# CHEMISTRY, B.S. - NANOTECHNOLOGY OPTION

## Major in Chemistry, BS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 188</td>
<td>Freshman Seminar in Chemistry</td>
<td>1</td>
</tr>
</tbody>
</table>

### 100 AND 200 LEVEL CHEMISTRY REQUIRED COURSES
A grade of C or better is required in the 100/200 level courses before proceeding to the courses for which they are pre-requisites.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 111</td>
<td>Introductory Chemistry 1 (C minimum)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>Introductory Chemistry 2 (C minimum)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 231</td>
<td>Organic Chemistry 1 (C minimum)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 232</td>
<td>Organic Chemistry 2 (C minimum)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 251</td>
<td>Inorganic Chemistry 1 (C minimum)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 265</td>
<td>Quantitative Analysis (C minimum)</td>
<td>4</td>
</tr>
</tbody>
</table>

### 300 AND 400 LEVEL CHEMISTRY REQUIRED COURSES

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM 341</td>
<td>Physical Chemistry 1</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 342</td>
<td>Physical Chemistry 2</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 487</td>
<td>Seminar in Chemistry 1</td>
<td>0.5</td>
</tr>
<tr>
<td>CHEM 488</td>
<td>Seminar in Chemistry 2</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Independent Study - Choose 1 hour from:

- CHEM 498 Independent Study

## CHEMISTRY OPTIONS

Option in Nanotechnology - See separate block

Total Hours: 34

## Option in Nanotechnology, Chemistry, BS

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 312</td>
<td>Chemistry in Nanotechnology</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives - Choose 4 hours from:

- CHEM 300 Co-Op Ed Experience in Chem
- CHEM 326 Biochemistry 1
- CHEM 375 Environmental Chemistry
- CHEM 381 Polymer Chemistry 1
- CHEM 391 Advanced Laboratory 1
- CHEM 392 Advanced Laboratory 2
- CHEM 435 Advanced Organic Chemistry
- CHEM 452 Inorganic Chemistry
- CHEM 465 Analytical Chemistry
- CHEM 486 Topics in Chemistry
- CHEM 489 Honors Course
- CHEM 498 Independent Study
- CHEM 499 Departmental Honors

## PROFESSIONAL BLOCK PENN STATE COURSES

Courses taken in a Capstone Semester at Penn State University in the Nanofabrication Facility.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>NFMT 315</td>
<td>Materials Modification in Nanotechnology</td>
<td>3</td>
</tr>
<tr>
<td>NFMT 316</td>
<td>Characterization, Testing Nanotech Structures &amp; Materials</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours: 25

## Req Related for Chemistry, BS

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH 161</td>
<td>Calculus 1</td>
<td>4</td>
</tr>
<tr>
<td>MATH 163H</td>
<td>Honors Calculus 1</td>
<td>1</td>
</tr>
<tr>
<td>MATH 211</td>
<td>Calculus 2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 311</td>
<td>Calculus 3</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 231</td>
<td>Physics 1 with Calculus</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 232</td>
<td>Physics 2 with Calculus</td>
<td>5</td>
</tr>
</tbody>
</table>

Total Hours: 22-23

## American Chemical Society Certification - Optional

### REQUIRED COURSES FOR ACS CERTIFICATION

<table>
<thead>
<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>CHEM 326</td>
<td>Biochemistry 1</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 392</td>
<td>Advanced Laboratory 2</td>
<td>1</td>
</tr>
</tbody>
</table>

Required Independent Research - Choose 3 hours from:

- CHEM 489 Honors Course
- CHEM 498 Independent Study
- CHEM 499 Departmental Honors

### RECOMMENDED COURSES FOR ACS CERTIFICATION

Introductory Economics - Optional Recommended

Elementary Language German or Russian - Optional Recommended

Total Hours: 8