## CHEMISTRY MAJOR (BS)

Department website (https://www.uwp.edu/learn/programs/ chemistry.cfm)

College: College of Natural \& Health Sciences

## Preparation for Graduate School

Some graduate programs require that specific courses be taken for admission. Students considering graduate study should consult their advisor and the admissions office of the graduate program.

## Program Learning Outcomes

1. Students develop a knowledge and understanding of chemistry and use it to communicate results from scientific studies in formats suitable to the profession. Students will evaluate literature and other information relevant to their work, summarize information in tables and graphs, write effective reports and give effective oral presentations.
2. Students perform and evaluate scientific experiments and studies in the field of chemistry. Students will perform experiments using accepted laboratory practices, evaluate results in the context of relevant scientific principles, and propose appropriate future directions for the study based upon the findings.
3. Students act as socially responsible members of the profession. Students will demonstrate concern for the health and safety of others by using proper safety protocols, apply chemical principles to everyday life, and treat each other with respect.

## Program-Specific Policies

## Redundant Courses

Credits earned in courses which in large part duplicate the content of any of those listed above cannot be applied toward the major or used in computing the GPA for the major.

## Honors in Chemistry

To be eligible for a B.S. with honors in chemistry, a chemistry major must attain a GPA of 3.25 or better in all chemistry courses taken and complete a senior thesis (CHEM 497 Senior Thesis) and defend it before a committee of three faculty members, at least two of whom are from chemistry. In addition, an overall GPA of at least 3.00 must be attained.

## Requirements for the Chemistry Major

At least 15 credits of upper-level courses in the major must be completed at UW-Parkside. Chemistry majors must have a minimum GPA of 2.50 in all courses required for the major, including math and physics. The following courses are required of all chemistry majors. Students are expected to pay attention to required prerequisites and then follow the additional requirements associated with their specific concentration. Undergraduate research is strongly encouraged.

## Code <br> Title <br> Credits

College of Natural and Health Sciences requirement
New entering students, and transfer students with less than 30 college credits, choosing a major in the College of Natural and Health Sciences are required to take this course.
UWP 101 First Year Seminar. Natural and Health Sciences 1
Required Introductory Chemistry Courses

| CHEM 101 | General Chemistry I | 4 |
| :---: | :---: | :---: |
| CHEM 102 | General Chemistry II | 4 |
| CHEM 103 | General Chemistry Lab I | 1 |
| CHEM 104 | General Chemistry Lab II | 1 |
| Required Introdu | ctory Chemistry Courses Subtotal | 11 |
| Required Chemistry Courses |  |  |
| CHEM 155 | Chemistry Seminar. Careers, Safety and Literature | 3 |
| CHEM 206 | Quantitative Chemical Analysis | 5 |
| CHEM 302 | Physical Chemistry I | 4 |
| CHEM 321 | Organic Chemistry I | 4 |
| CHEM 322 | Organic Chemistry II | 4 |
| CHEM 323 | Organic Chemistry Lab | 2 |
| Required Chemis | try Courses Subtotal | 22 |
| Required Courses in Mathematics |  |  |
| MATH 221 | Calculus and Analytic Geometry I | 5 |
| MATH 222 | Calculus and Analytic Geometry II | 5 |
| Required Courses | in Mathematics Subtotal | 10 |
| Capstone Requirement |  |  |
| CHEM 495 or CHEM 497 | Senior Seminar Senior Thesis | 1 |
| Capstone Requir | ment Subtotal | 1 |
| Concentration Options |  |  |
| Choose one optio |  | 31-62 |
| Concentration Op | tions Subtotal | 31-62 |

## Total Credits

75-106

## Concentration Options

## General Chemistry Concentration

Students completing this concentration are equipped with essential foundational knowledge and skills for many entry level positions and to consider a career in secondary education. This concentration is also ideal for students who are already employed in the field and need a degree to increase their career options. Students who complete this concentration are also eligible for a certificate in green chemistry. It is the responsibility of the student to declare the certificate, it is not automatically awarded.

| Code | Title | Credits |
| :--- | :--- | ---: |
| Required Chemistry Courses |  |  |
| CHEM 210 | Introduction to Inorganic Chemistry |  |
| CHEM 230 | Introduction to Green Chemistry | 3 |
| CHEM 303 | Physical Chemistry II | 2 |
| CHEM 304 | Physical Chemistry Lab I | 3 |
| CHEM 308 | Biochemistry Laboratory | 2 |
| CHEM 324 | Chemistry of Biological Systems | 2 |
| CHEM 400 | Instrumental Analysis Laboratory |  |
| Required Chemistry Courses Subtotal | 3 |  |
| Elective Chemistry Course | 3 |  |
| Select one of the following: | 18 |  |
| CHEM 306 | Chemical Instrumentation | 3 |
| CHEM 402 | Advanced Organic Chemistry |  |
| CHEM 410 | Advanced Biochemistry |  |
| Elective Chemistry Course Subtotal | 3 |  |
| Required Physics Courses | General Physics I | 5 |


| PHYS 202 | General Physics II | 5 |
| :---: | :---: | :---: |
| Required Physics | Courses Subtotal | 10 |
| Total Credits |  | 31 |
| Chemistry for Pre-Health Professions Concentration [Pre-Medical/ Pharmacy] <br> This curriculum is specifically designed for students continuing into professional health schools. Students who complete this concentration are also eligible for a minor in biological sciences. It is the responsibility of the student to declare this minor, it is not automatically awarded. |  |  |
| Code | Title | Credits |
| Essential Preparatory Courses |  |  |
| COMM 105 | Public Speaking for the 21 st Century | 3 |
| ECON 120 | Principles of Microeconomics | 3 |
| ENGL 167 | Introduction to Literature | 3 |
| PSYC 101 | Introduction to Psychological Science | 3 |
| SOCA 101 | Introduction to Sociology | 3 |
| Essential Prepara | tory Courses Subtotal | 15 |
| Required Biological Sciences Courses |  |  |
| BIOS 101 | Bioscience | 4 |
| BIOS 102 | Organismal Biology | 4 |
| BIOS 210 | Biostatistics | 4 |
| BIOS 260 | General Genetics | 4 |
| BIOS 303 | Microbiology | 4 |
| BIOS 341 | Mammalian Physiology | 3 |
| Required Biologic | al Sciences Courses Subtotal | 23 |
| Required Chemistry Courses |  |  |
| CHEM 303 | Physical Chemistry II | 3 |
| CHEM 304 | Physical Chemistry Lab I | 2 |
| CHEM/BIOS 307 | Biochemical Metabolism | 3 |
| CHEM 324 | Chemistry of Biological Systems | 3 |
| CHEM 400 | Instrumental Analysis Laboratory | 3 |
| Required Chemis | ry Courses Subtotal | 14 |
| Required Physics Courses |  |  |
| PHYS 201 | General Physics I | 5 |
| PHYS 202 | General Physics II | 5 |
| Required Physics | Courses Subtotal | 10 |
| Total Credits |  | 62 |

## Biochemistry Concentration

The biochemistry concentration provides additional laboratory experience compared to the pre-health professions concentration and is best suited to students continuing in graduate schools with a specific interest in drug design, medicinal chemistry and toxicology. Students who complete this concentration are also eligible for a minor in biological sciences. It is the responsibility of the student to declare this minor, it is not automatically awarded.

| Code | Title | Credits |
| :--- | :--- | ---: |
| Required Biological Sciences Courses |  |  |
| BIOS 101 | Bioscience | 4 |
| BIOS 102 | Organismal Biology | 4 |
| BIOS 210 | Biostatistics | 4 |
| BIOS 260 | General Genetics | 4 |
| BIOS 309 | Molecular Biology | 3 |


| Required Biological Sciences Courses Subtotal | 19 |  |
| :--- | :--- | ---: |
| Elective in Biological Sciences |  |  |
| BIOS 453 | Molecular Biology and Bioinformatics of Nucleic | 4 |
|  | Acids |  |
| or BIOS 455 | Protein Biochemistry and Bioinformatics |  |
| Elective in Biological Sciences Subtotal | 4 |  |

Required Chemistry Courses
CHEM 303 Physical Chemistry II 3
CHEM 304 Physical Chemistry Lab I 2
CHEM/BIOS 307 Biochemical Metabolism 3
CHEM 308 Biochemistry Laboratory ..... 2
CHEM 324 Chemistry of Biological Systems ..... 3
CHEM 400 Instrumental Analysis Laboratory ..... 3
CHEM 410 Advanced Biochemistry ..... 3
Required Chemistry Courses Subtotal ..... 19
Required Physics Courses
PHYS 201 General Physics I ..... 5
PHYS 202 General Physics II ..... 5
Required Physics Courses Subtotal ..... 10
Total Credits ..... 52

## Industrial Chemistry Concentration

The industrial chemistry concentration equips students for nonlaboratory intensive career in the chemical industry including product development, business development, sales, marketing research, technical service and manufacturing. These positions are at the interface between product development and applications. Students who complete this concentration are also eligible for the certificate in green chemistry, but it is the responsibility of the student to declare the certificate.

| Code | Title | Credits |
| :--- | :--- | ---: |
| Required Business and Economics Courses |  |  |
| ACCT 201 | Financial Accounting | 3 |
| ACCT 202 | Managerial Accounting | 3 |
| ECON 120 | Principles of Microeconomics | 3 |
| ECON 121 | Principles of Macroeconomics | 3 |
| FIN 330 | Managerial Finance | 3 |
| MGT 349 | Organizational Behavior | 3 |
| MKT 350 | Marketing Principles | 3 |
| QM 210 | Business Statistics I | 3 |
| Elective in management and/or marketing | 3 |  |
| Required Business and Economics Courses Subtotal | 27 |  |

Required Chemistry Courses
CHEM 210 Introduction to Inorganic Chemistry 3
CHEM 230 Introduction to Green Chemistry 2

CHEM 355 Survey of Industrial Chemistry 3
CHEM 494 Internship in Chemistry 1
Required Chemistry Courses Subtotal 9
In-Depth Elective Chemistry Course Sequence
Choose one sequence:
Physical
CHEM 303 Physical Chemistry II
CHEM 304 Physical Chemistry Lab I
Analytical

| CHEM 306 | Chemical Instrumentation |  |
| :---: | :---: | :---: |
| CHEM 400 | Instrumental Analysis Laboratory |  |
| Biochemistry |  |  |
| $\begin{aligned} & \text { CHEM/BIOS } \\ & 307 \\ & \text { or CHEM } 3 \end{aligned}$ | Biochemical Metabolism <br> 4Chemistry of Biological Systems |  |
| CHEM 410 | Advanced Biochemistry |  |
| Organic |  |  |
| CHEM 401 | Advanced Organic Laboratory |  |
| CHEM 402 | Advanced Organic Chemistry |  |
| In-Depth Elective | Chemistry Course Sequence Subtotal | 5-6 |
| Required Physics Courses |  |  |
| PHYS 105 | College Physics $1^{1}$ | 5 |
| PHYS 106 | College Physics II ${ }^{1}$ | 5 |
| Required Physic | Courses Subtotal | 10 |

${ }^{1}$ Students may use PHYS 201 General Physics I and PHYS 202 General Physics II in place of PHYS 105 College Physics I and PHYS 106 College Physics II.

## Natural Products Concentration

Natural products have had a major impact on chemistry, chemical biology and drug discovery and have been part of medical remedies since ancient times. The structural diversity of organic molecules produced in nature is matched only by the range of their biological activities and applications. Natural products represent an important source of leads for medicinal chemistry, and drugs developed from natural products are used for the treatment of cancer, cardiovascular diseases, as well as bacterial, viral and fungal infections. Students completing this concentration will be able to describe the biological activities of secondary metabolites, and develop and verify analytical methods for the extraction and analysis of active ingredients in natural products.

| Code | Title Cr | Credits |
| :---: | :---: | :---: |
| Required Chemistry Courses |  |  |
| CHEM 306 | Chemical Instrumentation | 3 |
| CHEM 324 | Chemistry of Biological Systems | 3 |
| CHEM 350 | Chemistry of Natural Products | 3 |
| CHEM 400 | Instrumental Analysis Laboratory | 3 |
| CHEM 450 | Current and Future Directions in Natural Products | 3 |
| Required Chem | ry Courses Subtotal | 15 |
| Elective Chemistry Core |  |  |
| Select three credits of the following: |  | 3 |
| Any combination of the following accepted but content must be related to Natural Products and suitable for capstone requirement. |  |  |
| CHEM 494 | Internship in Chemistry |  |
| CHEM 499 | Independent Study |  |
| Elective Chemistry Core Subtotal |  | 3 |
| Required Biological Sciences Courses |  |  |
| BIOS 101 | Bioscience | 4 |
| BIOS 102 | Organismal Biology | 4 |
| BIOS 324 | Botany | 4 |
| BIOS 344 | Plant Physiology | 3 |
| Required Biolog | al Sciences Courses Subtotal | 15 |


| Required Physics Courses |  |
| :--- | ---: |
| PHYS 105 | College Physics I |
| PHYS 106 | College Physics II |
| Required Physics Courses Subtotal | 5 |
| Capstone Chemistry Requirement | 10 |
| CHEM 497 $\quad$ Senior Thesis | 1 |
| Capstone Chemistry Requirement Subtotal | 1 |

Total Credits

## Professional Chemistry Concentration [ACS Approved]

This concentration is approved by the American Chemical Society (ACS). Students who complete this concentration are registered with the ACS and have the certification recorded on their official University credentials. Participation in undergraduate research, independent study, is strongly encouraged. This concentration is also the premier choice for students planning to pursue graduate studies.

| Code | Title | Credits |
| :---: | :---: | :---: |
| Required Chemistry Courses |  |  |
| CHEM 210 | Introduction to Inorganic Chemistry | 3 |
| CHEM 303 | Physical Chemistry II | 3 |
| CHEM 304 | Physical Chemistry Lab I | 2 |
| CHEM 308 | Biochemistry Laboratory | 2 |
| CHEM 324 | Chemistry of Biological Systems | 3 |
| CHEM 400 | Instrumental Analysis Laboratory | 3 |
| CHEM 401 | Advanced Organic Laboratory | 3 |
| Required Che | try Courses Subtotal | 19 |
| Elective Chemistry Course |  |  |
| Select one of the following: |  | 3 |
| CHEM 306 | Chemical Instrumentation |  |
| CHEM 402 | Advanced Organic Chemistry |  |
| CHEM 410 | Advanced Biochemistry |  |
| Elective Chemistry Course Subtotal |  | 3 |
| Required Physics Courses |  |  |
| PHYS 201 | General Physics I | 5 |
| PHYS 202 | General Physics II | 5 |
| Required Physics Courses Subtotal |  | 10 |
| Total Credits |  | 32 |

## General University Degree Requirements (Bachelor's Degree)

In addition to individual program requirements, students must also fulfill the following requirements:

| Requirement | Credits |
| :--- | :--- |
| Skills | $7-8$ |
| General Education | 36 |
| Foreign Language** | $6-8$ |
| Ethnic Diversity 3 <br> Total $52-55$ <br> ** Transfer students in sustainable management, and health information  <br> management and technology collaborative, online degree-completion  <br> programs, the business management online degree-completion program,  <br> and the flexible option degree-completion program will be exempt from  |  |

the university's foreign language requirement. See appropriate academic section for further information.

Skills Requirement (https://catalog.uwp.edu/policies/\#skills)

| Code | Title | Credits |
| :--- | :--- | ---: |
| Reading and Writing |  |  |
| ENGL 101 | Composition and Reading | 3 |
| Computational Skills |  |  |
| Select one of the following: | $4-5$ |  |
| MATH 102 | Survey of Mathematics |  |
| MATH 103 | Elementary Statistics |  |
| MATH 104 | Quantitative Reasoning |  |
| MATH 111 | College Algebra I | $\mathbf{7 - 8}$ |
| Total Credits |  |  |

General Education (https://catalog.uwp.edu/policies/\#general)

- General Education Course List (https://catalog.uwp.edu/programs/ general-education-program/\#coursestext)

Foreign Language (https://catalog.uwp.edu/policies/\#language)
Ethnic Diversity (https://catalog.uwp.edu/policies/\#ethnic)
Degree Requirements

| Requirement | Credits |
| :--- | :--- |
| Minimum Total Credits | 120 |
| Upper Level Credits (300 level or <br> above) | 36 |
| Residency | 30 |

Cumulative Degree GPA: 2.0 minimum

