



UNIVERSITY OF JAMMU

(NAAC ACCREDITED A++ GRADE UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: academicsectionju14@gmail.com

NOTIFICATION (25/Oct./Adp./23)

In supersession to this office Notification No. F.Acd./II/25/6973-7008 dated 21.08.2025, It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the revised Syllabi and Courses of Study of the subject of **Mathematics** of Semester I and II for **Four Year Under Graduate Programme as per NEP-2020 (as given in the Annexure)** for the Examinations to be held in the years indicated against each semester as under:-

Semesters	Existing Code Course	New Code Course	For the examinations to be held in the years	%Change
Semester-I	UMJMAT-101	UMJMAT-101	Dec. 2026, 2027 and 2028	Less than 5%
	UMIMAT-102	UMIMAT-102	Dec. 2026, 2027 and 2028	Less than 5%
	UMDMAT-103	UMDMAT-103	Dec. 2026, 2027 and 2028	No Change
	UAEMAT-104	UAEMAT-104	Dec. 2026, 2027 and 2028	No Change
	USEMAT-105	USEMAT-111	Dec. 2026, 2027 and 2028	100%
Semester-II	UMJMAT-201	UMJMAT-201	May 2027, 2028 and 2029	Less than 5%
	UMIMAT-202	UMIMAT-202	May 2027, 2028 and 2029	Less than 5%
	UMDMAT-203	UMDMAT-203	May 2027, 2028 and 2029	No Change
	UAEMAT-204	UAEMAT-204	May 2027, 2028 and 2029	No Change
	USEMAT-205	USEMAT-211	May 2027, 2028 and 2029	100%

The Syllabi of the courses are also available on the University website: www.jammuuniversity.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/25/11798-815
Dated: 28/10/2025

Copy for information and necessary action to:

1. Dean, Faculty of **Mathematical Science**
2. Convener, Board of Studies in **Mathematics**
3. All members of the Board of Studies
4. Sr. P.A. to the Controller of Examinations
5. Director, CITES&M, University of Jammu for directing the concerned to upload the notification on University Website.
6. C.A. to the Controller of Examinations
7. Director, Computer Centre, University of Jammu.
8. Joint Registrar/Deputy Registrar/Asst. Registrar (Confidential/Exam UG/Exam. Non Prof.)

Joint Registrar (Academic)

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24/11/25

DEPARTMENT OF MATHEMATICS

UNIVERSITY OF JAMMU

FIVE YEARS UNDER GRADUATE PROGRAMME (FYUGP) IN THE DEPARTMENT OF MATHEMATICS

SEMESTER-I

SEMESTER-I (MATHEMATICS)

4 Credits courses

S. No	Course Type	Course No.	Course Title	Credits	Marks				Total Marks	Percentage %
					Theory		Tutorial			
				4=3Th+1T				100		
1.	Major	UMJMAT101	Differential Calculus	4	Mid Semester Examination 15 Marks	End Semester Examination 60 Marks	Continuous Assessment : 10 Marks	Final Exam: 15 Marks	Less than 5%	
2.	Minor	UMIMAT102	Calculus-I	4					Less than 5%	

03 Credits Courses

S. No.	Course Type	Course No	Course Title	Credits	Marks				Total Marks	Percentage %
					Theory					
1.	Multidisciplinary	UMDMAT103	Foundations of Mathematics	3	Mid Semester Examination: 15 Marks		End Semester Examination: 60 Marks			
2.	Ability Enhancement Course	UAEMMAT104	A Bridge to Mathematics	3						
					Marks					
					Theory		Practicals			
3.	Skill Enhancement Course	USEMAT111	Probability	3	Mid term assessment test 10 Marks	End Semester Examination 15 Marks	Internal Practical Assessment 20 Marks	Final Practical Examination 30 Marks		25%

SEMESTER-II (MATHEMATICS)

4 Credits courses

S. No	Course Type	Course No.	Course Title	Credits	Marks				Total Marks	Percentage %
					Theory		Tutorial			
				4=3Th+1T					100	
1.	Major	UMJMAT201	Integral Calculus and Differential Equations	4	Mid Semester Examination 15 Marks	End Semester Examination 60 Marks	Continuous Assessment : 10 Marks	Final Exam: 15 Marks		Less than 5%
2.	Minor	UMIMAT202	Calculus-II	4						Less than 5%

03 Credits Courses

S. No.	Course Type	Course No	Course Title	Credits	Marks				Total Marks	Percentage %
					Theory					
									75	
1.	Multidisciplinary	UMDMAT203	Foundations of Mathematics	3	Mid Semester Examination: 15 Marks	End Semester Examination: 60 Marks				
2.	Ability Enhancement Course	UAEMAT204	Matrices and Linear Equations	3						
					Marks					
					Theory		Practicals			
3.	Skill Enhancement Course	USEMAT211	Numerical Methods	3	Mid term assessment test 10 Marks	End Semester Examination 15 Marks	Internal Practical Assessment 20 Marks	Final Practical Examination 30 Marks		25%

University of Jammu
Syllabus of Mathematics at FYUGP as per
NEP-2020.

SEMESTER I

(Examination to be held in December 2026, 2027, 2028)

Major Course

Course Code: UMJMAT101 **Course Title:** Differential Calculus
Credits: 04 **Total Number of Lectures:** Theory: 45, Tutorials: 15
Maximum Marks: 100, **Theory:** 75, **Tutorial:** 25

Objectives: Calculus is a study of motion and change. It is an indispensable tool in use in almost every branch of pure and applied science and some of the social sciences besides in other branches of Mathematics. So to make the students acquainted with notions and ideas of Calculus with applications to other disciplines is the main objective of this course.

Prerequisite of this course: 12th standard course on elementary calculus.

Structure of the Course: This course is divided into four units of 15 class lectures each, wherein one lecture is of one hour duration.

Unit-I

$\varepsilon - \delta$ definition of limit with basic illustrations, continuity and differentiability of real-valued functions of a real variable. Rolle's theorem and Lagrange's mean value theorem with geometric interpretation, indeterminate forms and L'Hôpital's Rule. Examples and exercises on these topics.

Unit-II

Functions of two variables, limits and continuity, partial derivatives and Euler's theorem, basic chain rule with simple examples, directional derivatives with basic examples, singular points of order two (double points) of functions in implicit form $f(x, y) = 0$. Examples and exercises on these topics.



Unit-III

Asymptotes, concavity, inflection points, and critical points of real-valued functions in explicit form. graphing using first and second derivatives. curve tracing in Cartesian coordinates. Examples and exercises on these topics.

Unit-IV

Polar coordinates and their relation with Cartesian coordinates, angle between radius vector and tangent. plotting of standard polar curves such as

$$r = a \pm b \cos \theta, \quad r = a \pm b \sin \theta, \quad r = a \sin n\theta, \quad r = a \cos n\theta \quad \text{for } n = 2, 3.$$

Text Book: George B. Thomas, Jr. and Ross L. Finney, *Calculus and Analytic Geometry*, 9th Edition. Addison-Wesley Publishing Company, 1998/Pearson, India.

Reference Books:

1. Tom M. Apostol, *Calculus*, Vol. 1, Jhon-Wiley and sons Inc, 2007.
2. Shanti Narayan and P. K. Mittal, *Differential Calculus*, S Chand and Co. 2020.
3. S. Lang, *A first Course in Calculus*, by S. Lang. Springer-Verlag, 1998.

Note to the College: Teaching and understanding of concepts of Mathematics being different from other disciplines requires problem solving sessions beyond regular class work. Therefore, extra three lectures per week need to be devoted to problem solving sessions as tutorials.

Scheme of Examination: (i) After covering half of the syllabus (two units) there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15 marks. The question paper must spread over entire two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks, shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.

Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.

(iii) 25 marks are allotted to Tutorials out of which 10 marks are allotted to continuous assessment and 15 marks are for the final examination (on Tutorials).

University of Jammu

Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER I

(Examination to be held in December 2026, 2027, 2028)

Minor Course

Course Code: UMIMAT102

Course Title: Calculus-I

Credits: 04 **Total Number of Lectures:** Theory: 45, Tutorials: 30

Maximum Marks: 100, Theory: 75, Tutorial: 25

Objectives: Calculus is a study of motion and change. It is an indispensable tool in use in almost every branch of pure and applied science and some of the social sciences besides in other branches of Mathematics. So to make the students acquainted with notions and ideas of Calculus with applications to other disciplines is the main objective of this course.

Prerequisite of this course: 12th standard course on elementary calculus.

Structure of the Course: This course is divided into four units of 15 class lectures each, wherein one lecture is of one hour duration.

Unit-I

$\varepsilon - \delta$ definition of limit with basic illustrations, continuity and differentiability of real-valued functions of a real variable. Rolle's theorem and Lagrange's mean value theorem with geometric interpretation, indeterminate forms and L'Hôpital's Rule. Examples and exercises on these topics.

Unit-II

Functions of two variables, limits and continuity, partial derivatives and Euler's theorem, basic chain rule with simple examples, directional derivatives with basic examples, singular points of order two (double points) of functions in implicit form $f(x, y) = 0$. Examples and exercises on these topics.

Unit-III

Asymptotes, concavity, inflection points, and critical points of real-valued functions in explicit form, graphing using first and second derivatives, curve tracing in Cartesian coordinates. Examples and exercises on these topics.

Unit-IV

Polar coordinates and their relation with Cartesian coordinates, angle between radius vector and tangent, plotting of standard polar curves such as

$$r = a \pm b \cos \theta, \quad r = a \pm b \sin \theta, \quad r = a \sin n\theta, \quad r = a \cos n\theta \quad \text{for } n = 2, 3.$$

Text Book: George B. Thomas, Jr. and Ross L. Finney, *Calculus and Analytic Geometry*, 9th Edition. Addison-Wesley Publishing Company, 1998/Pearson, India.

Reference Books:

1. Tom M. Apostol, *Calculus*, Vol. 1, Jhon-Wiley and sons Inc, 2007.
2. Shanti Narayan and P. K. Mittal, *Differential Calculus*, S Chand and Co. 2020.
3. S. Lang. *A first Course in Calculus*, by S. Lang. Springer-Verlag, 1998.

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Scheme of Examination: (i) After covering half of the syllabus (two units) there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15 marks. The question paper must spread over entire two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks, shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.

Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.

(iii) 25 marks are allotted to Tutorials out of which 10 marks are allotted to continuous assessment and 15 marks are for the final examination (on Tutorials).

University of Jammu

Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER I

(Examination to be held in December 2026, 2027, 2028)

Multidisciplinary Course

Course Code: UMDMAT103
Mathematics

Course Title: Foundations of

Credits: 03

Total Number of Lectures: Theory: 45

Maximum Marks: 75,

Objectives: The objectives of the course is to introduce the students to the language of mathematics-the language to know the nature, As Mathematics has vast range of applications to almost all disciplines of learning and evolves the critical thinking develops a logical and rational approach towards the solutions of problems, learning of the basic mathematics is indispensable for the creation of critical and logical thinkers. that's why this course is designed.

Structure of the Course: This course is divided into four units of 45 lectures in total; tentative number of lectures required for each unit is indicated against each unit, wherein one lecture is of one hour duration.

Unit-I (12 Lectures)

Propositions, truth values and truth tables, negation, conjunction and disjunction, implications, bi-conditional propositions, converse, contrapositive and inverse propositions, propositional equivalence: logical equivalences, predicates and quantifiers, tautology and contradiction, Analysis of arguments. Examples and exercises on these topics.

Unit-II (12 Lectures)

Sets, subsets, set operations, the laws of set theory and Venn diagrams. Examples of finite and infinite sets, finite sets and counting principle, power set, classes of sets. Difference and symmetric difference of two sets, set identities, generalized union and intersections with laws. Examples and exercises on these topics.

Unit-III (12 Lectures)

Cartesian product of sets, relation between sets, types of relation, partition of a set, fundamental theorem of equivalence relation(statement only). Functions: Basic definitions, injective function, surjective function, bijective function, composition of functions, inverse of a function. Examples and exercises on these topics.

Unit-IV (09 Lectures)

Prime numbers. GCD, LCM, division algorithm. relation between GCD and LCM, principle of mathematical induction. Examples and exercises on these topics.

Text Book: Steve Warner, *Pure Mathematics for Beginners*, Get 800 LLC, 2018.

Reference Books:

1. Shobha Bagai, Amber Habib and Geetha Venkataraman. *A Bridge to Mathematics*, Sage Publications India Pvt Ltd., 2017.
2. David M. Burton, *Elementary Number Theory*, McGraw Hill Education, 2017.
3. Paul R. Halmos, *Naïve Set Theory*, Springer, 1998.
4. K. Devlin, *The Joy of Sets: Fundamentals of Contemporary Set Theory*, Undergraduate Texts in Mathematics, 2nd Edition, New York, Springer, 1993.
5. *NCERT Textbook of Mathematics for Class XI*, Jammu and Kashmir State Board of School Education, 2022.

Note to the College: Teaching and understanding of concepts of Mathematics being different from other disciplines requires problem solving sessions beyond regular class work. Therefore, extra three lectures per week be devoted to problem solving sessions as tutorials.

Scheme of Examination: (i) After covering half of the syllabus, there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15 marks. The question paper must spread over entire two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks, shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.

Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.

University of Jammu
Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER I

(Examination to be held in December 2026, 2027, 2028)

Ability Enhancement Course

Course Code: UAE/MAT104
Mathematics

Course Title: A Bridge to

Credits: 03

Total Number of Lectures: Theory: 45

Maximum Marks: 75

Objectives: The objective of the course is to construct a bridge to Mathematics by introducing the students to the language of mathematics-the language to know the nature. As Mathematics has vast range of applications to almost all disciplines of learning and evolves the critical thinking with logic and reasoning, learning of the basic mathematics is indispensable across all disciplines. Precisely this course aims at

- increasing the appreciation of mathematics as an art and a human endeavour;
- motivating students towards the study and use of mathematics by providing them basic tools to understand critical issues-evolving mathematical ability to handle real life problems

Structure of the Course: This course is divided into four units of 45 lectures in total: tentative number of lectures required for each unit is indicated against each unit, wherein one lecture is of one hour duration.

Unit-I (13 Lectures)

Motivation: To illustrate how mathematics has grown out of human needs, use of examples to highlight different aspects and applications of mathematics starting from the dawn of human civilization to the present day.

Logic and Reasoning: Statements, analysing statements-simple statements with quantifiers, negating a simple statement, compound statements, conjunctions and disjunctions, truth tables, tautologies and contradictions, establishing logical equivalence using truth tables, De'Morgan's laws, Analysis of arguments: disjunctive syllogism, contrapositive reasoning, direct reasoning, transitive reasoning, invalid patterns of reasoning. Examples and exercises on these topics.

Unit-II (13 Lectures)

Sets: Describing a set, roster form, set-builder form, equality of sets, sets of different sizes, subsets, power set, Union of sets, intersection of sets, complement of a set, Euler diagrams, configuration of two sets, configuration of three sets, Venn diagrams, counting with Venn diagrams. Examples and exercises on these topics.



Unit-III (10 Lectures)

Data Analysis and Modelling: Interacting with data. ratio and percentage, raw and grouped data. introduction to spreadsheet programs, spreadsheet functions, grouping data with spreadsheets. copying from one cell to another.

Unit-IV (10 Lectures)

Bar charts with spreadsheets, histograms and pie charts with spreadsheets, line plots, line plots and graphs in spreadsheets. identifying trends from graphs. linear interpolation and line of the best fit. scatter plots in spreadsheets, locating the center. mode, median and mean and their calculations with spreadsheets, percentiles. percentiles in spreadsheets. percent rank. variance and standard deviation.

Text Book: Shobha Bagai, Amber Habib and Geetha Venkataraman, *A Bridge to Mathematics*. Sage Publications India Pvt Ltd., 2017.

Reference Books:

1. Ajit Kumar, S. Kumaresen and Bhaba Kumar Sarma. *A Foundation Course in Mathematics*. Narosa Publications. 2018.
2. Steve Warner, *Pure Mathematics for Beginners*, Get 800 LLC, 2018.
3. Paul R. Halmos. *Naïve Set Theory*, Springer, 1998.
4. K. Devlin, *The Joy of Sets: Fundamentals of Contemporary Set Theory*. Undergraduate Texts in Mathematics. 2nd Edition, New York, Springer. 1993.
5. *NCERT Textbook of Mathematics for Class XI*. Jammu and Kashmir State Board of School Education. 2022.

Note to the College: Teaching and understanding of concepts of Mathematics being different from other disciplines requires problem solving sessions beyond regular class work. Therefore, extra three lectures per week be devoted to problem solving sessions as tutorials.

Scheme of Examination: (i) After covering half of the syllabus, there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15 marks. The question paper must spread over uniformly on the first two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks. shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.



Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.



University of Jammu
Syllabus Mathematics at FYUGP as per NEP-2020
SEMESTER I
(Examination to be held in December 2026, 2027, 2028)
Skill Enhancement Course

Course Code: USEMAT-111 Course Title: Probability
Credits: 03, (Theory: 1, Practical: 2)
Maximum Marks: 75, Theory: 25, Practical: 50

Objectives: The objective of this course is to equip students with a skill in Mathematics in addition to Major course in Mathematics. A course on Probability with a wide range of applications to other disciplines shall serve the purpose of skill enhancement in mathematics.

Structure of the Course: This course is divided into four units with prescribed lectures for theory and practical, wherein one lecture is of one hour duration.

Unit-I
Basics of Probability (20 Lectures)

Random Experiments-Sample Space, Events. Types of events-Simple, Mutually Exclusive, Exhaustive. Addition and Multiplication Rules. Conditional Probability and Baye's Theorem.

Practical: Listing sample spaces using coins, dice, cards, balls. Verification of basic properties and theorems using manual enumeration.

Unit-II
Random Variables and Distribution Functions (20 Lectures)

Random Variables (Discrete and Continuous), Probability Mass Function (PMF) and Probability Density Function (PDF), Cumulative Distribution Function (CDF): properties such as monotonicity and limits.

Practical: Plotting PMF and CDF for basic random variables. Simulating simple random variables.

Unit-III
Expectation and Inequalities (20 Lectures)

Expectation and properties. Mean, Variance and Standard Deviation.

Practical: Numerical computation of expected values from given PMF/PDF. Expectation of coin, cards, dice. Relation between Mean, Variance and Standard Deviation about origin.

Unit-IV
Moment Generating Functions (15 Lectures)

Moments about origin and mean. Moment Generating Function (m.g.f) and its applications.

Practical: Calculation of moments and m.g.f.



Text Books:

1. *Hogg, R. V., McKean, J. W., & Craig, A. T.*, Introduction to Mathematical Statistics, Pearson Education Asia, 2007.

Reference Books:

1. *Miller, I. & Miller, M., Freund, J. E.* Mathematical Statistics with Applications, Pearson, 2006.
2. *Ross, S.* Introduction to Probability Models, Academic Press, 2007.
3. *Mood, A. M., Graybill, F. A., & Boes, D. C.* Introduction to the Theory of Statistics, Tata McGraw-Hill, 2007.

Scheme of Examination

Total Marks: 75 [Theory: 25 Marks, Practical: 50 Marks]

Internal Assessment (Theory): Mid-Term Assessment Test (after 50% syllabus): Duration: 60 minutes and Marks: 10.

The test will consist of short and long answer-type questions covering at least half of the syllabus, to be conducted by the course coordinator.

End Semester Theory Examination: Duration: 1.5 Hours and Marks: 15.

The paper will have two sections:

Section A (Short Answer Type):- Four questions selecting one from each theory unit. Each question shall carry 2 marks. All questions shall be compulsory. (Total: 8 marks)

Section B (Long Answer Type):- Four questions will be given (covering all theory units). Students must attempt any two questions. Each question shall carry 3.5 marks. (Total: 7 marks)

Practical Examination: 50 Marks

(i) Internal Practical Assessment (20 Marks): Based on daily Evaluation of Practicals/ Assignments/ Viva-Voce/ Presentations.

(ii) Final Practical Examination (30 Marks): To be conducted at the end of the semester based on practical performance/ Practical file/presentation/viva or as framed by course coordinator.



University of Jammu

Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER II

(Examination to be held in May 2027, 2028, 2029)

Major Course

Course Code: UMJMAT201 **Course Title:** Integral Calculus and Differential Equations

Credits: 04 **Total Number of Lectures:** Theory: 45, Tutorials: 30

Maximum Marks: 100, **Theory:** 75, **Tutorial:** 25

Objectives: The objective of this course is to acquaint the students with applications of Differential Calculus and Integral Calculus to study the physical phenomena-the differential equations.

Prerequisite of this course: A course on Differential Calculus studied in Semester-I.

Structure of the Course: This course is divided into four units of 15 class lectures each, wherein one lecture is of one hour duration.

Unit-I

Integration of irrational functions. reduction formulae:

$$\int \sin^n x dx, \int \cos^n x dx, \int \tan^n x dx, \int \sec^n x dx,$$
$$\int \operatorname{cosec}^n x dx, \int \sin^n x \cos^m x dx, \int (\log x)^n dx.$$

Volumes of solids of revolution along x -axis and y -axis, length of plane curves, areas of surfaces of revolution.

Unit-II

Review of differential equations: Linear differential equations and Bernoulli equation, first order higher degree differential equations solvable for x , y , p . Clairaut's equation, exact and non-exact differential equations, integrating factors and rule for finding the integrating factor of a non-exact differential equations. Examples and exercises based on these topics.

Unit-III

Basic theory of linear differential equations: Linearly dependent and linearly independent functions, Wronskian and its properties, linear homogeneous differential equations with constant coefficients, solving a linear homogeneous differential equation with variable coefficients by reducing its order. Examples and exercises based on these topics.

Unit-IV

Non-homogeneous linear differential equations with constant coefficients. Non-homogeneous linear differential equations with variable coefficients-the method of variation of parameters and the Cauchy-Euler equation. Examples and exercises based on these topics.

Text Books:

1. George B. Thomas, Jr. and Ross L. Finney, *Calculus and Analytic Geometry*, 9th Edition, Addison-Wesley Publishing Company, 1998/Pearson, India (for Unit I).
2. Shepley L. Ross, *Differential Equations*, 3rd Edition, John Wiley and Sons, 1984(for Units II, III and IV)

Reference Books:

1. Shanti Narayan and P. K. Mittal, *Integral Calculus*, S. Chand and Co. 2020.
2. Frank Ayres Jr, *Schaum's Outline of Theory and Problems of Differential Equations*, McGraw-Hill Book Company, Singapore, 1972.
3. I. Sneddon, *Elements of Partial Differential Equations*, McGraw-Hill International Edition, 1967.
4. Earl A. Coddington, *An Introduction to Ordinary Differential Equations*, PHI Learning Private Limited, New Delhi, 2009.
5. George F. Simmons, *Differential Equations with Applications and Historical Notes*, McGraw Hill Education; 2nd edition, 2017.
6. M. D. Raisinghania, *Ordinary and Partial Differential Equations*, S. Chand and Co., New Delhi, 2005.

Note to the college: Teaching and understanding of concepts of Mathematics being different from other disciplines requires problem solving sessions beyond regular class work. Therefore, extra three lectures per week be devoted to problem solving sessions as tutorials.

Scheme of Examination: (i) After covering half of the syllabus (two units) there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15

marks. The question paper must spread over entire two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks, shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.

Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.

(iii) 25 marks are allotted to Tutorials out of which 10 marks are allotted to continuous assessment and 15 marks are for the final examination (on Tutorials).



University of Jammu

Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER II

(Examination to be held in May 2027, 2028, 2029)

Minor Course

Course Code: UMIMAT202

Course Title: Calculus-II

Credits: 04 **Total Number of Lectures: Theory;45, Tutorials: 30**

Maximum Marks: 100, Theory: 75, Tutorial: 25

Objectives: The objective of this course is to acquaint the students with applications of Differential Calculus and Integral Calculus to study the physical phenomena-the differential equations.

Prerequisite of this course: 12th standard calculus and a course on Differential Calculus studied in Semester-I.

Structure of the Course: This course is divided into four units of 15 class lectures each, wherein one lecture is of one hour duration.

Unit-I

Integration of irrational functions. reduction formulac:

$$\int \sin^n x dx. \int \cos^n x dx. \int \tan^n x dx. \int \sec^n x dx.$$
$$\int \operatorname{cosec}^n x dx, \int \sin^n x \cos^m x dx, \int (\log x)^n dx.$$

Areas between curves, volumes of solids of revolution along x -axis and y -axis, length of plane curves, areas of surfaces of revolution.

Unit-II

Review of differential equations: Linear differential equations and Bernoulli equation, first order higher degree differential equations solvable for x , y , p . Clairaut's equation, exact and non-exact differential equations, integrating factors and rule for finding the integrating factor of a non-exact differential equations. Examples and exercises based on these topics.

Unit-III

Basic theory of linear differential equations: Linearly dependent and linearly independent functions. Wronskian and its properties, linear homogeneous differential equations with constant coefficients. solving a linear homogeneous differential equation with variable coefficients by reducing its order. Examples and exercises based on these topics.

Unit-IV

Non-homogeneous linear differential equations with constant coefficients-the method of undetermined coefficients. Non-homogeneous linear differential equations with variable coefficients-the method of variation of parameters and the Cauchy-Euler equation. Examples and exercises based on these topics.

Text Books:

1. George B. Thomas, Jr. and Ross L. Finney, *Calculus and Analytic Geometry*. 9th Edition. Addison-Wesley Publishing Company, 1998/Pearson, India (for Unit I).
2. Shepley L. Ross, *Differential Equations*, 3rd Edition. John Wiley and Sons, 1984(for Units II, III and IV)

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1. Shanti Narayan and P. K. Mittal, *Integral Calculus*, S. Chand and Co. 2020.
2. Frank Ayres Jr. *Schaum's Outline of Theory and Problems of Differential Equations*. McGraw-Hill Book Company. Singapore, 1972.
3. I. Sneddon, *Elements of Partial Differential Equations*. McGraw-Hill International Edition, 1967.
4. Earl A. Coddington, *An Introduction to Ordinary Differential Equations*. PHI Learning Private Limited, New Delhi, 2009.
5. George F. Simmons, *Differential Equations with Applications and Historical Notes*. McGraw Hill Education: 2nd edition, 2017.
6. M. D. Raisinghania, *Ordinary and Partial Differential Equations*, S. Chand and Co., New Delhi, 2005.

Note to the College: Teaching and understanding of concepts of Mathematics being different from other disciplines requires problem solving sessions beyond regular class work. Therefore, extra three lectures per week be devoted to problem solving sessions as tutorials.

Scheme of Examination: (i) After covering half of the syllabus (two units) there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15 marks. The question paper must spread over entire two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks, shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.

Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.

(iii) 25 marks are allotted to Tutorials out of which 10 marks are allotted to continuous assessment and 15 marks are for the final examination (on Tutorials).



University of Jammu

Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER II

(Examination to be held in May 2027, 2028, 2029)

Multidisciplinary Course

Course Code: UDMMAT203
Mathematics

Course Title: Foundations of

Credits: 03

Total Number of Lectures: Theory: 45

Maximum Marks: 75,

Objectives: The objectives of the course is to introduce the students to the language of mathematics-the language to know the nature, As Mathematics has vast range of applications to almost all disciplines of learning and evolves the critical thinking develops a logical and rational approach towards the solutions of problems, learning of the basic mathematics is indispensable for the creation of critical and logical thinkers, that's why this course is designed.

Structure of the Course: This course is divided into four units of 45 lectures in total; tentative number of lectures required for each unit is indicated against each unit, wherein one lecture is of one hour duration.

Unit-I (12 Lectures)

Propositions, truth values and truth tables, negation, conjunction and disjunction, implications, bi-conditional propositions, converse, contrapositive and inverse propositions, propositional equivalence, logical equivalences, predicates and quantifiers, tautology and contradiction, Analysis of arguments, Examples and exercises on these topics.

Unit-II (12 Lectures)

Sets, subsets, set operations, the laws of set theory and Venn diagrams, Examples of finite and infinite sets, finite sets and counting principle, power set, classes of sets, Difference and symmetric difference of two sets, set identities, generalized union and intersections with laws, Examples and exercises on these topics.

Unit-III (12 Lectures)

Cartesian product of sets, relation between sets, types of relation, partition of a set, fundamental theorem of equivalence relation(statement only). Functions: Basic definitions, injective function, surjective function, bijective function, composition of functions, inverse of a function. Examples and exercises on these topics.

Unit-IV (09 Lectures)

Prime numbers. GCD, LCM, division algorithm. relation between GCD and LCM, principle of mathematical induction. Examples and exercises on these topics.

Text Book: Steve Warner, *Pure Mathematics for Beginners*, Get 800 LLC, 2018.

Reference Books:

1. Shobha Bagai, Amber Habib and Geetha Venkataraman. *A Bridge to Mathematics*, Sage Publications India Pvt Ltd., 2017.
2. David M. Burton, *Elementary Number Theory*, McGraw Hill Education, 2017.
3. Paul R. Halmos, *Naïve Set Theory*, Springer, 1998.
4. K. Devlin, *The Joy of Sets: Fundamentals of Contemporary Set Theory*, Undergraduate Texts in Mathematics. 2nd Edition, New York, Springer, 1993.
5. *NCERT Textbook of Mathematics for Class XI*, Jammu and Kashmir State Board of School Education, 2022.

Note to the College: Teaching and understanding of concepts of Mathematics being different from other disciplines requires problem solving sessions beyond regular class work. Therefore, extra three lectures per week be devoted to problem solving sessions as tutorials.

Scheme of Examination: (i) After covering half of the syllabus, there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15 marks. The question paper must spread over entire two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks, shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.

Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.

University of Jammu

Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER II

(Examination to be held in May 2027, 2028, 2029)

Ability Enhancement Course

Course Code: UAE²⁰MAT204 Course Title: Matrices and Linear Equations

Credits: 03 Total Number of Lectures: Theory: 45

Maximum Marks: 75

Objectives: The objective of the course is to construct a bridge to Mathematics by introducing the students to the language of mathematics-the language to know the nature. As Mathematics has vast range of applications to almost all disciplines of learning and evolves the critical thinking with logic and reasoning, learning of the basic mathematics is indispensable across all disciplines. Precisely this course aims at

- increasing the appreciation of mathematics as an art and a human endeavour;
- motivating students towards the study and use of mathematics by providing them basic tools to understand critical issues-evolving mathematical ability to handle real life problems

Structure of the Course: This course is divided into four units of 45 lectures in total; tentative number of lectures required for each unit is indicated against each unit, wherein one lecture is of one hour duration.

Unit-I (12 Lectures)

Propositions, truth values and truth tables, negation, conjunction and disjunction, implications, bi-conditional propositions, converse, contrapositive and inverse propositions, propositional equivalence: logical equivalences, predicates and quantifiers, tautology and contradiction, Analysis of arguments. Examples and exercises on these topics.

Unit-II (11 Lectures)

Sets, subsets, set operations, the laws of set theory and Venn diagrams. Examples of finite and infinite sets, finite sets and counting principle, power set, classes of sets. Difference and symmetric difference of two sets, set identities, generalized union and intersections with laws. Examples and exercises on these topics.

Unit-III (12 Lectures)

Matrices: Importance of matrices, definitions and concepts, equal matrices, sums of matrices, product of matrices, types of matrices, adjoint of a square matrix (of orders 2 and 3), inverse of a matrix. Determinant of matrices of orders 2 and 3 and properties of determinants. Examples and exercises on these topics.

Unit-IV (10 Lectures)

Determinant of matrices of orders 2 and 3 and properties of determinants. Linear equations: Systems of non-homogeneous equations, solution using matrices, Cramer's rule, system of homogeneous equations. Examples and exercises on these topics.

Text Books:

1. Shobha Bagai, Amber Habib and Geetha Venkataraman. *A Bridge to Mathematics*. Sage Publications India Pvt Ltd., 2017.
2. Frank Ayres Jr., *Theory and Problems of Matrices, Schaum's Outline Series*, McGraw-Hill International Book Company, Singapore. Asian Student Edition, 1982.

Reference Books:

1. Ajit Kumar, S. Kumaresen and Bhaba Kumar Sarma. *A Foundation Course in Mathematics*, Narosa Publications, 2018.
2. Steve Warner, *Pure Mathematics for Beginners*, Get 800 LLC, 2018.
3. Paul R. Halmos, *Naïve Set Theory*, Springer, 1998.
4. *NCERT Textbook of Mathematics for Class XI*, Jammu and Kashmir State Board of School Education, 2022.
5. H. Schneider and G. P. Barker, *Matrices and Linear Algebra*, Dover Publications, 1989.

Note to the College: Teaching and understanding of concepts of Mathematics being different from other disciplines requires problem solving sessions beyond regular class work. Therefore, extra three lectures per week be devoted to problem solving sessions as tutorials.

Scheme of Examination: (i) After covering half of the syllabus, there shall be a Mid Term Assessment Test of 90 minutes duration carrying 15 marks. The question paper must spread over uniformly on the first two units and questions asked should be of short answer as well as long answer type. This test shall be conducted by the course coordinator.

(ii) The External End Semester Examination of 3 hours duration carrying 60 marks, shall consist of two sections:

Section A. Four(4) short answer questions one question from each unit and each question shall carry three(3) marks. All questions shall be compulsory.

Section B. Eight(8) long answer questions spread uniformly over the entire syllabus (two questions from each unit) out of which four(4) questions are to be answered selecting at least one question from each unit. Each question shall carry 12 marks.



University of Jammu

Syllabus Mathematics at FYUGP as per NEP-2020.

SEMESTER II

(Examination to be held in May 2027, 2028, 2029)

Skill Enhancement Course

Course Code: USEMAT-211 Course Title: Numerical Methods
Credits: 03, (Theory: 1, Practical: 2)

Maximum Marks: 75, Theory: 25, Practical: 50

Objectives: To develop computational skills using numerical techniques for solving mathematical problems. The course emphasizes applications and practical implementation of numerical methods.

Structure of the Course: This course is divided into four units with prescribed lectures for theory practical, wherein one lecture is of one hour duration.

Unit-I

Errors and Root-Finding Methods-I (20 Lectures)

Accuracy of numbers, types of errors, absolute and relative errors, Rules for error estimation,

Practical: Compute and compare errors (absolute, relative) for given data.

Unit-II

Root-Finding Methods-II (20 Lectures)

Iterative methods: Bisection Method, Regula-Falsi Method, Secant Method.

Practical: Solve exercises manually using above methods.

Unit-III

Root-Finding Methods-III (20 Lectures)

Iteration Method (Fixed Point Iteration), Newton-Raphson Method

Practical: Solve exercises manually using above methods.

Unit-IV

Finite Differences and Interpolation (20 Lectures)

Forward and Backward Differences, Interpolation: Newton's Forward and Backward Formula.

Practical: Construct difference tables and apply interpolation formulas, Use interpolation to estimate missing data points.

Reference Books:

1. *B.S. Grewal*, Numerical Methods in Engineering and Science, Khanna Publishers, 2017.
2. *B. Bradie*, A Friendly Introduction to Numerical Analysis, Pearson Education, 2007.
3. *M.K. Jain, S.R.K. Iyengar, R.K. Jain*, Numerical Methods for Scientific and Engineering Computation, New Age, 2007.
4. *S.S. Sastry*, Introductory Methods of Numerical Analysis, PHI, 2012

Scheme of Examination

Total Marks: 75 [Theory: 25 Marks, Practical: 50 Marks]

Internal Assessment (Theory): Mid-Term Assessment Test (after 50% syllabus): Duration: 60 minutes and Marks: 10.

The test will consist of short and long answer-type questions covering at least half of the syllabus, to be conducted by the course coordinator.

End Semester Theory Examination: Duration: 1.5 Hours and Marks: 15.

The paper will have two sections:

Section A (Short Answer Type):- Four questions selecting one from each theory unit. Each question shall carry 2 marks. All questions shall be compulsory. (Total: 8 marks)

Section B (Long Answer Type):- Four questions will be given (covering all theory units). Students must attempt any two questions. Each question shall carry 3.5 marks. (Total: 7 marks)

Practical Examination: 50 Marks

- (i) Internal Practical Assessment (20 Marks): Based on daily Evaluation of Practicals/ Assignments/ Viva-Voce/ Presentations.
- (ii) Final Practical Examination (30 Marks): To be conducted at the end of the semester based on practical performance/Practical file/presentation/viva or as framed by course coordinator.