School of Natural Sciences and Mathematics

Chemistry (BA, BS)

The Chemistry major builds on a base of chemistry, physics, mathematics, and computer science to provide the student the opportunity to develop essential theoretical and practical skills in the subdisciplines of organic, physical, inorganic, analytical, and macromolecular chemistry. Typically, the practice of chemistry in industry deals with the synthesis, analysis, and control of the many materials used in our technological society.

The Chemistry program at UT Dallas is designed to instruct the student in how chemical experiments are performed, how results are interpreted, and through its integrated laboratory sequence, to emphasize the importance of one subdiscipline in solving problems inherent to another. Meeting these goals, the Chemistry program provides the student with the flexibility to enter industry, go on to graduate school, or pursue medical, dental, and other degrees in the health sciences.

Degrees

The Chemistry major may choose a program leading either to the BA or BS degree. The latter degree sequence has been approved by the American Chemical Society’s Committee on Professional Training.

BA Program

The BA program offers the minimum fundamental knowledge required for adequate professional function in a career in chemistry. It is possible that students choosing this option may, through suitable use of unspecified semester credit hours, prepare for careers in areas as varied as chemistry-related businesses, government, medicine and dentistry, secondary school teaching, and even law or politics.

BS Program

The BS program provides more intensive training in chemistry for the student who intends either to obtain employment at the bachelor’s level in the chemical industry or to pursue graduate study.

Bachelor of Arts or Bachelor of Science in Chemistry

Degree Requirements (120 semester credit hours)
Faculty

Distinguished Chair in Natural Sciences and Mathematics; Dean of the School of Natural Sciences and Mathematics: Bruce M. Novak

Cecil and Ida Green Distinguished Chair in Systems Biology; Professor of Chemistry: A. Dean Sherry

Professors: Kenneth J. Balkus Jr., Julia Chan, Rockford K. Draper, John P. Ferraris, Inga H. Musselman, Mihaela C. Stefan, Jie Zheng

Associate Professors: Jung-Mo Ahn, Michael C. Biewer, Gregg R. Dieckmann, Warren J. Goux, Steven O. Nielsen, Paul Pantano, John W. Sibert IV, Ronald A. Smaldone

Assistant Professors: Sheena D'Arcy, Sheel Dodani, Jeremiah J. Gassensmith, Jiyong Lee, Gabriele Meloni

Research Professor: Duck Joo (D. J.) Yang

Senior Lecturers: Sergio Cortes, Sandhya R. Gavva, Nimanka Panapitiya, Yanping Qin, Amandeep Sra, Claudia Taenzler

Professor Emeritus: Richard A. Caldwell

I. Core Curriculum Requirements: 42 semester credit hours

Communication: 6 semester credit hours

   COMM 1311 Survey of Oral and Technology-based Communication
   RHET 1302 Rhetoric

Mathematics: 3 semester credit hours

   MATH 2417 Calculus I
   or MATH 2413 Differential Calculus

Life and Physical Sciences: 6 semester credit hours

   CHEM 1311 General Chemistry
   or CHEM 1315 Honors Freshman Chemistry
   CHEM 1312 General Chemistry II
   or CHEM 1316 Honors Freshman Chemistry II

2 https://catalog.utdallas.edu/2019/undergraduate/programs/nsm/chemistry
Language, Philosophy and Culture: 3 semester credit hours
Select any 3 semester credit hours from Language, Philosophy and Culture core courses (see advisor)

Creative Arts: 3 semester credit hours
Select any 3 semester credit hours from Creative Arts core courses (see advisor)

American History: 6 semester credit hours
Select any 6 semester credit hours from American History core courses (see advisor)

Government / Political Science: 6 semester credit hours

  GOVT 2305 American National Government
  GOVT 2306 State and Local Government

Social and Behavioral Sciences: 3 semester credit hours
Select any 3 semester credit hours from Social and Behavioral Sciences core courses (see advisor)

Component Area Option: 6 semester credit hours

  MATH 2417 Calculus I\(^3\), \(^4\)
  or MATH 2413 Differential Calculus\(^3\), \(^4\)
  MATH 2419 Calculus II\(^3\), \(^4\)
  or MATH 2414 Integral Calculus\(^3\), \(^4\)
  PHYS 2125 Physics Laboratory I\(^3\), \(^5\)
  or PHYS 2421 Honors Physics I - Mechanics and Heat\(^6\)

II. Major Requirements: BS 62-65 semester credit hours; BA 61-65 semester credit hours

Major Preparatory Courses: 28-30 semester credit hours beyond Core Curriculum

  CHEM 1111 General Chemistry Laboratory I
  or CHEM 1115 Honors Freshman Chemistry Laboratory I
  CHEM 1112 General Chemistry Laboratory II
  or CHEM 1116 Honors Freshman Chemistry Laboratory II
  CHEM 1311 General Chemistry I\(^3\), \(^5\)
or **CHEM 1315** Honors Freshman Chemistry I<sup>3, 5</sup>

**CHEM 1312** General Chemistry II<sup>3, 5</sup>

or **CHEM 1316** Honors Freshman Chemistry II<sup>3, 5</sup>

**CHEM 2123** Introductory Organic Chemistry Laboratory I<sup>7</sup>

**CHEM 2125** Introductory Organic Chemistry Laboratory II<sup>7</sup>

**CHEM 2323** Introductory Organic Chemistry I<sup>7</sup>

**CHEM 2325** Introductory Organic Chemistry II<sup>7</sup>

**CHEM 2401** Introductory Quantitative Methods in Chemistry

**MATH Sequence - Students may choose one of the following sequences:**

I. **MATH 2413** Differential Calculus<sup>3, 4</sup>
   
   and **MATH 2414** Integral Calculus<sup>3, 4</sup>
   
   and **MATH 2415** Calculus of Several Variables
   
   and **MATH 2418** Linear Algebra
   
   or **STAT 2332** Introductory Statistics for Life Sciences

OR

II. **MATH 2417** Calculus I<sup>3, 4</sup>
   
   and **MATH 2419** Calculus II<sup>3, 4</sup>
   
   and **MATH 2451** Multivariable Calculus with Applications
   
   and **MATH 2418** Linear Algebra
   
   or **STAT 2332** Introductory Statistics for Life Sciences

   **PHYS 2325** Mechanics<sup>8</sup> and **PHYS 2125** Physics Laboratory I<sup>9, 10</sup>
   
   or **PHYS 2421** Honors Physics I - Mechanics and Heat<sup>8, 11</sup>

   **PHYS 2326** Electromagnetism and Waves
   
   or **PHYS 2422** Honors Physics II - Electromagnetism and Waves

   **PHYS 2126** Physics Laboratory II

**Major Core Courses: 11 semester credit hours**

**CHEM 3321** Physical Chemistry I

**CHEM 3471** Advanced Chemical Synthesis Laboratory

**CHEM 3472** Instrumental Analysis
Major Related Courses: BS 23-24 semester credit hours; BA 22 semester credit hours

Bachelor of Arts: 22 semester credit hours

- **BIOL 3361** or **CHEM 3361** Biochemistry I
- or **CHEM 4335** Polymer Chemistry
- **BIOL 3161** Biochemistry Workshop I
- **CHEM 3341** Inorganic Chemistry I
- or **CHEM 3322** Physical Chemistry II

Guided Electives: 15 semester credit hours

May be used in (partial) fulfillment of a Second Major, Minor or Teaching Certificate

Bachelor of Science: 23-24 semester credit hours beyond Core Curriculum

- **CHEM 3322** Physical Chemistry II
- **CHEM 3341** Inorganic Chemistry I
- **BIOL 3361** or **CHEM 3361** Biochemistry I
  - and **BIOL 3161** Biochemistry Workshop I
- **CHEM 4473** Physical Measurements Laboratory
- **CHEM 4390** Research and Advanced Writing in Chemistry
  - or **CHEM 4399** Research and Advanced Writing in Chemistry for Honors Students
- **CHEM 4V91** (3 semester credit hours) Research in Chemistry
- **BIOL 3362** or **CHEM 3362** Biochemistry II
  - and **BIOL 3162** Biochemistry Workshop II
  - or **CHEM 4335** Polymer Chemistry
  - or **CHEM 4355** Computational Modeling

III. Elective Requirements: BS 13-16 semester credit hours; BA 14-17 semester credit hours

6 semester credit hours must be outside the major and be upper-division and/or have prerequisites.

For BS: 17 semester credit hours needed if enroll in **STAT 2332** in Math Sequence (II. Major Requirements); 16 semester credit hours needed if enroll in **MATH 2418** in Math Sequence.
For BA: 18 semester credit hours needed if enroll in \textbf{STAT 2332} in Math Sequence (II. Major Requirements); 17 semester credit hours needed if enroll in \textbf{MATH 2418} in Math Sequence.

The plan must include sufficient upper-division courses to total 51 upper-division semester credit hours.

\textbf{UTeach Option}

The \textbf{UTeach option} may be added to either the BA or BS degree. UTeach Dallas Option degree plans are streamlined to allow students to complete both a rigorous Bachelor of Science or Bachelor of Arts degree and all coursework for middle or high school teacher certification in four years. Teaching Option degrees require deep content knowledge combined with courses grounded in the latest research on math and science education. While most graduates go on to classroom teaching, UTeach alums are also prepared to enter graduate school and to work in discipline related industry.

\textbf{Fast Track Baccalaureate/Master's Degrees}

Undergraduate students at UT Dallas with strong academic records who intend to pursue the MS in Chemistry at UT Dallas may apply for a Fast Track plan of study which involves taking selected graduate courses as an upper-level student. After Fast Track admission to the graduate program, 15 semester credit hours of graduate courses with an earned grade of B or better can be used toward completion of the baccalaureate degree and to satisfy requirements for the master's degree. Interested students should contact the undergraduate advisor well in advance of the junior year to prepare a sequence permitting maximal advantage to be taken of the catalog's regulations (see \url{catalog.utdallas.edu/2019/undergraduate/policies/graduate-courses}) regarding Undergraduate Registration for Graduate Courses.

1. Incoming freshmen must enroll and complete requirements of UNIV 1010 and the corresponding school-related freshman seminar course. Students, including transfer students, who complete their core curriculum at UT Dallas must take UNIV 2020.

2. Curriculum Requirements can be fulfilled by other approved courses from institutions of higher education. The courses listed are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at UT Dallas.

3. A required Major course that also fulfills Core Curriculum requirements. If semester credit hours are counted in the Core Curriculum, students must complete additional coursework to meet the minimum requirement for graduation. Course selection assistance is available from the undergraduate advisor.

4. Three semester credit hours of Calculus are counted to fulfill the Mathematics Core Requirement with the remaining five semester credit hours to be counted under Component Area Option Core.

5. Six semester credit hours of Chemistry are counted under Science core, and one semester of Physics (PHYS 2125) is counted under Component Area Option core.

6. Students may use PHYS 2421 as part of the component area core curriculum requirement instead of PHYS 2125 if
they choose that Physics sequence.

7. Indicates a prerequisite class to be completed before enrolling for upper-division classes.

8. Students will take one of the two Physics sequences: PHYS 2325 and PHYS 2326 or PHYS 2421 and PHYS 2422 with accompanying labs.

9. A required Major course that also fulfills Core Curriculum requirement. Semester credit hours are counted in the Core Curriculum.

10. Six semester credit hours of Chemistry are counted under Science core, and one semester of Physics (PHYS 2125) are counted under Component Area Option core.

11. Students who complete PHYS 2421 do not need to complete PHYS 2125.

12. Research in Chemistry (CHEM 4V91), Research and Advanced Writing in Chemistry (CHEM 4390), and Research and Advanced Writing in Chemistry for Honors Students (CHEM 4399) are better defined as a project than a course and constitute an important part of the BS degree. The student conducts original research under the supervision of a faculty member, and then must submit a research report which is defended orally. Normally this project will span two or more semesters. A complete set of guidelines is available from the undergraduate advisor.

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