laboratory	
CHM 426	Biosynthetic Organic Chemistry	
CHM 427	Medicinal Chemistry	
CHM 438	Sustainability and Chemistry	
CHM 454	Rational Drug Design	
CHM 458	Metabolism and Human Disease	
CHM 477	Honors Thesis Project	3
CHM 478	Honors Thesis Project	3
CHM 497 & CHM 498	Research Seminar and Research & Thesis	
CHM 498	Research & Thesis	3
CHM 499	Research & Thesis	

Major Requirements [1] 47

Year 1		
BIO 151 & 151L	Concepts of Biology I: Cellular & Molecular Biology and Concepts of Biology Laboratory I: Cellular & Molecular Biology	4
BIO 152	Concepts of Biology II: Evolution & Ecology	3
CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CHM 124 & 124L	General Chemistry and General Chemistry Laboratory	4
CHM 190	Seminar I	0
Year 2		
CHM 201 & 201L	Quantitative Analysis and Quantitative Analysis Laboratory	4
CHM 313 & 313L	Organic Chemistry and Organic Chemistry Laboratory	4
CHM 314 & 314L	Organic Chemistry and Organic Chemistry Laboratory	4

CHM 290	Seminar II	0
BIO Elective and Laboratory		4
Year 3		
CHM 303 & 303L	Physical Chemistry I and Physical Chemistry Laboratory	4
CHM 304	Physical Chemistry II	3
CHM 451	General Biochemistry I	3
CHM 452	General Biochemistry II	3
CHM 462L	Biochemistry Laboratory	1
CHM 390	Seminar III	0
Year 4		
CHM 480	Professional Practices Seminar	1
CHM 490	Seminar IV	1
Breadth		
ASI 150	Introduction to the University Experience	1
Social and Behavioral Sciences		6
Total Hours to total at least		120

[1] Advanced placement is permitted.

Bachelor of Science, Chemistry (CHM) minimum 120 hours

The Common Academic Program (CAP) is an innovative curriculum that is the foundation of a University of Dayton education. It is a learning experience that is shared in common among all undergraduate students, regardless of their major. Some CAP requirements must be fulfilled by courses taken at UD (e.g., Capstone and Diversity and Social Justice). Some major requirements must also be fulfilled by courses taken at UD. Students should consult with their advisor regarding applicability of transfer credit to fulfill CAP and major program requirements.

Common Academic Program (CAP) [1]

First-Year Humanities Commons [2]		12 cr. hrs.
HST 103	Introduction to Global Historical Studies	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Introduction to Philosophy	
ENG 100	Writing Seminar I [3]	
Second-Year Writing Seminar [4]		0-3 cr. hrs.
ENG 200	Writing Seminar II	
Oral Communication		3 cr. hrs.
CMM 100	Principles of Oral Communication	
Mathematics		3 cr. hrs.
Social Science		3 cr. hrs.
Arts		3 cr. hrs.
Natural Sciences [5]		7 cr. hrs.
Crossing Boundaries		up to 12 cr. hrs.
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		
Philosophy and/or Religious Studies (6 cr. hrs.)		
Historical Studies (3 cr. hrs.) [6]		
Diversity and Social Justice [7]		3 cr. hrs.
Major Capstone [8]		0-6 cr. hrs.

[1] The credit hours listed reflect what is needed to complete each CAP component. However, they should not be viewed as a cumulative addition to a student's degree requirements because many CAP courses are designed to satisfy more than one CAP component (e.g., Crossing Boundaries and Advanced Studies) and may also satisfy requirements in the student's major.

[2] May be completed with ASI 110 and ASI 120 through the Core Program.

[3] May be completed with ENG 100A and ENG 100B, by placement.

[4] May be completed with ENG 114 or ENG 198 or ASI 120.

[5] Must include two different disciplines and at least one accompanying lab.

[6] May be completed with ASI 110 and ASI 120 through the Core Program.

[7] May not double count with First-Year Humanities Commons, Second-Year Writing, Oral Communication, Social Science, Arts, or Natural Sciences CAP components, but may double count with courses taken to satisfy other CAP components and/or courses taken in the student's major.

[8] The course or experience is designed by faculty in each major; it may, or may not, be assigned credit hours.

Science Breadth Requirements

Mathematics, Computer Sciences [1]		15
MTH 168	Analytic Geometry & Calculus I	
MTH 169	Analytic Geometry & Calculus II	
MTH 218	Analytic Geometry & Calculus III	
Mathematics Elective - Select one course from:		3
MTH 219	Applied Differential Equations	
MTH 367	Statistical Methods I	
PHY 206	General Physics I - Mechanics	3
PHY 207	General Physics II - Electricity & Magnetism	3
PHY 208	General Physics III- Thermodynamics, Waves, and Fluids	3

PHY 210L	General Physics Laboratory I	1
CHM 319L	Advanced Organic Synthesis Laboratory	1
Major Requirements [2]		**51**
Year 1		
CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CHM 124 & 124L	General Chemistry and General Chemistry Laboratory	4
CHM 190	Seminar I	0
Year 2		
CHM 201 & 201L	Quantitative Analysis and Quantitative Analysis Laboratory	4
CHM 313 & 313L	Organic Chemistry and Organic Chemistry Laboratory	4
CHM 314 & 314L	Organic Chemistry and Organic Chemistry Laboratory	4
CHM 290	Seminar II	0
Year 3		
CHM 303 & 303L	Physical Chemistry I and Physical Chemistry Laboratory	4
CHM 304 & 304L	Physical Chemistry II and Physical Chemistry Laboratory	4
CHM 317	Spectroscopic Identification of Organic Compounds	1
CHM 390	Seminar III	0
Year 4		
CHM 415 & 415L	Analytical Chemistry and Analytical Chemistry Laboratory	4
CHM 417	Inorganic Chemistry	3
CHM 418L	Inorganic Chemistry Laboratory	1
CHM 420	Biochemistry	3
or CHM 451 & CHM 452	General Biochemistry I and General Biochemistry II	
CHM 480	Professional Practices Seminar	1
CHM 490	Seminar IV	1
Approved Materials Course		3
CME 409	Introduction to Polymer Science - Thermoplastics	
CME 410	High Performance Thermoset Polymers	
Or any graduate level CHM Course		
Select three courses from: [3]		9
CHM 404	Special Topics in Physical Chemistry	
CHM 410	Biological Inorganic Chemistry	
CHM 412	Intermediate Organic Chemistry	
CHM 426	Biosynthetic Organic Chemistry	
CHM 427	Medicinal Chemistry	
CHM 438	Sustainability and Chemistry	
CHM 450	Advanced Organic Synthesis	
CHM 454	Rational Drug Design	
CHM 458	Metabolism and Human Disease	
CHM 462L	Biochemistry Laboratory	
CHM 477 & CHM 478	Honors Thesis Project and Honors Thesis Project	
CHM 478	Honors Thesis Project	
CHM 498	Research & Thesis	
CHM 499	Research & Thesis	
Or any graduate level CHM Course		
Breadth		
ASI 150	Introduction to the University Experience	1
Social and Behavioral Sciences		6
Total Hours to total at least		120

1. Should be completed during the first two years.
2. Advanced placement is permitted.
3. May substitute one approved science course from another department.

Bachelor of Science, Medicinal-Pharmaceutical Chemistry (MCM) minimum 120 hours

The Common Academic Program (CAP) is an innovative curriculum that is the foundation of a University of Dayton education. It is a learning experience that is shared in common among all undergraduate students, regardless of their major. Some CAP requirements must be fulfilled by courses taken at UD (e.g., Capstone and Diversity and Social Justice). Some major requirements must also be fulfilled by courses taken at UD. Students should consult with their advisor regarding applicability of transfer credit to fulfill CAP and major program requirements.

Common Academic Program (CAP) [1]		
First-Year Humanities Commons [2]		12 cr. hrs.
HST 103	Introduction to Global Historical Studies	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Introduction to Philosophy	
ENG 100	Writing Seminar I [3]	
Second-Year Writing Seminar [4]		0-3 cr. hrs.
ENG 200	Writing Seminar II	
Oral Communication		3 cr. hrs.
CMM 100	Principles of Oral Communication	
Mathematics		3 cr. hrs.
Social Science		3 cr. hrs.
Arts		3 cr. hrs.
Natural Sciences [5]		7 cr. hrs.

Crossing Boundaries	up to 12 cr. hrs.
Faith Traditions	
Practical Ethical Action	
Inquiry	
Integrative	
Advanced Study	
Philosophy and/or Religious Studies (6 cr. hrs.)	
Historical Studies (3 cr. hrs.) [6]	
Diversity and Social Justice [7]	3 cr. hrs.
Major Capstone [8]	0-6 cr. hrs.

1 The credit hours listed reflect what is needed to complete each CAP component. However, they should not be viewed as a cumulative addition to a student's degree requirements because many CAP courses are designed to satisfy more than one CAP component (e.g., Crossing Boundaries and Advanced Studies) and may also satisfy requirements in the student's major.
2 May be completed with ASI 110 and ASI 120 through the Core Program.
3 May be completed with ENG 100A and ENG 100B, by placement.
4 May be completed with ENG 114 or ENG 198 or ASI 120.
5 Must include two different disciplines and at least one accompanying lab.
6 May be completed with ASI 110 and ASI 120 through the Core Program.
7 May not double count with First-Year Humanities Commons, Second-Year Writing, Oral Communication, Social Science, Arts, or Natural Sciences CAP components, but may double count with courses taken to satisfy other CAP components and/or courses taken in the student's major.
8 The course or experience is designed by faculty in each major; it may, or may not, be assigned credit hours.

Science Breadth Requirements

Satisfies CAP Mathematics and CAP Natural Science		
BIO 151 & 151L	Concepts of Biology I: Cellular & Molecular Biology and Concepts of Biology Laboratory I: Cellular & Molecular Biology	4
BIO 152 & 152L	Concepts of Biology II: Evolution & Ecology and Concepts of Biology Laboratory II: Evolution & Ecology	4
MTH 148 & MTH 149	Introductory Calculus I and Introductory Calculus II	6
MTH 367	Statistical Methods I	3
PHY 201 & 201L	College Physics I and College Physics Laboratory I	4
PHY 202 & 202L	College Physics II and General Physics Laboratory	4

Major Requirements [2, 3]		**55**
Year 1		
CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CHM 124 & 124L	General Chemistry and General Chemistry Laboratory	4
CHM 190	Seminar I	0
Year 2		
CHM 201 & 201L	Quantitative Analysis and Quantitative Analysis Laboratory	4
CHM 290	Seminar II	0
CHM 313 & 313L	Organic Chemistry and Organic Chemistry Laboratory	4
CHM 314 & 314L	Organic Chemistry and Organic Chemistry Laboratory	4
Year 3		
CHM 302 & 302L	Physical Chemistry and Physical Chemistry Laboratory [1]	4
CHM 317	Spectroscopic Identification of Organic Compounds	1
CHM 390	Seminar III	0
CHM 420	Biochemistry [4]	3
CHM 420L	Biochemistry Lab for the Medical Sciences	1
Year 4		
CHM 319L	Advanced Organic Synthesis Laboratory	1
CHM 426	Biosynthetic Organic Chemistry	3
CHM 427	Medicinal Chemistry	3
CHM 454	Rational Drug Design	3
CHM 463L	Bioanalytical Chemistry Laboratory	1
CHM 480	Professional Practices Seminar	1
CHM 490	Seminar IV (Satisfies CAP Major Capstone)	1
Science Requirements		**13**
Select six semester hours from: [5]		
CHM 412	Intermediate Organic Chemistry	
CHM 415 & 415L	Analytical Chemistry and Analytical Chemistry Laboratory	
CHM 417	Inorganic Chemistry	
CHM 418L	Inorganic Chemistry Laboratory	
CHM 497 & CHM 498	Research Seminar and Research & Thesis	
Select two lecture courses and one laboratory from:		
BIO 403 & 403L	Physiology I and Physiology Laboratory I	
BIO 411 & 411L	General Microbiology and General Microbiology Laboratory	
BIO 440 & 440L	Cell Biology and Cell Biology Laboratory	

Breadth [6]		
ASI 150	Introduction to the University Experience	1
Social and Behavioral Sciences (Includes CAP Social Science)		6
Total Hours to total at least		120

1 Substitution of more advanced courses is possible upon consultation with the Department of Chemistry chairperson.
2 Consult General Requirements for all Bachelor of Science programs and the Common Academic Program requirements.

[3] Advanced placement is permitted.

[4] Biochemistry courses CHM 451 and CHM 452 may be substituted, with CHM 452 counting as a general elective.

[5] Chemistry graduate courses or advanced electives from other departments may be selected with the permission of the Department of Chemistry chairperson.

[6] If composition requirement is waived, the student should seek the English elective. Advanced writing courses are recommended.

Minor in Chemistry (CHM)

Chemistry		
CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CHM 124 & 124L	General Chemistry and General Chemistry Laboratory	4
CHM 302 or CHM 303	Physical Chemistry Physical Chemistry	3
Select three CHM courses (300/400 level) [1]		9

[1] In consultation with the chairperson.

- Bachelor of Arts, Chemistry (p. 1)
- Bachelor of Science, Medicinal-Pharmaceutical Chemistry (p. 7)
- Bachelor of Science, Biochemistry (p. 8)
- Bachelor of Science, Chemistry (p. 4)

Bachelor of Arts, Chemistry

First Year

Fall	Hours	Spring	Hours
CHM 123 & 123L	4	CHM 124 & 124L	4
MTH 148 (Satisfies CAP Mathematics)	3	MTH 149	3
REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3	ENG 100 (CAP Humanities Commons)	3
PHL 103	3	HST 103	3
Social Science - intro level	3	Lauguage 101	4
ASI 150	1	CHM 190	0
	17		**17**

Second Year

Fall	Hours	Spring	Hours
CHM 313 & 313L	4	CHM 314 & 314L	4
MTH 367	3	CHM 201 & 201L	4
ENG 200 (CAP Writing Seminar)	3	CMM 100 (CAP Communication)	3
Social Science - 300/400 level	3	Literature	3
Language 141	4	Language 201 or contextual course	3
		CHM 290	0
	17		**17**

Third Year

Fall	Hours	Spring	Hours
CHM 302	3	CHM elective	3
PHY 201 & 201L (CAP Natural Science)	4	PHY 202	3
CHM elective	3	PHY 202L	1
CAP Faith Traditions	3	CAP Arts / Creative and Performing	3
Social Science - elective	3	SSC 200 (CAP Social Science)	3
		CAP Advanced Philosophy/ Religious Studies	3
		CHM 390	0
	16		**16**

Fourth Year

Fall	Hours	Spring	Hours
CHM elective	3	CHM elective	3
CAP Inquiry	3	CAP Integrative	3
CAP Advanced Philosophy/Religious Studies	3	CAP Practical Ethical Action	3
CAP Advanced Historical Studies	3	CAP Diversity and Social Justice	3
General Elective	3	General Elective (optional)	3
CHM 480	1	CHM 490 (Satisfies CAP Major Capstone)	1
	16		**16**

Total credit hours: 132

Bachelor of Science, Medicinal-Pharmaceutical Chemistry

First Year

Fall	Hours	Spring	Hours
CHM 123 & 123L	4	CHM 124 & 124L	4
BIO 151 & 151L (CAP Natural Science)	4	BIO 152 & 152L	4
MTH 148 (Satisfies CAP Mathematics)	3	MTH 149	3
ENG 100 (CAP Humanities Commons)	3	REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3
ASI 150	1	REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3
		CHM 190	0
	15		**17**

Second Year

Fall	Hours	Spring	Hours
CHM 313 & 313L	4	CHM 314 & 314L	4
PHY 201 & 201L	4	CHM 201	3
REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3	CHM 201L	1

ENG 200	3	PHY 202 & 202L	4
SSC 200 (CAP Social Science)	3	CMM 100 (CAP Communication)	3
		CAP Arts	3
		CHM 290	0
	17		**18**

Third Year

Fall	Hours	Spring	Hours
CHM 302 & 302L	4	CHM 420 & 420L	4
CHM elective	3	CHM 317	1
BIO elective and lab	4	CHM elective	3
MTH 367	3	BIO elective	3
CAP Faith Traditions	3	Social Science - elective	3
		CHM 390	0
	17		**14**

Fourth Year

Fall	Hours	Spring	Hours
CHM 426	3	CHM 319L	1
CHM 427	3	CHM 454	3
CAP Inquiry	3	CHM 463L	1
CAP Advanced Philosophy/Religious Studies	3	CAP Practical Ethical Action	3
CAP Advanced Historical Studies	3	CAP Integrative	3
CHM 480	1	CAP Diversity and Social Justice	3
		CAP Advanced Philosophy/ Religious Studies	3
		CHM 490 (Satisfies CAP Major Capstone)	1
	16		**18**

Total credit hours: 132

Bachelor of Science, Biochemistry

First Year

Fall	Hours	Spring	Hours
CHM 123 & 123L	4	CHM 124 & 124L	4
BIO 151 & 151L (CAP Natural Science)	4	BIO 152	3
MTH 168 (Satisfies CAP Mathematics)	4	MTH 169	4
ENG 100 (CAP Humanities Commons)	3	REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3
ASI 150	1	REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3
		CHM 190	0
	16		**17**

Second Year

Fall	Hours	Spring	Hours
CHM 313 & 313L	4	CHM 314 & 314L	4
PHY 206 & PHY 210L	4	CHM 201	3
MTH 218	4	CHM 201L	1
ENG 200	3	PHY 207	3
		MTH 219 or 367	3
		CMM 100 (CAP Communication)	3
		CHM 290	0
	15		**17**

Third Year

Fall	Hours	Spring	Hours
CHM 303 & 303L	4	CHM 304	3
CHM 451	3	CHM 452 & CHM 462L	4
Bio Elective w/lab	4	REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3
CAP Arts	3	CAP Advanced Historical Studies	3
SSC 200	3	Social Science elective	3
		CHM 390	0
	17		**16**

Fourth Year

Fall	Hours	Spring	Hours
BIO/CHM elective	3	BIO/CHM elective	3
CAP Faith Traditions	3	BIO/CHM elective	3
CAP Inquiry	3	CAP Adv. Philosophy/ Religious Studies (Practical Ethical Action/Faith Traditions)	3
CAP Adv. Philosophy/Religious Studies (Practical Ethical Action/Faith Traditions)	3	CAP Integrative	3
CHM 480	1	CAP Diversity and Social Justice	3
		CHM 490 (Satisfies CAP Major Capstone)	1
	13		**16**

Total credit hours: 127

Bachelor of Science, Chemistry

First Year

Fall	Hours	Spring	Hours
CHM 123 & 123L	4	CHM 124 & 124L	4

BIO 151, 101, or 152	3	MTH 169	4
MTH 168 (Satisfies CAP Mathematics)	4	CMM 100 (CAP Communication)	3
REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3	REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3
ENG 100 (CAP Humanities Commons)	3	REL 103, PHL 103, or HST 103 (CAP Humanities Commons)	3
ASI 150	1	CHM 190	0
	18		**17**

Second Year

Fall	Hours	Spring	Hours
CHM 313 & 313L	4	CHM 314 & 314L	4
PHY 206 & PHY 210L (CAP Natural Science)	4	CHM 201	3
MTH 218	4	CHM 201L	1
ENG 200	3	PHY 207	3
		MTH 219 or 367	3
		CHM 290	0
	15		**14**

Third Year

Fall	Hours	Spring	Hours
CHM 303 & 303L	4	CHM 304 & 304L	4
CHM elective	3	CHM 317	1
PHY 208	3	CHM 319L	1
CAP Arts	3	CHM 420	3
SSC 200 (CAP Social Science)	3	CAP Faith Traditions	3
		CAP Advanced Historical Studies	3
		Social Science - elective	3
		CHM 390	0
	16		**18**

Fourth Year

Fall	Hours	Spring	Hours
CHM 415 & 415L	4	CHM 417	3
CHM elective	3	CHM 418L	1
CAP Practical Ethical Action	3	CHM elective	3
CAP Inquiry	3	CAP Diversity and Social Justice	3
CAP Advanced Philosophy/Religious Studies	3	CAP Integrative	3
CHM 480	1	CAP Advanced Philosophy/ Religious Studies	3
		CHM 490 (Satisfies CAP Major Capstone)	1
	17		**17**

Total credit hours: 132

Courses

CHM 101. Introductory General, Organic, and Biochemistry I. 3 Hours
The first semester of a two-semester course covering fundamentals of general, organic and biochemistry as they relates to the health sciences, human medicine, or science education. The topics include states of matter, scientific measurements, balancing chemical equations, acid-base properties of aqueous reactions, pH-scale, buffers, and intramolecular and intermolecular chemical bonding. Foundational general chemistry topics essential to understanding biological systems and health sciences are emphasized.

CHM 101L. Introductory General, Organic, and Biochemistry Laboratory I. 1 Hour
Laboratory course to complement CHM 101. Laboratory procedures reinforce concepts covered in lecture with an emphasis on relating chemistry to the health sciences and human medicine. One three-hour laboratory session each week. Corequisite(s): CHM 101.

CHM 102. Introductory General, Organic, and Biochemistry II. 3 Hours
The second part of a two-semester course that covers the fundamentals of general, organic and biochemistry subject areas. Topics include an introduction to chemical nomenclature, structure, and function of biologically relevant organic compounds including function and reactivity of chemical groups commonly encountered in living systems. This course will also cover fundamental components of cell structure, transcription and translation, and metabolism as it relates to chemical principles and reactivity. Several aspects of organic chemistry relevant to living organisms will be emphasized. Prerequisite(s): CHM 101.

CHM 102L. Introductory General, Organic, and Biochemistry Laboratory Course II. 1 Hour
Laboratory course to complement CHM 102, a lecture course which covers the fundamentals of general, organic and biochemistry as it relates to the health sciences or human medicine. One three-hour laboratory session each week. Prerequisites: CHM 101L. Corequisites: CHM 102.

CHM 115. College Prepatory Chemistry. 3 Hours
One-term course for students desiring to enter a science or engineering program but whose background is insufficient for CHM 123 and CHM 124. Unacceptable for credit toward chemistry requirements in any chemistry program.

CHM 115L. College Prepatory Chemistry Laboratory. 1 Hour
Course to accompany CHM 115 or to be elected by students in CHM 200 who lack previous chemistry laboratory experience. One three-hour laboratory each week.

CHM 123. General Chemistry. 3 Hours
Comprehensive treatment of the fundamentals of general chemistry. Prerequisite(s): One year of high school chemistry or equivalent.

CHM 123L. General Chemistry Laboratory. 1 Hour
Laboratory course to complement CHM 123. One three-hour laboratory session each week. Corequisite(s): CHM 123.

CHM 124. General Chemistry. 3 Hours
Comprehensive treatment of the fundamentals of general chemistry. Prerequisite(s): CHM 123.

CHM 124L. General Chemistry Laboratory. 1 Hour
Laboratory course to complement CHM 124. One three-hour laboratory session each week. Prerequisites: CHM 123L and CHM 123 and CHM 124 (can be taken concurrently).

CHM 190. Seminar I. 0 Hours
Overview of methods of scientific oral presentation and formal conversation within the molecular sciences professional community.

CHM 200. Chemistry & Society. 3 Hours
Examination of issues such as environmental quality, disease, hunger, synthetic materials, and law enforcement by the application of chemical principles. Course is for non-science majors. Depending upon background and experience, a student needing a laboratory course may enroll in SCI220L. Prerequisite(s): One year of high school chemistry or equivalent.

CHM 201. Quantitative Analysis. 3 Hours
Application of the principles of chemical equilibrium to the theory and techniques of gravimetric, volumetric, spectrophotometric, and electroanalytical methods of chemical analysis. Prerequisite(s): CHM 124, CHM 124L.

CHM 201L. Quantitative Analysis Laboratory. 1 Hour
Course to accompany CHM 201. One three-hour laboratory period each week.

CHM 234. Energy Resources. 3 Hours
The chemical and geological aspects of formation, production, and benefits/costs (including environmental impacts) of energy derived from fossil fuels (coal and hydrocarbons), biofuels (e.g., ethanol production), radioactive materials (nuclear power), and renewable sources (e.g., geothermal, hydro, wind, and solar power). Prerequisite(s): CHM 123, CHM 124. Corequisite(s): GEO 208.

CHM 290. Seminar II. 0 Hours
Overview of methods of scientific oral presentation and formal conversation within the molecular sciences professional community.

CHM 302. Physical Chemistry. 3 Hours
Essential elements of thermodynamics, chemical kinetics, equilibria, and electrochemistry for those with a primary interest in the life sciences. For B.A. chemistry majors and premedical, predental, and biology majors. Prerequisite(s): CHM 124.

CHM 302L. Physical Chemistry Laboratory. 1 Hour
Course to accompany CHM 302. One three-hour laboratory each week. Prerequisite(s): CHM 201, CHM 201L. Corequisite(s): CHM 302.

CHM 303. Physical Chemistry. 3 Hours
Fundamentals of thermodynamics, chemical kinetics, electrochemistry, and spectroscopy with a mathematics format. For B.S. chemistry and biochemistry majors and chemical engineers. Prerequisite(s): CHM 201 or equivalent. Corequisite(s): MTH 218.

CHM 303L. Physical Chemistry Laboratory. 1 Hour
Course to accompany CHM 303. One three-hour laboratory each week. Prerequisite(s): MTH 218.

CHM 304. Physical Chemistry. 3 Hours
Fundamentals of thermodynamics, chemical kinetics, electrochemistry, and spectroscopy with a mathematics format. For B.S. chemistry and biochemistry majors and chemical engineers.

CHM 304L. Physical Chemistry Laboratory. 1 Hour
Course to accompany CHM 304. One three-hour laboratory each week. Corequisite(s): MTH 218.

CHM 313. Organic Chemistry. 3 Hours
Major topics in organic chemistry including synthesis, mechanisms, stereochemistry, and spectroscopy. Required of all chemistry majors and students in the life sciences. Prerequisite(s): CHM 124.

CHM 313L. Organic Chemistry Laboratory. 1 Hour
Common separation, purification, and analytical techniques including chromatography and spectroscopy. One three-hour laboratory each week. Prerequisite(s): CHM 124, 124L Corequisite(s): CHM 313.

CHM 314. Organic Chemistry. 3 Hours
Major topics in organic chemistry including synthesis, mechanisms, stereochemistry, and spectroscopy. Required of all chemistry majors and students in the life sciences. Prerequisite(s): CHM 313.

CHM 314L. Organic Chemistry Laboratory. 1 Hour
Synthesis and characterization of organic materials utilizing skills from CHM 313L. One three-hour laboratory each week. Prerequisite(s): CHM 313L. Corequisite(s): CHM 314.

CHM 317. Spectroscopic Identification of Organic Compounds. 1 Hour
The use of nuclear magnetic resonance, infrared, and mass spectrometry in elucidating structures. Emphasis on interpretation and integration of spectral data in problem solving. Prerequisite(s): (CHM 314, CHM 314L) or equivalent.

CHM 319L. Advanced Organic Synthesis Laboratory. 1 Hour
Preparation of organic compounds by single and multi-step synthetic sequences. Basic techniques in synthesis including use of organometallics, inert atmosphere, temperature control, extraction, vacuum distillation, column chromatography, recrystallization, and spectroscopic characterization methods. One four-hour laboratory each week. Prerequisite(s): CHM 314, CHM 314L.

CHM 341. Environmental Chemistry. 3 Hours
An introduction to the chemical processes in the environment. Topics include chemical equilibrium in aqueous solution, reaction mechanisms as applied to atmospheric chemistry, and analytical methods commonly applied to environmental samples. Prerequisite(s): CHM 314 or permission of instructor.

CHM 341L. Environmental Chemistry Laboratory. 1 Hour
Laboratory course to accompany CHM 341. Corequisite(s): CHM 341.

CHM 390. Seminar III. 0 Hours
Overview of methods of scientific oral presentation and formal conversation within the molecular sciences professional community.

CHM 404. Special Topics in Physical Chemistry. 3 Hours
Thorough treatment of topics such as electrochemistry, macromolecules, photochemistry, or spectroscopy. May be repeated as topics change. Prerequisite(s): CHM 302 or CHM 303.

CHM 410. Biological Inorganic Chemistry. 3 Hours
An advanced course which considers the role of metal ions in biological and plant systems. For example, alkali and alkaline earth metal ions and their roles in membrane stabilization, nerve signals, and electrical gradients. Transition metal ions in metalloenzymes (superoxided dismutase, carbonic anhydrase, hemoglobin, hemocyanin) and their role in redox processes, transport, and catalysis. Metal complexes as therapeutics and imaging agents. Prerequisites: CHM 314.

CHM 412. Intermediate Organic Chemistry. 3 Hours
Modern theory and practice of organic chemistry. May include structure-reactivity relationships, reaction mechanism, and synthetic topics not normally treated in introductory courses. Prerequisite(s): CHM 302 or equivalent; CHM 313, CHM 314; senior standing.

CHM 415. Analytical Chemistry. 2 Hours
Chemical analysis based on modern instrumentation. Chromatographic, electrochemical, and spectroscopic methods. Prerequisite(s): CHM 201, CHM 201L; (CHM 302 or CHM 304).

CHM 415L. Analytical Chemistry Laboratory. 2 Hours
Course to accompany CHM 415. Two three-hour laboratory sessions each week. Prerequisite(s): CHM 201L; CHM 302 or equivalent.

CHM 417. Inorganic Chemistry. 3 Hours
An advanced course in modern inorganic chemistry. Atomic structure, principles of bonding and structure, acid-base chemistry, periodicity, coordination compounds, nonaqueous solvents, electrochemistry, molecular symmetry, organometallic compounds, and the chemistry of selected representative elements. Prerequisite(s): CHM 314. Corequisite(s): CHM 302 or CHM 304.

CHM 418L. Inorganic Chemistry Laboratory. 1 Hour
Laboratory course dealing with the synthesis and characterization of inorganic and organometallic compounds. Topics include vacuum and inert atmosphere techniques, separation and purification, spectroscopic characterization, X-ray diffraction, magnetic moment, and conductance measurements. Prerequisite(s): CHM 201L, CHM 314L. Corequisite(s): CHM 417.

CHM 420. Biochemistry. 3 Hours
The fundamental aspects of the chemistry and biochemistry of carbohydrates, lipids, proteins, and nucleic acids. Enzymology, protein purification, bioenergetics, metabolism of carbohydrates, lipids, amino acids, nucleotides and nucleic acids, elementary molecular biology, and control processes are described. Acceptable preparation for medical school. Prerequisite(s): CHM 314.

CHM 420L. Biochemistry Lab for the Medical Sciences. 1 Hour
A laboratory course to accompany CHM420, biochemistry. Prerequisite(s): CHM314, CHM314L. Corequisite(s): CHM420.

CHM 426. Biosynthetic Organic Chemistry. 3 Hours
Mechanistic fundamentals of the biosynthesis and transformation of organic natural products, with special emphasis on medicinal compounds, toxins, pheromones and other secondary metabolite structures. Prerequisite(s): (CHM 314, CHM 314L) or equivalent.

CHM 427. Medicinal Chemistry. 3 Hours
The chemical mechanisms of action of the major drug classes will be surveyed with particular emphasis on the facets of organic chemistry that control drug-receptor interactions, metabolism and mechanisms of toxicity and resistance. First term. Prerequisite(s): CHM 314; (CHM 420 or CHM 451).

CHM 438. Sustainability and Chemistry. 3 Hours
Chemical industrial practices drive many sustainability challenges in the near and long term. Many chemical technologies can address the sustainability of these practices as long as the costs (monetary and environmental) of such innovations are accurately presented and evaluated. Sustainability and Chemistry is an advanced 1 semester course describing chemical concepts and principles that underlie the foundations for a more sustainable world. This course analyzes the root chemical and societal causes of unsustainable practices in chemical transformations in our everyday life, and explores techniques to evaluate them. The core technologies discussed will be deeply integrated in the current environmental, economic, and social pillars of modern society. We will specifically address green chemistry principles with learning how to create and manage life cycle assessments (cradle to grave) with computational tools. We will also discuss molecular design to reduce hazards to the environment, and how we can establish practices to quantitatively evaluate the health and safety of core chemical technologies. Prerequisites: CHM 102 or CHM123 or any fundamental chemistry, sustainability, biology, or engineering courses that include sustainability ideas with permission.

CHM 450. Advanced Organic Synthesis. 3 Hours
Fundamentals of synthesis and transformations of organic compounds, with emphasis on mechanisms; pericyclic reactions; small and medium ring synthesis; chemoselectivity, regioselectivity, stereoselectivity, retrosynthesis, functional group transformations, carbon-carbon bond forming reactions, oxidations, reductions and protecting groups. Prerequisite: (CHM 314, CHM 314L) or equivalent.

CHM 451. General Biochemistry I. 3 Hours
Discussion of the chemistry and biochemistry of carbohydrates, amino acids, proteins, and nucleic acids, including health-science and methodologic aspects. Descriptions of enzymology, protein purification, and carbohydrate metabolism related to such topics as bioenergetics, membranes, and disease processes. Recommended for students desiring entry into graduate and professional schools. Prerequisite(s): CHM 201, CHM 314.

CHM 452. General Biochemistry II. 3 Hours
Discussion of selected topics in bioenergetics, and metabolism of lipids, amino acids, porphyrins, nucleic acids, and proteins. Current aspects of nutrition, biochemical genetics, endocrinology, regulation, and genetic engineering addressed and related to health-science topics as time permits. Suitable preparation for medical school. Prerequisite(s): CHM 451.

CHM 454. Rational Drug Design. 3 Hours
Introduction to drug target selection, lead compound discovery, and application of structure-activity relationships and computational chemistry towards refinement and optimization of lead compounds and their derivatives. Use of molecular graphics software and publicly available macromolecular structure databases will provide the foundation for evaluating macromolecular models of drug targets and allow a hands-on exploration of the structure/function relationships of proteins that have been successful targets of rational drug design. Prerequisite(s): (CHM 420 or CHM 452) or equivalent.

CHM 458. Metabolism and Human Disease. 3 Hours
This course examines the connections between metabolism, human disease and diet with an emphasis placed on current research related to these topics. Prerequisites: Undergraduate biochemistry course that covers metabolism CHM 420, CHM 452, HSS 307 or BIO 403.

CHM 462L. Biochemistry Laboratory. 1 Hour
Laboratory course to accompany biochemistry lecture courses. Spectrophotometry, pH and dissociation, enzymologic methodology and analytical techniques, chromatographic techniques. Corequisite(s): CHM 420 or CHM 451.

CHM 463L. Bioanalytical Chemistry Laboratory. 1 Hour
Introduction to analytical methods in current use in biochemistry. Course will focus on separations and spectroscopic methods for the analysis of biomolecules. Prerequisite(s): CHM 201, CHM 201L, CHM 302.

CHM 477. Honors Thesis Project. 3 Hours
First of two courses leading to the selection, design, investigation, and completion of an independent, original Honors Thesis project under the guidance of a faculty research advisor. Restricted to students in the University Honors Program with permission of the program director and department chairperson. Students pursuing an interdisciplinary thesis topic may register for three semester hours each in two separate disciplines in consultation with the department chairpersons. Prerequisite(s): Approval of University Honors Program.

CHM 478. Honors Thesis Project. 3 Hours
Second of two courses leading to the selection, design, investigation, and completion of an independent, original Honors Thesis project under the guidance of a faculty research advisor. Restricted to students in the University Honors Program with permission of the program director and department chairperson. Students pursuing an interdisciplinary thesis topic may register for three semester hours each in two separate disciplines in consultation with the department chairpersons. Prerequisite(s): Approved 477; approval of University Honors Program.

CHM 480. Professional Practices Seminar. 1 Hour
Practicum which culminates in the presentation of a technical talk on a topic in chemistry to peers and faculty members. Emphasis on the molecular scale of observation.

CHM 490. Seminar IV. 1 Hour
Presentation of a research topic during the weekly seminar series for the Department of Chemistry. Prerequisite(s): CHM 480.

CHM 495. Introduction to Research Seminar. 0 Hours
Research topics presented by visiting scientists and faculty, and the results of thesis research by senior students. Required of all junior chemistry and biochemistry majors in the B.S. programs. Grading Option two.

CHM 496. Professional Practices Seminar. 0 Hours
After discussions of the chemical literature and information retrieval, resumes, graduate education, and career opportunities, students present technical talks on topics with social, ethical, or historical implications. Required of all chemistry and biochemistry majors, both B.S. and B.A.

CHM 497. Research Seminar. 0 Hours
A series of seminars as described under CHM 495. Required of all senior chemistry and biochemistry majors in the B.S. programs.

CHM 498. Research & Thesis. 3 Hours
All students in the B.S. programs including co-op students are required to enroll for a minimum of three semester hours in a research course (CHM 498). Students may take additional research semester hours (CHM 499) if the work extends for more than two semesters. Successful completion of research courses requires the submission of a typewritten thesis and the presentation of a seminar. With the prior approval of the department chairperson, B.S. co-op students may substitute work experience for research. Prerequisite(s): Permission of department chairperson.

CHM 499. Research & Thesis. 1-3 Hours
All students in the B.S. programs including co-op students are required to enroll for a minimum of three semester hours in a research course (CHM 498). Students may take additional research semester hours (CHM 499) if the work extends for more than two semesters. Successful completion of research courses requires the submission of a typewritten thesis and the presentation of a seminar. With the prior approval of the department chairperson, B.S. co-op students may substitute work experience for research. Prerequisite(s): CHM 498; permission of department chairperson.