There are six core areas. These are:

- analytical chemistry,
- biochemistry,
- environmental chemistry,
- inorganic chemistry,
- organic chemistry, and
- physical chemistry.

Students enrolled in the research/thesis option must take one course from three different core areas; non-thesis option students must take one course from five of the core areas.

Seminar
All students are required to register for seminar (CHEM 690, one credit, pass/fail) and attend departmental seminars for one semester.

Research and Thesis
During their first semester (and not later than the end of their first academic year), students electing the Research/Thesis Option are required to interview the chemistry graduate faculty, choose a graduate faculty research advisor, and select a research committee in consultation with their advisor and the Graduate Program Director. Upon completion of their research, students must write a formal thesis describing their research, present their work in a public seminar, and pass an oral examination by their research committee.

Non-Thesis Option
Not later than the end of their first academic year, students electing the Non-Thesis Option are required to interview the chemistry graduate faculty and choose an independent study advisor. Non-thesis students and their independent study advisor will then agree upon an independent study project. Upon completion of their independent study project, non-thesis students must write a formal Independent Study Report acceptable to their independent study advisor and the Graduate Studies Committee and pass an oral exam on their project.

Master of Science in Education - Chemistry Major
Refer to the Darden College of Education section of this catalog (http://catalog.odu.edu/previous/2014-2015/graduate/dardencollegeofeducation) .

Doctor of Philosophy – Chemistry
The Ph.D. program in Chemistry prepares students in the application of chemical principles to address many of society’s technical, environmental, and biomedical problems. Students will be able to provide leadership in industrial, governmental, and educational institutions in directing research and/or development to solve these problems. The Ph.D. degree in Chemistry is granted to students who have:

1. mastered advanced knowledge of definite sub-fields of chemistry
2. become familiar with research in these specific fields and developed perceptions of opportunities for further scientific advances
3. demonstrated the capacity to perform original, independent, and scholarly scientific investigation in their specific field and interpret their results.

All students admitted to the program must read and understand the regulations and policies described here and elsewhere throughout this catalog relevant to Old Dominion University’s requirements for Ph.D. degrees. The essential credit requirements for the Chemistry Ph.D. are:

A minimum of 78 credit hours beyond the Bachelor’s degree, and 48 credit hours beyond the Master’s degree.

Admission
An application (www.admissions.odu.edu ), transcripts, three letters of recommendation from former college instructors, an essay about career goals and Graduate Record Examination (GRE) scores (aptitude section) are required for consideration of admission to the program. Admission to regular status requires a grade point average of 3.00 in the major and 3.00 overall (based on a 4.00 scale). General university admission requirements...
apply. In addition, a bachelor’s degree (or equivalent) with a major in chemistry (or another science) is required, although applications from majors in all science disciplines are encouraged. Undergraduate courses in inorganic chemistry, organic chemistry, analytical chemistry (quantitative and instrumental analysis), physical chemistry, and calculus are required for regular admission. Deficiencies in any of these areas will be identified and must be rectified by taking undergraduate coursework in these areas.

**Program Requirements**

**Writing Proficiency Policy**

The departmental graduate committee will request a writing sample from each new student. If the graduate committee feels that remedial assistance in writing is needed, the student will be referred to the Writing Center.

**Courses**

A minimum of 78 semester hours beyond the undergraduate degree or 48 hours past the master`s degree is required by this program. The broad requirements for granting the Ph.D. are as follows:

- satisfactory performance in core and elective courses,
- successful completion of both written and oral portions of the Candidacy Examination,
- completion of the dissertation prospectus,
- and completion of a satisfactory dissertation and defense of the dissertation.

Students who earn grades of C+ or lower in any two graduate courses will not be allowed to continue in the Ph.D. program.

**Core Courses**

Students must choose one course from three different core areas. The core areas are:

- analytical chemistry,
- biochemistry,
- environmental chemistry,
- inorganic chemistry,
- organic chemistry, and
- physical chemistry.

Classes from each area are listed on the following pages.

**Elective Courses**

Students are required to take nine credit hours of elective courses. The courses are to be chosen upon consultation with their advisor and/or their guidance committee.

**Teaching**

Students are required to spend at least one semester as a teaching assistant.

**Seminar**

All students are required to register for seminar CHEM 890 (one credit, graded pass/fail) and attend departmental seminars throughout their graduate career. Twice during their career, students will register for CHEM 891 (two credits) and present a seminar, which will receive a letter grade. In the second year, students will give a background literature talk on their research. The second semester of CHEM 891 may not be taken in the same semester as graduation.

**Advisor Selection**

During their first semester (and not later than the end of their first semester), students are required to interview the chemistry graduate faculty (a signed sheet of at least three faculty members is required), choose a graduate faculty research advisor, and select a guidance committee in consultation with their advisor and the Graduate Program Director.

**Candidacy Examination**

A student admitted to the Ph.D. program in chemistry becomes a candidate for the Ph.D. degree by passing the Ph.D. Candidacy Examination. This examination consists of a written portion and oral portion. The student is required to submit a written description of a novel research idea in the form of a grant proposal, and then present and defend the idea to his or her guidance committee.

**Dissertation**

The dissertation is the final and most important part of the work required for the Doctor of Philosophy degree in chemistry. The dissertation must be based on original research and make a contribution to existing knowledge of sufficient interest to warrant publication in a refereed journal. The candidate normally works closely with the research advisor, who is chair of the dissertation committee.

**Dissertation Defense**

The final examination of the candidate consists of the oral defense of the dissertation. This public examination is conducted by the dissertation committee with the research advisor serving as chair.

**Doctor of Philosophy - Biomedical Sciences**

Robert E. Ratzlaff, Graduate Program Director

In this interdisciplinary program all students are required to master a broad knowledge of the basic biomedical sciences. Refer to the College of Sciences (http://catalog.odu.edu/graduate/collegeofsciences) section of this catalog for details.