

Chemistry Handbook



GUIDELINES FOR STUDENTS

Monsoon 2021

Department of Chemistry

Chemistry at Ashoka

The chemistry curriculum for undergraduate program in Ashoka University in the Monsoon 2021 semester is designed for students at all levels. The students majoring in Chemistry as well as those who are interested or doing minor, both will get benefit from this course. Meticulous understanding of chemistry for any students is the focus of this syllabus.

Chemistry is involved in everything we do. Even if you are not chemist, every time you cook, bake, use the washing powder, toothpaste or taking medicine, you are dealing with chemicals. The study of Chemistry provides a molecular level of description as well as insights into chemical bonding and give you a perfect picture of bond breaking and forming, overall a reaction. At Ashoka, our objective is to teach Chemistry in an integrative and holistic manner connecting with other branches of science, physics, biology, computer and environmental science. We are constantly trying to correlate with them and bring out the best interest of our students. We are very hopeful to be an integrated part of Ashoka University in near future.

Further, the chemistry department is building up to do innovative and current research. The chemistry research requires to have a very sound knowledge on the basic of chemistry and our target is to build you up as an aspiring researcher through the basic concept of organic, inorganic and physical chemistry in this semester. We are very certain that this knowledge will take you further for any field of science or humanities.

The undergraduate Major in Chemistry

The chemistry major in Ashoka University designed with a belief that the students getting a degree in chemistry can take him/her wherever he/she wants to go, whether it is industry or immediate professional career, or further research in chemistry or intermediate subjects.

The chemistry major must complete a total 14 courses to get a graduate degree from Ashoka University. This includes 7 core theory courses and 4 lab courses and any 3 electives. Courses offered by chemistry department or cross-listed with the chemistry department (if any) will also be counted. The final year students will be offered proposal writing course and can pursue independent research in the department.

The core (theory) courses are:

- Topics in Chemistry (Semester II)
- Energetics of Change (Semester II)
- Basic Inorganic Chemistry (Semester III)
- Concepts in Organic Chemistry (Semester III)
- Atoms, quanta and light (Semester III)
- Inorganic Chemistry (Semester IV)
- Rate, order and mechanism (Semester IV)
- Mechanistic Organic Chemistry I (Semester V)
- Modern Methods of Analysis and Characterization (Semester V)
- Mechanistic Organic chemistry II (Semester VI)

Electives

Electives courses are there to broaden the knowledge of the core courses so that students can have better understanding of the subjects. There are many courses Ashoka chemistry is offering. A major in chemistry must choose at least 3 electives to graduate.

Suggested Electives

- Applied Organometallic & Coordination Chemistry
- Environmental Analysis
- Chemical Biology
- Chemistry of Materials
- Renewable Energy: Hydrogen and Solar Energy
- Materials at nano scale
- Computational Chemistry and Molecular Simulation
- Environmental Chemistry
- Energy Materials: Batteries, Super capacitors etc

The undergraduate Minor in Chemistry

Students from different department are always encouraged to take chemistry as their minor. The knowledge will help a student to understand the science in our everyday life. This will also help to become a better researcher in any field of science. We believe it's a great opportunity for a liberal university student.

To pursue minor in Chemistry at Ashoka, student must take 6 courses. This can include direct course offered from chemistry department or cross-listed (if any) with the department. 4 theory courses and 1 lab course and any 1 elective can be chosen to complete a minor in Chemistry.

Concentration in Chemistry

For taking concentration in Chemistry student must take minimum 4 courses out of which 1 must be an elective. In this case also lab course will be considered as a concentration subject.

Courses offered by Chemistry department in monsoon 2021:Semester V (Semester III + V)

- Atoms, quanta and light (Theory)
- Basic Inorganic Chemistry (Theory)
- Concepts in Organic Chemistry (Theory)
- Mechanistic Organic Chemistry I (Theory)
- Modern Methods of Analysis and Characterization (Theory)
- General chemistry Laboratory I I (Lab course)

Courses offered by Chemistry department in spring 2022: Semester VI (Semester II + IV + VI)

- Topics in Chemistry (Theory)
- Energetics of Change (Theory)
- Introductory Laboratory Course (Lab Course)
- Inorganic Chemistry (Theory)
- Rate, order and mechanism (Theory)
- Elective I (Theory)
- General Chemistry Laboratory I (Lab Course)
- Mechanistic Organic Chemistry II (Theory)
- Elective II (Theory)
- Elective III (Research Project)
- Advance General Chemistry Laboratory (Lab Course)

Prerequisite

The professors require a minimum knowledge of a student for a course. It will be always mentioned in the webpage of chemistry about the prerequisite or students can directly ask the professors. For any introductory theory or lab course and any basic chemistry course no prerequisite requires. For example, 'introductory laboratory course' (1401-1) demands no prerequisite. For 1000/2000 level courses like 'Chemistry for life' no prerequisite needed, anybody can participate. Students from Physics, Biology and Environmental Science can take physical chemistry/ theoretical chemistry, chemical biology and environmental chemistry course after discussing with the respective professors without any prerequisite.

The tentative prerequisites are mentioned in the bracket (it may change according to professor demand). These are all 3000 level courses

- Basic Inorganic Chemistry: Theory Course (**None**)
- Concepts in Organic Chemistry: Theory Course (**None**)
- Atoms, quanta and light: Theory Course (**None**)
- Inorganic Chemistry: Theory Course (**Basic Inorganic Chemistry**)
- Rate, order and mechanism: Theory **Course (None)**
- General Chemistry Laboratory: Lab course (**Introductory Laboratory Course**)
- Mechanistic Organic Chemistry: Theory Course (**Concept in Organic Chemistry**)
- Modern Methods of Analysis and Characterization: Theory Course (**None**)
- General Chemistry Laboratory: Lab Course (**Introductory Laboratory Course**)
- Organic Synthesis: Reagents and Synthetic Strategies (**Concept in Organic Chemistry**)/
(**Mechanistic Organic Chemistry**)
- Applied Organometallic & Coordination Chemistry (**Basic Inorganic Chemistry**/ **Inorganic Chemistry**)
- Environmental Analysis (**Concept in Organic Chemistry**/ **Basic Inorganic Chemistry**)
- Chemical Biology (**Basic Inorganic Chemistry**/ **Concept in Organic Chemistry**/ **Introduction to Cell & Molecular Biology**/ **Chemical Basis of Life**/ **Biochemistry**/ **Biology**)
- Chemistry of Materials (**Basic Inorganic Chemistry**/ **Atoms, Quanta, & Light**)
- Renewable Energy: Hydrogen and Solar Energy (**Basic Inorganic Chemistry**/ **Concept in Organic Chemistry**/ **Atoms, Quanta, & Light**)
- Materials at nano scale (**Basic Inorganic Chemistry**/ **Atoms, Quanta, & Light**)
- Computational Chemistry and Molecular Simulation (**Atoms, Quanta, & Light**/ **Physics major**)
- Environmental Chemistry (**Basic Inorganic Chemistry**/ **Concept in Organic Chemistry**/ **Environmental science major**)
- Energy Materials: Batteries, Super capacitors etc (**Basic Inorganic Chemistry**/ **Concept in Organic Chemistry**/ **Atoms, Quanta, & Light**)

Frequently asked questions

If you have any other questions, you can write to your first Point of Contact, the Chemistry Student Representative, Guuleed Cali at guuleed.cali_ug22@ashoka.edu.in or direct your queries to the

- Head, Department of Chemistry, at hod.che@ashoka.edu.in

UG Program Coordinator, Department of Chemistry, Dr. Aryya Ghosh at aryya.ghosh@ashoka.edu.in

1. What are the mandatory courses (or RC's) for a Chemistry major/minor?

We have mentioned this in the section Requirements for Major/Minor in this article above: We request you to go through this handbook again.

2. Can laboratory courses be counted as an elective?

No, it's a core course. Any Minor also can take lab course.

3. Will the labs be independent of the theory courses - in terms of number of credits (and hours)?

All labs are stand-alone courses and mandatory for Chemistry major students. They each count for the same number of credits as theory courses.

4. Is a thesis mandatory?

Only for ASP students.

5. Can I complete my major within 3 years?

Yes. But it is recommended that you stay for a 4th year.

6. I am interested in TA'ing for a Chemistry course. How can I apply?

We haven't decided about TA in Chemistry course

7. I am a Biology/ Physics/ EVS major. Can I take biochemistry, Theoretical chemistry or Physical chemistry and environmental chemistry?

Yes. But prior to take the courses please contact with the respective professors or HOD Prof. Sourav Pal.

8. Does the ASP 4th year count as an Advanced Major?

Yes. It will be count as an advanced major.

9. Do I need to complete electives for different levels?

Electives are offered at 300 level. You can choose to do any 3 for a major and 2 for a minor and 1 for concentration. There is no minimum limit.

10. I am a Psychology/Math/Physics/Computer Science/Environmental Studies student and I would like to minor in Chemistry. Will any of those courses be cross listed with Chemistry and count towards my Chemistry credits?

As of now, the Chemistry department is not offering any cross listed subjects. For future information please talk to HOD or Dr. Aryya Ghosh

11. What about research opportunities? Are Chemistry students expected to learn from hands-on experience or in the classroom?

We are investing in the idea of the 4th year as a time when undergraduates delve into research in a serious year-long way. In addition, there are several summer opportunities for science and undergraduates can approach labs of their interest in Ashoka in order to start doing research whenever they would like as their undergraduate degree progresses. We encourage students to take small projects with the professors in any time of the year.

12. In what research areas will the Ashoka Chemistry program specialize?

We are interested in specializing in various areas of Chemistry as well as some interface area with biology and chemistry. Material science, Inorganic chemistry, Bioinorganic chemistry, Theoretical and computational chemistry are the few such mentioned fields, chemistry department are offering for research.

13. What is the degree that is offered at Ashoka? Is it a B.Sc. in Chemistry? Would I get a B.Sc. or a B.A. in Chemistry?

The 3-year degree you get if you specialize in Chemistry would be a B.Sc. However, the additional qualification you get for the fourth year would be named as per the norms of the State Government.

14. Whom should I contact for further queries?

You can email your queries to your first Point of Contact, the Chemistry Student Representative, Guuleed Cali, at guuleed.cali_ug22@ashoka.edu.in or contact the HoD, at hod.che@ashoka.edu.in or Dr Aryya Ghosh, at aryya.ghosh@ashoka.edu.in