



Chemistry

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Chemistry is the central science linking mathematics and physics to the biological sciences. The creative insight of chemists into the substance of nature has led not only to an elegant model of the material world, but also to a valuable utility in everyday life. Our goal is to introduce students to the principles of chemistry and the processes of thought which have organized these principles into a coherent body of knowledge.

The chemistry program at Wheeling Jesuit University offers two degree paths — the bachelor of science degree (BS) and the bachelor of arts degree (BA). The BS degree is designed to prepare students for careers in chemistry. The program consists of 50-52 hours of chemistry and prepares students for graduate school or entry-level positions in industry. The BA degree, with 30-31 hours of chemistry, is more flexible. It is designed to prepare students for careers in medicine, dentistry, physical therapy, pharmacy, forensics, environmental science and chemical education.

Requirements for Chemistry Major Bachelor of Science Degree

Upon completion of the Chemistry program, students will be able to demonstrate the ability to:

1. Understand the principles and concepts fundamental to chemistry.
2. Apply lab techniques appropriate for an entry-level chemist.
3. Have problem-solving skills.
4. Be proficient in oral and written communication.

In addition to completing the core curriculum requirements, outlined on pp. 14-15 of this catalog, chemistry majors must complete the following courses:

CHE 110, 120	General Chemistry Lecture I, II	(8 crs)
CHE 121, 122	General Chemistry Lab I, II	(2 crs)
CHE 221, 222	Organic Chemistry Lecture I, II	(8 crs)
CHE 231, 232	Organic Chemistry Lab I, II	(2 crs)
CHE 315	Quantitative Analysis	(3 crs)
CHE 319	Quantitative Analysis Lab	(1 cr)
CHE 316	Instrumental Analysis Lecture	(3 crs)
CHE 317	Instrumental Analysis Lab	(1 cr)
CHE 321, 322	Physical Chemistry Lecture I, II	(8 crs)
CHE 331, 332	Physical Chemistry Lab I, II	(2 crs)
CHE 314	Biochemistry	(3 crs)
CHE 401	Inorganic Chemistry	(3 crs)
CHE 411	Inorganic Chemistry Lab	(1 cr)
CHE 480	Seminar	(1 cr)

Chemistry Option (one of the following):

CHE 318	Environmental Chemistry	(3 crs)
CHE 405	Advanced Inorganic Chemistry	(3 crs)
CHE 410	Advanced Biochemistry	(3 crs)
CHE 415	Advanced Organic Chemistry	(3 crs)
CHE 420	Advanced Physical Chemistry	(3 crs)

Required Lab or Project (one of the following):

CHE 344, 345	Biochemical Lab Projects I, II	(2 crs)
CHE 431, 432	Advanced Laboratory Techniques I, II	(4 crs)
CHE 477, 478	Senior Research Project I, II	(4 crs)

Other required courses:

MAT 111, 112	Calculus I, II	(8 crs)
PHY 110, 120	Physics Lecture I, II	(8 crs)
PHY 121, 122	Physics Lab I, II	(2 crs)

(68-70 crs)

Note: The program outlined above meets or slightly exceeds the requirements for certification by the American Chemical Society.

Requirements for Bachelor of Arts Degree in Chemistry

Upon completion of the BA degree program, students will be able to demonstrate the ability to:

1. Understand the principles and concepts fundamental to science, with an emphasis in chemistry.
2. Possess laboratory experiences appropriate for a person knowledgeable in science.
3. Have problem-solving skills.
4. Be proficient in oral and written communication.

The BA chemistry major is designed to be combined with a minor or a program rather than as a stand-alone program. The flexible nature of this program allows students to take courses in biology, education, computer science, math, business, etc. to prepare them for medical, dental, pharmacy and physical therapy schools. It is also a desired degree for those entering professions in forensics, environmental science and chemical education.

In addition to completing the core curriculum requirements outlined on pp. 14-15 of this catalog, BA chemistry majors must complete the following courses:

CHE 110, 120	General Chemistry I and II	(8 crs)
CHE 121, 122	General Chemistry Lab	(2 crs)
CHE 221, 222	Organic Chemistry I and II	(8 crs)
CHE 231, 232	Organic Chemistry Lab I and II	(2 crs)
CHE 315	Quantative Analysis	(3 crs)

CHE 319	Quantitative Analysis Lab	(1 cr)
CHE 321	Physical Chemistry I	(4 crs)
CHE	Approved 300-Level Electives	(2-3 crs)
MAT 111, 112	Calculus I and II	(8 crs)
PHY 110, 120	Physics I and II	(8 crs)
PHY 121, 122	Physics Lab I and II	(2 crs)
		(48-49 crs)

Requirements for a Minor in Chemistry

A minor in chemistry is recommended for students majoring in biology, physics, computer science, management, marketing, pre-engineering, pre-legal studies or professional writing.

The following chemistry courses must be completed: CHE 110, CHE 120, CHE 121, CHE 122, CHE 221, CHE 222, CHE 231, CHE 232 and either CHE 315 and CHE 319 or CHE 314 and CHE 344.

Core Fulfilling Courses

CHE 105	Intro. General, Organic and Biochemistry	(3 crs)
CHE 107	Intro. Chemistry for Non-science majors	(3 crs)
CHE 110	General Chemistry Lecture	(4 crs)

BS in CHEMISTRY - Recommended Course Sequence

	Freshman		Sophomore		Junior		Senior	
FALL	FYS 101	1	CHE 221	4	CHE Req. A*	8	CHE Req. A*	8
	CHE 110	4	CHE 231	1	LIT 250	3	RST Elective	3
	CHE 121	1	PHY 110	4	PHI 105	3	SSC Core	3
	MAT 111	4	PHY 121	1	FAS 101	1	FAS 20x	2
	ENG 105 or 110	3	MOL	3				
	HIS 110	3	Elective	3				
	Semester total	16		16		15		16
SPRING	CHE 120	4	CHE 222	4	CHE Req. B**	7-9	RST/PHI 305	3
	CHE 122	1	CHE 232	1	Global Persp.	3	CHE Req. B**	7-9
	MAT 112	4	PHY 120	4	PHI 205	3	Electives	6
	LIT 120	3	PHY 122	1	RST 106/107	3		
	HIS 120	3	MOL	3				
			Elective	3				
	Semester total	15		16		16-18		16-18
	Total Credits	31		32		31-33		32-34 126-128

* offered in alternate year blocks: [321, 331, 401] or [315, 319, 480, elective]

** offered in alternate year blocks: [322, 332, 411] or [316, 317, elective]

Course Descriptions

CHE 105 Intro. General, Organic & Biochemistry (3 crs)

A one-semester introduction to fundamental chemical principles necessary to describe the behavior of matter. Biochemical concepts and medical applications included as needed. Required for BSN majors.

CHE 107 Intro. Chemistry for Non-science Majors (3 crs)

Introductory chemistry course for the non-science major emphasizing applications of chemistry to problems involving environmental pollution, sources of energy, radioactivity and human health.

CHE 110, 120 General Chemistry (4 crs ea)

Modern concepts of atomic structure and chemical properties, chemical bonding, stoichiometry, chemical equilibrium and kinetics. For CHE 120, CHE 110 is a prerequisite.

CHE 121, 122 General Chemistry Lab (1 cr ea)

Qualitative and quantitative studies of chemical systems. Introduction to basic synthetic and instrumental chemical methods. For CHE 122, CHE 120 is a corequisite.

CHE 221, 222 Organic Chemistry Lecture (4 crs ea)

The study of the structure and reactions of organic compounds as described by modern theories of bonding and reactivity. Prerequisite: CHE 110 and 120 or equivalent.

CHE 231, 232 Organic Chemistry Lab (1 cr ea)

The techniques necessary to synthesize and identify organic compounds by both chemical and instrumental methods. Prerequisite: CHE 122 or equivalent. For CHE 231, CHE 221 is a corequisite. For CHE 232, CHE 222 is a corequisite.

CHE 312 Introductory Physical Chemistry (3 crs)

A basic course which develops the principles of thermodynamics, equilibrium and kinetics. Prerequisites: CHE 120 and 222, MAT 112, PHY 120.

CHE 314 Biochemistry (3 crs)

A basic course which develops concepts necessary for a description of macromolecular structure, biological regulatory processes and chemical biodynamics. Prerequisite: CHE 222.

CHE 315 Quantitative Analysis (3 crs)

Principles of quantitative analysis with a general introduction to instrumental methods. Emphasis on development of analytic skills as currently employed. Prerequisite: CHE 120 and 122 (BIO 315 is strongly recommended).

CHE 316 Instrumental Analysis (3 crs)

A lecture course in the theory and application of modern instrumental methods of separation and analysis. Prerequisites: CHE 315, PHY 120, PHY 122.

CHE 317 Instrumental Analysis Lab (1 cr)

A laboratory course in the theory and application of modern instrumental methods of separation and analysis. Corequisite: CHE 316.

BA in CHEMISTRY - Recommended Course Sequence

	Freshman		Sophomore		Junior		Senior	
FALL	FYS 101	1	CHE 221	4	CHE Req. A*	4	PHI 105	3
	CHE 110	4	CHE 231	1	Electives	4	RST Elective	3
	CHE 121	1	PHY 110	4	MOL	3	Elective	3
	Elective	3	PHY 121	1	RST 106/107	3	CHE Req. A*	4
	ENG 105 or 110	3	SSC Core	3	FAS	2	PHI 205	3
	HIS 110	3	MAT 111	4				
	Semester total	15		17		16		16
SPRING	CHE 120	4	CHE 222	4	CHE Elective	2-3	PHI 205	3
	CHE 122	1	CHE 232	1	Electives	4	PHI/RST 305	3
	Elective	3	PHY 120	4	MOL	3	Electives	9
	LIT 120	3	PHY 122	1	LIT 250	3		
	HIS 120	3	Global Persp.	3	FAS 101	1		
			MAT 112	4				
	Semester total	14		17		13-14		15
	Total Credits	29		34		29-30		31 123-125

* offered in alternate year blocks: [CHE 321] or [CHE 315, 319]

CHE 318 Environmental Chemistry (3 cr)

Basic chemistry of soils, atmosphere and natural waters. Changes resulting from pollution discharges. Chemical perspectives on environmental problems. Prerequisite: CHE 120 and 122.

CHE 319 Quantitative Analysis Lab (1 cr)

A laboratory course involving the principles of quantitative analysis and an introduction to instrumental methods. Prerequisites: CHE 120 and 122. Corequisite: CHE 315.

CHE 321, 322 Physical Chemistry Lecture (4 crs ea)

Modern concepts of molecular structure, chemical thermodynamics, equilibrium and kinetics. Prerequisites: CHE 120/222, MAT 112, PHY 120

CHE 331, 332 Physical-Instrumental Measurements Lab (1 cr ea)

Experiments in physical-chemical measurements with an emphasis on instrumental methods. Prerequisites: CHE 122, CHE 232, PHY 122.

CHE 344, 345 Biochemical Lab Projects I & II (1 cr ea)

Directed experiments to illustrate basic testing procedures performed in hospitals and research biochemistry laboratories. Experimental test results related to actual patient case histories will provide for meaningful discussions about medical biochemistry in health and disease. Pre/Corequisite for I is CHE/BIO 314; Prerequisite for II is CHE 344.

CHE 401 Inorganic Chemistry (3 crs)

Modern concepts of bonding and structure in inorganic compounds, reactivity and reaction mechanisms, acid-base and solid state chemistry. Prerequisite: CHE 222.

CHE 405 Advanced Inorganic Chemistry (3 crs)

An advanced topics lecture course in inorganic chemistry. Prerequisites: CHE 401.

CHE 410 Advanced Biochemistry (3 crs)

An advanced topics lecture course in physical biochemistry. Prerequisite: CHE 314.

CHE 411 Inorganic Chemistry Laboratory (1 cr)

A laboratory course providing experience in the synthesis of significant inorganic compounds and the techniques of various experimental and spectroscopic methods. Corequisite: CHE 401.

CHE 415 Advanced Organic Chemistry (3 crs)

An advanced topics lecture course in physical-organic chemistry. Prerequisites: CHE 222.

CHE 420 Advanced Physical Chemistry (3 crs)

An advanced topics lecture course in physical chemistry. Prerequisite: CHE 322.

CHE 431, 432 Advanced Lab Techniques I & II (1 or 2 crs ea)

Directed experimental projects in the synthesis of organic and inorganic compounds. Emphasis on instrumental characterization. Prerequisite: CHE 317.

CHE 477, 478 Senior Research Project I and II (2 crs ea)

Directed research projects. A seminar and the satisfactory completion of an original paper are integral parts of each course. Prerequisite: Senior standing as a major.

CHE 450 Thesis

Completion of senior research project resulting in an undergraduate research thesis. Prerequisites: Senior standing, permission.

CHE 480 Seminar (1 cr)

Seminar presentations by faculty and chemists from industry and other academic institutions; student presentations on their undergraduate research and literature topics. Prerequisite: Senior standing as major or permission.

NOTE: Without passing grades in prerequisites, 400-level chemistry courses may be taken only on a credit/no-credit basis.

Clinical Science

Course Descriptions

CLS 121 Introduction to Hospital Science (2 crs)

The duties and responsibilities of various health care professions; introduction to medical terminology; seminars, speakers and field trips. For 3 hours credit, an introduction to the use of computers in the hospital, college and personal settings is added.

CLS 130 (PHY 130) Physics for Allied Health (3 crs)

General physical principles with special emphasis on gas laws, flow principles, fluidics, the use of formulae and how they apply to nuclear medicine technology and respiratory therapy.

CLS 215 Concepts of Epidemiology and Microbiology (2 crs)

The recognition of normal flora occurring on/within the human body, invasion processes, control mechanisms for the prevention of the spread of microorganisms and the effects of the infection by certain specific microbes will be covered. Principles of immunology are covered as well.

CLS 234 (BIO 234) Pathophysiology (3 crs)

A survey of disease processes which affect tissues, organs, or the body as a whole. Prerequisites: BIO 128 and BIO 129, or equivalent. A system-wide approach with interactions.

CLS 311 Introduction to Pharmacology (1 cr)

Principles of drug actions and reactions.

CLS 312 Emergency Life Support Techniques (3 crs)

Emergency procedures for first responders. Includes cardiopulmonary resuscitation.

CLS 320 Management Techniques for the Health Sciences (2 crs)

An introduction to the principles, practices and problems of management encountered in the allied health professions.

CLS 330 Principles of Instruction (2 crs)

An introduction of educational methods, techniques and their application to a clinical setting, academic classroom or professional arena. This class offers a systematic approach to instruction, presentation, teaching and methods of practice as it relates to educational instruction or professional seminars. This course also includes a service learning project.