



Y B N UNIVERSITY

RAJAULATU, NAMKUM, RANCHI (Jharkhand)

Established by the Act. of Government of Jharkhand Act. 15, 2017

Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

School of Science UG - PHYSICS (HONS.)

Program Outcome:

PO1	Core competency: Students will acquire core competency in the subject Physics, and in allied subject areas.
PO2	Systematic and coherent understanding of the fundamental concepts in Physics and other related allied Physics subjects.
PO3	Students will be able to use the evidence based comparative Physics approach to explain the scientific and technological problems.
PO4	The students will be able to understand the laws of nature.
PO5	Students will be able to understand the basic principle of equipment, instruments used in the Physics laboratory.
PO6	Students will be able to demonstrate the experimental techniques and methods of their area of specialization in Physics.
PO7	Disciplinary knowledge and skill: A graduate student are expected to be capable of demonstrating comprehensive knowledge and understanding of both theoretical and experimental/applied Physics knowledge in various fields of interest like Mathematical Physics, Thermal and Statistical Physics, Electromagnetism, Waves and Optics, Analog and Digital Electronics, Modern Physics, Quantum Mechanics, Solid State Physics, Nuclear and Particle Physics, Classical Dynamics, Experimental Techniques, Devices and Instruments, etc.
PO8	Skilled communicator: The course curriculum incorporates basics and advanced training in order to make a graduate student capable of expressing the subject through technical writing as well as through oral presentation. Critical thinker and problem solver: The course curriculum also includes components that can be helpful to graduate students to develop critical thinking ability by way of solving problems/numerical using basic Physics knowledge and concepts.
PO9	Sense of inquiry: It is expected that the course curriculum will develop an inquisitive characteristic among the students through appropriate questions, planning and reporting experimental investigation. Team player: The course curriculum has been designed to provide opportunity to act as team player by contributing in laboratory, field-based situation and industry.
PO10	Skilled project manager: The course curriculum has been designed in such a manner as to enable a graduate student to become a skilled project manager by acquiring knowledge about Physics project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.
PO11	Digitally literate: The course curriculum has been so designed to impart a good working knowledge in understanding and carrying out data analysis, use of library search tools, and use of simulation software and related computational work.

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YBN UNIVERSITY, RANCHI (JHARKHAND)





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As per Section 2(f) of UGC Act. 1956

PO12	Ethical awareness/reasoning: A graduate student requires understanding and developing ethical awareness/reasoning which the course curriculum adequately provide.
PO13	Lifelong learner: The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.

Programme Specific Outcome (PSO)

1. **PSO1-Fundamental Understanding of Physics** – Develop a systematic and coherent understanding of core physics concepts, including mechanics, electromagnetism, quantum mechanics, and thermodynamics.
2. **PSO2-Experimental & Analytical Skills** – Acquire hands-on experience in conducting physics experiments, analyzing data, and making scientific observations with precision.
3. **PSO3-Mathematical & Computational Proficiency** – Utilize mathematical modeling, simulations, and computational techniques to solve complex physics problems.

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Gazette Notification No. 505, Dated 17 July 2017

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School of Science P G - PHYSICS (HONS.)

Program Outcome:

PO1	Theoretical knowledge of Physics: Apply theoretical knowledge of principles and concepts of Physics to practical problems.
PO2	Scientific Accuracy and Precision: Develop approaches with a concern for accuracy and precision in significance to science and technology, i.e., develop the ability to critically evaluate theories, methods, principles, and applications of pure and applied science.
PO3	Computer Simulation Knowledge: Visualize and verify the Theoretical predictions/ propositions of Physics through Computer Simulation.
PO4	Experimental design and Data Interpretation: Identify, formulate and solve scientific problems based on design, experiment, data interpretation and analysis of results.
PO5	Societal benefit Investigate various problems and ways to solve which will be very beneficial to society.
PO6	Usage of Modern Tools: Show ability in using modern tools for design and analysis.
PO7	Meet the realistic demands: Design a system, component, or process to meet desired needs within realistic constraints such as environmental, health, safety, manufacturability, and sustainability.
PO8	Ethical Practice: Understand and practice professional ethics
PO9	Multidisciplinary Focus: Work in teams on multi-disciplinary projects in research organizations and industries.
PO10	New Challenges: Take up new challenges to understand the reasoning of any physical phenomena through research and design solutions to meet the societal as well as scientific demands.
PO11	Scientific Reporting: Demonstrate the ability to undertake a major, individual, physics- related project and reporting the results in a full scientific report and oral and poster presentation.
PO12	Effective Communication: Build up communication skills, both written and oral, to specialized and non-specialized audiences.

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Gazzate Notification No. 505, Dated 17 July 2017

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Programme specific Outcome (PSO)

1. **PSO1- Advanced Knowledge in Core Physics** – Gain in-depth understanding of fundamental and advanced physics concepts, including quantum mechanics, condensed matter physics, and electromagnetism.
2. **PSO2- Computational & Experimental Expertise** – Develop proficiency in computational tools and scientific software for solving complex physics problems.
3. **PSO3- Research & Innovation** – Conduct independent research, contribute to scientific advancements, and apply physics principles to real-world challenges.

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YBN UNIVERSITY, RANCHI (JHARKHAND)





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SCHOOL OF SCIENCE

B.Sc. (Hons) Biotechnology

Programme Outcome (PO)

The objectives of the B.Sc. Biotechnology Programme are to empower the students from the basics of interdisciplinary life-sciences to the recent trends in Biotechnology and its applications for the benefit of the community. The course accredits the students with conceptual and practical skills of biotechnology and introduces the students to the latest developments in biotechnology. It is fast emerging as a top course providing distinct advantages to students as it finds applications in various aspects of life sciences. The curriculum for the Biotechnology Four-Year Undergraduate Program is based on the LOCF-CBCS system of the UGC with value addition courses which are envisaged in the NEP-2020. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honours) Biotechnology is intended to provide a comprehensive foundation for the subject and to help students develop the ability to successfully continue with further studies, research and startup in the subject while they are equipped with the required skills at various stages. This course serves a plethora of opportunities in different fields right from conventional to applied aspects in Biotechnology.

By the end of the program the students will be able to: -

PO1: Detailed Knowledge of Living Organisms

- Students will have a detailed knowledge in the structure, function, and applications of living organisms.

PO2: Interdisciplinary Skills in Biotechnology

- Students will understand concepts in Biotechnology and demonstrate interdisciplinary skills acquired in cell biology, genetics, biochemistry, microbiology, and molecular biology.

PO3: Laboratory Skills

- Students will have skill sets in handling microorganisms in the laboratory and their applications in academia and industry.

PO4: Industrial and Environmental Applications

- Students will understand and implement the applications of biotechnology in industry, healthcare, environmental protection, food, and agricultural research.

PO5: Current Trends in Biotechnology

- Students will understand the current trends in biotechnology and its applications. **PO6:**

Experimental Design and Interpretation

- Students will demonstrate the ability to design, perform, and interpret experiments during practical courses with an emphasis on technological aspects.

PO7: Innovations and Skills in Biotechnology





Y B N UNIVERSITY

RAJAULATU, NAMKUM, RANCHI (Jharkhand)

Established by the Act. of Government of Jharkhand Act. 15, 2017

Gazette Notification No. 505, Dated 17 July 2017

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- Students will demonstrate comprehensive innovations and skills in the field of biomolecules, cell biology, molecular biology, bioprocess engineering, and genetic engineering.

PO8: Bioinformatics and Computational Modeling

- Students will apply knowledge and skills of immunology, bioinformatics in computational modeling of proteins, drug design, and simulation.

PO9: Data Analysis and Interpretation

- Students will critically analyze, interpret data, and apply tools of bioinformatics in various sectors of biotechnology.

PO10: Communication and Scientific Writing

- Students will demonstrate communication skills, scientific writing, data collection, and interpretation abilities in all fields of biotechnology.

PO11: Professional Skills and Ethics

- Students will learn and practice professional skills in handling microbes, animals, plants, and demonstrate the ability to identify ethical issues related to biotechnology.

PO12: Good Laboratory and Manufacturing Practices

- Students will gain knowledge and apply good laboratory practice and good manufacturing practices in biotech industries.

PO13: Molecular Biology Techniques

- Students will understand and apply molecular biology techniques and principles in forensics and clinical biotechnology.

PO14: Innovative Thinking and Problem-Solving

- Students will explore biotechnological practices and demonstrate innovative thinking in addressing current and future challenges.

Program Specific Outcome (PSOs)

PSO1: Application of Biotechnology Principles

- Students will be able to apply the principles of biotechnology to develop innovative solutions in fields such as healthcare, agriculture, and environmental protection.

PSO2: Critical Thinking and Problem-Solving in Biotechnology

- Students will be able to critically analyze complex problems in biotechnology, design experiments, and interpret data to develop effective solutions and applications in various sectors of biotechnology.

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Y B N UNIVERSITY

RAJAULATU, NAMKUM, RANCHI (Jharkhand)

Established by the Act. of Government of Jharkhand Act. 15, 2017

Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

SCHOOL OF SCIENCE

M.Sc. Biotechnology

Programme Outcome (PO)

By completing the M.Sc. Biotechnology program, graduates will possess a strong foundation in biotechnology, research skills, and critical thinking abilities, and be prepared to pursue careers in various fields, including research, industry, and academia.

By the end of the program the students will be able to: -

PO1: Knowledge and Understanding

- Students will demonstrate a thorough understanding of the fundamental concepts and principles of biotechnology, including molecular biology, cell biology, microbiology, biochemistry, and biophysics.

PO2: Research and Analysis

- Students will be able to apply research skills and analytical techniques to investigate complex biological problems and develop innovative solutions.

PO3: Critical Thinking and Problem-Solving

- Students will develop critical thinking and problem-solving skills to analyze complex biological data, evaluate scientific evidence, and develop well-supported conclusions.

PO4: Communication and Collaboration

- Students will be able to effectively communicate scientific information and research findings to diverse audiences, and collaborate with peers and professionals in the field.

PO5: Professionalism and Ethics

- Students will demonstrate a commitment to professionalism, ethics, and social responsibility in their scientific pursuits, and be aware of the impact of biotechnology on society and the environment.

Program Specific Outcome (PSOs)

PSO1: Biotechnology Expertise

- Graduates will possess in-depth knowledge and skills in biotechnology, including genetic engineering, plant and animal biotechnology, industrial biotechnology, and environmental biotechnology.

PSO2: Research and Development

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YBN UNIVERSITY, RANCHI (JHARKHAND)





Y B N UNIVERSITY

RAJAULATU, NAMKUM, RANCHI (Jharkhand)

Established by the Act. of Government of Jharkhand Act. 15, 2017

Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

- Graduates will be able to design, conduct, and analyze research projects in biotechnology, and develop innovative products and technologies.

PSO3: Industry and Academia Linkages

- Graduates will be able to bridge the gap between academia and industry, and apply their knowledge and skills to real-world problems and applications.


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Gazette Notification No. 505, Dated 17 July 2017

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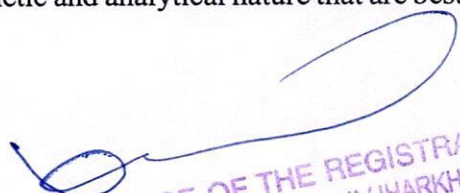
SCHOOL OF SCIENCE

B.Sc. Chemistry

Programme Outcomes (POs)

A student graduating with B.Sc. (FYUP) Chemistry should be able to acquire:

- ❖ A graduate student is expected to acquire comprehensive knowledge and understanding of both theoretical and experimental/applied chemistry knowledge in various fields of interest like Analytical Chemistry, Physical Chemistry, Inorganic Chemistry, Organic Chemistry, Material Chemistry, etc. Further, the student will be able to explain, integrate and apply relevant knowledge to problems that emerge from the broader interdisciplinary and multi-disciplinary areas.
- ❖ A much-valued learning outcome of this programme is the laboratory skills that students will develop during the course. Hands-on training on various analytical instruments and classical quantitative techniques in this course will enable them to cross branches to join analytical, pharmaceutical, material testing and biochemical labs besides standard chemical laboratories.
- ❖ The course curriculum will enable students to prepare the results of scientific work in written and electronic formats and communicate it to the peers and the public at large. It will also enable the students to appreciate the central role of chemistry in our society and use the knowledge to address the problems and issues pertaining to ethical, social, economic, and environment to academia, industry and government.
- ❖ The course curriculum includes components that can be helpful to graduate students to develop critical thinking using basic chemistry knowledge and concepts.
- ❖ An integral part of the 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.


OFFICE OF THE REGISTRAR
YBN UNIVERSITY, RANCHI (JHARKHAND)







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RAJAULATU, NAMKUM, RANCHI (Jharkhand)

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- ❖ It is expected that the course curriculum will enable students to develop skills to design and test hypothesis, execute research experiments, conduct chemical syntheses, analyses or other chemical investigations, compile raw data and provide logical conclusions.
- ❖ Modern day scientific environment requires students to possess 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 whereby a student can function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ❖ The course curriculum has been so designed to impart a good working knowledge in understanding and carrying out data analysis, use of library search tools, and use of chemical simulation software and related computational work.
- ❖ A graduate student requires understanding and developing ethical awareness/reasoning which the course curriculum adequately provides.
- ❖ The course curriculum is designed to inculcate a habit of learning continuously for personal academic growth as well as to find gainful employment in public and private sector, be accepted for higher education or professional studies, or find employment in various levels as instructors or administrators.

Programme Specific Outcome (PSO)

1. **Fundamental Understanding of Chemistry** – Develop a strong foundation in organic, inorganic, physical, and analytical chemistry.
2. **Experimental & Analytical Skills** – Perform laboratory techniques proficiently, ensuring accuracy in chemical analysis.
3. **Critical Thinking & Problem-Solving** – Apply chemistry principles to solve real-world scientific and industrial challenges.


OFFICE OF THE REGISTRAR
YBN UNIVERSITY, RANCHI (JHARKHAND)





Y B N UNIVERSITY

RAJAULATU, NAMKUM, RANCHI (Jharkhand)

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Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

SCHOOL OF SCIENCE

M.Sc. Chemistry

Programme Outcomes (POs)

On the completion of the M.Sc Chemistry, the students will be

PO1	Advanced Theoretical Knowledge	Gain in-depth understanding of organic, inorganic, physical, and analytical chemistry, along with emerging fields like materials chemistry and environmental chemistry.
PO2	Laboratory Techniques & Instrumentation	Develop proficiency in advanced laboratory techniques and the use of sophisticated instrumentation for precise chemical analysis.
PO3	Research & Innovation	Conduct independent research, apply modern methodologies, and contribute to scientific advancements in chemistry.
PO4	Chemical Safety & Ethics	Understand chemical safety protocols, ethical considerations, and environmental impact of chemical processes.
PO5	Interdisciplinary & Collaborative Skills	Integrate chemistry with physics, biology, and environmental science to address complex interdisciplinary problems.
PO6	Professional & Career Readiness	Prepare for doctoral studies, research roles, and leadership positions in academia, industry, and government sectors.

Programme Specific Outcomes (PSOs)

On the completion of the M.Sc Chemistry, the students will be

PSO1	Specialized Knowledge	Master advanced concepts in organic synthesis, spectroscopy, quantum chemistry, and molecular modeling.
PSO2	Analytical & Problem-Solving Skills	Apply chemical principles to solve industrial and environmental challenges.
PSO3	Research & Development	Engage in innovative research, contributing to advancements in pharmaceuticals, materials science, and green chemistry.
PSO4	Career Opportunities	Prepare for roles in R&D, quality control, academia, and competitive exams like CSIR-NET and GATE.

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YBN UNIVERSITY, RANCHI (JHARKHAND)





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Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

SCHOOL OF SCIENCE

B.Sc Botany (Hons.)

Programme Outcomes (POs)

On the completion of the B.Sc Botany (Hons.), the students will be

PO1	Understanding Plant Diversity	Gain knowledge of plant diversity, including structure, function, and environmental relationships.
PO2	Taxonomy & Classification	Develop skills in plant identification, classification, and understanding flora at regional and global levels.
PO3	Ecology & Environmental Awareness	Understand the role of plants in ecosystems and their impact on environmental sustainability.
PO4	Scientific Research & Analytical Skills	Apply scientific methods, conduct experiments, and analyze data using modern tools.
PO5	Biotechnology & Applied Botany	Explore plant biotechnology, tissue culture, and genetic engineering applications.
PO6	Ethical & Social Responsibility	Recognize the importance of biodiversity conservation and sustainable development.

Programme Specific Outcomes (PSOs)

On the completion of the B.Sc Botany (Hons.), the students will be

PSO1	Plant Physiology & Biochemistry	Understand plant metabolism, physiological processes, and biochemical interactions.
PSO2	Genetics & Molecular Biology	Study genetic principles, molecular mechanisms, and their applications in botany.
PSO3	Economic Botany & Ethnobotany	Explore the economic importance of plants, including medicinal, agricultural, and industrial applications.
PSO4	Practical & Field-Based Learning	Gain hands-on experience through laboratory work, field studies, and ecological surveys.

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RAJAULATU, NAMKUM, RANCHI (Jharkhand)

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Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

SCHOOL OF SCIENCE

M.Sc Botany (Hons.)

Programme Outcomes (POs)

On the completion of the M.Sc Botany (Hons.), the students will be

Programme Outcomes (POs)

PO1	Advanced Knowledge in Botany	Gain in-depth understanding of plant biology, taxonomy, physiology, and molecular biology.
PO2	Research & Analytical Skills	Develop expertise in scientific research methodologies, data analysis, and experimental techniques.
PO3	Environmental & Conservation Awareness	Apply botanical knowledge to biodiversity conservation and sustainable environmental practices.
PO4	Biotechnology & Applied Botany	Utilize plant biotechnology for agricultural, medicinal, and industrial applications.
PO5	Ethical & Professional Responsibility	Uphold ethical standards in botanical research and professional practice.
PO6	Communication & Scientific Writing	Effectively present research findings through reports, presentations, and publications.

Programme Specific Outcomes (PSOs)

On the completion of the M.Sc Botany (Hons.), the students will be

PSO1	Plant Physiology & Biochemistry	Understand plant metabolism, physiological processes, and biochemical interactions.
PSO2	Genetics & Molecular Biology	Study genetic principles, molecular mechanisms, and their applications in botany.
PSO3	Economic Botany & Ethnobotany	Explore the economic importance of plants, including medicinal, agricultural, and industrial applications.
PSO4	Practical & Field-Based Learning	Gain hands-on experience through laboratory work, field studies, and ecological surveys.

OFFICE OF THE REGISTRAR
YBN UNIVERSITY, RANCHI (JHARKHAND)





Y B N UNIVERSITY

RAJAULATU, NAMKUM, RANCHI (Jharkhand)

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Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

SCHOOL OF SCIENCE **B.Sc. ZOOLOGY (HONS.)**

Program Outcome:

PO1-In-depth knowledge and understanding about the fundamental concepts, principles and processes underlying the academic field of Zoology and its different subfields (animal diversity, principles of ecology, comparative anatomy and developmental biology of vertebrates, physiology and biochemistry, genetics and evolutionary biology, animal biotechnology, applied Zoology, aquatic biology, immunology, reproductive biology, and insect, vectors and diseases, apiculture, aquarium fish keeping, medical diagnostics, and sericulture)

PO2-Procedural knowledge that creates different types of professionals in the field of Zoology and related fields such as, apiculture, aquarium fish keeping, medical diagnostics, and sericulture, etc.

PO3-Skills related to specialization areas within Zoology as well as within subfields of Zoology, including broader interdisciplinary subfields (Chemistry, Physics and Mathematics).

PO4-Over the years, Zoologists were able to find many differences within the same breed of an animal species. As a Zoology professional one can study extinct animals by specializing in Paleozoology, on the different types of birds in Ornithology opt for studying Herpetology and Arachnology, the branches dealing with the study of snakes and spiders, respectively or

PO5-Appreciate the complexity of life processes, their molecular, cellular and physiological processes, their genetics, evolution and behaviour and their interrelationships with the environment.

PO6-Study concepts, principles and theories related with animal behaviour and welfare.

PO7-Understand and interpret data to reach a conclusion Design and conduct experiments to test a hypothesis.

PO8-Understand scientific principles underlying animal health, management and welfare.

PO9-Accept the legal restrictions & ethical considerations placed for animal welfare.

PO10-Understand fundamental aspects of animal science relating to management of animals.

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RAJAU LATU, NAMKUM, RANCHI (Jharkhand)

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Gazzate Notification No. 505, Dated 17 July 2017

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Program Specific Outcomes

PSO1. Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology

PSO2. Analyse the relationships among animals with their ecosystems

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Y B N UNIVERSITY

RAJAULATU, NAMKUM, RANCHI (Jharkhand)

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Gazette Notification No. 505, Dated 17 July 2017

As per Section 2(f) of UGC Act. 1956

SCHOOL OF SCIENCE M.Sc. ZOOLOGY (HONS.)

Programme Outcomes (POs)

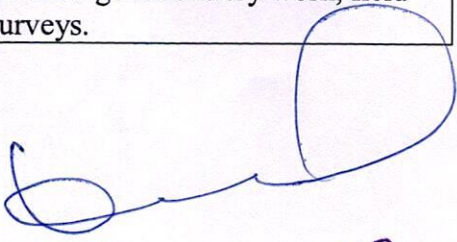
On the completion of the M.Sc Zoology (Hons.), the students will be

PO1	Advanced Knowledge in Zoology	Gain in-depth understanding of animal biology, taxonomy, physiology, and molecular biology.
PO2	Research & Analytical Skills	Develop expertise in scientific research methodologies, data analysis, and experimental techniques.
PO3	Environmental & Conservation Awareness	Apply zoological knowledge to biodiversity conservation and sustainable environmental practices.
PO4	Biotechnology & Applied Zoology	Utilize biotechnology for applications in genetics, microbiology, and animal sciences.
PO5	Ethical & Professional Responsibility	Uphold ethical standards in zoological research and professional practice.
PO6	Communication & Scientific Writing	Effectively present research findings through reports, presentations, and publications.

Programme Specific Outcomes (PSOs)

On the completion of the M.Sc Zoology (Hons.), the students will be

PSO1	Animal Physiology & Biochemistry	Understand metabolic processes, physiological mechanisms, and biochemical interactions in animals.
PSO2	Genetics & Molecular Biology	Study genetic principles, molecular mechanisms, and their applications in zoology.
PSO3	Ecology & Evolutionary Biology	Explore ecological interactions, evolutionary processes, and environmental adaptations.
PSO4	Practical & Field-Based Learning	Gain hands-on experience through laboratory work, field studies, and ecological surveys.


OFFICE OF THE REGISTRAR
YBN UNIVERSITY, RANCHI (JHARKHAND)





Y B N UNIVERSITY

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SCHOOL OF SCIENCE B.Sc. Mathematics (Hons.)

Programme Outcomes (POs)

On the completion of the B.Sc. Mathematics (Hons.), the students will be

PO1	Mathematical Thinking	Develop logical reasoning and problem-solving skills through mathematical concepts.
PO2	Analytical & Computational Skills	Apply mathematical techniques to analyze and solve real-world problems.
PO3	Interdisciplinary Applications	Utilize mathematical principles in fields like physics, engineering, and economics.
PO4	Research & Innovation	Engage in mathematical research and contribute to advancements in theoretical and applied mathematics.
PO5	Ethical & Professional Responsibility	Uphold ethical standards in mathematical research and professional practice.
PO6	Communication & Scientific Writing	Present mathematical findings clearly through reports, presentations, and publications.

Programme Specific Outcomes (PSOs)

On the completion of the B.Sc. Mathematics (Hons.), the students will be

PSO1	Algebra & Analysis	Master fundamental concepts in algebra, calculus, and real analysis.
PSO2	Applied Mathematics	Utilize mathematical modeling and computational techniques in scientific applications.
PSO3	Probability & Statistics	Develop expertise in statistical analysis and probability theory for data interpretation.
PSO4	Mathematical Software & Programming	Gain proficiency in mathematical software and programming languages for problem-solving.

OFFICE OF THE REGISTRAR
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SCHOOL OF SCIENCE M.Sc. Mathematics (Hons.)

Programme Outcomes (POs)

On the completion of the M.Sc. Mathematics (Hons.), the students will be

PO1	Advanced Mathematical Knowledge	Gain in-depth understanding of pure and applied mathematics.
PO2	Research & Analytical Skills	Conduct independent research and apply mathematical techniques to complex problems.
PO3	Computational & Numerical Methods	Utilize computational tools for mathematical modeling and simulations.
PO4	Interdisciplinary & Collaborative Skills	Apply mathematical knowledge in interdisciplinary fields like data science and engineering.
PO5	Ethical & Professional Responsibility	Demonstrate integrity and professionalism in mathematical research and applications.
PO6	Communication & Scientific Writing	Effectively present mathematical research through reports, papers, and conferences.

Programme Specific Outcomes (PSOs)

On the completion of the M.Sc. Mathematics (Hons.), the students will be

PSO Number	Programme Specific Outcome	Description
PSO1	Advanced Algebra & Analysis	Master higher-level concepts in algebra, topology, and functional analysis.
PSO2	Applied Mathematics & Optimization	Solve real-world problems using optimization techniques and applied mathematics.
PSO3	Probability, Statistics & Data Science	Develop expertise in statistical modeling, probability theory, and data science applications.
PSO4	Mathematical Research & Innovation	Engage in mathematical research, contributing to advancements in theoretical and applied mathematics.

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