

Binghamton University  
Department of Chemistry



Undergraduate  
Student  
Handbook  
2023 -2024





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# **DIFFERENCES BETWEEN BA AND BS DEGREES**

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One of the most common questions is "Which degree should I get - a BS or a BA?" This is an important question, but also one that does not have a simple answer. Even among the Chemistry Department faculty, there is a difference of opinion. At the same time, the following guidelines may help in your decision.

1. The BA degree gives you exposure to the four main areas of Chemistry (Analytical, Inorganic, Organic, and Physical) but requires fewer courses than the BS degree. As such, it provides more opportunity to explore other areas and interests. This extra flexibility can be quite useful if your goal is admission to a graduate program or professional school outside of Chemistry (for example,

# **REQUIREMENTS FOR CHEMISTRY DEGREES**



## THE TYPICAL COURSE SEQUENCE

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With the type of degree and general course requirements in hand, the obvious question is "When do I need to take all of these courses?" The answer is that there is a great deal of flexibility in building a schedule leading to a degree in Chemistry. The first year, in particular, can vary a lot depending upon your background. A student with a strong high school Chemistry background and AP credit may not need to take General Chemistry (CHEM 107/108 if AP = 5; IB = 6,7 or CHEM 111 if AP = 4) at all and can start in Organic Chemistry (CHEM 231).

There are a number of course sequences outlined in the following charts (varying based on major and introductory chemistry options). It is important to bear in mind that not all of the upper level Chemistry courses are offered every semester. As a result, you need to plan carefully to make certain that you fulfill the prerequisites in time to take certain courses in the semester in which they are offered.

All of the required courses for the Chemistry degree are guaranteed to be offered during their scheduled semesters (*e.g.*, CHEM 351, every fall semester; CHEM 451 every spring semester). However, some of the upper level elective courses (particularly the Topics courses CHEM 481-486) might not be offered every year. The Chemistry Department has a good idea which electives will be offered by the time of pre-registration and this information can be obtained from either of the Chemistry Department offices (S2 room 226, and outside of SN 2104) You should talk with your chemistry advisor regarding course scheduling

For all course sequences, Chem 104/105/106 can replace Chem 107/108 as major requirements. However, it is strongly recommended to choose the Chem 107/108 sequence, because it is targeted to Chemistry majors.

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# CHEMISTRY COURSE OFFERINGS BY SEMESTER

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Course	Name	Semester offered
100	Basic Chemistry	fall
101	Introduction to Chemistry I	fall
102	Introduction to Chemistry II	spring
107	Introductory Chemistry I	fall
108	Introductory Chemistry II	spring
111	Chemical Principles	fall
221	Introduction to Analytical Chemistry	spring
231	Organic Chemistry I	fall; spring; summer term I
332	Organic Chemistry II	fall; spring; summer term II
335	Organic Chemistry Laboratory	fall; spring; summer term III
341	Inorganic Chemistry	



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## SAMPLE COURSE SEQUENCE FOR BA DEGREE WITH CHEM 107-108

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Year	Fall Semester	Spring Semester
Freshman	CHEM 107 MATH 224/225	CHEM 108 MATH 226/227
Sophomore	CHEM 231 PHYS 131*	CHEM 221 CHEM 332 PHYS 132*
Junior	CHEM 341 CHEM 351 or 361	CHEM Elective CHEM Elective
Senior	CHEM 496 CHEM Elective	CHEM Elective

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CHEM electives must include 1½ courses (6 credits) selected from CHEM 335, 422, 445, 455, 497/498 (these are lab courses). Additional all-college elective courses would be taken to complete a full course load.

\* Physics with calculus (PHYS 131 and 132) is strongly recommended but not required (PHYS 121 and 122 can be taken instead.)

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## SAMPLE COURSE SEQUENCE FOR BA DEGREE WITH CHEM 111

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Year	Fall Semester	Spring Semester
Freshman	CHEM 111 MATH 224/225	CHEM 231 MATH 226/227
Sophomore	CHEM 332 PHYS 131*	CHEM 221 PHYS 132*
Junior	CHEM 341 CHEM 351 or 361	CHEM Elective CHEM Elective
Senior	CHEM 496 CHEM Elective	CHEM Elective Science Elective

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CHEM Electives must include 1½ courses selected from CHEM 335, 422, 445, 455, 497/498 (these are lab courses). Science Elective can be any course within the Division of Science and Mathematics (e.g., BIOL 113, PSYC 111, MATH 323 or chemistry elective). Additional all-college elective courses would be taken to complete a full course load.

\*Physics with calculus (PHYS 131 and 132) is strongly recommended but not required (

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## SAMPLE COURSE SEQUENCE FOR BS DEGREE WITH CHEM 107-108

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Year	Fall Semester	Spring Semester
Freshman	CHEM 107 MATH 224/225	CHEM 108 MATH 226/227
Sophomore	CHEM 231 PHYS 131*	CHEM 221 CHEM 332 CHEM 335 PHYS 132*
Junior	CHEM 341 CHEM 351 CHEM 422	CHEM 451 Inorganic CHEM II CHEM 455
Senior	CHEM 496 Science Elective Science Elective	Science Elective Science Elective

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Inorganic CHEM II can be CHEM 442, 443, 444, 445 or 484.

Science Electives can be any course within the Division of Science and Mathematics (e.g., BIOL 113, PSYC 111, MATH 323, or chemistry elective).

Additional all-college elective courses would be taken to complete a full course load.

\* Calculus based physics (PHYS 131 and 132) is strongly recommended



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**SAMPLE COURSE SEQUENCE FOR ACS CERTIFIED BS DEGREE  
WITH CHEM 107-108**

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Year	Fall Semester	Spring Semester
Freshman	CHEM 107 MATH 224/225	CHEM 108 MATH 226/227
Sophomore	CHEM 231 PHYS 131* BIOL 113	CHEM 221 CHEM 332 CHEM 335 PHYS 132*
Junior	CHEM 341 CHEM 351 CHEM 422	CHEM 451 BCHM 403 CHEM 455
Senior	CHEM 496 Inorganic CHEM II	Science Elective Lab Elective

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Inorganic CHEM II can be CHEM 442, 443, 444, or 484.



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**SAMPLE COURSE SEQUENCE FOR BS DEGREE WITH EMPHASIS IN  
BIOLOGICAL CHEMISTRY WITH CHEM 107-108**

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Year	Fall Semester	Spring Semester
Freshman	CHEM 107 MATH 224/225	CHEM 108 MATH 226/227
Sophomore	CHEM 231 PHYS 131* BIOL 113 and 115	CHEM 221 CHEM 332 CHEM 335 PHYS 132*
Junior	CHEM 341 CHEM 361 CHEM 422	CHEM 451 CHEM 455 BCHM 403
Senior	CHEM 496 Inorganic CHEM II	CHEM Elective Science Elective

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Inorganic CHEM II can be CHEM 442, 443, 444, 445 or 484.

Science Electives can be any course within the Division of Science and Mathematics (e.g., Bio114, PSYC 111, MATH 323, or chemistry elective).

CHEM elective to be selected from a list of biologically-related chemistry courses including CHEM 434 and 485K.

Additional all-college elective courses would be taken to complete a full course load. ng (en-US)BDC q0.00000912 0

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## SAMPLE COURSE SEQUENCE FOR BS DEGREE WITH EMPHASIS IN BIOLOGICAL CHEMISTRY WITH CHEM 111

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Year	Fall Semester	Spring Semester
Freshman	CHEM 111 MATH 224/225	CHEM 231 MATH 226/227
Sophomore	CHEM 332 BIOL 113 and 115 PHYS 131*	CHEM 221 CHEM 335 PHYS 132*
Junior	CHEM 341 CHEM 361 CHEM 422	CHEM 451 CHEM 455 BCHM 403
Senior	CHEM 496 Inorganic CHEM II	CHEM Elective Science Elective

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Inorganic CHEM II can be CHEM 442, 443, 444, 445 or 484.

Science Electives can be any course within the Division of Science and Mathematics (e.g., BIOL 114, PSYC 111, MATH 323, or chemistry elective).

CHEM elective to be selected from a list of biologically-related chemistry including CHEM 434 and 485K.

Additional all-college elective courses would be taken to complete a full course load.

\*Physics with calculus (PHYS 131 and 132) is strongly recommended but not required (PHYS 121 and 122 can be taken instead.)

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## SAMPLE COURSE SEQUENCE FOR BS DEGREE WITH EMPHASIS IN MATERIALS CHEMISTRY

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Year	Fall Semester	Spring Semester
Freshman	CHEM 111 MATH 224/225	CHEM 231 MATH 226/227
Sophomore	CHEM 332 CHEM 335 PHYS 131*	CHEM 221 Science Elective PHYS 132*
Junior	CHEM 341 CHEM 351 CHEM 422	CHEM 451 CHEM 444 Materials Lab**
Senior	CHEM 496 Materials Elective	Materials Elective CHEM 455

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\*Physics with calculus (PHYS 131 and 132) is strongly recommended but not required (PHYS 121 and 122 can be taken instead.)

\*\*Materials laboratory can be CHEM 445 OR CHEM 497/498

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# Chemistry Minor



## INDEPENDENT STUDY AND HONORS

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There is another exciting aspect to pursuing a degree in Chemistry that many students find the most interesting and satisfying part of their studies - independent research. There are three courses that fall into this category - CHEM 397, 497, and 498. In any of these courses, you will be working directly in the research group of one faculty member on a real research project. This gives you the chance to obtain real research experience and to more fully understand what all goes into a well planned and executed series of experiments.

The details of the independent study courses in the Chemistry department are described in greater detail in another handout (The Guide to Undergraduate Research), but a few of the highlights are outlined below.

CHEM 397 - This is the typical first course for independent study and requires no advance preparation other than finding a faculty member who is doing research that you think is interesting and obtaining permission from them to do research in their group.

CHEM 497 - This is a more advanced level of independent study and requires you to have completed most or all of the core chemistry courses. Continuing to and repeating CHEM 497 requires faculty mentor permission, A written abstract of what research project you intend to pursue and what some of the key experiments will be and Approval by the Chemistry Undergraduate Program Chair. This course can be repeated several times.

CHEM 498 - This is a special independent study course for qualified students who decide (with their faculty advisor's consent) to pursue honors in Chemistry by writing and defending an honors thesis. Successful completion of these requirements will result in the honor "Distinguished Independent Work in Chemistry" being awarded.

As for what research the different faculty members in the department are pursuing, a brief guide follows, but more details can be found in the "Guide to Undergraduate Research" (<https://www.binghamton.edu/chemistry/undergraduate-program/undergraduate-research.html>) or on the different faculty members web sites (<http://chemistry.binghamton.edu/>). A maximum of 4 credits of CHEM 397 can count toward chemistry degree

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# FACULTY AND RESEARCH INTERESTS

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will support a graduate student for up to four years, usually as a TA. However, typically you will join a

# Combined Awards (4 + 1) Programs in Chemistry

The 4+1 programs are designed for outstanding students who wish to combine a Bachelor of Science/Arts degree in Chemistry with a                    degree in Chemistry. The combined program allows students who are interested in a                    degree to complete two separate degrees in five years, saving time and tuition. This is achieved by completing graduate courses already in the senior year of undergraduate studies.

## 4+1 Programs in Chemistry offered at Binghamton University

- BA/BS Chemistry + MA/MS Chemistry
- BS Chemistry + MS Materials Science and Engineering

### You should consider the 4+1 program if

- you are interested in a career in industry with experience and qualifications in addition to bachelor degree, but you do not want to commit to a PhD degree.
- you want to determine whether research, eventually pursuing a PhD degree, is the right career choice for you.
- you want to increase preparation for Medical School, for example to increase your GPA or to



# FAQs for 4 + 1 Programs in Chemistry

## Junior Year

Ø **Do I need an advisor in the Chemistry department?**

- Yes

Ø **For the 4+1 MS degree, should I be enrolled in independent study (research), with a project underway during my junior year?**

- Ideally, yes. However, it is not mandatory.

Ø **How many courses should I have completed by the end of my junior year to be eligible?**

- There is no exact requirement that defines eligibility as the progress to degree of each student

