



Yogoda Satsanga Mahavidyalaya

JAGANNATHPUR, DHURWA, RANCHI – 834004

Email address: ysmranchi4@gmail.com

(NAAC Accredited, Grade: B++, CGPA: 2.89)

COURSEPLAN

NAME OF THE DEPARTMENT	: MATHEMATICS
NAME OF THE FACULTY	: Prof. Shekhar Suman
ACADEMIC SESSION	: 2023-2027
YEAR	: 2023
PROGRAMME	: B.Sc.
SEMESTER	: 1
COURSE TYPE	: Major
COURSE	: Multivariable Calculus
COURSE CODE	: MJ-2
TOTAL CREDIT	: 4

Submitted by:

HoD:



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PROGRAMME OUTCOMES (POs):

Student will be able:

PO1: Develop in-depth knowledge of algebra, analysis, calculus, geometry, differential equations and several other branches of mathematics. This also leads to study of related areas like computer science and statistics.

PO2: Analyze intrinsic beauty which can be utilized for solving real life problems through the use of mathematical modeling, cryptography and coding.

PO3: Apply knowledge of mathematical science in understanding and skills to identify the difficult/unsolved problems in mathematics. Realize the given scientific data critically and systematically and to do research so that to get the ability to draw the objective conclusions.

PO4: Understand logically question assertions, to recognize patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society.

PO5: Develop skills and competency for employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

PO6: Design solutions for complex scientific problems and design processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, legal, constitutional and environmental considerations.

PO7: Demonstrate fundamental systematic knowledge of mathematics and its applications in engineering, science, technology and mathematical sciences. It should also enhance the subject specific knowledge and help in creating jobs in various sectors.

PO8: Demonstrate knowledge and understanding of the scientific principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO9: Communicate effectively on complex science activities with the science community and the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO10: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of scientific development, technological advancement and global changes.



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PO11: Use research-based knowledge and research-based methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO12: Develop understanding and habits for physical, physiological and psychological well-being by staying committed through personal practice and conduct.

PO13: Apply academic learning for a sustainable living, initiation of entrepreneurial adventures through innovation to create opportunities and wealth for self and society.

PO14: Value and support social causes and rural development through service and philanthropic activities.

PROGRAMME SPECIFIC OUTCOMES (PSO):

PSO1: Understand the requirements in mathematics, drawing from a range of contemporary research works and their applications in diverse areas of mathematical sciences and demonstrate educational skills in the areas of analysis, geometry, algebra, mechanics, differential equations etc.

PSO2: Apply skills and knowledge through on-the-job training, research projects and internships to use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion and creating Mathematical models, algorithms, etc. to facilitate application of mathematics in different professions and knowledge domains.

PSO3: Analyze the applications of Mathematics and computing methods using MATLAB, PYTHON, MATHEMATICA etc. to solve the problems of Science in general and Mathematics in particular.

COURSE OUTCOMES (COs):

Semester-3

Paper: Multivariable Calculus (MJ-2)

This course will enable the students to:

CO1: Recall and identify basic principles and techniques related to partial derivatives, double and triple integrals, and vector fields.

CO2: Explain the concepts of partial differentiation, multiple integration, and vector calculus, including the Chain rule, Jacobians, and Gradient, Divergence, and Curl operations.

CO3: Apply the principles of partial derivatives and multiple integrals to solve problems involving optimization, surface area, volume, and change of variables.

CO4: Analyse vector fields, their properties, and vector identities, and evaluate line integrals and surface integrals in various coordinate systems.



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CO5: theorems such as Green's, Stokes', and Gauss divergence theorems, and apply them to solve advanced problems in physics and engineering, demonstrating critical thinking and problem-solving skills.

A. CORRELATION BETWEEN POs AND COs

POs Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PSO 1	PSO 2	PSO 3
CO1	-	2	-	-	2	2	2	-	-	-	2	2	-	-	-	3	3
CO2	3	2	2	-	2	-	-	2	-	2	3	3	3	-	-	3	3
CO3	-	-	2	2	1	2	-	-	-	-	2	2	2	2	-	-	2
CO4	3	1	-	-	-	1	-	1	-	1	2	2	-	-	3	3	2
CO5	-	2	-	-	2	1	-	1	1	-	2	2	2	-	2	3	2

1. Weak

2. Moderate

3. Strong

COURSE TEACHING AND LEARNING ACTIVITIES

A. PEDAGOGY

- i. Whiteboard
- ii. PPT
- iii. Zoom, Google meet

B. COURSE COMPLETION PLAN

UNIT	NO. OF LECTURES		TEST	QUIZ	ASSIGNMENT
	Lectures	Tutorial Lectures			
1	10	1	1	1	1
2	18	2	1	1	1
3	15	1	1	1	1
4	12	1	1	1	1



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A. COURSE DELIVERY PLAN:

UNIT	LECTURE REQUIRED	TOPIC	CO ADDRESSED
1	16	Partial Derivatives	CO1, CO2
2	15	Double and triple integrals	CO3
3	16	Vector field	CO5
4	13	Green's theorem	CO4

B. COURSE OUTCOME ASSESSMENT PLAN

a. DIRECT ASSESSMENT

(Please tick the appropriate column)

COURSE OUTCOME	ASSESSMENT				REMARKS
	QUIZ	TEST	MID SEMESTER	Term Exam	
CO1	1	1	1	1	
CO2	1	1	1	1	
CO3	1		1	1	
CO4	1	1	1	1	
CO5	1		1	1	

b. INDIRECT ASSESSMENT (STUDENT SURVEY)

Name of the Student:
University Roll no/ Class roll no.:
Name of the Programme:
Semester and Session:
Course and Course Code:



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Rate the following aspects of course outcomes. Use the scale 1-3

S. No	Course Outcome	1	2	3
1.	CO1			3
2.	CO2		2	
3.	CO3			3
4.	CO4		2	
5.	CO5	1		
6.	CO6			3

1. Average
2. Good
3. Very Good

B. SUGGESTED READINGS

a. TEXT BOOKS:

1. Erwin Kreyszig (2011). Advanced Engineering Mathematics (10th edition). Wiley.
2. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.
3. A. S. Dasgupta & S. B. Prasad (2017). Degree Level Vector Analysis. Bharti Bhawan

b. REFERENCE BOOKS

1. Lalji Prasad (2019). Differential Calculus. Paramount Publication. *Calculus*, Bharti Bhawan.

b. VIDEO RESOURCE

1. <https://www.youtube.com/user/professorleonard57/playlists>
2. https://www.youtube.com/channel/UC2VuCzJx_9luS0y-WDfL3Tg/playlists
3. <https://archive.nptel.ac.in/courses/111/106/111106146/>

a. WEB RESOURCES:-

1. <https://en.wikipedia.org/wiki/Calculus>
2. <https://archive.nptel.ac.in/courses/111/106/111106146/>

b. E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_ma75/preview