

## **Chemistry Academic Learning Compact**

The chemistry program at New College encourages and develops independence, scientific judgment, and a high level of performance. From the beginning, students work closely with faculty in a non-competitive environment, learning the skills and techniques necessary for scientific work. Tutorials, Independent Study Projects, and the senior thesis provide opportunities for intensive study on specific topics and original laboratory research.

Laboratories are well equipped for organic, inorganic, and physical chemistry projects as well as for biochemistry and molecular biology. Students also have access to research grade instruments in laboratory courses and research projects. Research facilities include a 60 MHz and a 250 MHz NMR spectrometer, a Silicon Graphics workstation; several FTIR and UV-visible spectrophotometers, a fluorimeter, an ellipsometer, high-pressure liquid chromatographs, an inert atmosphere glove box, electrochemical equipment, a GC-MS, a real-time PCR machine, and a digital imaging system.

Courses offered in the core program in chemistry include General Chemistry I and II, Organic Chemistry - Structure and Reactivity I and II, Inorganic Chemistry, Physical Chemistry I and II, and Biochemistry I. General, Organic, Inorganic, and Physical Chemistry are each accompanied by separate laboratory courses. Other courses offered include Chemistry and Society, Environmental Chemistry, Advanced Organic Chemistry, Biochemistry II, Biochemistry Laboratory, and Bioinorganic Chemistry. Recent tutorials have been conducted in Structure Elucidation, Chemical Applications of Group Theory, Surface Chemistry, Photochemistry, Polymer chemistry, Main Group Inorganic Chemistry, and Molecular Biology. Many opportunities are available for laboratory research tutorials.

A concentration in chemistry begins with a two-semester (Fall and Spring) General Chemistry sequence, along with General Chemistry Laboratory during Spring Semester. During the second year, students take two semesters of Organic Chemistry - Structure and Reactivity, along with the Chemistry Inquiry Laboratory in the fall and Organic Laboratory in the spring.

For students with little experience in the natural sciences, Chemistry and Society presents chemistry within the context of society and the environment. Chemistry and Society and General Chemistry I satisfy the Liberal Arts Curriculum requirement.

An Area of Concentration in chemistry normally includes the General and Organic Chemistry sequences; Physical Chemistry I and II (with lab); Inorganic Chemistry (with lab); Biochemistry I; one additional advanced chemistry course; one Independent Study Project in chemistry; and a senior thesis. Calculus I, II, and III and Physics I and II (with lab) are also required. Students typically complete other advanced courses or tutorials in chemistry, biology, physics, mathematics, or languages, and often do a second ISP in chemistry. Joint and double areas of concentration may be accomplished by arrangement with the chemistry faculty.

### **Expected outcomes:**

Expected outcomes of an area of concentration in chemistry are the following:

1. Students demonstrate appropriate undergraduate mastery of the content of organic, inorganic, physical chemistry, instrumental methods, and biochemistry.
2. Students demonstrate laboratory skills including use of instrumentation, recording of experimental work, synthesis and characterization of compounds and analysis of experimental results.
3. Students demonstrate ability to communicate effectively about chemistry in oral presentations and written reports.

4. Students complete an original piece of scientific research, write up their results in a senior thesis, and defend their work in an oral exam.
5. Students are able to apply basic chemical principles and analytical skills to relevant life activities.
6. The expected outcomes include competency in content knowledge, communication skills, and critical thinking skills. The table below correlates required courses for the area of concentration with each of these demonstrated competency areas.

Required Courses	Content*	Critical Thinking*	Communication Skills*
General Chemistry I and II	X	X	
General Chemistry Laboratory	x	x	x
Organic Chemistry I and II	X	X	x
Chemical Inquiry Laboratory	x	x	x
Organic Chemistry Laboratory	x	x	x
Inorganic Chemistry	X	X	x
Inorganic Chemistry Laboratory	x	x	X
Biochemistry I	X	X	X
Physical Chemistry I and II	X	X	
Physical Chemistry Laboratory	x	x	X
Other Courses			
Chemistry and Society	x	x	x
Biochemistry II	X	X	X
Biochemistry Laboratory	x	x	X
Chemistry Seminar		x	X

\*The symbol X indicates that the skill is emphasized in the course.

#### Measures to track student progress:

The chemistry faculty track student progress toward satisfactorily completing an area of concentration in chemistry using the following methods: satisfactory evaluations in required courses; American Chemistry Society exam scores in Organic, Biochemistry, and Physical Chemistry; a review of academic performance during the 5<sup>th</sup> semester with the Provisional Area of Concentration form; and a review of academic performance during the 6<sup>th</sup> semester with the Thesis Prospectus form.

#### Measures to demonstrate each graduate's competencies:

The chemistry faculty use the oral baccalaureate exam and the written thesis project as measures of evidence to demonstrate student competencies.