

SRIDEV SUMAN UTTARAKHAND UNIVERSITY
BADSHAHI THAUL (TEHRI GARHWAL), UTTARAKHAND-249199

National Education Policy-2020

**Common Minimum Syllabus for Uttarakhand State
Universities and Colleges**

SKILL ENHANCEMENT COURSE (SEC)

SYLLABUS



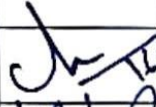
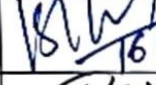
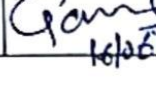
DEPARTMENT OF MATHEMATICS

Curriculum Design Committee, Uttarakhand

S. No.	Name & Designation	
1.	Prof. D. S. Rawat Vice-Chancellor, Kumaon University, Nainital, Uttarakhand	Chairman
2.	Prof. N. K. Joshi Vice-Chancellor, Sri Dev Suman Uttarakhand University, Badshahi Thaul, Tehri Garhwal, Uttarakhand	Member
3.	Prof. O.P.S. Negi Vice-Chancellor, Uttarakhand Open University	Member
4.	Prof. Surekha Dangwal Vice-Chancellor, Doon University, Dehradun	Member
5.	Prof. Satpal Singh Bisht Vice-Chancellor, Soban Singh Jeena University, Almora	Member
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7.	Prof. K.D. Purohit Advisor Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	Member

Member of Board of Studies- Mathematics Sri Dev Suman Uttarakhand University

Prof. G.K. Dhingra, Dean Faculty of Science - chairperson

S. No.	Name	Designation	Affiliation	Signature
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2.	Prof. K. S. Rawat	Professor	S.R.T. Campus, Badshahi Thaul, Tehri	
3.	Prof. Dipa Sharma	Professor	Pt. L.M.S. Campus, Sri Dev Suman Uttarakhand University, Rishikesh	
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(Board of Studies on June 16, 2025)


16/06/25

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SKILL ENHANCEMENT COURSES (SEC)					
Year	Semester	Course Code	Paper Title	Paper Type	Credits
First Year	I	SEC Maths1	Mathematical Techniques	Theory	2
	II	SEC Maths2	Data Analysis Methods	Theory	2
Second Year	III	SEC Math3	Financial Mathematical Analysis	Theory	2

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Program Outcomes (POs)

- **Strong Mathematical Foundation:** Students will develop a comprehensive understanding of applied mathematics, including transform techniques, data analysis, and financial computations, equipping them to tackle real-world problems analytically.
- **Analytical Thinking and Problem Solving:** Students will be able to formulate mathematical models, analyze quantitative data, and derive meaningful solutions for practical problems across science, business, and economics.
- **Statistical and Data Interpretation Skills:** Students will acquire the ability to summarize, visualize, and interpret complex data sets using statistical tools, charts, and regression techniques to support data-driven decision-making.
- **Application in Finance and Industry:** Students will gain practical knowledge in applying mathematical concepts such as time value of money, interest theory, and portfolio optimization to solve problems in finance, banking, and investment.
- **Computational and Technological Skills:** Students will develop the ability to use appropriate mathematical software and tools (e.g., MATLAB, Excel, or programming environments) for numerical analysis and financial modelling.
- **Research and Lifelong Learning:** Students will be equipped with a research mindset and the capability to independently explore advanced topics, supporting continuous learning and innovation in interdisciplinary domains.
- **Ethical and Professional Awareness:** Students will demonstrate an understanding of ethical issues in data use, financial decision-making, and the societal impact of mathematical applications, promoting responsible professional conduct.

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Program Specific Outcomes (PSOs)

- **PSO1 – Proficiency in Mathematical Techniques:** Students will be able to apply Laplace and Fourier transforms, along with their properties and theorems, to solve differential equations and initial value problems that arise in engineering and physical sciences.
- **PSO2 – Competence in Data Analysis Methods:** Students will effectively collect, organize, and analyze different types of data using visualization tools and statistical measures. They will apply regression and curve fitting techniques to understand trends and relationships in data.
- **PSO3 – Expertise in Financial Mathematics:** Students will understand financial concepts such as simple and compound interest, annuities, bonds, stock pricing, arbitrage, and risk-neutral valuation. They will apply mathematical models to evaluate investments and assess financial risk.
- **PSO4 – Practical and Interdisciplinary Problem Solving:** Students will integrate mathematical, statistical, and financial knowledge to address real-life problems in diverse fields such as economics, insurance, banking, and business analytics, supporting informed decision-making.

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SEMESTER-I						
SKILL ENHANCEMENT COURSE (SEC Maths1): Mathematical Techniques						
CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITE OF THE COURSE						
Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/Practice		
SEC Maths1: Mathematical Techniques	2	1	1	0	Passed Class XII with Mathematics	Nil
Course Outcomes: Students will understand and apply Laplace and Fourier transforms to solve differential equations and initial value problems. They will learn basic properties, inverse transforms, and the use of convolution and shifting theorems in solving real-world mathematical models.						

SKILL ENHANCEMENT COURSE	
Year: I	Semester: I
Course Code: SEC Maths1	Course Title: Mathematical Techniques
Credits: 4	Skill Enhancement Course
Min. Passing Marks: As per University rules	No. of Hours: 28-30

Unit	Content	Number of Hours
Unit I	Transforms: Integral Transforms, Laplace Transforms, elementary properties, Unit step function, shifting theorem, transforms of derivatives and derivatives of transforms.	7-8
Unit II	Inverse Laplace Transforms: Inverse Laplace transforms, use of partial fractions, convolution theorem.	7
Unit III	Applications: Solution of differential equations using Laplace transforms, Initial value problems.	7
Unit IV	Introduction to Fourier Transforms: Finite Fourier transforms, Fourier Sine transforms, Fourier Cosine transforms.	7-8

Books Recommended:

1. Joel L. Schiss, The Laplace Transforms: Theory and Applications, Springer
2. E. M. Stein and Rami Shakarchi, Fourier Analysis, An Introduction: Levant Books, Kolkata.

Digital Platform: NPTEL/SWAYAM/MOOCs.

SEMESTER-II						
SKILL ENHANCEMENT COURSE (SEC Maths2): Data Analysis Methods						
CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITE OF THE COURSE						
Course Title	Credits	Credit distribution of the Course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/Practice		
SEC Maths2: Data Analysis Methods	2	1	1	0	Passed Class XII with Mathematics	Nil
Course Outcomes: Students will understand types of data and learn to organize, visualize, and interpret data using various charts and statistical measures. They will develop skills in correlation, regression, and curve fitting techniques for data analysis.						

SKILL ENHANCEMENT COURSE	
Year: I	Semester: II
Course Code: SEC Maths2	Course Title: Data Analysis Methods
Credits: 4	Skill Enhancement Course
Min. Passing Marks: As per University rules	No. of Hours: 28-30

Unit	Content	Number of Hours
Unit I	Introduction: Data, Primary and secondary data, qualitative and quantitative data, Categorical, Numerical and Time-series data	7
Unit II	Data Visualization: Bar chart, Pie chart, Histogram, Scatter plots, Boxplot, Line chart	7
Unit III	Statistics: Measures of Central Tendency: Mean, Median, Mode, Measures of Dispersion: Range, Variance, Standard Deviation, correlation and regression analysis.	7-8
Unit IV	Curve Fitting: least square curve fitting procedure, fitting straight line, curve fitting by polynomial.	7-8

Books Recommended:

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, S Chand and Sons.
2. Deepak Shrivastava, Introduction to Data and Data Analysis, Notion Press.

Digital Platform: NPTEL/SWAYAM/MOOCs.

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SEMESTER-III						
SKILL ENHANCEMENT COURSE (SEC Maths3): Financial Mathematical Analysis						
CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITE OF THE COURSE						
Course Title	Credits	Credit distribution of the Course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/Practice		
SEC Maths3: Financial Mathematical Analysis	2	1	1	0	Passed Class XII with Mathematics	Nil
Course Outcomes: Students will understand the principles of interest, time value of money, and financial instruments like annuities, bonds, and stocks. They will gain knowledge of risk assessment, portfolio optimization, and financial market concepts such as arbitrage and value at risk.						

SKILL ENHANCEMENT COURSE	
Year: II	Semester: III
Course Code: SEC Maths3	Course Title: Financial Mathematical Analysis
Credits: 4	Skill Enhancement Course
Min. Passing Marks: As per University rules	No. of Hours: 30

Unit	Content	Number of Hours
Unit I	Interest: simple and compound, discrete and continuous, Time Value of Money and Cash Flows.	7
Unit II	Concept of inflation, deflation, banking system, taxation system, Mutual funds, Annuities and Bonds, bond prices and yields.	7
Unit III	Stocks and Stock Price Models, Arbitrage and Risk-Neutral Pricing, Value at risk, Dividend Paying Stock.	7-8
Unit IV	Portfolio Management: Expected Utility Functions, Portfolio Optimization for Two Assets, Portfolio Optimization for N Assets.	7-8

Books Recommended:

1. Amber Habib, The Calculus of Finance, University of Hyderabad.
2. Steven Roman, Introduction to mathematics of Finance, Springer International Edition.

Digital Platform: NPTEL/SWAYAM/MOOCs.

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Pattern of Examination Theory Papers

1. Theory

- *Each theory paper shall consist of two sections – A and B.*
- ***Section A** (Short answers type with reasoning): **45 marks**, eight questions of nine marks each, any five have to be attempted.*
- ***Section B** (Long answers type): **30 marks**, two questions of fifteen marks each, and both questions are compulsory with internal choice.*

2. Internal Assessment

- *For each theory paper internal assessment shall be conducted periodically (in the form of class tests and/or assignments/ group discussion/ oral presentation/ overall performance) during the semester period.*
- *Total marks allotted to internal assessment shall be 25.*
- *The evaluated answer sheets/assignments have to be retained by the Professor In-Charge for the period of six months and can be shown to the students if students want to see the evaluated answer sheets.*
- *The marks obtained by the students shall be submitted to the Head of concerned department/ the Principal of the College for uploading onto the University examination portal.*