

## DEPARTMENT OF CHEMISTRY::BODOLAND UNIVERSITY

### Programme Specific Outcome (PSO) of M.Sc. in Chemistry

**PSO 1:** Acquire deep understanding to develop the problem solving skills using principles and processes of chemical sciences.

**PSO 2:** Develop skills of extraction, estimation, preparation, separation, and characterization of materials and chemical compounds following the chemical processes and using sophisticated analytical techniques.

**PSO 3:** Develop research and scientific writing skills through project/dissertation in the fields of chemistry such as organic, inorganic, physical, polymer science, analytical, etc.

**PSO 4:** Acquire knowledge in natural products, and biological and energy systems.

**PSO 5:** To well-equip the students with theoretical and analytical knowledge of different branches of chemical sciences to make them fit for industry jobs.

**PSO 6:** Theoretical knowledge gained through this course will help them to qualify national and international competitive examinations to fulfil their dreams as researcher/academician.

### COURSE OUTCOME

#### SEMESTER-I

SEMESTER-I	
Paper code	Paper Title
CHM 101	Physical Chemistry-I
<i>Course Outcome</i>	Students will be able to understand the fundamentals of equilibrium and non-equilibrium thermodynamics, statistical mechanics, electrochemistry and polymers. With better understanding on these topics, their problem-solving capability will improve.
CHM 102	Organic Chemistry-I

<i>Course Outcome</i>	Students will be able to demonstrate/explain the unique features of aromaticity, stereoelectronic factors, stereochemistry, organic reaction mechanism and reactivity & selectivity principles and will be able to solve related problems.
CHM 103	Inorganic Chemistry–I
<i>Course Outcome</i>	Students will be able to explain/critically examine the chemistry of chemical bonding, structure of solids and applications of redox chemistry.
CHM 104	Spectroscopy–I
<i>Course Outcome</i>	Students will be able to identify/elucidate the basis of different spectroscopic techniques, and demonstrate their various applications in analyzing and interpreting experimental data.
CHM 105	Practical (Organic Chemistry)
<i>Course Outcome</i>	Students will be able to perform qualitative and quantitative analysis of organic compounds and mixtures, and implement single-step and multi-step organic synthesis.
CHM 106-OP1	Green Chemistry
<i>Course Outcome</i>	Students will be able to explain and compare relationships between Green Chemistry and chemical laboratory and industry for the design of safer processes and chemicals.
CHM 106-OP2	Chemistry in Everyday Life
<i>Course Outcome</i>	Students will be able to understand and demonstrate the involvement of chemistry, chemical composition and chemical processes in the day to day social life.
CHM 106-OP3	Basic Rubber Science
<i>Course Outcome</i>	Students will learn the basic about Rubber: their origin, types and some of their applications.
<b>SEMESTER-II</b>	
<b>Paper code</b>	<b>Paper Title</b>
CHM 201	Physical Chemistry–II
<i>Course Outcome</i>	Students will learn about the theoretical basis of various theories of chemical kinetics, reaction dynamics, catalysis, adsorption and surface chemistry and most importantly the ways/methods of validation of these theories.
CHM 202	Organic Chemistry–II

<i>Course Outcome</i>	After learning the course, students will acquire the detailed knowledge on stereoselective synthesis, oxidation and reduction reactions, pericyclic reactions and organic photochemistry.
CHM 203	Inorganic Chemistry–II
<i>Course Outcome</i>	Students will be able to apply their knowledge of inorganic and solid state chemistry in explaining, interpreting and critically examining bonding/structure/reactivity of metal complexes and lanthanides and actinides.
CHM 204	Spectroscopy–II
<i>Course Outcome</i>	Students will be able to explain the basic working principle of various spectroscopic techniques and will be able to apply their knowledge in analytical purposes and interpretation of data.
CHM 205	Practical (Inorganic Chemistry)
<i>Course Outcome</i>	Students will be able to demonstrate experimental skills encompassing set-up of experiments, synthesis, characterization of different inorganic materials, and usage of analytical equipments.
CHM 206-OP1	Renewable Energy
<i>Course Outcome</i>	After learning the course, students will acquire the detailed knowledge on renewable energy, conversion processes and applications.
CHM 206-OP2	Petrochemical Process Technology
<i>Course Outcome</i>	After learning the course, students will acquire the detailed knowledge on physicochemical properties petroleum products and their technological processes.
CHM 206-OP3	Polymer and Environment
<i>Course Outcome</i>	Students will be able to know about the use of environmentally friendly polymers, their source, potential applications and management in minimizing their negative effect on environment.
<b>SEMESTER-III</b>	
<b>Paper code</b>	<b>Paper Title</b>
CHM 301	Quantum Chemistry
<i>Course Outcome</i>	Students will be able to know the several theories and methods of quantum chemistry and their successful applications in calculation of various theoretical parameters, e.g. energy etc.

CHM 302	Analytical Techniques
<i>Course Outcome</i>	Students will be able to explain/demonstrate the application of different analytical techniques in chemistry.
CHM 303	Environmental Chemistry
<i>Course Outcome</i>	Students will be able to demonstrate an understanding of environmental chemistry viz. air, water and soil chemistry and identify the relationships between atmosphere, solar radiation and ozone formation.
CHM 304	Advanced Topics in Chemistry
<i>Course Outcome</i>	After learning the course, students will acquire the detailed knowledge on nanochemistry, supramolecular chemistry, advanced topics of pericyclic reactions and will be able to characterize and interpret organic molecules using advanced level of NMR techniques.
CHM 305	Practical (Physical Chemistry)
<i>Course Outcome</i>	The students will be able to understand physical chemistry from experimental point of view. Moreover, they will learn some modern methods of analysis required in different area of research.
CHM 306-E1	Biochemistry
<i>Course Outcome</i>	Students will be able to demonstrate and represent the different chemical and physical processes of living organisms.
CHM 306-E2	Computational Quantum Chemistry
<i>Course Outcome</i>	After learning the course, students will acquire the detailed knowledge on computational quantum chemistry and its applications.
CHM 306-E3	Solid State Chemistry
<i>Course Outcome</i>	After learning the course, students will acquire the detailed knowledge on theories, reactions and properties solid state and materials.
CHM 306-E4	Applied Electrochemistry
<i>Course Outcome</i>	The students will acquire the detailed knowledge and will be able to demonstrate electrochemical energy conversion and storage processes and surface modification techniques.
CHM 306-E5	Supramolecular Chemistry

<i>Course Outcome</i>	The students will acquire the detailed knowledge and will be able to demonstrate principles, properties and applications of supramolecular chemistry.
<b>SEMESTER-IV</b>	
CHM 401	Polymer Science
<i>Course Outcome</i>	The students will acquire the detailed knowledge about polymers, their synthesis, processing abilities, properties, structure-property relationship to their applications
CHM 402	Natural Products and Heterocyclic Chemistry
<i>Course Outcome</i>	After learning the course, students will be able to identify different types of natural products, their sources and applications. Students will also be able to describe important methods of extraction, their synthesis, and biosynthesis processes.
CHM 403	Transition Metals and Inorganic Materials
<i>Course Outcome</i>	Students will be able to explain/describe/rationalize molecular structure and bonding using group theory.
CHM 404	Catalysis
<i>Course Outcome</i>	Students will be able to describe the theories and mechanisms of heterogeneous catalysis, and demonstrate the applications of the materials for industrial purposes.
CHM 405	Organic Synthesis
<i>Course Outcome</i>	Students will be able to describe and design organic synthetic strategies.
CHM 406	Organometallics and Photoinorganic Chemistry
<i>Course Outcome</i>	Students will be able to discuss/explain the synthesis, structure, & reactivity of organometallic compounds, reagents, and demonstrate their uses in industrially important reactions.
CHM 407	Chemistry of Surfactants
<i>Course Outcome</i>	The students will be able to demonstrate the chemistry of surfactants including their importance and applications.
CHM 408	Bioorganic and Medicinal Chemistry
<i>Course Outcome</i>	Students will be able to identify, compare and explain aspects related to biochemical processes, drug design and mode of action of drug.
CHM 409	Bioinorganic Chemistry
<i>Course Outcome</i>	Students will be able to classify/critically examine supramolecular systems, explicate the underlying principles, with regard to concepts of molecular recognition, self-assembly, catalysis, and devices. They will also learn the role of metal ions in functioning of biological

	systems, toxicity due to metal ions, the role in a diseases and therapy.
CHM 410	Project/Dissertation
<i>Course Outcome</i>	The students would be able to demonstrate and plan a scientific research, and implement it within a reasonable time-frame. It is expected that after completing this project/dissertation, students will learn to work independently and how to keep accurate/readable record of their experimental works. In addition, students will be able to handle laboratory equipment and chemicals, and utilize sophisticated instruments for analysis, data collection and interpretation. Moreover, students will learn how to perform literature review and will be able to critically examine research articles, and improve their scientific writing/communication.