Pt. Ravishankar Shukla University Raipur

CURRICULUM & SYLLABI

(Based on CBCS & LOCF)

M.A./M.Sc. Statistics

Semester System

Session: 2024-26

Approved by:	Board of Studies	Academic Council
Date:		

7/9/2024

M.Sc. Statistics

The Master of Science in Statistics is a two-year, four-semester program designed to provide students with a comprehensive understanding of advanced statistical tools and techniques with their applications. Through a balanced curriculum covering diverse areas, students establish a strong foundational knowledge during the initial semesters. As the program progresses, students have the flexibility to tailor their learning by choosing specialized electives that align with their interests and career goals. Upon completion of the program, students will be well-prepared for diverse career paths, including academia, research, and technology sectors. With a solid statistical background, they will excel as analytical thinkers and contribute effectively to various fields.

Program Outcomes:

Upon successful completion of the Master of Science in Statistics program, students will be able to:

PO-1	**Knowledge:** Demonstrate a deep understanding of advanced statistical concepts, theories, and techniques in various subfields of Statistics.
PO-2	**Critical Thinking and Reasoning:** Exhibit advanced critical thinking skills by analyzing and evaluating mathematical arguments, theories, and proofs, and by making reasoned judgments about statistical concepts and their implications.
PO-3	**Problem Solving:** Formulate abstract statistical problems and derive solutions using rigorous logical reasoning. Demonstrate mastery in constructing mathematical proofs and justifications.
PO-4	**Advanced Analytical and Computational Skills:** Possess advanced skills in statistical analysis and computation, including proficiency in using statistical software, programming languages, and computational tools for numerical simulations and data analysis.
PO-5	**Effective Communication**: Communicate complex statistical ideas and results effectively to both technical and non-technical audiences, through written reports, presentations, and teaching.
PO-6	**Social/ Interdisciplinary Interaction**: Integrate statistical concepts and techniques into interdisciplinary contexts, collaborating effectively with professionals from other fields to address complex problems.
PO-7	**Self-directed and Life-long Learning**: Recognize the importance of ongoing professional development and lifelong learning in the rapidly evolving field of mathematics, and will exhibit the ability to continue learning independently or in formal educational settings.
PO-8	**Effective Citizenship**: **Leadership and Innovation:** Lead and innovate in various statistical contexts, contributing to advancements in the field and applying statistical insights to emerging challenges.
PO-9	**Ethics**: Demonstrate ethical and responsible conduct in statistical research, teaching, and collaboration, adhering to professional standards and best practices.
PO-10	**Further Education or Employment:** Engage for further academic pursuits, including Ph.D. programs in statistics or related fields. Get employment in academia, research institutions, industry, government, and other sectors.
PO-11	**Global Perspective**: Recognize the global nature of statistical research and its impact, appreciating diverse cultural perspectives in statistical practices.

PROGRAMME SPECIFIC OUTCOMES (PSOs) :At the end of the program, the student will be able to:

PSO1	Understand the nature of abstract statistics and explore the concepts in further details.
PSO2	Apply the knowledge of statistical concepts in interdisciplinary fields and draw the inferences by finding appropriate solutions.
PSO3	Pursue research in challenging areas of statistics.
PSO4	Employ confidently the knowledge of statistical software and tools for treating the complex statistical problems and scientific investigations.
PSO5	Qualify national level tests like NET/GATE etc.

M.Sc. Statistics
PROGRAMME STRUCTURE

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week	Credits	Marks		
							CIA	ESE	Total
Semester-I	Core	SAT 110	Real Analysis and Linear Algebra	T	5	5	30	70	100
	Core	SAT 120	Statistical Methods	T	5	5	30	70	100
	Core	SAT 130	Probability and Measure	T	5	5	30	70	100
	Core	SAT 140	Applied Statistics	T	5	5	30	70	100
	Core	SAT 150	Lab Course I: Practical based on Course II	P	4	2	30	70	100
	Core	SAT 160	Lab Course II: Practical based on Courses III & IV	P	4	2	30	70	100
Semester-II	Core	SAT 210	Biostatistics	T	5	5	30	70	100
	Core	SAT 220	Statistical Computing	T	5	5	30	70	100
	Core	SAT 230	Stochastic Processes	T	5	5	30	70	100
	Core	SAT 240	Sampling Theory	T	5	5	30	70	100
	Core	SAT 250	Lab Course I: Practical based on Course II	P	4	2	30	70	100
	Core	SAT 260	Lab Course II: Practical based on Courses III & IV	P	4	2	30	70	100
	Core	SAT 270	Internship	P	*	2	30	70	100
Semester-III	Core	SAT310	Inference-I	T	5	5	30	70	100
	Core	SAT320	Design of Experiments	T	5	5	30	70	100
	Elective-1 (Select any one)	SAT331	Operations Research (I)	T	5	5	30	70	100
		SAT332	Demography						
	Elective-2 (Select any one)	SAT341	Statistical Quality Control	T	5	5	30	70	100
		SAT342	Survival Analysis						
	Core	SAT350	Lab Course I: Practical based on Course I & II	P	4	2	30	70	100
	Core	SAT360	Lab Course I: Practical based on Course III & IV	P	4	2	30	70	100
Semester-IV	Core	SAT410	Inference-II	T	5	5	30	70	100
	Core	SAT420	Multivariate Analysis	T	5	5	30	70	100
	Elective-3 (Select any one)	SAT431	Advance Operation Research	T	5	5	30	70	100
		SAT432	Econometrics						
	Elective-4 (Select any one)	SAT441	Reliability Theory	T	5	5	30	70	100
		SAT442	Actuarial Statistics						
	Core	SAT450	Lab Course I: Practical based on Course I & II	P	4	2	30	70	100
	Core	SAT460	Lab Course I: Practical based on Course III & IV	P	4	2	30	70	100
	Core	SAT 470	Project Work	P	4	2	30	70	100

Note: * Total 60 hours during summer vacation.

1. In place of Elective Course Student can choose paper(s) from MOOC Courses (Swayam Portal) subject to the following conditions:.
    a. The chosen paper will be other than the papers offered in the current course structure.
    b. The paper will be PG level with a minimum of 12 weeks' duration.
    c. The list of courses on SWAYAM keeps changing, the departmental committee will finalize the list of MOOC courses for each semester.
    d. The paper(s) may be chosen from Swayam Portal on the recommendation of Head of the Department.
2. The candidates who have joined the PG Programme in School of Studies (University Teaching Department), shall undergo Generic Elective Courses (only qualifying in nature) offered by other departments/SoS in Semester II and Semester III.
3. The candidates who have joined the PG Programme in School of Studies (University Teaching Department), shall undergo Skill Enhancement Course/Value Added Course (only qualifying in nature) in Semester I and Semester II.

Generic Elective Courses: (Offered to PG students of other Departments/SoS only)

Semester	Course Code	Course Title	Course Type (T/P)	Hrs/ Week	Credits	Marks		
						CIA	ESE	Total
II	SAT 520	Statistical Methods	T	3	3	30	70	100
III	SAT 530	Applied Statistics	T	3	3	30	70	100

Skill Enhancement/Value Added Courses:(Offered to the PG students of SoS in Statistics)

Semester	Course Code	Course Title	Course Type (T/P)	Hrs/ Week	Credits	Marks		
						CIA	ESE	Total
I	SAT 610	Indian Knowledge System (IKS)	P	2	2	30	70	100
III	SAT 630	Programming in Python	P	2	2	30	70	100

M.Sc. STATISTICS Program

Specification of Course	Semester	No. of Courses	Credits
Core	I-IV	22	80
Elective	III-IV	04	20
Total		26	100
Additional Courses(Qualifying in nature, for Student admitted in School of Studies only)			
Generic Elective	II-III	02	06
Skill Enhancement (Value Added Courses)	III	01	02
Indian Knowledge System (IKS)	I	01	02

M.Sc. (Statistics) Semester-I

(Offered to PG students of SoS in Statistics only)

Program	Subject	Year	Semester
M.Sc.	Statistics	1	I
Course Code	**Course Title**		**Course Type**
SAT 610	**Indian Knowledge System (IKS)- Concepts and Mathematics Tradition**		IKS
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
2	2	--	--

Maximum Marks	CIA	ESE
100	30	70

Learning Objective (LO):

The course aims to:

- Sensitize the students about context in which they are embedded, i.e., Indian culture and civilisation including its Knowledge System and Tradition.
- Provide information about great mathematicians and astronomers who given significant contribution in Indian mathematics and astronomy.
- Help students to trace, identify, practice and develop the significant Indian mathematic.

Detailed Syllabus:

Unit No.	Topics	No. of Lectures
I	Indian Knowledge System (IKS) – An Introduction: What is IKS? Why do we need IKS? Organization of IKS. Historicity of IKS Some salient aspects of IKS.	6
II	The Vedic Corpus: Introduction to Vedas. A synopsis of the four Vedas. Sub-classification of Vedas. Messages in Vedas. Introduction to Vedāṅgas. Prologue on Śikṣā and Vyākaraṇa. Basics of Nirukta and Chandas. Introduction to Kalpa and Jyotiṣa. Vedic Life: A Distinctive Features.	6
III	Wisdom through the Ages: Gateways of ancestral wisdoms. Introduction to Purāṇa. The Purāṇic repository. Issues of interest in Purāṇas. Introduction to Itihāsas. Key messages in Itihāsas. Wisdom through Nīti-śāstras. Wisdom through Subhāṣita.	6
IV	Number Systems and Units of Measurement: Number systems in India - Historical evidence. Salient aspects of Indian Mathematics. Bhūta-Saṃkhyā system. Kaṭapayādi system. Measurements for time, distance, and weight. Piṅgala and the binary system.	6
V	Indian contribution to Statistics,Prasanta Chandra mahalanobis, C. R. Rao, Devbrata Basu, Samarendra Nath Roy, P. V. Sukhatmi, Raj Chandra Bose, Kanti Lal Mardia.K. C. Sreedhaan Pillai, Pranab K. Sen, B. L.S. Prakash Rao, V. S. Huzurbazar, Jyant Kumar Ghosh, raghu raj bahadur, Anil Kumar Bhattacharya, introduction about agencies- NSO and CSO.	6

Books Recommended:

B. Mahadevan, Vinayak Rajat Bhat, R.N. Nagendra Pavana, Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Pvt. Ltd., 2022

Reference Books:

1. K. Kapur A.K. Singh (Eds), Indian Knowledge Systems, Vol. 1 & 2. D.K. Printworld Pvt. Ltd., 2005
2. शशिबाला, ओम विकास, अशोक प्रधान (संपादक), भारती विद्या सार-1, भारतीय विद्या भवन, 2018.
3. S. B. Rao, Indian Mathematics and Astronomy: Some Landmarks (Revised Third Edition), Bhartiya Vidhya Bhavan, 2012,
4. G.G.Josheph, Indian Mathematics: Engaging with the World from Ancient to Modern Times, speaking Tiger, 2016
5. B.S. Yadav, Ancient Indian Leaps into Mathematics, Birkausher Publication, 2010
6. Dharampal, Indian Science and Technology in the Eighteenth Century, Other India Press, 2000
7. Dharampal, The Beautiful Tree: Indigenous Indian Education in the Eighteenth Century, Other India Press, 2000.