

# Chemistry

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## Department Information

- **Department Location:**  
Ladd Hall
- **Department Phone:**  
701-231-8694
- **Department Email:**  
ndsu.chemistry@ndsu.edu
- **Department Web Site:**  
[www.ndsu.edu/chemistry/](http://www.ndsu.edu/chemistry/) (<http://www.ndsu.edu/chemistry/>)
- **Credential Offered:**  
B.S.; B.A.
- **Plan Of Study Sample:**  
[catalog.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext](http://catalog.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext) (<http://catalog.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext>)

## Major Requirements

### Major: Chemistry

**Degree Type:** B.A. or B.S.

**Minimum Degree Credits to Graduate:** 122

### University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
  - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
  - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (<http://catalog.ndsu.edu/past-bulletin-archive/2021-22/academic-policies/undergraduate-policies/degree-and-graduation/>) section of this Bulletin.

### University General Education Requirements

| Code   | Title                           | Credits   |
|--|---------------------------------|-----------|
| <b>Communication (C)</b>                               |                                 | <b>12</b> |
| ENGL 110   | College Composition I           |           |
| ENGL 120   | College Composition II          |           |
| COMM 110   | Fundamentals of Public Speaking |           |
| Upper Division Writing <sup>†</sup>                    |                                 |           |
| <b>Quantitative Reasoning (R) <sup>†</sup></b>         |                                 | <b>3</b>  |
| <b>Science and Technology (S) <sup>†</sup></b>         |                                 | <b>10</b> |
| <b>Humanities and Fine Arts (A) <sup>†</sup></b>       |                                 | <b>6</b>  |
| <b>Social and Behavioral Sciences (B) <sup>†</sup></b> |                                 | <b>6</b>  |
| <b>Wellness (W) <sup>†</sup></b>                       |                                 | <b>2</b>  |
| <b>Cultural Diversity (D) <sup>*†</sup></b>            |                                 |           |
| <b>Global Perspectives (G) <sup>*†</sup></b>           |                                 |           |
| <b>Total Credits</b>                                   |                                 | <b>39</b> |

- \* May be satisfied by completing courses in another General Education category.
- † General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.
- A list of university approved general education courses and administrative policies are available here (<http://catalog.ndsu.edu/past-bulletin-archive/2021-22/academic-policies/undergraduate-policies/general-education/#genedcoursestext>).

## College Requirements

| Code | Title   | Credits   |
|------|---|-----------|
|      | <b>Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language.*</b> | <b>12</b> |
|      | <b>Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*</b>  | <b>6</b>  |

- \* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

## Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

| Code  | Title  | Credits |
|---|--|---------|
| <b>Chemistry Core Requirements</b>  |  |         |
| Select one from the following (May satisfy general education category S): |  | 4       |
| CHEM 121<br>& 121L  | General Chemistry I<br>and General Chemistry I Laboratory  |         |
| CHEM 150<br>& CHEM 160  | Principles of Chemistry I<br>and Principles of Chemistry Laboratory I                                      |         |
| Select one from the following (May satisfy general education category S): |  | 4       |
| CHEM 122<br>& 122L  | General Chemistry II<br>and General Chemistry II Laboratory  |         |
| CHEM 151<br>& CHEM 161  | Principles of Chemistry II<br>and Principles of Chemistry Laboratory II                                    |         |
| CHEM 341  | Organic Chemistry I  | 3       |
| CHEM 342  | Organic Chemistry II   | 3       |
| CHEM 353  | Majors Organic Chemistry Laboratory I  | 1       |
| CHEM 354  | Majors Organic Chemistry Laboratory II   | 2       |
| CHEM 364  | Physical Chemistry I   | 3       |
| CHEM 365  | Physical Chemistry II  | 3       |
| CHEM 380  | Chemistry Junior Seminar   | 1       |
| CHEM 431<br>& 431L  | Analytical Chemistry I<br>and Analytical Chemistry I Laboratory  | 5       |
| CHEM 471  | Physical Chemistry Laboratory (Not required for Pre-professional and Chemistry Education Options)          | 2       |
| BIOC 460  | Foundations of Biochemistry and Molecular Biology I  | 3       |
| BIOC 460L   | Foundations of Biochemistry I Laboratory   | 1       |
| CHEM 491  | Seminar  | 2       |
| <b>Related Required Courses</b>   |  |         |
| ENGL 321<br>or ENGL 324   | Writing in the Technical Professions (May satisfy general education category C)<br>Writing in the Sciences | 3       |
| MATH 128  | Introduction to Linear Algebra   | 1       |
| MATH 165  | Calculus I (May satisfy general education category R)  | 4       |
| MATH 166  | Calculus II  | 4       |
| MATH 259  | Multivariate Calculus  | 3       |
| PHYS 251<br>& 251L  | University Physics I<br>and University Physics I Laboratory (May satisfy general education category S)     | 5       |

|                      |   |              |
|----------------------|---|--------------|
| PHYS 252<br>& 252L   | University Physics II<br>and University Physics II Laboratory             | 5            |
| <b>Option</b>        | <b>Select one of the five options listed below to complete the major.</b> | <b>12-32</b> |
| <b>Total Credits</b> |   | <b>74-94</b> |

### Select one of the five options to complete major requirements (12-32 credits):

#### Option 1: ACS Certified Chemistry

| Code                   | Title   | Credits   |
|------------------------|---|-----------|
| CHEM 425<br>& CHEM 429 | Inorganic Chemistry I<br>and Inorganic Chemistry Laboratory       | 5         |
| CHEM 432<br>& 432L     | Analytical Chemistry II<br>and Analytical Chemistry II Laboratory | 4         |
| MATH 266               | Introduction to Differential Equations                            | 3         |
| <b>Total Credits</b>   |   | <b>12</b> |

#### Option 2: ACS Certified w/Biochemistry Option

| Code   | Title   | Credits   |
|--|---|-----------|
| BIOC 461                                     | Foundations of Biochemistry and Molecular Biology II        | 3         |
| BIOC 473                                     | Methods of Biochemical Research                             | 3         |
| BIOC 474                                     | Methods of Recombinant DNA Technology                       | 3         |
| BIOL 150<br>& 150L                           | General Biology I<br>and General Biology I Laboratory       | 4         |
| CHEM 425<br>& CHEM 429                       | Inorganic Chemistry I<br>and Inorganic Chemistry Laboratory | 5         |
| MATH 266                                     | Introduction to Differential Equations                      | 3         |
| MICR 350<br>& 350L                           | General Microbiology<br>and General Microbiology Lab        | 5         |
| Select 6 credits of the following (Biology): |   | 6         |
| BIOL 315<br>& 315L                           | Genetics<br>and Genetics Laboratory                         |           |
| BOT 380                                      | Plant Physiology  |           |
| MICR 352                                     | General Microbiology II                                     |           |
| ZOO 370                                      | Cell Biology  |           |
| <b>Total Credits</b>                         |   | <b>32</b> |

#### Option 3: Coating & Polymeric Materials

| Code                   | Title   | Credits   |
|------------------------|---|-----------|
| CHEM 425<br>& CHEM 429 | Inorganic Chemistry I<br>and Inorganic Chemistry Laboratory       | 5         |
| CHEM 471               | Physical Chemistry Laboratory                                     | 2         |
| CHEM 432<br>& 432L     | Analytical Chemistry II<br>and Analytical Chemistry II Laboratory | 4         |
| CPM 473                | Polymer Synthesis   | 3         |
| CPM 474<br>& CPM 484   | Applied Polymer Science<br>and Coatings I Laboratory              | 5         |
| CPM 475<br>& CPM 485   | Coatings' Materials Science<br>and Coatings II Laboratory         | 5         |
| MATH 266               | Introduction to Differential Equations                            | 3         |
| <b>Total Credits</b>   |   | <b>27</b> |

#### Option 4: Pre-Professional Option

| Code               | Title   | Credits |
|--------------------|---|---------|
| BIOL 150<br>& 150L | General Biology I<br>and General Biology I Laboratory | 4       |

|                         |   |           |
|-------------------------|---|-----------|
| BIOL 220<br>& 220L      | Human Anatomy and Physiology I<br>and Human Anatomy and Physiology I Laboratory   | 4         |
| BIOL 221<br>& 221L      | Human Anatomy and Physiology II<br>and Human Anatomy and Physiology II Laboratory | 4         |
| CHEM 425                | Inorganic Chemistry I   | 3         |
| MATH 266<br>or STAT 330 | Introduction to Differential Equations<br>Introductory Statistics                 | 3         |
| MICR 350<br>& 350L      | General Microbiology<br>and General Microbiology Lab                              | 5         |
| <b>Total Credits</b>    |   | <b>23</b> |

**Option 5: Chemistry Pre-Education Application must be made to the School of Education in order to obtain a teaching degree**

| Code                             | Title   | Credits   |
|----------------------------------|---|-----------|
| BIOL 150<br>& 150L               | General Biology I<br>and General Biology I Laboratory             | 4         |
| CHEM 425                         | Inorganic Chemistry I   | 3         |
| EDUC 321                         | Introduction to Teaching  | 3         |
| EDUC 322                         | Educational Psychology  | 3         |
| MATH 266<br>or STAT 330          | Introduction to Differential Equations<br>Introductory Statistics | 3         |
| PHYS Elective                    |   | 3         |
| Recommended for Education Option |   |           |
| BIOL 151<br>& 151L               | General Biology II<br>and General Biology II Laboratory           | 4         |
| GEOL 105<br>& 105L               | Physical Geology<br>and Physical Geology Lab                      | 4         |
| <b>Total Credits</b>             |   | <b>27</b> |

## Minor Requirements

### Minor: Chemistry

Required Credits: 19

#### Minor Requirements

| Code  | Title                           | Credits   |
|---|---------------------------------|-----------|
| <b>Required Courses</b>   |                                 |           |
| CHEM 121  | General Chemistry I             | 3         |
| CHEM 121L   | General Chemistry I Laboratory  | 1         |
| CHEM 122  | General Chemistry II            | 3         |
| CHEM 122L   | General Chemistry II Laboratory | 1         |
| <b>Electives</b>  |                                 | <b>11</b> |
| 300-400 level courses in chemistry, biochemistry, or coatings & polymeric materials; one lab course required. |                                 |           |
| <b>Total Credits</b>  |                                 | <b>19</b> |

#### Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.