

Faculty: Faculty of Science and Technology

Programme:

Bachelor of Science (B.Sc.):

Three year integrated degree programme compulsory of six semester under Choice Based Credit System (CBCS).

The curricular pattern shall be as under:

B.Sc. Part I (Semester I and II)

1. The Programme:

For B. Sc. Part I total Credits shall be 52 with 26 Credits for each Semester, of these; 18 Credits for theory and 8 credits for practical.

I. Ability Enhancement Compulsory Course (subjects) (hereafter termed as **AECC**) with Paper A for Sem. I and Paper B for Sem. II each of 50 marks, as compulsory English course.

II. There are 4 Discipline Specific Core Courses (subjects) (hereafter termed as **DSC**) per semester.

III. There are 2 theory papers each of 50 marks for a DSC.

IV. There is 1 practical of 50 marks for each DSC.

2. Weightage:

There are 2800 marks for 3 years B. Sc. CBCS Program with 140 Credits.

3. The Groups:

Students are supposed to select **Any One Group** from the following:

Science Group A: Physics, Chemistry, Mathematics, Statistics
Science Group B: Physics, Chemistry, Botany, Zoology

4.Instructions:

1. For Examination rules/schedules/updates/Revised Guidelines visit www.unishivaji.ac.in
2. Minimum passing criteria 35%, 35% and above Pass Class 45% and above Second Class, 60 % and above First Class, 70% and above First Class with Distinction.
3. ATKT as per the University rule.

Desired Outcomes: Science Faculty

The institution strives to attain the POs, PSOs, COs through enrichment, capacity enhancement programmes supplemented with ICT based interactive, experimental learning. The institution implements the curriculum as devised by the University to attain the programme outcomes (POs), Programme specific outcomes (PSOs) and Course outcomes (COs) as evolved by the University and revised, updated time to time based on the emerging needs, concerns with the focus on employability, entrepreneurship and skill development.

Outcomes: Science Faculty

1. Programme Outcomes (PO):

PO1. The B. Sc. Programme helped to develop scientific temperament and attitude among the science graduates.

PO2. The qualities of science: observation, precision, analytical mind, logical thinking, clarity of thought and expression, systematic approach, qualitative and quantitative decision making, are enlarged.

PO3. Empowered the graduates to appear for various competitive examinations and/or choose the post graduate programme of their choice.

PO4. This programme trained the learners to extract information, formulate and solve problems in a systematic and logical manner.

PO5. This programme enabled the learners to perform the jobs in diverse fields such as science, engineering, industries, survey, education, banking, development-planning, business, public service, self business etc. efficiently.

PO6. Acquired the knowledge with facts and figures related to various subjects in pure sciences such as Physics, Chemistry, Botany, Zoology, Mathematics, etc.

PO7. Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions.

PO8. Realized the pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life.

2. Programme Specific Outcomes (PSO):

The programme specific outcomes enable students to develop proficiency in Science along with the subfields, especially Physics, Chemistry, Mathematics, Statistics, Biology and Zoology. Learners also develop abilities in scientific approach. They get acquainted with the basic concepts and advanced theories in Science and know all theories and practical of various subjects and branches of science. They also know prominent Scientists, their inventions & contributions, their country and culture. Students also inculcate practical views & human values through the study of Science.

Student admitted to this program are expected to get the following outcomes:

After completion of the Programme, our students:

PSO1. Understand basic concepts of Physics, advanced technology in physics, basic research in emerging fields like Nano-technology, astrophysics and quantum mechanics.

PSO2. Understand basic concepts of Chemistry, chemical formulae and solve numerical problems as well as develop research oriented skills.

PSO3. Create awareness about scientific, practical & environmental approach.

PSO4. Develop mathematical arguments in a logical manner and understanding advanced areas of mathematics and statistics.

PSO5. Get jobs in various private and government sector.

PSO6. Understand the nature, function and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology.

PSO7. Develop knowledge about plant science and build life skills in mushroom cultivation, Bio fertilizer production, Greenhouse maintenance and Seed technology through value-added courses.

Programme: Bachelor of Science (B.Sc.) PHYSICS

Program Specific Outcomes (PSOs)

After completion of the Programme, our students:

PSO1. Demonstrate basic principles of Physics.

PSO2. Use advanced technology in the field of physics.

PSO3. Start basic research in emerging areas like Nano technology, astrophysics, and quantum mechanics.

PSO4. Seek jobs in various private and government sector.

PSO5. Get confident to take up competitive exams.

Programme: Bachelor of Science (B.Sc.) CHEMISTRY

Program Specific Outcomes (PSOs)

After completion of the Programme, our students:

PSO1. Gain the knowledge of Chemistry through theory and practical's.

PSO2. Explain nomenclature, stereochemistry, structures, reactivity and mechanism of the chemical reactions.

PSO3. Identify chemical formulae and solve numerical problems.

PSO4. Use modern chemical tools, Models, Chem-draw, Charts and Equipment.

PSO5. Know structure-activity relationship.

PSO6. Understand good laboratory practices and safety.

PSO7. Develop research oriented skills.

PSO8. Make aware and handle the sophisticated instruments/equipment

Programme: Bachelor of Science (B.Sc.) MATHEMATICS

Program Specific Outcomes (PSOs)

After completion of the Programme, our students:

PSO1. Think in critical manner.

PSO2. Know the basic concepts of mathematics.

PSO3. Formulate and develop mathematical arguments in a logical manner.

PSO4. Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.

PSO5. Understand, formulate and use quantitative models arising in social science, Business and other contexts.

Programme: Bachelor of Science (B.Sc.) STATISTICS

Program Specific Outcomes (PSOs)

After completion of the Programme, our students:

PSO1. Understand the fundamental and basic concepts in statistics for data analysis in software industries.

PSO2. Use appropriate statistical techniques to solve real life problems.

PSO3. Apply statistical techniques and concepts to perform computation and regression analysis.

PSO4. Get jobs in various private and government sector.

PSO5. Develop confident to take up competitive exams.

Programme: Bachelor of Science (B.Sc.) Zoology

Program Specific Outcomes (PSOs)

After completion of the Programme, our students:

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

PSO2. Analyze the relationships among animals.

PSO3. Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Clinical science, tools and techniques of Zoology, Biochemistry, Fish biology, Animal biotechnology, Immunology and research methodology .

PSO4. Understand the applications of biological sciences in Apiculture, Aquaculture.

PSO5. Gains knowledge about research methodologies and skills of problem solving methods

PSO6. Contribute the knowledge for Nation building.

Programme: Bachelor of Science (B.Sc.) BOTANY

Program Specific Outcomes (PSOs)

After completion of the Programme, our students:

PSO1. Get knowledge about plant science.

PSO2. Inculcate strong fundamentals on modern and classical aspects of Botany.

PSO3. Build life skills in Edible mushroom cultivation, Bio fertilizer production, Greenhouse maintenance and Seed technology through value-added courses.

PSO4. Create platform for higher studies in Botany.

PSO5. Facilitate students to take-up successful career in Botany.

PSO6. Contribute the knowledge for Nation building.

3. Course Outcomes(CO):

English

B.Sc. Part I – Ability Enhancement Compulsory Course (AECC 1)(CBCS)

English for Communication (June 2018 onwards)

After studying this course, students:

CO1. Know how to deal with communication skills.

CO 2. Know how to develop Vocabulary.

CO 3. Improve the language competencies of the students.

CO 4. Use English for general purposes in various situations.

PHYSICS

B.Sc.-I: Paper I, DSC - 1 A Mechanics - I

After studying this course, students:

CO1. Study the various concepts & basics in Mechanics.

- CO2. Recognize the motion of the charged particle in electromagnetic field.
- CO3. Describe conservation of energy, work, force, linear momentum and angular momentum
- CO4. Learn the fundamentals of harmonic oscillator model, including damped and forced oscillators.

B.Sc.-I: Paper II, DSC- 2 A Mechanics-II

After studying this course, students:

- CO1. Comprehend regarding the strength of the solid materials of different size.
- CO2. Understand the effect of gravitation on objects and understand the principle of rocket.
- CO3. Study the basic concepts in Mechanics.
- CO3. Analyze the motion in fluids and express the changes occurring in them in terms of boiling point and freezing point.

B.Sc. II: Paper 3 & 4, DSC- B Electricity and Magnetism-I

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DSC- 2B Electricity and Magnetism-II

After studying this course, students:

- CO1. Identify the presence of static electric charges and fields due to static charges.
- CO2. Possess adequate knowledge to analyze electrical circuits using faraday's law
- CO3. Understand the phenomena and apply the concept of emf wherever suitable

- CO4. Distinguish between different types of magnetic materials and different kinds of magnetism manifested in materials.
- CO5. Know and analyze magnetic properties of a ferromagnetic solid by analyzing or recording its hysteresis behavior
- CO6. Understand vector calculus in three dimensions and derive Gauss theorem, Stoke's theorem.
- CO7. Distinguish between magnetic effect of electric current and electromagnetic induction and to apply the related laws in appropriate circumstances
- CO8. Demonstrate magnetic field of electric current/ electromagnetic induction through proper understanding

CHEMISTRY

B.Sc.-I: Paper I, DSC – 3A Inorganic Chemistry

After studying this course, students:

- CO1. Know the meaning of various terms involved in co-ordination Chemistry
- CO2. Understand Werner's formulation of complexes.
- CO3. Know the limitations of VBT.
- CO4. Know the shapes of d-orbital and degeneracy of d-orbital.

B.Sc.-I: Paper II, DSC- 4A Organic Chemistry

After studying this course, students:

- CO1. Study the basics of Organic Chemistry.
- CO2. Define organic acids and bases.
- CO3. Distinguish between geometrical and optical isomerism.

CO4. Understand evidences, reactivity and mechanism of elimination and substitution reactions.

B. Sc. I: Paper III, DSC- 3B Physical Chemistry

After studying this course, students:

CO1. Study the basics of Physical Chemistry.

CO1. Write an expression for rate constant K for third order reaction.

CO2. Solve the numerical problems based on Rate constant.

CO3. Know the meaning of phase, component and degree of freedom.

B. Sc. I: Paper IV, DSC- 4B Analytical Chemistry

After studying this course, students:

CO1. Know the principles of common ion effect and solubility product.

CO2. Study the methods of thermo-gravimetric analysis.

CO3. Understand principles of Spectro - photometric analysis and properties of electromagnetic radiations.

CO4. Study the Voltammetry and Polarography as an analytical tool.

MATHEMATICS

B.Sc.-I: Paper I DSC - 5 A Differential Calculus

After studying this course, students:

CO1. Gain Knowledge of fundamental concepts of real numbers.

CO2. Verify the value of the limit of a function at a point using the definition of the limit

CO3. Understand sequence and series.

CO4. Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions.

B.Sc.-I: Paper II, DSC- 6A Calculus

After studying this course, students:

CO1. Understand differentiation and fundamental theorem in differentiation and various rules.

CO2. Know geometrical representation and problem solving on MVT and Rolle's theorem.

CO3. Find extreme values of function.

CO4. Introduce Ordinary Differential Equation.

B. Sc. I: Paper III, DSC- 5B Differential Equations

After studying this course, students:

CO1. Study differential equations in the context of Equations.

CO2. Solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.

CO3. Find the complete solution of a non homogeneous differential equation as a linear combination of the complementary function and a particular solution.

CO4. Get the working knowledge of basic application problems described by second order linear differential equations with constant coefficients.

B. Sc. I: Paper IV

DSC- 6B Higher Order Ordinary Differential Equations and Partial Differential Equations

After studying this course, students:

- CO1. Get familiar with the modeling assumptions and derivations that lead to PDEs.
- CO2. Recognize the major classification of PDEs and the qualitative differences between the classes of equations.
- CO3. Turn competent in solving linear PDEs using classical solution methods.
- CO4. Know the association between the attributes.

STATISTICS

B.Sc. – I Paper-I, DSC – 7A - Descriptive Statistics –I

After studying this course, students:

- CO1. Define & use the basic terminology of statistics.
- CO2. Classify the data by means of diagrams & graphs.
- CO3. Explain the concepts of central tendency, dispersion, skewness, kurtosis & moments.
- CO4 .Calculate & interpret the various measures of central tendency, measures of dispersion.

B.Sc. – I Paper -II

DSC – 8A- Elementary Probability Theory

After studying this course, students:

- CO1. Study Elementary Probability theory.
- CO2. Use the basic probability rules including additive & multiplicative laws using the terms independent & mutually exclusive events.
- CO3. Translate real world problem into probability models.

CO4. Know random variables of interest in a given scenario.

B.sc. Part – I Paper-III

DSC – 7B -Descriptive Statistics –II

After studying this course, students:

CO1. Compute & interpret the results of regression for forecasting.

CO2. Compute & interpret the results of correlation analysis.

CO3. Calculate the simple linear regression equation for set of data.

CO4. Acquire knowledge if index numbers.

B.Sc. Part – I Paper-IV

DSC – 8B -Descriptive Probability Distributions

After studying this course, students:

CO1. Calculate probabilities & derive marginal & conditional Distributions of bivariate random variable.

CO2. Study binomial outcomes & compute probability of getting x successes in N trials.

CO3. Identify the type of statistical situation to which different distributions can be applied.

CO4. Apply general properties of expectation.

CO5. Know some standard discrete probability distributions with real life situations.

ZOOLOGY

B.Sc.-I: Paper I, DSC – 15A Animal Diversity-I

After studying this course, students:

- CO1. Understand new concepts and characteristics of Animal Diversity.
- CO2. Describe general taxonomic rules on animal classification.
- CO3. Classify Protista up to phylum using examples from parasitic adaptation
- CO4. Classify Phylum Porifera to Echinodermata with taxonomic keys.
- CO5. Study Phylum Nematode and give examples of pathogenic Nematodes.

B.Sc.-I: Paper II

DSC- 16 A Animal Physiology

After studying this course, students:

- CO1. Understand basics and characteristics of Animal Physiology.
- CO2 Study the concepts of digestion respiration excretion the functioning of nerves and muscles.
- CO3. Gain fundamental knowledge of animal physiology.
- CO4. Develop skill to execute the roles of a biology teacher or medical lab technicians with training as they have basic fundamentals.

B.Sc.-I: Paper III

DSC- 15B Cell Biology and Evolutionary Biology

After studying this course, students:

- CO1. Understand the concept and importance of Cell Biology.
- CO2 Structural and functional aspects of basic unit of life i.e. cell concepts.
- CO3 Study the background of Theories of Evolution.
- CO4 Knowledge of eras and evolution of species.

B.Sc.-I: Paper IV

DSC- 16B Genetics

After studying this course, students:

CO1 Understand of basic concepts of genetics, laws of inheritance and central dogma of biology

CO2 Study of genetic basis of evolution, human karyotyping and speciation

CO2 Understand Mendelian and non mendelian inheritance

CO3 Identify the concept behind genetic disorder, gene mutations- various causes associated with inborn errors of metabolism

BOTANY

B.Sc.-I: Paper I

DSC –13A Biodiversity of Microbes, Algae and Fungi

After studying this course, students:

CO1. Know the structure, pigmentation, food reserves and methods of reproduction of Algae

CO2. Learn about the structure, pigmentation, food reserves and methods of reproduction of Fungi.

CO3. Know about the Economic importance of algae, Fungi

CO4. Learn about structure of Microbes.

B.Sc.-I: Paper II

DSC- 14A Biodiversity of Bryophytes, Pteridophytes, Gymnosperm

After studying this course, students:

- CO1. Understand new concepts, importance and characteristics of Biodiversity..
- CO2. Learn about the general characters and classification by K.R. Sporne, stelar evolution in Pteridophytes, heterospory and origin of seed habit.
- CO3. Know about the structure, life history and Economic importance of Gymnosperms.
- CO4. Learn about the structure, pigmentation, food reserves and methods of reproduction of Algae.

B.Sc.-I: Paper III

DSC –13B Plant Ecology

After studying this course, students:

- CO1. Understand new concepts and characteristics of Plant Ecology.
- CO2. Learn the Approaches to the study of Ecology (Autecology, Synecology and Genecology)
- CO3. Understand the population & Community Ecology - concept of metapopulational.
- CO4. Know about the Principles of Toxicology and types of Toxins, sources, metabolism and Biological monitoring.

B.Sc.-I: Paper IV

DSC –13B Plant Taxonomy

After studying this course, students:

- CO1. Learn the types of classifications- artificial, Natural and phylogenetic.

CO2. Gain knowledge about Botanical Survey of India (BSI).

CO3. Study on herbarium techniques.

CO4. Learn the taxonomic evidences from molecular, numerical and chemicals.

CO5. Study the economic products with special reference to the Botanical name, family, morphology of useful part and the uses.