ASHOKA UNIVERSITY

The Department of Chemistry

Student Handbook

This handbook applies to students admitted during the academic years

2023–24, 2024–25, 2025-26

Chemistry at Ashoka

The Chemistry curriculum in the undergraduate program at Ashoka University has been meticulously designed to **cater to students of all levels**. The benefits of the programme extend beyond those pursuing a major in Chemistry, thereby reaching individuals interested in a minor, concentration, or even those with a general curiosity about the subject. The core emphasis of this syllabus is to foster a comprehensive understanding of Chemistry among all students.

Chemistry occupies a fundamental role in our daily lives, transcending the boundaries of one's profession. Ordinary activities like cooking, baking, using household products, or taking medication inherently involve chemical processes. The study of Chemistry provides insights into molecular intricacies, a grasp of chemical bonding, and a vivid comprehension of bond formation and rupture, encapsulating the entirety of a reaction. At Ashoka, our mission involves teaching Chemistry through an **integrative and holistic approach** that intersects with other scientific domains, including Physics, Biology, Computer Science, and Environmental Science. Our consistent effort is to establish meaningful connections with these disciplines, thus nurturing the diverse interests of our students. We are eagerly anticipating the department's integral role in shaping the fabric of Ashoka University in the near future.

Moreover, the Department of Chemistry is devoted to advancing innovative and contemporary research. Successful chemistry research is built upon a strong foundation of fundamental principles. Our aim is to **nurture your potential** as an aspiring researcher by grounding you in the essential concepts of Organic, Inorganic, and Physical Chemistry during this semester. We hold great confidence that this knowledge will serve as a catalyst for your success across various fields of science and humanities.

3-year B.Sc. Honours program

Total Credits Required: 60

Section 1: Mandatory Courses (16 Credits)

The mandatory courses for the 3-year Chemistry Major are:

1. **CHM-1501 – Topics in Chemistry (4 credits)**
2. **CHM-1020 – Introductory Physical Chemistry (4 credits)**
3. **CHM-1101 – Concepts in Organic Chemistry (4 credits)**
4. **CHM-1159 – Introductory Inorganic Chemistry (4 credits)**

Section 2: Core Courses (12 Credits Required)

Students are required to complete 12 credits from the following core courses:

1. **CHM-3212 – Energetics and Rate of Reactions (4 credits)**
2. **CHM-1201 / CHM-2100 – Atoms, Quanta and Light (4 credits)**
3. **CHM-2003 / CHM-4003 – Inorganic Chemistry (4 credits)**
4. **CHM-2012 / CHM-4012 – Organic Chemistry (4 credits)**
5. **CHM-3214 – Stereochemistry and Heterocyclic Chemistry (4 credits)**
6. **CHM-4402 – Structure Elucidation of Organic Molecules (4 credits)**
7. **CHM-3201 – Bioinorganic Chemistry (4 credits)**
8. **CHM-3120 / CHM-4407 / CHM-6612 – Advanced Organic Chemistry (4 credits)**
9. **CHM-2311 – Introductory Biochemistry (4 credits)**

Section 3: Laboratory Courses (16 Credits Required)

Students are required to complete 16 credits from the following laboratory courses:

1. **CHM-3109 – Physical Chemistry Laboratory (4 credits)**
2. **CHM-1099 – Introductory Chemistry Laboratory (4 credits)**
3. **CHM-3219 – Synthetic Chemistry Laboratory (4 credits)**
4. **CHM-3206 – Instrumentation Laboratory (4 credits)**
5. **CHM-3613 / CHM-4408 / CHM-6613 – Advanced Chemistry Laboratory (4 credits)**
6. **CHM-2601 – Chemical Analysis Lab (4 credits)**

Section 4: Elective Courses (16 Credits Required)

Students are required to complete 16 credits from the following elective courses:

1. **CHM-6604 / CHM-4001 – Chemical Biology (4 credits)**
2. **CHM-3511 / CHM-4004 / CHM-6001 – Advances in Biochemistry (4 credits)**
3. **CHM-3213 / CHM-4213 / CHM-6213 – Smart and Biomaterials (4 credits)**
4. **CHM-4406 / CHM-3306 / PHY-4730 / PHY-3730 / PHY-6730 – Nanomaterials (4 credits)**
5. **CHM-2305 / BIO-3306 – Computational Aspects of Drug Discovery (4 credits)**
6. **CHM-4405 / CHM-6611 / CHM-3405-1 / PHY-4530 – Group Theory and Quantum Mechanics (4 credits)**
7. **CHM-2013 / CHM-4013 – Analytical Chemistry (4 credits)**
8. **CHM-3207 / CHM-4207 / CHM-6207 – Organometallics (4 credits)**
9. **CHM-3220 – Light Matter Interactions (4 credits)**
10. **CHM-4401 – Applicants of Computational Chemistry (4 credits)**

11. CHM-3216 – Biophysical Chemistry (2 credits)

12. CHM-2201 – Coordination Chemistry (4 credits)

13. CHM-2501 – Industrial Chemistry (4 credits)

14. CHM-3209 – Medicinal Chemistry (4 credits)

15. CHM-2001 – UG Science Communication (2 credits)

16. CHM-1005 – Chemistry for Beginners (2 credits)

17. CHM-1006 – Mathematics for Chemistry (2 credits)

18. CHM-2303/ CHM-3303 Renewable Energy (4 credits)

19. ISM

To summarise,

Section	*No. of Credits Required*
1. Mandatory	16
2. Core	12
3. Laboratory	16
4. Electives	16

4-year B.Sc. Honours program

Total Required Credits: 80

Section 1: Mandatory Courses (16 Credits)

The mandatory courses for the 4-year Chemistry Major are:

1. **CHM-1501 – Topics in Chemistry (4 credits)**
2. **CHM-1020 – Introductory Physical Chemistry (4 credits)**
3. **CHM-1101 – Concepts in Organic Chemistry (4 credits)**
4. **CHM-1159 – Introductory Inorganic Chemistry (4 credits)**

Section 2: Core Courses (20 Credits Required)

Students are required to complete 20 credits from the following core courses:

1. **CHM-3212 – Energetics and Rate of Reactions (4 credits)**
2. **CHM-1201 / CHM-2100 – Atoms, Quanta and Light (4 credits)**
3. **CHM-2003 / CHM-4003 – Inorganic Chemistry (4 credits)**
4. **CHM-2012 / CHM-4012 – Organic Chemistry (4 credits)**
5. **CHM-3214 – Stereochemistry and Heterocyclic Chemistry (4 credits)**
6. **CHM-4402 – Structure Elucidation of Organic Molecules (4 credits)**
7. **CHM-3201 – Bioinorganic Chemistry (4 credits)**
8. **CHM-3120 / CHM-4407 / CHM-6612 – Advanced Organic Chemistry (4 credits)**
9. **CHM-2311 – Introductory Biochemistry (4 credits)**

Section 3: Laboratory Courses (16 Credits Required)

Students are required to complete 16 credits from the following laboratory courses:

1. **CHM-3109 – Physical Chemistry Laboratory (4 credits)**
2. **CHM-1099 – Introductory Chemistry Laboratory (4 credits)**
3. **CHM-3219 – Synthetic Chemistry Laboratory (4 credits)**
4. **CHM-3206 – Instrumentation Laboratory (4 credits)**
5. **CHM-3613 / CHM-4408 / CHM-6613 – Advanced Chemistry Laboratory (4 credits)**
6. **CHM-2601 – Chemical Analysis Lab (4 credits)**

Section 4: Elective Courses (28 Credits Required)

Students are required to complete 28 credits from the following elective courses:

1. **CHM-6604 / CHM-4001 – Chemical Biology (4 credits)**
2. **CHM-3511 / CHM-4004 / CHM-6001 – Advances in Biochemistry (4 credits)**
3. **CHM-3213 / CHM-4213 / CHM-6213 – Smart and Biomaterials (4 credits)**
4. **CHM-4406 / CHM-3306 / PHY-4730 / PHY-3730 / PHY-6730 – Nanomaterials (4 credits)**
5. **CHM-2305 / BIO-3306 – Computational Aspects of Drug Discovery (4 credits)**

6. **CHM-4405 / CHM-6611 / CHM-3405-1 / PHY-4530 – Group Theory and Quantum Mechanics (4 credits)**
7. **CHM-2013 / CHM-4013 – Analytical Chemistry (4 credits)**
8. **CHM-3207 / CHM-4207 / CHM-6207 – Organometallics (4 credits)**
9. **CHM-3220 – Light Matter Interactions (4 credits)**
10. **CHM-4401 – Applicants of Computational Chemistry (4 credits)**
11. **CHM-3216 – Biophysical Chemistry (2 credits)**
12. **CHM-2201 – Coordination Chemistry (4 credits)**
13. **CHM-2501 – Industrial Chemistry (4 credits)**
14. **CHM-3209 – Medicinal Chemistry (4 credits)**
15. **CHM-2001 – UG Science Communication (2 credits)**
16. **CHM-1005 – Chemistry for Beginners (2 credits)**
17. **CHM-1006 – Mathematics for Chemistry (2 credits)**
18. **CHM-2303/ CHM-3303 Renewable Energy (4 credits)**
19. **ISM**

To summarise,

Section	*No. of Credits Required*
1. Mandatory	16
2. Core	20
3. Laboratory	16
4. Electives	28

4-Year B.Sc. (Honours) with Research in Chemistry

To graduate with a **B.Sc. (Honours) with Research in Chemistry**, students must complete an additional **12 credits** of **Undergraduate Research Thesis** during the fourth year.

The research requirement comprises:

- **Semester 7:** Undergraduate Research Thesis – **4 credits**
- **Semester 8:** Undergraduate Research Thesis – **8 credits**

Please find below the UG Thesis Guidelines for Fourth-Year Students - Department of Chemistry, Ashoka University

Total Course Weight: 12 Credits

1. Eligibility Requirements

- Minimum CGPA: Students must have a minimum 3.0 CGPA in their major to qualify for thesis work.

2. Semester 7 Breakdown (4 Credits)

During semester seven, students begin their thesis work and undergo an initial evaluation to determine if they can proceed.

- Evaluation Committee: The student's work is assessed by a two-person committee consisting of the student's Instructor and a minimum one more faculty member from the University.
- Continuation Requirement: A student must achieve at least a B+ grade in Semester seven to continue with their thesis.

  If the student does not earn a B+ or higher, they cannot proceed with the Semester 8 thesis work.

3. Semester 8 Breakdown (8 Credits)

Note: The remaining 8 credits in Semester 8 bring the total thesis weight to 12 credits.

In the eighth semester, the final evaluation is split between a formal presentation and the actual thesis/research work.

Grading Rubric:

Evaluation Component	Weight	Breakdown Details	Evaluator
Presentation	**40%**	• 15%: Presentation • 20%: Question & Answer session • 5%: Work progress demonstration	Committee (Instructor + 2 more faculty members)
Thesis & Research	**60%**	• 60%: Final thesis evaluation	Supervisor

Hence, Total Credits Required: 92 Credits *(80 credits for the B.Sc. (Honours) in Chemistry + 12 credits for the Undergraduate Research Thesis).*

Minor Course Requirements

To obtain a Minor degree in Chemistry, students are required to complete 24 credits, as described below.

Section 1: Core Courses (12 Credits Required)

Students are required to complete 12 credits from the following core courses:

1. **CHM-1501 – Topics in Chemistry (4 credits)**
2. **CHM-1020 – Introductory Physical Chemistry (4 credits)**
3. **CHM-1101 – Concepts in Organic Chemistry (4 credits)**
4. **CHM-1159 – Introductory Inorganic Chemistry (4 credits)**
5. **CHM-3212 – Energetics and Rate of Reactions (4 credits)**
6. **CHM-1201 / CHM-2100 – Atoms, Quanta and Light (4 credits)**
7. **CHM-2003 / CHM-4003 – Inorganic Chemistry (4 credits)**
8. **CHM-2012 / CHM-4012 – Organic Chemistry (4 credits)**
9. **CHM-3214 – Stereochemistry and Heterocyclic Chemistry (4 credits)**
10. **CHM-4402 – Structure Elucidation of Organic Molecules (4 credits)**
11. **CHM-3201 – Bioinorganic Chemistry (4 credits)**
12. **CHM-3120 / CHM-4407 / CHM-6612 – Advanced Organic Chemistry (4 credits)**
13. **CHM-2311 – Introductory Biochemistry (4 credits)**

Section 2: Laboratory Courses (8 Credits Required)

Students are required to complete 8 credits from the following laboratory courses:

1. **CHM-3109 – Physical Chemistry Laboratory (4 credits)**
2. **CHM-1099 – Introductory Chemistry Laboratory (4 credits)**
3. **CHM-3219 – Synthetic Chemistry Laboratory (4 credits)**
4. **CHM-3206 – Instrumentation Laboratory (4 credits)**
5. **CHM-3613 / CHM-4408 / CHM-6613 – Advanced Chemistry Laboratory (4 credits)**
6. **CHM-2601 – Chemical Analysis Lab (4 credits)**

Section 3: Elective Courses (4 Credits Required)

Students are required to complete 4 credits from the following elective courses:

1. **CHM-6604 / CHM-4001 – Chemical Biology (4 credits)**
2. **CHM-3511 / CHM-4004 / CHM-6001 – Advances in Biochemistry (4 credits)**
3. **CHM-3213 / CHM-4213 / CHM-6213 – Smart and Biomaterials (4 credits)**
4. **CHM-4406 / CHM-3306 / PHY-4730 / PHY-3730 / PHY-6730 – Nanomaterials (4 credits)**
5. **CHM-2305 / BIO-3306 – Computational Aspects of Drug Discovery (4 credits)**
6. **CHM-4405 / CHM-6611 / CHM-3405-1 / PHY-4530 – Group Theory and Quantum Mechanics (4 credits)**
7. **CHM-2013 / CHM-4013 – Analytical Chemistry (4 credits)**

8. **CHM-3207 / CHM-4207 / CHM-6207 – Organometallics (4 credits)**
9. **CHM-3220 – Light Matter Interactions (4 credits)**
10. **CHM-4401 – Applicants of Computational Chemistry (4 credits)**
11. **CHM-3216 – Biophysical Chemistry (2 credits)**
12. **CHM-2201 – Coordination Chemistry (4 credits)**
13. **CHM-2501 – Industrial Chemistry (4 credits)**
14. **CHM-3209 – Medicinal Chemistry (4 credits)**
15. **CHM-2001 – UG Science Communication (2 credits)**
16. **CHM-1005 – Chemistry for Beginners (2 credits)**
17. **CHM-1006 – Mathematics for Chemistry (2 credits)**
18. **CHM-2303/ CHM-3303 Renewable Energy (4 credits)**
19. **ISM**

To summarise,

Section	*No. of Credits Required*
1. Core	12
2. Laboratory	8
3. Electives	4

A maximum of 2 cross-listed (8 credits) courses are allowed.

Concentration Course Requirements

To obtain a Concentration in Chemistry, students are required to complete 16 credits, as described below.

Section 1: Core Course Requirements (12 Credits Required)

Students are required to complete 12 credits from the following courses:

1. **CHM-1501 – Topics in Chemistry (4 credits)**
2. **CHM-1020 – Introductory Physical Chemistry (4 credits)**
3. **CHM-1101 – Concepts in Organic Chemistry (4 credits)**
4. **CHM-1159 – Introductory Inorganic Chemistry (4 credits)**
5. **CHM-3212 – Energetics and Rate of Reactions (4 credits)**
6. **CHM-1201 / CHM-2100 – Atoms, Quanta and Light (4 credits)**
7. **CHM-2003 / CHM-4003 – Inorganic Chemistry (4 credits)**
8. **CHM-2012 / CHM-4012 – Organic Chemistry (4 credits)**
9. **CHM-3214 – Stereochemistry and Heterocyclic Chemistry (4 credits)**
10. **CHM-4402 – Structure Elucidation of Organic Molecules (4 credits)**
11. **CHM-3201 – Bioinorganic Chemistry (4 credits)**
12. **CHM-3120 / CHM-4407 / CHM-6612 – Advanced Organic Chemistry (4 credits)**
13. **CHM-2311 – Introductory Biochemistry (4 credits)**
14. **CHM-3109 – Physical Chemistry Laboratory (4 credits)**

15. **CHM-1099 – Introductory Chemistry Laboratory (4 credits)**
16. **CHM-3219 – Synthetic Chemistry Laboratory (4 credits)**
17. **CHM-3206 – Instrumentation Laboratory (4 credits)**
18. **CHM-3613 / CHM-4408 / CHM-6613 – Advanced Chemistry Laboratory (4 credits)**
19. **CHM-2601 – Chemical Analysis Lab (4 credits)**

Section 2: Elective Courses (4 Credits Required)

Students are required to complete 4 credits from the following elective courses:

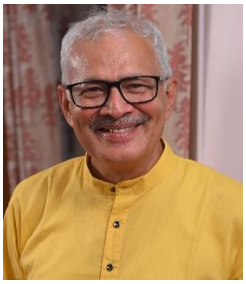
1. **CHM-6604 / CHM-4001 – Chemical Biology (4 credits)**
2. **CHM-3511 / CHM-4004 / CHM-6001 – Advances in Biochemistry (4 credits)**
3. **CHM-3213 / CHM-4213 / CHM-6213 – Smart and Biomaterials (4 credits)**
4. **CHM-4406 / CHM-3306 / PHY-4730 / PHY-3730 / PHY-6730 – Nanomaterials (4 credits)**
5. **CHM-2305 / BIO-3306 – Computational Aspects of Drug Discovery (4 credits)**
6. **CHM-4405 / CHM-6611 / CHM-3405-1 / PHY-4530 – Group Theory and Quantum Mechanics (4 credits)**
7. **CHM-2013 / CHM-4013 – Analytical Chemistry (4 credits)**
8. **CHM-3207 / CHM-4207 / CHM-6207 – Organometallics (4 credits)**

9. **CHM-3220 – Light Matter Interactions (4 credits)**
10. **CHM-4401 – Applicants of Computational Chemistry (4 credits)**
11. **CHM-3216 – Biophysical Chemistry (2 credits)**
12. **CHM-2201 – Coordination Chemistry (4 credits)**
13. **CHM-2501 – Industrial Chemistry (4 credits)**
14. **CHM-3209 – Medicinal Chemistry (4 credits)**
15. **CHM-2001 – UG Science Communication (2 credits)**
16. **CHM-1005 – Chemistry for Beginners (2 credits)**
17. **CHM-1006 – Mathematics for Chemistry (2 credits)**
18. **CHM-2303/ CHM-3303 Renewable Energy (4 credits)**

To summarise,

Section	*No. of Credits Required*
1. Core Courses	12
2. Electives	4

Head of the Department



Professor **V. Chandrasekhar**

Prof V. Chandrasekhar studied chemistry and obtained his PhD degree in 1982 from the Indian Institute of Science, Bangalore and postdoctoral work at the University of Massachusetts, Amherst, Massachusetts, USA. After briefly working at the Research and Development section of the Indian Petrochemicals Corporation at Vadodara, as a Senior Research Officer, he joined the Department of Chemistry at the Indian Institute of Technology Kanpur in 1987 where he was a full professor since 1995 until his superannuation in November 2023. He served for an additional month at IIT Kanpur as a professor. He served as the Head of the Department of Chemistry, IIT Kanpur (2008–10), and as the Dean of Faculty Affairs, IIT Kanpur (2011–12). He also worked at the Tata Institute of Fundamental Research, Centre for Interdisciplinary Sciences, Hyderabad, as a Senior Professor/Dean (2012–14) and Director (2014–17), National Institute of Science Education and Research (NISER), Bhubaneswar, India, as a Centre Director of the Tata Institute of Fundamental Research, Hyderabad (2017-23). He is a visiting Distinguished Professor at the Tata Institute of Fundamental Research Hyderabad.

He has been on the editorial board of several journals including, Organometallics. Currently he is on the editorial board of Dalton Transactions as an Associate Editor. His research work is documented in 460+ publications.

Research Interests

1. Molecular Materials (Molecular magnetism: single-molecule magnets, spin-cross over materials; Photophysical properties of main-group compounds)
2. Main-group Organometallic Chemistry and catalysis
3. Inorganic Rings and Polymers
4. Polynuclear Metal Assemblies Using multi-site coordination ligands

Awards and Honours

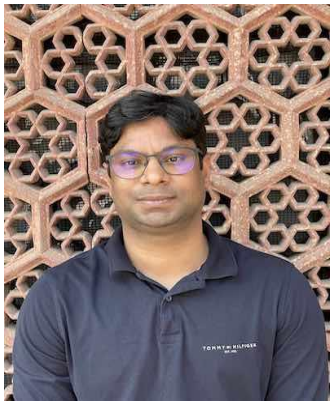
1. SS Bhatnagar Award (2003)
2. Friedrich-Wilhelm Bessel Award (2003)
3. Fellow of Indian Academy of Sciences, National Academy of Sciences, Indian National Science Academy, World Academy of Sciences
4. President, Chemical Research Society of India (2026-29)
5. President, Asian Chemical Editorial Society (2026-29)

Fellow of Indian Academy of Sciences, National Academy of Sciences, Indian National Science Academy, World Academy of Sciences

President, Chemical Research Society of India (2026-29)

President, Asian Chemical Editorial Society (2026-29)

Faculty Members



Professor Deepak Asthana - *Assistant Professor of Chemistry*

Education: Doctoral degree (2013) from the School of Physical Sciences (SPS), Jawaharlal Nehru University (JNU), New Delhi, India;

Experience: In 2014, Professor Asthana was awarded the prestigious JSPS fellowship by the Japan Society for the Promotion of Sciences academy to pursue two years of postdoctoral research at Kyushu University, Japan. In December 2016 he joined the Molecular Magnets group at the School of Chemistry, The University of Manchester, UK and in April 2021, he joined the Chemistry Department at Ashoka University.

Field of Scientific Interest and Area of Research: Dr. Asthana's current research interests are about designing new molecular materials for light harvesting and opto-electronic applications. The primary focus is on the synthesis of ideal fluorescent systems capable of exhibiting exciting optical properties, specially, circularly polarised luminescence (CPL) and photon up-conversion of low intensity lights. He is also interested in design and synthesis of rotaxane and catenane based materials with particular interest in systems allowing external stimuli-based mechanical activities.



Professor Vidya Dnyaneshwar Avasare - *Professor of Chemistry*

Education: MSc in Organic Chemistry, SPPU, Pune; PhD in Organometallics, IIT Bombay.

Teaching Philosophy: Dr. Avasare is a passionate teacher and researcher, driven by the belief that "transforming the life of a student is like transforming not only generations but also the strength of our nation in achieving excellence." To become a successful chemist, students must understand the logic and philosophy of fundamental subjects while developing their experimental skills. A teacher's role goes beyond facilitation; It involves mentoring, guiding inquisitive minds and nurturing their curiosity. By illuminating the path of scientific exploration, students are empowered to develop and execute innovative ideas, shaping the future of science and society.

Field of Scientific Interest: To excel in the field, Professor Avasare challenges the boundaries traditionally set within chemistry. Her scientific mission is to provide sustainable solutions to conventional, non-sustainable chemical technologies used in energy, pharmaceuticals, materials, and more. Achieving this complex objective requires a holistic understanding of chemistry, embracing its entirety to drive innovation and create impactful change.

Area of Research: Developing novel catalyst technologies. To achieve this, Professor Avasare employs a range of methods and tools, including computational and machine learning techniques, to facilitate high-throughput discovery of catalysts and CO2 capture materials. She uses these catalysts to develop new technologies in several key areas:

1. CO2 Utilisation: Converting CO2 into value-added products and chemical hydrogen storage solutions such as formic acid, methanol, ethanol, propanol, butanol, ethylene, and propylene.
2. C-N Cross-Coupling Reactions: Developing heterogeneous catalysts to produce commercially valuable aryl amines under sustainable conditions.
3. C-H Activation: Addressing this crucial challenge to streamline processes, reduce the number of steps, and minimise complex intermediates by providing sustainable, green, and atom-efficient protocols.
4. Green Hydrogen Production: Tackling this critical issue to advance sustainable hydrogen production methods and Mechanistic Insights: Utilising Density Functional Theory (DFT) to unravel and understand complex chemical reaction mechanism.



Professor Sourav Chatterjee - *Assistant Professor of Chemistry*

Education: Ph.D. (Chemistry), CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata, India

Experience: Postdoctoral Associate, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India; Research area: Epigenetics, histone methylation, histone acetylation. Postdoctoral Associate, The Scripps Research Institute, Florida, USA; Research area: Protein glycosylation. Postdoctoral Associate, University of Minnesota, Minneapolis, USA; Research area: Protein hydroxylation, protein engineering, enzymatic C-H halogenation.

Field of Scientific Interest: Catalysis, Chemical Biology and Medicinal Chemistry

Area of Research: Development of new catalysts and synthetic routes to prepare molecules of interest; Small molecule discovery targeting disease-associated proteins of interest; Modulation of epigenetic modifications by developing small molecules; Small molecule-based target protein degradation; Organelle selective fluorescent probe design for bioimaging applications.



Professor Aryya Ghosh - *Assistant Professor of Chemistry*

Education: Msc in Physical Chemistry specialisation, Visva Bharati University; PhD in theoretical Chemistry, CSIR-National Chemical Laboratory (CSIR-NCL)

Experience: After successful completion of Professor Ghosh's doctoral degree developing cutting-edge electronic structure theory at CSIR-National Chemical Laboratory (CSIR-NCL) under the supervision of Prof. Sourav Pal, he pursued his first postdoctoral research in the prominent US-based group of Prof. Bowman in the area of semiclassical dynamics, specifically on the topic of roaming dynamics, a new topic of great current interest.He completed his second postdoctoral research at University of Heidelberg, Germany in the group of Prof. Lorenz S Cederbaum in the area of quantum dynamics simulation of non-radiative decay processes. At Ashoka University, he has established a new theoretical chemistry research group with four students pursuing their PhD program under his supervision.

Field of Scientific Interest: Electronic structure theory development; Ultrafast electron dynamics; Wave packet based nuclear dynamics (Quantum dynamics); Bioinformatics and Computational biology

Area of Research: Ab-initio and dynamical (semi-classical and quantum dynamics) investigation of non-radiative decay processes (Interatomic coulombic decay, electron transfer mediated decay, Auger decay, etc); Optimising therapeutic approaches through novel drug target development and accurate protein ligand binding affinity prediction in the context of human diseases.



Professor Munmun Ghosh - *Assistant Professor of Chemistry*

Education: Ph.D. degree in Chemical Science from National Chemical laboratory (NCL) Pune, India followed by a postdoctoral stint at Göttingen University, Germany as an Alexander von Humboldt fellow.

Experience: Dr. Munmun Ghosh was a visiting fellow at Carnegie Mellon University, USA, an Exchange student in Regensburg University Germany and worked as an intern in BASF Ludwigshafen Germany. Before joining Ashoka University as an assistant professor, she was a scientist in Reliance Industries Limited, Navi Mumbai dealing with crude oils and for a short time was a guest lecturer in Delhi University.

Field of Scientific Interest: Bioinorganic Chemistry with a focus on small molecules like water, carbon-dioxide, nitrogen activation by bioinspired molecular catalysts. For example: Hydrogenase enzymes in nature contain iron and nickel metal centres and Fe4S4 units act as electron reservoirs.

Area of Research: Synthesis of metal complexes, which are functional mimics of hydrogenase enzymes. Thorough mechanisms are studied to produce green H2 from water, value-added products like methanol, ethanol from carbon-dioxide etc.



Dr. NAUPADA PREEYANKA (Ramanujan Faculty Fellow)

Education: Dr. Naupada Preeyanka completed her Ph.D. at NISE where her research work focused on exciton dynamics in inorganic–organic nanohybrid materials. The research involved the synthesis and spectroscopic investigation of semiconductor quantum dots, metal nanoclusters, and perovskite quantum dots, with emphasis on their interactions with organic and biological systems.

Experience: At the Weizmann Institute of Science, Dr. Naupada Preeyanka carried her postdoctoral research in two areas: a) One in the field of molecular spintronics, focusing on spin-selective electron transport through chiral molecules and biomolecules, including proteins and DNA, and exploring chirality-induced spin selectivity (CISS) and spin-polarized charge dynamics; b) Second, She worked on magnetometry studies on nitrogen vacancy-centered diamonds. Here, she fabricated designed structures on the NV centre diamond and tried to do some optical measurements.

Field of Scientific Research: Physical Chemistry, Fluorescence Spectroscopy and Molecular Spintronics, with research interests in Chirality-Induced Spin Selectivity (CISS), spin-selective electron transfer and transport, nanomaterials, exciton dynamics, and bio-inspired molecular systems.

Area of Research: Her research focuses on molecular spintronics and physical chemistry, with particular emphasis on chirality-induced spin selectivity (CISS), spin-selective electron transfer and transport, and molecular-scale charge and spin dynamics. She is also interested in nanomaterials, exciton dynamics, and bio-inspired molecular systems, with the broader goal of understanding and utilizing spin-dependent processes for the development of novel molecular and nanoscale electronic devices.



Professor Sourav Pal – *Professor of Chemistry*

Education: Five-year (Integrated) M Sc in Chemistry at IIT Kanpur, PhD IACS Kolkata.

Experience: Professor Pal trained in quantum chemistry and computational sciences, worked at NCL, Pune for 33 years; Director of NCL, 2010-2015, Professor at IIT Bombay, 2015 June- 2017 Oct, Director, IISER Kolkata, Oct 2017-Oct 2022, Ashoka University, Oct 2022 onwards as Head, Deptt of Chemistry; Shanti Swarup Bhatnagar awardee, Sastra CNR Rao award 2014 among many awards/ honours, Fellow of all three National Academies of Science, DST J C Bose Fellowship from 2008-2023, Chairman and member of many scientific Committees, Chairman, BIS Chemical Division Council 2014 onwards, President, Chemical Research Society of India, 2014-2017, Founding Executive Board member, Commonwealth Chemistry 2020-2023, Executive Council of Federation of Asian Chemical Society, 2016-2020.

Field of Scientific Interest: Quantum Chemistry/ Computational material science.

Area of Research: Many-body methods, reactivity, catalysis, hydrogen storage.

Staff Members



Puneet Kaur – *Manager*

Education:

- Bachelor of Computer Applications (BCA) – Guru Nanak Dev University
- Master's Degree – Punjab Technical University

At Ashoka University, I serve as the Department Manager for the Departments of Biology, Chemistry, and Mathematics. I manage the academic and administrative operations of all three departments. My responsibilities include course scheduling, faculty and TA/TF coordination, budget and procurement management, organizing departmental meetings, seminars, workshops, and academic events, supporting recruitment and onboarding, maintaining departmental records, and coordinating with various university offices to ensure the smooth execution of teaching, research, and departmental activities. I also facilitate effective communication among faculty, students, and administrative stakeholders while ensuring compliance with university policies and processes.



D B Avasare – *Senior Lab Superintendent*

Education: BSc- major in Chemistry with Physics and Mathematics; Masters in Organic Chemistry from SPPU, PUNE.

At Ashoka University: Dnyaneshwar plays an active role in developing undergraduate chemistry labs, general maintenance, Research Purchase and acts as the POC for students at Ashoka. Beyond his academic responsibilities, he is deeply engaged in science exposure programs like the Young Scholars Programme (YSP) and the Centralised facility maintenance.



Bhupendra Mali - *Scientific Officer*

Education: Ph.D. in Chemistry (National Chemical Laboratory, Pune, India), Postdoctoral Research experience in Crystallography and MOFs (University of Liverpool, UK)

At Ashoka, Dr. Mali is responsible for:

- Managing and operating the Single-Crystal X-ray Diffraction (SCXRD) facility.
- Providing technical support for crystallographic research to faculty members, researchers, and students.
- Training users in crystal screening, SCXRD data collection, data processing, structure solution, refinement, and crystallographic analysis.
- Assisting with crystal structure determination, disorder modelling, and preparation of crystallographic reports and CIFs for publication.
- Supporting research projects involving structural characterization of molecular, coordination, and framework materials.
- Coordinating instrument maintenance, calibration, procurement of consumables, and liaison with instrument vendors.
- Contributing to research collaborations, data interpretation, and publication support across the department.



Peeyush Choudhary - *Junior Scientific Officer*

Education: M.Sc. in Chemistry (Polymer Science & Chemical Technology), Chaudhary Charan Singh University, Meerut

At Ashoka, Peeyush is responsible for managing and operating the Field Emission Scanning Electron Microscope (FE-SEM) facility for advanced materials characterization. Providing analytical and technical support to faculty members, researchers, students, and external users in electron microscopy and materials analysis. Training users in sample preparation, FE-SEM operation, EDS elemental mapping, image acquisition, and quantitative data interpretation.

Performing high-resolution morphological and compositional characterization of polymers, nanomaterials, catalysts, ceramics, metals, composites, and functional materials. Supporting interdisciplinary research through data analysis, technical consultation, report preparation, and publication-quality characterization. Coordinating instrument maintenance, calibration, troubleshooting, laboratory operations, procurement of consumables, and liaison with equipment vendors.

Document Directory

Please find all the important links below.

Document	***Links***
Internship Opportunities	View them here

Journal Websites:

Name	***Look it up!***
The American Chemical Society	Link
Royal Society of Chemistry	Link
Nature publications	Link
Science	Link
Nature Catalysis	Link
Cell publications	Link
Indian Academy of Sciences Journal	Link

News, Education and History of Chemistry (so you stay updated):

Name	***Check it out!***
Chemistry Nobel Prize list	Link
Stories of Great Chemists	Link
3D printing for the Chemical Industry	Link
Chemical and Engineering News	Link
Chemistry World news	Link
Journal of Chemical Education	Link
Royal Society of Chemistry Education	Link

Practicals and Chemistry Software:

Name	***Try it out!***
Synthesis/Preparation of organic compounds	Link
Advanced molecule editor and visualiser	Link
ChemDoodle (for making chemical graphics)	Link
ChemSketch Freeware (draw structures, calculate properties)	Link
Quantitative/Visual quantum theory analyses from data	Link
KingDraw (chemical structure editor)	Link
List of other helpful softwares	Link

Frequently Asked Questions

You may direct your queries to the following persons of contact:

Chemistry Student Representative, **Ishita Mazumdar**

chem.rep@ashoka.edu.in

UG Programme Coordinator, Dr. Deepak Asthana

ugcoordinator_chemistry@ashoka.edu.in

Head, Department of Chemistry, Prof. V Chandrasekhar

hod.che@ashoka.edu.in

Where can I find details about the different courses offered?

You can find the course descriptions on AMS under 'Manage Courses'→ 'View Course Catalogue'. By the end of September, we will be mailing the course catalogue to intended majors/minors/concentrations for ease of viewing.

Are all these courses offered every semester?

No. Some courses are offered in the monsoon semesters (first semester in the academic year) and others are offered in the spring semester (second semester in the academic year). Many courses in the chemistry department are offered every alternate monsoon or spring (i.e. every 4^{th} semester). The course catalogue to be mailed will have the course and semester mentioned.

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

If you're interested in becoming a Teaching Assistant (TA) for a Chemistry course, the process involves contacting the relevant professors either through email or in person during their office hours, based on the specific requirements of the course. Please keep in mind that TA-ships are generally offered based on the existing need for assistance in the course. Additionally, it's important to note that Ph.D. students are mandated to undertake Teaching Fellowships (TF) for courses as an integral component of their program.

I am a Biology/ Physics/ CS major. How can I navigate biochemistry, computational chemistry or Physical chemistry?

As a Biology, Physics, or CS major, you are welcome to take up courses offered that bridge your major with Chemistry such as introductory/advanced biochemistry, Computational aspects of drug discovery, Physical chemistry, etc. While deciding your courses and course trajectories, we recommend that you reach out to the subject reps, respective professors or the Head of the Department for guidance and approval.

What are cross-listed courses?

Cross listed courses refer to those that are jointly offered by multiple departments. For instance, Chemistry and Biology cross-listed courses will have course codes looking like CHM-___/BIO-___. **The list of cross-listed chemistry courses is as follows: Nanomaterials (Physics-Chemistry), Computational Aspects of Drug Discovery (Chemistry-Biology), Group Theory and Quantum Mechanics (Chemistry-Physics).** We are looking to cross list more.

Is there a recommended course trajectory for a Chemistry major? Do the chemistry courses have any prerequisites?

We would urge you to begin with the *Topics in Chemistry* theory course and *Introductory Chemistry Laboratory* course in your second semester (first year). We encourage chemistry majors to complete a minimum of 3 courses in each semester from your second semester onwards. While the trajectory depends on your choices of core courses and electives, Chemistry majors must also register for the assigned mandatory courses (*Introductory Physical Chemistry, Concepts in Organic Chemistry and Introductory Inorganic Chemistry*) and attempt one lab course in every semester. Please reach out to your subject representatives in case you would prefer personalised recommendations. There are prerequisites for certain courses and these will be updated in the Course Catalogue document.

What about research opportunities? Are Chemistry students expected to learn from hands-on experience or in the classroom? How can we get in touch with Professors to work in their labs?

There are numerous research opportunities offered for the summer. With the smaller classroom sizes and 1:1 attention offered through office hours, students learn quickly within lab classes. If interested in exploring different professors' labs, we recommend you to reach out to them directly via email.

In what research areas will the Ashoka Chemistry programme specialise in?

We are committed to fostering specialisation in various domains of Chemistry, extending into interdisciplinary realms with pure sciences. Our research offerings encompass diverse fields such as Material Science, Inorganic Chemistry, Bioinorganic Chemistry, and Theoretical and Computational Chemistry. This presents a unique opportunity for undergraduates to engage in research alongside esteemed professors, enriching their academic journey through hands-on experience and mentorship.