

CHEMISTRY

The courses offered by the Department of Chemistry are designed for the student to attain: 1) knowledge and understanding of the basic concepts of chemistry, basic instrumentation, and analytic and synthetic methods used in chemistry; 2) knowledge and use of safety procedures and respect for hazardous chemicals and their interaction with the environment; 3) skills in problem-solving, accessing and organizing information, and communicating as a science professional; and 4) an appreciation of the importance of the field of chemistry in today's society.

Since these objectives are all included to some degree in every course, majors in other areas of science, education, and nursing, as well as chemistry, will be adequately prepared in terms of the supportive knowledge and skills needed for their respective areas of study.

MAJOR IN CHEMISTRY (53 credits)

REQUIRED: 14 courses (49 credits)

CHM 121 & 122 General Chem I & II

CHM 233 & 234 Organic Chem I & II

CHM 246 Quantitative Analysis

ESS 121 Mechanics & Heat

ESS 122 Optics

CHM 367 & 368 Physical Chem I & II

CHM 440 Instr Methods of Analysis

CHM 455 Research in Chem

CHM 460 Seminar in Chem

MTH 125 Calculus I

MTH 126 Calculus II

ELECTIVES: Any 4 credits in Chemistry.

MINOR IN CHEMISTRY (18 credits)

REQUIRED: 2 courses (8 credits)

CHM 121 & 122 General Chem I & II

ELECTIVES: Any 10 credits in Chemistry except CHM 101, 255, and 455
(CHM 246 is strongly recommended).

Physical Science Teaching: The Chemistry major coupled with a minor in education will lead to a license to teach physical science (chemistry & physics) at the middle school and high school levels. This program of study coupled with Core 5 covers all six areas required by the state of Indiana (Structure of Atoms, Structure & Properties of Matter, Chemical Reactions, Motions of Forces, Laws of Thermodynamics, Interactions of Energy & Matter) for a license to teach Physical Science at the middle school, junior high and high school levels. A second license to teach Life Science can be obtained with a minor in biology or a second license in Earth/Space Science can be obtained with a minor in earth science.

The minimum requirements for a teaching license in Physical Science is a major and minor or group-major in the Natural Science Division plus an education minor with the following distribution of courses:

REQUIRED: 23 credits of Physical Science courses (fulfills a chemistry minor and may be accomplished with a biology, biology-chemistry) that must include:

CHM 121-122 Gen Chemistry ESS 121-122 Physics CHM 233 Organic Chem I

3-4 credits from:

CHM 234 Organic Chem II	CHM 367 Phs. Chem I
CHM 246 Quant Analysis	Physics elective
CHM 379 Biochemistry	

COURSE DESCRIPTIONS

(Any course stated to be a prerequisite must be completed with a grade of C- or better.)

101. Introduction to General Chemistry **3 credits**

This is an introduction to general chemistry and may serve as a preparation for students to take CHM 121. It covers topics in general chemistry including metric conversions, atomic structure, bonding, chemical and physical changes, gases, solutions, acids and bases. **Prerequisites: high school chemistry.**

121. General Chemistry I **4 credits**

This course combines the basic concepts of chemistry with practical application of these concepts in the laboratory. It is intended to build upon a foundation of high school chemistry. **Prerequisite: high school chemistry.**

122. General Chemistry II **4 credits**

This course is a continuation of Chemistry 121 or an equivalent.

Prerequisite: CHM 121.

233. Organic Chemistry I **4 credits**

A study of the structure, naming, properties, and reactions of aliphatic and aromatic hydrocarbons. The material presented in the lecture will be supplemented by application studies in the laboratory with representative compounds. **Prerequisite: CHM 122.**

234. Organic Chemistry II **4 credits**

A study of the structure, naming, properties, and reactions of the functional groups of organic compounds. A study of these properties and reactions will be directed in the laboratory where spectroscopic methods will also be introduced. **Prereq: CHM 233.**

246. Quantitative Analysis **4 credits**

A study of the theoretical principles upon which analytical methods are based. Included are a survey of the field of analytical chemistry and a detailed investigation of the standard methods. Volumetric, gravimetric and electroanalytical experiments are carried out in the laboratory. **Prerequisite: CHM 122.**

255. Independent Study **1-3 credits**

350. Inorganic Chemistry **2 credits**

This course provides an introduction to the foundations of inorganic chemistry, including topics in Coordination Chemistry, Organometallic Chemistry and Bioinorganic Chemistry. Emphasis will be given to the understanding of topics including the 18-electron rule, ligands, geometric isomers, oxidative addition and reductive elimination reactions, and Ligand Field Theory. **Prerequisite: CHM 234.**

367. Physical Chemistry I **4 credits**

A fundamental course based on the principles of physical chemistry. The role of energy in chemical reactions is treated both from the descriptive and the analytical viewpoints. **Prerequisites: CHM 246, MTH 126, and ESS 122.**

368. Physical Chemistry II **4 credits**

A continuation of Chemistry 367. This course emphasizes atomic and molecular structure and reaction dynamics. **Prerequisite: CHM 367.**

379. Biochemistry (BIO 379) **4 credits**

A study of the chemistry and properties of carbohydrates, amino acids, proteins, lipids, and nucleic acids as they relate to cellular metabolism and organelles. Examination of molecular structure and active sites of some model enzyme systems and a study of intermediary metabolism and its control mechanisms are included.

Prerequisite: BIO 111, 112 and CHM 233 (CHM 234 preferred).

380. Introduction to Medicinal Chemistry **3 credits**

This course is an introduction to the chemistry of medicinal substances. Emphasis is given to structural features of these substances and how they interact with body tissues. Coverage also includes dosage forms and drug metabolism. **Prerequisite: CHM 234.**

440. Instrumental Methods of Analysis **4 credits**

A study of the principles of chemistry underlying the use of instruments in analysis and a survey of the field. The laboratory work consists of analyses carried out with representative instruments. **Prerequisite: CHM 246.**

455. Research in Chemistry **1-2 credits**

This is an individual research project on some special problems in chemistry. The student makes a thorough search of the literature and carries out the experiments needed to reach a conclusion. Progress reports are made and discussed with the faculty director. Can be repeated. **Prerequisite: consent of instructor.**

458. Topics: Chemistry **1-3 credits**

460. Seminar in Chemistry **1 credit**

A seminar which focuses on chemical literature and careers in chemistry and related fields. Students will conduct literature research and present their results in writing and orally to the students and faculty of the department. Discussion topics include literature usage, writing in chemistry, professional ethics and research honesty, career exploration, job searching, resumes, and interviewing. Students may propose relevant topics for discussion. **Junior or senior standing required.**