

CHANDIDAS MAHAVIDYALAYA

*Department
of*

Mathematics

PO, PSO, CO

(Programme Outcome, Programme Specific Outcome, Course Outcome)

Under

Curriculum and Credit Framework for Undergraduate Programmes (CCFUP)

as per NEP, 2020

Session: 2023-2024




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A Govt. Aided Degree College, ESTD 1972
Affiliated to the University of Burdwan
UGC Accredited under
section 2(f) & 12(B)
NAAC Accredited (2nd Cycle)
Website: www.chandidasmahavidyalaya.ac.in

Programme Outcome

Mathematics is a fundamental part of human thought and logic, which attempts to understand the world and ourselves. The study of Mathematics makes students able to analyse, test, interpret and form independent judgments in both academic and non-academic contexts. The students should have adequate curiosity, patience, dedication, fundamental thinking and ability of asking the correct questions to teachers. The students can build a solid foundation for higher studies in Mathematics. Through studying Mathematics, the students can be capable to create, select and apply appropriate techniques, resources and modern technology in multidisciplinary environment. Also, it comprises critical thoughts to carry out scientific investigation objectively without being biased with preconceived notions. The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilised in modelling and solving real life problems. The study of Mathematics accumulates logic, axioms, facts, principles, concepts and methods within the mind, which makes students better at solving problems in both academic as well as non-academic environment and stimulates their cognitive growth and development. After completing the Programme of Mathematics, students should be able to present mathematics clearly and precisely, make vague ideas precise by formulating them in the language of mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of Mathematics to non-mathematicians. Therefore, B.Sc. in Mathematics is an exciting and important degree that can open up a lot of opportunities for under-graduate students.


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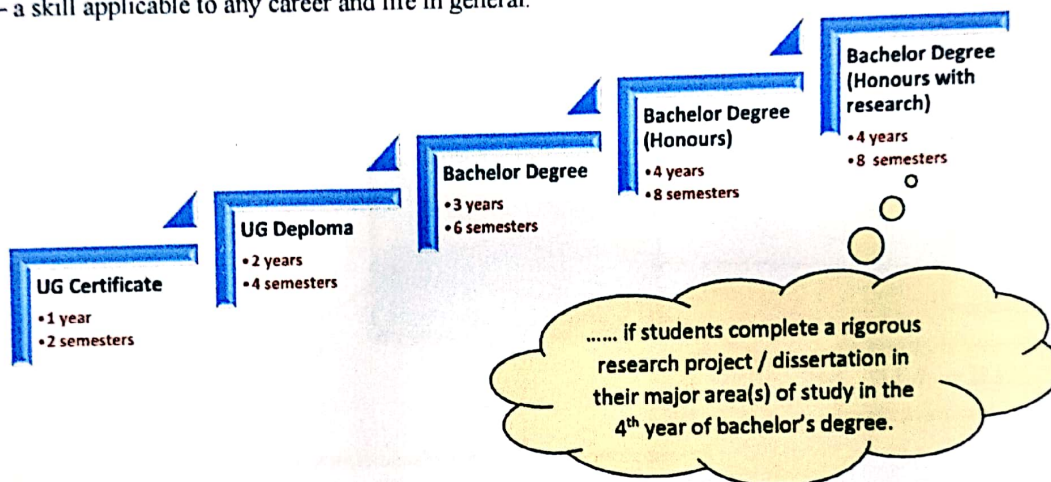
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Programme Specific Outcome

From the very beginning of recorded history, the discoveries in Mathematics have been at the forefront of every civilized society, and even it belongs to the most primitive of cultures. The needs of Mathematics arose based on the wants of society. Mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigor. In addition, mathematical knowledge plays a crucial role in understanding the contents of other subjects such as science, social studies, and even music and art. Mathematics can teach us how to look longer and harder for solutions – a skill applicable to any career and life in general.



There are two major distinct Programme Specific Outcomes for graduate students in Mathematics: while some may work in academia as researchers, others work in diverse industry roles. After completing B.Sc. in Mathematics, a student can either decide to go for higher studies or apply for jobs. In the case of or 4 years' bachelor degree (Honours) in Mathematics, both the options are very promising. After being graduated in Mathematics, students can pursue M.Sc. in Mathematics followed by Ph.D. or M.Phil. programme from several Universities and R&D institutions in India as well as abroad. A student can admit to the post-graduate course in several subjects viz. Mathematics, Actuarial Science, Financial Mathematics and Computation, Actuarial Science, Statistics, Statistics and Operational Research, Computer Application, Business Administration, Data Science, Machine Learning etc. Moreover, a student can also get admitted in several professional courses viz. D.Ed., B.Ed., B.Tech., B.E., L.L.B. etc. for various jobs such as teaching, engineering etc. This sums up the point that there are plenty of courses that one can look forward on the completion of B.Sc. Honours in Mathematics. Also, a graduate student can apply for banking, accounting, private and even Govt. jobs. The exams like UPSC, WBCS, CGL, CHsL, SSC, IBPS, Railways etc. require expertise in solving problems in Mathematics.

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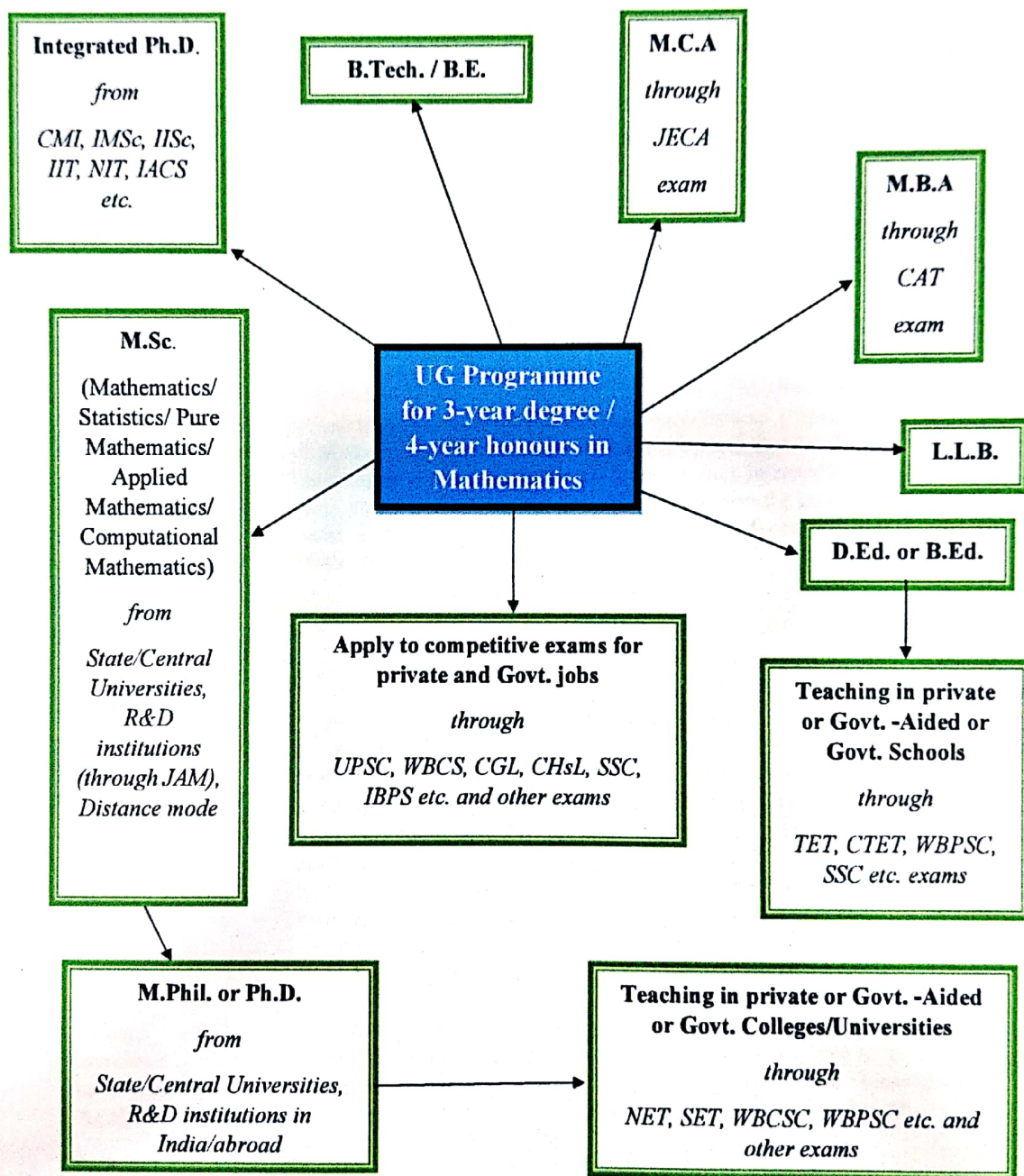
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In the next, a pictorial representation of Programme Specific Outcomes is given in form of the career planning for the students.



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Course Outcome

Courses / Topics	Course Codes	Course Outcomes
Algebra	MATH2021, MATH2031, MATH3012, MATH4012, MATH8014	The students learn to follow a logical path to prove theorems and to solve problems. Students are introduced to abstract algebra, linear algebra. In abstract algebra, they can learn group theory, ring theory and field theory, which have a broad range of applications in Mathematics as well as multidisciplinary subjects. In linear algebra, the concept of vector space, normed linear space, inner-product space, linear transformation etc. have been introduced.
Geometry	MATH1011, MATH1021, MATH1031, MATH8012	The students can understand the foundations of Mathematics through visualizing two-dimensional and three-dimensional shapes/objects in terms of Mathematics. The students can gain knowledge and skills and develop the competency, which also leads to proficiency in analytical reasoning. Also, students can understand the beauty between the geometrical objects (such as straight lines, planes, conics, curves, surfaces etc.) and Mathematical equations.
Calculus	MATH1011, MATH1021, MATH3031, MATH4013, MATH8013	The students learn about the mathematical aspect of "change". This course provides a framework for modelling systems in which there is change, and a way to deduce the predictions of such models. Also, students can learn multivariate calculus, differential calculus, integral calculus in this course. In integral calculus, the students encounter different concepts such as the area of various geometric shapes, the area under the curve by using the definite integral, the indefinite integral and various practical applications. The students can also develop their skills to apply calculus for problem solving such as finding extremum, area-volume of a shape, asymptotes of curves, monotonicity of functions, cusps, nodes, point of inflection, envelope of family of curves, mathematical model, velocity along a curve etc. which has crucial applications in any field of applied sciences.
Real / complex / functional Analysis	MATH3011, MATH5011, MATH6012, MATH7012, MATH8021, MATH8013	The students study about the concept of limits, continuity, differentiability of a real/complex-valued functions. Also, students are able to learn about convergence, connectedness, compactness, convexity etc. This course helps to develop the skills of solving several analytical problems.

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Metric. Spaces and Topology	MATH4011, MATH7014	The students understand that metric is a generalization of the concept of distance and the topology is more general concept than the concept of metric space. The students study several theorems from Real Analysis in the new context of metric spaces and topology. Basically, this course teaches about the concept of generalization in Mathematics.
Numerical Analysis and Methods	MATH6011, MATH8011	The students learn that several numerical solutions can be obtained for problems, where an analytical solution does not exist. Major number of mathematical problems, which are originated from our real-life situation, do not have analytics solutions. But this course teaches about methods for finding numerical solutions by approximation.
Probability and Statistics	MATH5012	The students can be enabled to better understand, process, and interpret the vast amounts of quantitative data that exist all around them, and to have a probabilistic sense in situations of uncertainty. The students understand that Probability is all about chance and Statistics is more about how we handle various data using different techniques for a certain purpose. This course stimulates the skills of students to understand the laws governing random events, including the collection, analysis, interpretation, and display of numerical data.
LPP and Operation Research	MATH5012, MATH7011	The students can learn the methods (such as transportation & assignment problems) of finding optimal solutions of several mathematical problems. This course makes logical thinking for students and provides better insight into business problems by evaluating the cost and profit.
Mechanics	MATH6014, MATH7013	The students learn several important topics in Mechanics such as Newton's laws of motion, Galilean transformation, Isothermal and adiabatic changes in Gases, Convective equilibrium, Stress in continuum body, Lagrange's equation of motion for holonomic system, Gibbs-Appell's principle of least constraint etc., which helps to develop the skills to formulate mechanical problems and finding their solutions.

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Graph Theory	MATH1051	The students ultimately the study the concept of relationships in more logical or mathematical ways. Students can learn many features of graphs like data flow diagram, decision making ability, displays relationships among objects, easy alterations and modifications in existing system etc. along with their real-life application. Also, the students can know historical notes about Leonhard Euler, the father of graph theory, settled a famous unsolved problem called the Konigsberg Bridge Problem, which motivates them in research.
Boolean Algebra, Automata and Computer Language	MATH2051	The students can learn the concept of the truth or falsity of a given proposition or logical statement used as variables instead of the numeric quantities employed by ordinary algebra. Also, it helps students to create tools for describing and analysing the dynamic behaviour of discrete systems. In addition, students can learn several computer languages such as C, C++, FORTRAN, MATLAB etc. which are essential in the study of Mathematics.
Differential Equations	MATH5013, MATH5021, MATH6013, MATH7021	The students can understand that physical systems can be described by differential equations and also feel the practical importance of solving differential equations. The students can learn that for many physical systems, one can, subject to suitable idealizations, formulate a differential equation that describes how the system changes in time.

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