

B.Sc. Hons. Chemistry

PROGRAM OUTCOMES

❖ Learning outcomes-based approach to curriculum planning and development

The Learning Outcomes-based Curriculum Framework (LOCF) for the B.Sc. (Hons.) degree in Chemistry provides a broad structural framework that can accommodate the current curricular needs as well as gives sufficient flexibility to include changes in content that assume importance as the frontiers of science grow. The inherent flexibility in the framework allows design of course basket in tune with individual preferences. The basic uniformity in core course design ensures smooth movement across universities in the country.

❖ Nature and Extent of B.Sc. (Hons.) Chemistry

The B.Sc. (Hons.) Chemistry programme covers a wide range of basic and applied courses as well as courses of interdisciplinary nature.

❖ Aims of the Bachelor's Degree Programme

The core courses offered in the programme aim to build a strong conceptual chemical knowledge base in the student, the contents of electives and skill enhancement courses help them explore their fitness and suitability to pursue studies in these areas.

❖ Graduate Attributes

Though a student pursuing an undergraduate degree in a science discipline is inherently curiosity driven and has the ability to observe and integrate rationally, here are the additional attributes that distinguish a student graduating with an honours degree in chemistry:

Disciplinary Knowledge:

The student has acquired in-depth knowledge of the various concepts and theoretical principles and is aware of their manifestations. An understanding of the centrality of chemistry is usually evident from familiarity with interfacial disciplines. A graduate in chemistry is expected to be thoroughly conversant with all basic analytical, qualitative and quantitative laboratory techniques and demonstrate meticulousness in operation. She/he is aware of the importance of working with safety and consciousness in laboratory and actively seeks information about health and environmental safety of chemicals that are used in the laboratories and follows protocols for their safe disposal.

Communication skills:

Effective communication is a much desirable attribute across courses. However, a chemistry honours student is expected to assimilate technical information about chemistry from various

sources and convey it to intended audience, both orally and in writing in an intelligible manner.

Critical thinking:

Critical thinking as an attribute enables a student to analyze a problem, assess it, reconstruct it and solve it.

Problem solving:

An integral part of the chemistry curriculum is problem solving. The student will be equipped to solve problems of numerical, synthetic and analytical nature that are best approached with critical thinking.

Analytical reasoning:

The student will be able to draw logical conclusions based on a group of observations, facts and rules.

Research related skills:

The student is inquisitive about processes and phenomena happening during experiments in laboratories and seeks answers through the research path.

Cooperation/Teamwork:

Teams may comprise peers in the classroom, laboratory or any other team of members from diverse fields. The student is capable of contributing meaningfully to team ethos and goals.

Scientific reasoning:

Students learn to investigate, experiment, relate information and draw logical conclusions based on scientific reasoning.

Reflective thinking:

Reflective thinking focuses on the process of making judgments about what has happened. The students learn to review their experience and make a plan for future actions in a similar situation with a view to improve.

Information/digital literacy:

Increasing use of instruments having interface with computers and use of computers in laboratory work creates this attribute. A student with a degree in chemistry is able to employ knowledge and skill in computers in a variety of situations- data analysis, computing as well as information retrieval and library use.

Self-directed learning:

Students are encouraged to explore the many sources of information available to them. Various activities require the students to find relevant information and educate themselves.

Multicultural competence:

The student recognizes that all persons are unique in their own way and appreciates the differences in cultural background, religious beliefs, and socio-economic status.

Moral and ethical awareness/reasoning:

The student is aware of what constitutes unethical behaviour-- plagiarism, fabrication and misrepresentation or manipulation of data.

Leadership readiness/qualities:

Leadership is essential in making teamwork into a reality. Working in teams promotes both teamwork and leadership qualities in the student.

Lifelong learning:

Having a strong conceptual framework in the subject along with the skills of teamwork, analytical reasoning, problem solving, critical thinking etc. make the students lifelong learners.

❖ Programme Specific Outcomes

The B.Sc.(Hons) programme in Chemistry is designed to develop in students in depth knowledge of the core concepts and principles that are central to the understanding of this core science discipline. Undergraduates pursuing this programme of study go through laboratory work that specifically develops their quantitative and qualitative skills, provides opportunities for critical thinking and team work, and exposes them to techniques useful for applied areas of scientific study.

• Knowledge:

Width and depth: Students acquire theoretical knowledge and understanding of the fundamental concepts, principles and processes in main branches of chemistry, namely, organic chemistry, inorganic chemistry, physical chemistry, analytical chemistry and biochemistry. In depth understanding is the outcome of transactional effectiveness and treatment of specialized course contents. Width results from the choice of electives that students are offered.

• Laboratory Skills:

Quantitative, analytical and instrument based: A much valued learning outcome of this programme is the laboratory skills that students develop during the course. Quantitative techniques gained through hands-on methods open the choice of joining the industrial

laboratory work force early on. The programme also provides ample training in handling basic chemical laboratory instruments and their use in analytical and biochemical determinations. Undergraduates on completion of this programme can cross branches to join analytical, pharmaceutical, material testing and biochemical labs besides standard chemical laboratories.

• **Communication:**

Communication is a highly desirable attribute to possess. Opportunities to enhance students' ability to write methodical, logical and precise reports are inherent to the structure of the programme. Techniques that effectively communicate scientific chemical content to large audiences are acquired through oral and poster presentations and regular laboratory report writing.

• **Capacity Enhancement:**

Modern day scientific environment requires students to possess the ability to think independently as well as be able to work productively in groups. This requires some degree of balancing. The chemistry honours programme course is designed to take care of this important aspect of student development through an effective teaching learning process.

• **Portable Skills:**

Besides communication skills, the programme develops a range of portable or transferable skills in students that they can carry with them to their new work environment after completion of chemistry honours programme. These are problem solving, numeracy and mathematical skills- error analysis, units and conversions, information retrieval skills, IT skills and organizational skills. These are valued across work environments.