

**Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBAJINAGAR.**



CIRCULAR NO.SU/ Sci./College/NEP-2020/104/2024

It is hereby inform to all concerned that, In continuation circular No.SU./Revised B.Sc./NEP/72/2024/25588-96 dated 29.04.2024, the revised syllabi prepared by the Board of Studies/Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technolgy, the Academic Council at its meeting held on 08 April 2024 has accepted **the following Revised B.Sc. Course Structure & Curriculum** as per direction by the State Government dated on 13 March 2024 under the Faculty of Science & Technology (as per National Education Policy – 2020) run at the Affiliated Colleges, Dr.Babasaheb Ambedkar Marathwada University as appended herewith.

Sr.No.	Courses	Semester
1	Physics	Ist and IInd semester
2	Instrumentation Practice	Ist and IInd semester
3	Electronics	Ist and IInd semester
4	Mathematics	Ist and IInd semester
5	Industrial Chemistry	Ist and IInd semester
6	Agrochemical Fertilizer	Ist and IInd semester
7	Horticulture	Ist and IInd semester
8	Biochemistry	Ist and IInd semester
9	Botany	Ist and IInd semester
10	Zoology	Ist and IInd semester
11	Biotechnology	Ist and IInd semester
12	bioinformatics	Ist and IInd semester
13	Microbiology	Ist and IInd semester
14	Dairy Science & TEchnology	Ist and IInd semester
15	Statistics	Ist and IInd semester
16	computer Science	Ist and IInd semester
17	Geology	Ist and IInd semester
18	Chemistry	Ist and IInd semester
19	Analytical Chemistry	Ist and IInd semester
20.	Polymer Chemistry	Ist and IInd semester
21.	Environmental Science	Ist and IInd semester
22.	Fishery Science	Ist and IInd semester

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajanagar
-431 004.
REF.NO. SU/SCI./2024/27128-35
Date:-27.05.2024.

★
★
★
★
★

★


**Deputy Registrar,
Academic Section.**

Copy forwarded with compliments to :-

- 1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,
- 2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajanagar.
- 2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajanagar.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajanagar.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University,Chhatrapati Sambhajanagar.
- 6] The Public Relation Officer, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.
- 7] The Record Keeper, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajanagar.

Dr. Babasaheb Ambedkar Marathwada University

Chhatrapati Sambhajinagar- 431001



B.Sc. Degree Programme

(Three Year / Four Years (Hons) / Four Years (Hons with Research))

Course Structure and Syllabus for B.Sc. First year

(Revised)

(AS PER NEP-2020)

Subject (Major): STATISTICS

A handwritten signature in blue ink, located in the bottom left corner of the page.

Effective from 2024-25

A handwritten signature in blue ink, located in the bottom right corner of the page.

Professor
Department of Statistics
Dr. Babasaheb Ambedkar
Marathwada University,
Chhatrapati Sambhajinagar (M.S.)

PREFACE

As we stand on the threshold of a new era in education, the dawn of the National Education Policy 2020 illuminates our path toward a holistic, inclusive, and progressive educational landscape. The Bachelor of Science (B. Sc.) curriculum outlined herein reflects the ethos and aspirations of this transformative policy, aiming to equip learners with the knowledge, skills, and values necessary to thrive in the dynamic world of the 21st century.

At its core, the National Education Policy 2020 envisions an educational framework that is learner-centric, multidisciplinary, and geared towards fostering creativity, critical thinking, and innovation. It emphasizes the integration of knowledge across disciplines, breaking down traditional silos to encourage holistic understanding and application of concepts. The Bachelor of Science (B. Sc.) curriculum embodies these principles by offering a diverse array of courses spanning various scientific domains, while also incorporating interdisciplinary studies to nurture well-rounded graduates capable of addressing complex challenges with agility and insight.

Furthermore, the curriculum is designed to promote experiential learning, research, and hands-on exploration, recognizing the importance of practical engagement in deepening understanding and cultivating real-world skills. Through laboratory work, field experiences, internships, and project-based learning opportunities, students will have the chance to apply theoretical knowledge in practical settings, develop problem-solving abilities, and cultivate a spirit of inquiry and discovery.

Integral to the National Education Policy 2020 is the commitment to inclusivity, equity, and access to quality education for all. The Bachelor of Science (B. Sc.) curriculum reflects this commitment by embracing diversity in perspectives, backgrounds, and experiences, and by fostering an inclusive learning environment where every student feels valued, supported, and empowered to succeed.

Moreover, the curriculum emphasizes the cultivation of ethical values, social responsibility, and global citizenship, instilling in students a sense of accountability towards society and the environment. By integrating courses on ethics, sustainability, and social sciences, the Bachelor of Science (B. Sc.) program aims to produce graduates who are not only proficient in their respective fields but also compassionate, ethical leaders committed to making a positive impact on the world.

As we embark on this journey of educational transformation guided by the National Education Policy 2020, the Bachelor of Science (B. Sc.) curriculum stands as a testament to our collective vision of a more equitable, inclusive, and enlightened society. It is our hope that through rigorous academics, innovative pedagogy, and unwavering dedication to excellence, we can inspire the next generation of scientists, scholars, and change-makers to realize their full potential and contribute meaningfully to the advancement of knowledge and the betterment of humanity.

Structure of B. Sc. (Three / Four Years Honours / Honours with Research Degree) Programme with Multiple Entry and Exit Options

Subject (Major): STATISTICS

B.Sc First Year: 1st Semester

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major (Core) M1 Mandatory	DSC-1	Descriptive Statistics	2	--	2	--	2+2 = 4
	DSC-2	Practical based on DSC-1	--	4	--	2	
Major (Core) M2 Mandatory	DSC-1		2	--	2	--	2+2 = 4
	DSC-2	Practical based on DSC-1	--	4	--	2	
Major (Core) M3 Mandatory	DSC-1		2	--	2	--	2+2 = 4
	DSC-2	Practical based on DSC-1	--	4	--	2	
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	GE/OE-1	To be chosen from other discipline of same faculty	2	--	2	--	2
SEC (Skill Enhancement Courses) (Choose any one from pool of courses)	SEC-1	1) Descriptive Statistics using Excel 2) Introduction to R	1	--	1	--	2
	SEC-2	1) Practicals based on SEC-1 2) Practicals based on SEC-2	--	2	--	1	
AEC, VEC, IKS	AEC-1	English (Common for all the faculty)	2	--	2	--	2+2 =4
	IKS-1	Choose any one from pool of courses	2	--	2	--	
OJT/ FP/CEP/CC/RP	CC-1	Health and Wellness (Common for all the faculty)	--	4	--	2	2
			13	18	13	09	22

GE/OE-1: Introduction to Statistics (This course will be available for the students from other faculty)

B.Sc First Year: 2nd Semester

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major (Core) M1 Mandatory	DSC-3	Probability & Distribution Theory	2	--	2	--	2+2 = 4
	DSC-4	Practical based on DSC-3	--	4	--	2	
Major (Core) M2 Mandatory	DSC-3		2	--	2	--	2+2 = 4
	DSC-4	Practical based on DSC-3	--	4	--	2	
Major (Core) M3 Mandatory	DSC-3		2	--	2	--	2+2 = 4
	DSC-4	Practical based on DSC-3	--	4	--	2	
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) It should be chosen compulsorily from the faculty other than that of Major	GE/OE-2	To be chosen from other discipline of same faculty	2	--	2	--	2
VSC (Vocational Skill Courses) (Choose any one from pool of courses)	VSC-1	1) Statistical Computation Using Excel 2) Introduction to Actuarial Statistics	1	--	1	--	2
	VSC-2	1)Practicals based onVSC-1(I) 2)Practicals based onVSC-1(II)	--	2	--	1	
AEC, VEC, IKS	AEC-1	English (Common for all the faculty)	2	--	2	--	2+2 =4
	VEC-1	Constitution of India (Common for all the faculty)	2	--	2	--	
OJT/ FP/CEP/CC/RP	CC-2	Yoga Education / Sports and Fitness (Common for all the faculty)	--	4	--	2	2
			13	18	13	09	22
Exit Option : Award of UG Certificate in 3 Majors with 44 credits and an additional 4 credits of core NSQF course / Internship OR continue with Major and Minor							

GE/OE-2 : Demography and Vital Statistics (This course will be available for the students from other faculty)

Students will have to choose any three subjects as a **Major 1, Major 2, Major 3**, from Basket 1 under the Faculty of Science and Technology.

Students will be having three subject options of equal credits (instead of Major and / or minor verticals) in the first year. Students will have to select / declare choice of one subject as a **major subject** in the beginning of second year **out of three major options M1, M2 and M3 (which were opted in the first year).**

Detailed Illustration of Courses included in 1st and 2nd semester:

- 1) **Major (Core)** subject are mandatory.

DSC-1 : This is a 2 credit theory course corresponding to Major (core) subject

DSC-2 : This is a 2 credit practical course based on DSC-1

DSC-3 : This is a 2 credit theory course corresponding to Major (core) subject

DSC-4 : This is a 2 credit practical course based on DSC-3

- 2) **Generic / Open Elective (GE/OE):** (Needs to be chosen (any one) from pool of courses available at respective college). **These courses should be chosen compulsorily from faculty other than that of Major.**

GE/OE -1 : This is a 2 credit theory course should be chosen compulsorily from faculty other than that of Major.

GE/OE -2 : This is a 2 credit theory course should be chosen compulsorily from faculty other than that of Major.

- 3) **SEC (Skill Enhancement Courses) :** Choose any one from pool of courses. These courses needs to be designed to enhance the technical skills of the students in specific area.

SEC-1 : This is a 1 credit theory course to enhance the technical skills of the students in specific area.

SEC-2 : This is a 1 credit practical course based on SEC-1.

- 4) **VSC (Vocational Skill Courses) :** Choose any one from pool of courses. These courses should be based on Hands on Training corresponding to Major (core) subject.

VSC-1 : This is a 1 credit theory course based Hands on Training corresponding to Major (core) subject.

VSC-2 : This is a 1 credit practical course based on VSC-1

- 5) **AEC (Ability Enhancement courses):** The focus of these courses should be based on linguistic and communication skills.

AEC-1 : English

This is a 2 credit theory course based on linguistic proficiency. It will be common for all the faculty.

AEC-2 : English

This is a 2 credit theory course based on linguistic proficiency. It will be common for all the faculty.

- 6) **IKS (Indian Knowledge System)** : The courses related to traditional and ancient culture of India will be included in this section. The respective college will have to choose one of the courses from the pool of courses designed by the University.

IKS-1 : To be chosen from the pool of courses designed by the University

This is a 2 credit theory course based on Indian Knowledge System. It will be common for all the faculty

- 7) **VEC (Value Education Courses)**: The courses such as understanding India, Environmental Science / Education, Digital and Technological solutions etc will be part of Value Education Courses.

VEC-1 : Constitution of India

This is a 2 credit theory course based on value education. It will be common for all the faculty

- 8) **CC (Curricular Courses)**: The courses such as Health and wellness, Yoga education, Sports and Fitness, Cultural activities, NSS/NCC, Performing Arts.

CC-1 : Health and Wellness

This is a 2 credit practical course based on Co-curricular activities. It will be common for all the faculty

CC-2 : Yoga education / Sports and Fitness

This is a 2 credit practical course based on Co-curricular activities. It will be common for all the faculty

General Guidelines for Course Selection

- 1) The Major subject is the discipline or course of main focus, bachelors degree shall be awarded in that discipline / subject.
- 2) Students will have to choose any three subjects as a Major 1, Major 2, Major 3, from **Basket 1** under the Faculty of Science and Technology (based on the available options in the respective college).
- 3) Students will be having three subject options of equal credits (instead of Major and / or minor verticals) in the first year.
- 4) In the beginning of second year, students will have to select / declare choice of **one major subject** and **one minor subject** from three major options **M1, M2 and M3 (which were opted in the first year)**
- 5) Once the students finalize their **Major Subject** and **Minor Subject** in the beginning of the second year of the programme, they shall pursue their further education in that particular subject as their **Major and Minor** subjects. Therefore, from second year onwards curriculum of the Major and Minor subjects shall be different.
- 6) Students are required to select **Minor subject** from **other discipline of the same faculty**
- 7) Students are required to select **Generic /Open Elective** (vertical 3 in the credit framework) **compulsorily from the faculty different than that of their Major / Minor subjects.**
- 8) Vocational Skill Courses and Skill Enhancement Courses (VSC and SEC) shall be related to the Major subject
- 9) Curriculum of Ability Enhancement Courses (AEC), Value Education Courses (VEC), Indian Knowledge System (IKS), and Co-curricular Courses (CC) will be provided by the University separately.

Programme Educational Objectives (PEOs) :

Programme Educational Objectives (PEOs) for the Bachelor of Science Curriculum under the National Education Policy 2020:

1. **Mastery of Discipline-Specific Knowledge:** Graduates of the Bachelor of Science program will demonstrate a deep understanding of fundamental principles, theories, and methodologies in their chosen scientific discipline, enabling them to analyze complex problems, propose innovative solutions, and contribute to advancements in their field.
2. **Interdisciplinary Proficiency:** Graduates will possess the ability to integrate knowledge and skills from multiple scientific disciplines, fostering a holistic approach to problem-solving and innovation. They will be equipped to address multifaceted challenges by drawing upon diverse perspectives and methodologies.
3. **Critical Thinking and Analytical Skills:** Graduates will develop strong critical thinking abilities, enabling them to evaluate information rigorously, analyze data effectively, and make informed decisions based on evidence. They will demonstrate proficiency in applying logical reasoning and scientific methods to solve problems and generate new knowledge.
4. **Leadership and Innovation:** Graduates will demonstrate leadership qualities and entrepreneurial mindset, capable of initiating and driving positive change in their organizations and communities. They will exhibit creativity, resilience, and adaptability, harnessing innovation to address complex challenges and seize opportunities for growth and advancement.
5. **Global Citizenship and Cultural Sensitivity:** Graduates will possess a global perspective and cultural sensitivity, recognizing the interconnectedness of diverse communities and the importance of collaboration across borders. They will engage in cross-cultural dialogue, embrace diversity, and contribute to the advancement of knowledge and understanding on a global scale.

These Programme Educational Objectives serve as guiding principles for the Bachelor of Science curriculum, reflecting our commitment to nurturing well-rounded graduates who are prepared to excel in their careers, contribute to society, and lead meaningful lives in a rapidly changing world.

Programme Outcomes (POs) :

The National Education Policy (NEP) 2020 for India emphasizes several key aspects for Bachelor of Science (B.Sc.) programs, aiming to produce graduates who are not only well-versed in their respective disciplines but also equipped with skills necessary for holistic development and employability. While specific program outcomes may vary between institutions and disciplines within B.Sc. programs, here are some common outcomes aligned with NEP 2020:

- **PO1. The citizenship and society:** Apply broad understanding of ethical and professional skill in science subjects in the context of global, economic, environmental and societal realities while encompassing relevant contemporary issues.
- **PO2. Environment and sustainability:** Apply broad understanding of impact of science subjects in a global, economic, environmental and societal context and demonstrate the knowledge of, and need for sustainable development.
- **PO3. Ethics:** Apply ability to develop sustainable practical solutions for science subject related problems within positive professional and ethical boundaries.
- **PO4. Individual and team work:** Function effectively as a leader and as well as team member in diverse/ multidisciplinary environments.
- **PO5. Communication:** Communicate effectively on complex science subject related activities with the scientific community in particular and with 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.
- **PO6. Project management and finance:** Demonstrate knowledge and understanding of the first principles of science and apply these to one's own work as a member and leader in a team, to complete project in any environment.
- **PO7. Life-long learning:** Recognize the need for lifelong learning and have the ability to engage in independent and life-long learning in the broadest context of technological change.

These program outcomes align with the broader goals of NEP 2020 to transform higher education in India and prepare students for the challenges and opportunities of the 21st century. Board of Studies designing B.Sc. curricula are encouraged to incorporate these outcomes into their program objectives and learning outcomes.

Programme Specific Outcomes (PSOs):

PSO1. Domain knowledge: Apply the concepts, principles and methods of statistics to various fields of study, and understand the importance and value of statistical principles and convert a problem description into testable research hypotheses.

PSO2. Problem Analysis: Select appropriate statistical tools to investigate a research hypothesis. Perform data analysis by apply appropriate statistical methodologies and tools.

PSO3. Design Development of solutions: Construction of appropriate hypothesis corresponding to the situation under study. Apply appropriate tool to take decision about acceptance of hypothesis and interpret results.

PSO4. Conduct Investigation of complex problems: Use established knowledge and methods to design of experiments, analyze resulting data and interpret the same to provide valid conclusions.

PSO5. Modern tools: Acquire skills and apply appropriate techniques, resources, and learn Statistical software to apply for solving real life problems.

DSC-1 : DESCRIPTIVE STATISTICS

Total Credits : 02
Maximum Marks : 50

Total Contact Hours : 30 Hrs

Learning Objectives of the Course:

1. To understand the four measurement scales .
2. To interpret the utilization of mean values to describe group results.
3. To apply measure of standard deviation in describing the properties of variability of group scores.
4. To review statistical functions using Excel.
5. To calculate mean values.
6. To calculate standard deviation values.
7. To calculate correlation and interpret results.

Course Outcomes (COs) :

After completion of the course, students will be able -

CO1: To learn basic concepts, importance and scope of statistics.

CO2: To compute descriptive Statistics

CO3: To do graphical representation of data. .

CO4: To interpret results.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	<p>Introduction to some basic concepts of Statistics Introduction to statistics: Scope and importance of Statistics, Various definitions of Statistics, Primary and Secondary data, Types of data : qualitative, quantitative, discrete, continuous, cross-section, time series, Meta data. Presentation of data: Graphical presentation: Histogram, frequency polygon, frequency curves, ogive curves, stem and leaf charts, check sheet.</p> <p>Diagrammatic presentation: Bar diagrams, Pie diagram, Pareto diagram, scatter diagram. Different types of scales: Qualitative data (Attributes): Nominal and ordinal scales, Quantitative data (Variables): Interval and ratio scales, linear and circular scales. Data validation</p> <p>Classification of data: Discrete and continuous frequency distributions, inclusive and exclusive methods of classification, relative and cumulative frequency distributions. Measures of central tendency: Frequency Distribution, Graphical representation, Arithmetic mean: A.M. for grouped and ungrouped data, properties of A.M. Combined mean.</p>	10 Hrs

	Trimmed mean, Geographic mean, Harmonic mean, Weighted mean (Definition, Formula, Properties) Median, Mode (Definition, Formula, Properties, Graphical Method)	
II	Range and coefficient of range Quartile Deviation and coefficient of Q.D Box plot Mean Deviation and coefficient of M.D. Standard Deviation and Coefficient of Variation. Combined S.D Moments , Skewness and Kurtosis.	10 Hrs
III	Correlation :Concepts of correlation, Types of correlation, correlation coefficient (grouped and ungrouped data), properties of correlation coefficient, Rank correlation, Regression: concepts of Regression, Independent and response variables, fitting of lines of regression by using principle of least square (with derivation), Regression coefficient Regression lines, properties, Coefficient of Association (Attributes).	10 Hrs

Text Books:

1. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.
2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd. Calcutta.
3. Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.
4. Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, Third Edition, Sultan Chand and Sons Publishers, New Delhi.
5. Neil A. Weiss, (2016). Introductory Statistics, Tenth Edition, Pearson.
6. Purohit, S. G., Gore S. D., Deshmukh S. R. (2008). Statistics Using R, Narosa Publishing House, New Delhi.
7. Sharma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentce Hall of India, New Delhi.
8. Snedecor G. W. and Cochran W. G.(1989). Statistical Methods, Eighth Ed. East- West Press.

DSC-2 : LAB COURSE based on DSC1

Total Credits : 02
Maximum Marks : 50

Total Contact Hours : 60 Hrs

Learning Objectives of the Course:

CO1: To learn basic concepts, importance and scope of statistics.

CO2: To compute descriptive Statistics

CO3: To do graphical representation of data. .

CO4: To interpret results.

Module No.	Topics / actual contents of the syllabus	
I	Classification, tabulation of grouped and ungrouped data	
II	Diagrammatic representation of grouped and ungrouped data	
III	Computation of arithmetic mean for grouped data	
IV	Computation of Arithmetic mean. Median, Mode for ungrouped data	
V	Computation of Trimmed mean,	
VI	Computation of Geometric mean,	
VII	Computation of Harmonic mean,	
VIII	Computation of Weighted mean	
IX	Computation and graphical representation of correlation coefficient	
X	Fitting of regression line.	

Text Books:

1. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.
2. Ghosh .J. K. and Mitra, S. K., Parthsarathi, K. R. (1993). Glimpses of India's Statistics Heritage, Wiley publishing Co.
3. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd. Calcutta.

-
4. Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.
 5. Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, Third Edition, Sultan Chand and Sons Publishers, New Delhi.
 6. Neil A. Weiss, (2016). Introductory Statistics, Tenth Edition, Pearson.
 7. Purohit, S. G., Gore S. D., Deshmukh S. R. (2008). Statistics Using R, Narosa Publishing House, New Delhi.
 8. Sharma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentice Hall of India, New Delhi.
 9. Snedecor G. W. and Cochran W. G.(1989). Statistical Methods, Eighth Ed. East-West Press.

SCE-1(I) : Descriptive Statistics using Excel

Total Credits : 01
Maximum Marks : 50

Total Contact Hours : 15 Hrs

Learning Objectives of the Course:

1. to get students started in Excel,
2. Students should handle software and make graphical data representation.
3. Students should work in descriptive statistics using excel.
4. Students should find correlation between variable and fit line of regression using excel.

Course Outcomes (COs) :

After completion of the course, students will be able -

CO1: To do data entry in Excel

CO2: To data files in excel.

CO3:To compute of summary statistics by using Excel software.

CO4: To represent data graphically

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Excel, Data entry, tabulation, Graphical computation of Data and Interpretation : Histogram, frequency curve, frequency polygon, ogive curves. Diagrammatic computation of Data and Interpretation : Bar diagrams (simple, component, multiple, percentage Bars), Pie diagram. Classification and Tabulation of data. Data Interpretation techniques, Precaution in Interpretation. Data interpretation problems.	07 Hrs
II	Measures of central tendency : Frequency Distribution; Graphical representation, Arithmetic mean: Trimmed mean, Geographic mean, Harmonic mean, Weighted mean Median, Mode, Range, Quartile Deviation, Mean Deviation, Standard Deviation, Moments & Kurtosis, Correlation coefficient, Regression coefficient Regression lines, Rank correlation	08 Hrs

Text Books :

1. KVS Sarma, Excel made easy
2. Microsoft Excel Bible: The Comprehensive Tutorial Resource

Reference Books :

1. Gardener, M (2012) Beginning R: The Statistical Programming Language, Wiley Publications.
2. Braun W J, Murdoch D J (2007): A First Course in Statistical Programming with R. Cambridge University Press. New York

SEC2(I): LAB COURSE based on SEC1(I)

Total Credits : 01
Maximum Marks : 50

Total Contact Hours : 30 Hrs

Learning Objectives of the Course:

CO1: To learn basic concepts, importance and scope of statistics.

CO2: To compute descriptive Statistics

CO3: To do graphical representation of data. .

CO4: To interpret results.

Module No.	Topics / actual contents of the syllabus	
I	Data entry in Excel,	
II	Tabulation of data	
III	Diagrammatic representation of grouped data	
IV	Diagrammatic representation ungrouped data	
V	Computation of arithmetic mean, Median, Mode for grouped data	
VI	Computation of Arithmetic mean. Median, Mode for ungrouped data	
VII	Computation of standard deviation, variance, C.V. , skewness and kurtosis.moments,	
VIII	Computation of Trimmed mean, Geometric mean, Harmonic mean, Weighted mean	
IX	Computation and graphical representation of correlation coefficient	
X	Fitting of regression line.	

SCE-1 (II) : Introduction to R

Total Credits : 01
Maximum Marks : 50

Total Contact Hours : 15 Hrs

Learning Objectives of the Course:

1. Expand R by installing R packages.
2. Explore and understand how to use the R documentation.
3. Read Structured Data into R from various sources.
4. Understand the different data structures in R.
5. Define, Calculate, a wide variety of problems.

Course Outcomes (COs) :

After completion of the course, students will be able to -

- CO1. Install R and R studio.
- CO2. Import and export of data file
- CO3. Different methods of Data entry in R
- CO4. Work over small programs in R
- CO5: Compute summary Statistics in R

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Basic commands in R, input and output of data. Import and export of file, Learn how to load data, tabulation (equal class intervals and unequal class intervals), Logical and Arithmetic operators, Numerical functions, Data frames.	07 Hrs
II	Graphical computation of Data and Interpretation: Histogram, frequency curve, frequency polygon, ogive curves. Diagrammatic computation of Data and Interpretation: Bar diagrams (simple, component, multiple, percentage Bars), Pie diagram. Classification and Tabulation of data.	08 Hrs

Recommended Books

1. Shailaja R Deshmukh Sudha G Purohit, Sharad D Gore, (2009) Statistics Using R 2/e, Narosa.
2. Nathan Metzler, R Programming for Beginners: An Introduction to Learn R Programming with Tutorials and Hands-On Examples
3. Jared P. Lander, R for Everyone, Addison-Wesley Data and Analytics Series.

SEC2(II): LAB COURSE based on SEC1(II)

Total Credits : 01

Total Contact Hours : 30 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

CO1: To learn basic concepts, importance and scope of statistics.

CO2: To compute descriptive Statistics

CO3: To do graphical representation of data. .

CO4: To interpret results.

Module No.	Topics / actual contents of the syllabus	
I	Data entry	
II	Tabulation of data	
III	Diagrammatic representation of grouped data	
IV	Diagrammatic representation ungrouped data	
V	Computation of arithmetic mean, Median, Mode for grouped data	
VI	Computation of Arithmetic mean. Median, Mode for ungrouped data	
VII	Computation of standard deviation, variance, C.V. , skewness and kurtosis.moments,	
VIII	Computation of Trimmed mean, Geometric mean, Harmonic mean, Weighted mean	
IX	Computation and graphical representation of correlation coefficient	
X	Fitting of regression line.	

This course will be available for the students from other faculty

GE/OE 1 : Introduction to Statistics

Total Credits : 02 Total Contact Hours : 30 Hrs
Maximum Marks : 50

Learning Objectives of the Course:

1. Students should be familiar with the terminology and special notation of statistical analysis
2. Students should be able to organize data into a regular or a grouped frequency distribution table, and understand data that are presented in a table
3. Students should be able to organize data into frequency distribution graphs, including bar graphs, histograms, polygons, and ogives. Also, students should be able to understand data that are presented in a graph.
4. Students should understand the purpose of measuring central tendency.
5. Students should be able to define and compute each of the three measures of central tendency (Mean, Median, Mode).
6. Students should understand the Pearson correlation as a descriptive statistic that measures and describes the relationship between two variables.
7. Students should be able to compute the Pearson correlation using either the definitional or the computational formula for SP (the sum of products of deviations).
8. Students should understand the Spearman correlation and how it differs from the Pearson correlation in terms of data that it uses and the type of relationship that it measures.

Course Outcomes (COs) :

After completion of the course, students will be able to -

CO1: Know the different organizations works for official Statistics.

CO2: Organize, manage and present data.

CO3: Analyze statistical data graphically using frequency distributions and cumulative frequency distributions.

CO4: Analyze statistical data using measures of central tendency, dispersion and location

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Statistics.Scope and importance of Statistics, Various definition of Statistics, Statistical Organization, Statisticians and their Contribution, Types of data	10 Hrs

II	Measure of central tendency mean, mode, median. (Computation & Interpretation S.D and C.V.)	10 Hrs
III	Correlation, rank correlation, Attributes correlation of Association (Comparison & Interpretation) properties (Without Proof)	10 Hrs

Recommended Books

1. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.
2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd. Calcutta.
3. Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.
4. Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, Third Edition, Sultan Chand and Sons Publishers, New Delhi.

SECOND SEMISTER

DSC-3 : Probability and Distribution Theory

Total Credits : 02
Maximum Marks : 50

Total Contact Hours : 30 Hrs

Learning Objectives of the Course:

1. Gain Knowledge of fundamental concepts of sample space and related events.
2. understand the basic concept of probability and different approaches.
3. To learn the concept of conditional probability and independence and to learn how to solve numerical problems in conditional probability.
4. learn univariate probability distributions and their properties .
5. To learn the concept of mathematical expectation , variance , moments , M.G.F. , C.G.F. etc of univariate probability distributions .
6. To learn different types of standard discrete probability distributions.

Course Outcomes (COs) :

After completion of the course, students will be able to -

CO1: To compute probabilities of different events

CO2: To identify the probability mass function

CO3: To find expectations of random variables

CO4: To establish different properties related to Binomial, Poisson and Geometric distributions

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Concept of experiments and random experiments, Definitions: sample space , discrete sample space (finite and countably infinite) Event, elementary event, complement of an event Definitions: Exhaustive events, Favorable events, Mutually Events, Equally likely events, Independent events, impossible events and certain events. Symbolic representation of given events and description. Apriori (classical) - definition of probability of an event, Equiprobable sample space, simple examples of computations of probability of the events based on permutation combinations	10 Hrs
II	Discrete random variable, probability mass function, cumulative distribution function and its properties, expectation of a random variables, median and mode of discrete distributions, moments (raw and central), Moment Generating Function and its properties, Cumulant generating Functions.	10 Hrs

III	<p>DISCRETE DISTRIBUTIONS: Definition of Bernoulli distribution and moments of the distribution, Additive property of Bernoulli distribution (Two variables), Definition of Binomial distribution and applications of Binomial distribution, Mode of Binomial distribution, Moments and recurrence relation in moments of Binomial distribution, Additive property of Binomial distribution</p> <p>Definition of Poisson distribution and applications, Poisson distribution as a limiting form of Binomial distribution, Mode of Poisson distribution, Moments of Poisson distribution, Additive property and its generalization for Poisson distribution.</p> <p>Geometric Distribution :-Definition, mean, variance, MGF, Distribution function, Lack of memory property, Distribution of $x+y$ when x & y are independent Distribution of $\min(x,y)$</p>	10 Hrs
------------	---	---------------

Recommended Books:

1. Agarwal B. L. (2003). Programmed Statistics, second edition, New Age International Publishers, New Delhi.
2. Gupta, S.C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.
3. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, New York.
4. Hogg, R.V. and Craig R.G. (1989). Introduction to Mathematical Statistics, Ed. MacMillan Publishing Co., New York.
5. Mayer, P. (1972). Introductory Probability and Statistical Applications, Addison Wesley Publishing Co., London.
6. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, Ed. 3, McGraw Hill Book Company.
7. Ross S. (2002). A First Course in Probability, Sixth Edition, Pearson Education, Inc. & Dorling Kindersley Publishing, Inc.

Additional Reference Websites for Paper I and Paper II:

1. www.stats.unipune.ac.in (100 Data sets for Statistics Education by Dr. Anil P. Gore, Dr. Mrs. S. A. Paranjpe and Madhav B. Kulkarni available in ISPS folder).
2. www.freestatistics.tk (National Statistical Agencies)
3. www.psychstat.smsu.edu/sbk00.htm (Online book)
4. www.bmj.bmjournals.com/collections/statsbk/index.shtml
5. www.statweb.calpoly.edu/bchance/stat-stuff.html
6. www.amstat.org/publications/jse/jse-data-archive.html (International journal on teaching and learning of statistics)
7. www.amstat.org/publications/chance (Chance magazine)
8. www.statsci.org/datasets.html (Datasets)
9. www.math.uah.edu/stat (Virtual laboratories in Statistics)

10. www.amstat.org/publications/stats(STATS : the magazine for students of Statistics)
 11. www.stat.ucla.edu/cases(Case studies inStatistics).
 12. www.statsoft.com
 13. www.statistics.com
 14. www.indiastat.com
 15. www.unstat.un.org
 16. www.stat.stanford.edu
 17. www.statpages.net
 18. www.wto.org
 19. www.censusindia.gov.in
 20. www.mospi.nic.in
- www.statisticsofindia.in

DSC-4 : Lab Course based on DSC-3

Total Credits : 02
Maximum Marks : 50

Total Contact Hours : 60 Hrs

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Computation of Probabilities	
II	Computation of raw and central moments , skewness and kurtosis of Binomial Distribution.	
III	Computation of mean mode and median of Binomial Distribution.	
IV	Fitting of Binomial Distribution	
V	Computation of raw and central moments , skewness and kurtosis of Poisson Distribution.	
VI	Computation of mean mode and median of Poisson Distribution.	
VII	Fitting of Poisson Distribution	
VIII	Computation of raw and central moments , skewness and kurtosis of Geometric Distribution.	
IX	Computation of mean mode and median of Geometric Distribution.	
X	Fitting of Geometric Distribution	

VSC1 (I) : Statistical Computation Using Excel

Total Credits : 01
Maximum Marks : 50

Total Contact Hours : 15 Hrs

Learning Objectives of the Course:

1. To compute correlation coefficient.
2. To fit line of regression using excel.
3. Fitting of non-linear curve in excel.
4. To fit discrete distributions.

Course Outcomes (COs) :

After completion of the course, students will be able -

CO1: to fit Poisson distribution in excel

CO2: to fit Geometric distribution in excel

CO3: to compute and interpret correlation coefficient and regression.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Computation of correlation, regression, non-linear curve,	05 Hrs
II	Fitting of Discrete distributions (Binomial, Poisson, Geometric)	05 Hrs
III	Computation of Index numbers, Birth and Death rates,	05 Hrs

Text Books :

1. KVS Sarma, Excel made easy
2. Microsoft Excel Bible: The Comprehensive Tutorial Resource

VEC-2(I) : Lab Course based on VEC1(I)

Total Credits : 01
Maximum Marks : 50

Total Contact Hours : 30 Hrs

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Computations of correlation coefficients	
II	Fitting of regression Line	
III	Fitting of Non- linear curves	
IV	Computation of Index number based on price	
V	Computation of Index number based on quantity.	
VI	Computation of Birth rates	
VII	Computation of death rates.	
VIII	Fitting of Binomial Distribution	
IX	Fitting of Poisson Distribution	
X	Fitting of Geometric Distribution	

VEC1 (II) : Introduction to Actuarial Statistics

Total Credits : 01

Total Contact Hours : 15 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

1. To compute correlation coefficient.
2. To fit line of regression using excel.
3. Fitting of non-linear curve in excel.
4. To fit discrete distributions.

Course Outcomes (COs) :

After completion of the course, students will be able -

CO1: to fit Poisson distribution in excel

CO2: to fit Geometric distribution in excel

CO3: to compute and interpret correlation coefficient and regression.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to insurance business, working of insurance business notion of utility, utility function, survival function and life tables,	08Hrs
II	Simple and compound interest rates, nominal and effective rates of interest, discount and accumulating factors, Life insurance, endowment insurance, deferred insurance.	07Hrs

Text Books / Reference Books :

- 1) Deshmukh S.R. (2009): Actuarial Statistics: in introduction using R, University press
- 2) Dixit S.R, Modi C.S. and Joshi R.V. (2000) Mathematical Basis of Life Assurance: Insurance institute of India, Bombay

VEC-2(II) : Lab Course based on VEC1(II)

Total Credits : 01
Maximum Marks : 50

Total Contact Hours : 30 Hrs

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Computation and graphical representation of Utility function.	
II	Computation and graphical representation of survival function.	
III	Construction of life tables.	
IV	Problems based on life tables	
V	Computation of simple interest rate	
VI	Computation of compound interest rate	
VII	nominal interest rate	
VIII	Computation of discount factors	
IX	Computation of accumulating factors	
X	Relation between nominal, effective and force of interest.	

This course will be available for the students from other faculty

GE/OE 2 : Demography and Vital Statistics

Total Credits : 02 Total Contact Hours : 30 Hrs Maximum Marks : 50

Learning Objectives of the Course:

1. Importance of statistics in demography.
2. Comprehend the basic components of population (fertility, mortality, migration)
3. Compute index numbers
4. Understand problem in construction of index numbers
5. Acquire knowledge on vital statistics

Course Outcomes (COs) :

After completion of the course, students will be able to -

CO1: To construct different price and quantity index numbers

CO2: To test consistency of Index numbers

CO3: Know Applications of cost of living index number

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Definition, Problems involved in the construction of index numbers, methods of constructing index numbers of prices and quantities, simple aggregate and price relatives method, weighted aggregate and weighted average of relatives method, important types of weighted index numbers: Laspeyre's, Paasche's, Bowley's, Marshall- Edgeworth, Fisher's, method of obtaining price and quantity index numbers, tests consistency of index numbers, time reversal test and factor reversal test for index numbers, Uses and limitations of index numbers.	10 Hrs
II	Classification of Index numbers, Wholesale price index number, Cost of living (Consumer price) index number: Problems involved in the construction of cost of living index number, advantages and disadvantages, Aggregative expenditure method and Family budget method for the construction of consumer price index numbers. Applications of Cost of Living Index numbers. Definition and measurement of Inflation rate – CPI and GNP Deflator. Index of industrial production and Agricultural production.	10 Hrs

III	Uses of Vital statistics, Methods of Obtaining Vital statistics, Measurement of Mortality, Crude Death rate, Specific Death rate, Age Specific Death rate, Standardized death rate, Infant Mortality rate, Crude Birth rate, General fertility rate, Specific fertility rate, Total fertility rate.	10 Hrs
------------	---	---------------

Text Books

1. Gupta and Kapoor (2007) Fundamentals of Applied Statistics, S. Chand publication.
2. Mukhopadhyay P. (1999): Applied Statistics, Books and Allied (P) Ltd.
3. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2008): Fundamentals of Statistics, Vol. II, 9th Edition, World Press.
4. Biswas, S. (1988): Stochastic Processes in Demography & Application, Wiley Eastern Ltd.
5. Croxton, Fredrick E., Cowden, Dudley J. and Klein, S. (1973): Applied General Statistics, 3rd Edition. Prentice Hall of India Pvt. Ltd.
6. Keyfitz N., Beckman John A.: Demogrophy through Problems S-Verlag New york. B. Sc. Honours (Statistics)

Basket 1: List of Major subjects in Science (DSC)

Students willing to pursue their bachelors in the **Faculty of Science and Technology** shall choose any three subjects (from the following options) as Major 1, Major 2 and Major 3 (Based on the available options in the respective college)

Semester	Sr No	BOS / Ad hoc Board proposing the course	Title of the Course
1st and 2nd Semester <i>(Students shall choose any three subjects (from these options) as Major 1, Major 2 and Major 3 (Based on the available options in the respective college)</i>	1	BOS in Botany	Botany
	2	BOS in Chemistry	Chemistry Analytical Chemistry Polymer Chemistry
	3	BOS in Mathematics	Mathematics
	4	BOS in Physics	Physics Non-Conventional and Conventional Energy Instrumentation Practice
	5	BOS in Zoology	Zoology
	6	BOS in Electronics	Electronics
	7	BOS in Fishery Science	Fishery Science
	8	BOS in Microbiology	Microbiology
	9	Ad Hoc Board in Statistics	Statistics
	10	Ad hoc Board in Industrial Chemistry	Industrial Chemistry
	11	Ad hoc Board in Dairy Science & Technology	Dairy Science & Technology
	12	Ad hoc Board in Biotechnology and Bioinformatics	Biotechnology Bioinformatics
	13	Ad hoc Board in Biochemistry	Biochemistry
	14	Ad hoc Board in Home Science	Home Science
	15	Ad Hoc Board in Agrochemical Fertilizers, Horticulture, Dry land Agriculture	Agrochemical Fertilizers Horticulture
	16	Ad hoc Board in Forensic Science	Forensic Science Forensic Science & Cyber Security
	17	Ad Hoc Board in Computer Science	Computer Science Computer Application Information Technology Data Science
	18	Ad Hoc Board in Networking and Multimedia	Networking and Multimedia
	19	Ad Hoc Board in Environmental Science	Environmental Science
	20	Ad hoc Board in Automobile Technology / Workshop Technology / Refrigerator and Air Conditioning	Automobile Technology Workshop Technology Refrigerator and Air

			Conditioning
	21	Ad hoc Board in Geology	Geology

XXXXXXXXXXXXXXXXXXXX