## CHEMISTRY, CALCULUS BASED PHYSICS, AREA OF CONCENTRATION IN ARTS \& SCIENCES (AS)

Award: Associate of Science Degree
No. of credits required: 60
For more information: Contact Assistant Professor Steven Iwanowski, 443-412-2250, siwanows@harford.edu (August 15th - June15th); or Admissions, 443-412-2109; or stem@harford.edu.

## Program Description

The chemistry program is designed to prepare students for transfer to a Bachelor's degree program in general chemistry, forensic chemistry, medicinal chemistry, environmental science/chemistry, and more. Chemists investigate the composition, structure and properties of substances and the transformations they undergo, through basic, as well as applied, research toward the development of new products and methods of producing new materials. They also work in biotechnology, drug development, forensic science, and other areas where a strong foundation in chemistry is essential.

## Program Goals

Upon successful completion of the Associate of Sciences Degree, Option in Arts and Sciences, Chemistry, the student will be able to:

1. Explain and apply the fundamental principles of chemistry.
2. Perform laboratory experiments and projects (collect, report and analyze data) by applying theoretical concepts and the scientific method.
3. Demonstrate safe laboratory skills.
4. Recognize and discuss the ethical issues in the discipline.
5. Locate, identify, evaluate and use scientific information effectively.
6. Apply computational skills in reasoning, estimation, problem-solving, and analysis.
7. Use appropriate grammatical forms in both oral and written formats to effectively communicate ideas and concepts.

## Transfer Information

Options for transfer into four-year programs include medicinal chemistry/ pre-pharmacy, general chemistry, forensic chemistry, and more. Students planning to transfer to a four-year college or university should check the requirements of that institution. If they differ significantly from those listed, students should consult with an advisor for academic guidance; it may be that a General Studies curriculum should be followed.

## Employment Information

A Bachelor's degree in chemistry or a related discipline usually is the minimum educational requirement for entry-level chemist jobs. Job growth for chemists will be concentrated in pharmaceutical and medicine manufacturing companies and in professional, scientific, and technical services firms.

## Diversity Requirement

To satisfy the diversity requirement: Associate degree students must complete one 3 -credit diversity course (D). It is recommended that students select one of the 3-credit (GB), (GH), (GI) course electives from those that also appear on the approved list of diversity course graduation requirements.

## Degree Requirements

## Recommended Course Sequence

| First Semester |  | Credits |
| :--- | :--- | ---: |
| CHEM 111 | General Chemistry I (GL) | 4 |
| ENG 101 | English Composition (GE) | 3 |
| MATH 203 | Calculus I (GM) | 4 |
| Behavioral/Social Science Elective (GB) (https:// <br> catalog.harford.edu/general-education/\#behavioral-social- <br> science) | 3 |  |


| Credits | 14 |
| :---: | :---: |
| Second Semester |  |
| CHEM 112 General Chemistry II A (GL) | 4 |
| MATH 204 Calculus II (GM) | 4 |
| PHYS 201 General Physics I: Mechanics (GL) | 4 |
| Program Elective (p.1) ${ }^{1}$ | 4 |
| Credits | 16 |
| Third Semester |  |
| CHEM 207 Organic Chemistry I | 4 |
| PHYS $204 \quad$ General Physics: Vibrations, Waves, Heat, Electricity and Magnetism (GL) | 4 |
| Program Electives (p.1) ${ }^{1}$ | 4 |
| Arts/Humanities Elective (GH) (https://catalog.harford.edu/ general-education/\#arts-humanities) | 3 |
| Credits | 15 |
| Fourth Semester |  |
| CHEM 208 Organic Chemistry II | 4 |
| Program Elective (p.1) ${ }^{1}$ | 4 |
| Arts/Humanities Elective (GH) (https://catalog.harford.edu/ general-education/\#arts-humanities) | 3 |
| Behavioral/Social Science Elective (GB) (https:// catalog.harford.edu/general-education/\#behavioral-socialscience) | 3 |
| Physical Education Elective | 1 |
| Credits | 15 |
| Total Credits | 60 |

${ }^{1}$ Students should choose from the courses listed below to complete a minimum total of 12 credits in program elecitives.

## Program Electives

| Code | Title | Credits |
| :--- | :--- | ---: |
| BIO 120 | General Biology I (GL) | 4 |
| BIO 208 | Genetics | 4 |
| CSI 131 | Computer Science I | 4 |
| CSI 132 | Computer Science II | 4 |
| ENG 109 | English Composition: Research Writing | 3 |


| MATH 206 | Calculus III | 4 |
| :--- | :--- | ---: |
| MATH 208 | Elementary Differential Equations | 3 |
| MATH 216 | Introduction to Statistics (GM) | 4 |
| PHYS 205 | General Physics: Electrodynamics, Light Relativity <br> and Modern Physics | 4 |
| General Elective |  | $1-4$ |

## General Education Degree Requirements

Note: The following codes identify courses which satisfy the General Education Degree Requirements:

Behavioral/Social Science (GB)
English Composition (GE)
Arts/Humanities (GH)
Interdisciplinary and Emerging Issues (GI)
Biological/Physical Laboratory Science (GL)
Mathematics (GM)
Biological/Physical Science (GS)

