Darrang College (Autonomous), Tezpur-784001

Syllabus for FYUGP

Sub: STATISTICS

Approved by :
Board of Studies meeting held on 27-12-2025 &
Academic Council vide Resolution no. 2 dated- 29-12-2025

DARRANG COLLEGE (AUTONOMOUS)
TEZPUR, ASSAM

FYUGP Structure as per UGC Credit Framework

DEPARTMENT OF STATISTICS

(Courses effective from Academic Year 2025-2026)

SYLLABUS OF COURSES OFFERED

Skill Enhancement Courses (SEC)

AIMS OF FOUR-YEAR UNDER GRADUATE PROGRAMME (FYUGP) IN STATISTICS:

The aims of Four-Year under Graduate Programme (FYUGP) in Statistics are:

- The UG Programme in Statistics is structured to develop analytical, critical, and logical thinking skills in students.
- It emphasizes the application of mathematical reasoning in solving real-world problems.
- Students are introduced to diverse and practical statistical concepts throughout the course.
- The programme prepares students for roles like data scientist, statistician, strategic banker, researcher, and biostatistician.
- Graduates can pursue careers in industries, government agencies, public sector units, finance, business, and research.
- The curriculum includes both mathematical and applied statistics topics for well-rounded learning.
- Practical training is provided through hands-on sessions in the Computer Lab.
- Students gain experience using statistical software such as MS Excel, C/C++, R, and SPSS.
- Coding skills and software usage are integrated to deepen understanding of statistical methods.
- The programme aims to equip students with the necessary tools for success in research and industry.

Programme Outcome:

By the end of the programme a UG student of Statistics should be able to know about:

- **Statistical Knowledge**: Gain a strong foundation in theoretical and applied statistics to analyze and interpret data effectively.
- **Mathematical Reasoning**: Develop the ability to use mathematical tools and logical thinking for solving real-life and research-oriented problems.

- **Data Handling Skills**: Acquire skills in data collection, cleaning, visualization, and analysis using modern software and statistical techniques.
- **Computational Proficiency**: Learn to use programming languages and statistical software such as R, Python, SPSS, and C/C++ for data analysis and modeling.
- **Critical Thinking**: Enhance the ability to critically evaluate data sources, methods, and interpretations in a wide range of applications.
- **Research Competence**: Build capability to design and conduct statistical investigations and contribute to interdisciplinary research.
- **Problem Solving**: Apply statistical methods to solve practical problems in domains such as business, health, economics, environment, and public policy.
- **Communication Skills**: Develop effective written and verbal communication skills to present statistical findings clearly to both technical and non-technical audiences.
- **Ethics and Responsibility**: Understand the ethical issues in data handling, privacy, and responsible use of statistical results.
- **Career Readiness**: Prepare for careers in data science, analytics, government services, research institutions, finance, and further academic studies.

Teaching Learning Process:

The programme supports the application of multiple pedagogical approaches in both classroom and computer lab environments.

- Focus on learner-centric and outcome-based teaching methods.
- Use of both traditional lectures and digital tools for content delivery.
- Emphasis on conceptual clarity and practical application.
- Interactive sessions including discussions, quizzes, and problem-solving.
- Regular hands-on training using statistical software like R, SPSS, and Excel.
- Continuous internal assessment through tests, assignments, and presentations.
- Integration of project-based learning for real-life data analysis.
- Opportunities for internships and field work for practical exposure.
- Interdisciplinary approach connecting statistics with other domains.
- Inclusion of soft skill development and ethical value-based activities.

Teaching Learning Tools:

- Blackboard and Whiteboard Teaching – For explaining concepts, formulas, and derivations.
- Power Point Presentations – To visually present data, graphs, and theoretical concepts.
- Statistical Softwares – Tools like R, SPSS, Python, Excel for data analysis and practical's.
- ICT Tools – Projectors, Google Classroom
- Graphs and Charts – Manual and digital graph plotting for visualization.
- Problem-Solving Sessions – Interactive numerical sessions to enhance analytical skills.
- Case Studies – Real-life statistical data applications to encourage critical thinking.
- Group Discussions

Assessment/Evaluation Methods:

- A variety of subject-specific assessment procedures will be used to monitor student progress.
- Continuous evaluation will determine the final grade.
- Evaluation includes both In-semester assessment and End semester examination.
- In-semester evaluation methods include:
    - Class tests
    - In-semester Sessional exams
    - Home Assignments
    - Group Discussions
    - Attendance
- Assessment techniques include:
    - Tutorials
    - In-semester assessment
    - Problem-based assignments
    - Lab reports for practicals
    - Individual project reports
    - Oral presentations (including seminars)
    - Viva-voce

- End Semester examinations (Theory and Practical)

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FYUGP Structure as per UGC Credit Framework

Year	Semester	Course Code	Title of the Course	Total Credit
1st Year	**1st Semester**	STA-MJ-01014	Introductory Statistics and Probability	4
		STA-MN-01014	Introductory Statistics and Probability	4
		STA-SEC-01013	Statistical Data Analysis Using Excel	3
		VAC		4
		MDC		3
		AEC		2
	Total			**20**
	2nd Semester	STA-MJ-02014	Intermediate Probability Theory	4
		STA-MN-02014	Intermediate Probability Theory	4
		STA-SEC-02013	Statistical Data Analysis Using SPSS	3
		VAC		4
		MDC		3
		AEC		2
	Total			**20**
2nd Year	**3rd Semester**	STA-MJ-03014	Statistical Inference	4
		STA-MJ-03024	Mathematical Analysis	4
		STA-MN-03014	Basics of Statistical Inference	4
		STA-SEC-01013	Statistical Data Analysis Using R	3
		MDC		3

		AEC		2
	Total			**20**
	4th Semester	STA-MJ-04014	Linear Models & Probability Laws	4
		STA-MJ-04024	Linear Algebra	4
		STA-MJ-04034	Sampling Distributions	4
		STA-MJ-04044	Survey Sampling	4
		STA-MN-04014	Survey Sampling & Design of Experiments	4
		AEC		2
	Total			**22**
3rd Year	**5th Semester**	STA-MJ-05014	Applied Statistics	4
		STA-MJ-05024	Analysis of Variance and Design of Experiments	4
		STA-MJ-05014	Operations Research	4
		STA-INT-05014	Internship	4
		STA-MN-05014	Applied Statistics	4
	Total			**20**
	6th Semester	STA-MJ-06014	Stochastic Process and Queuing Theory	4
		STA-MJ-06024	Multivariate Analysis and Non-Parametric Inference	4
		STA-MJ-06034	Demography and Vital Statistics	4
		STA-MJ-06044	Project	4
		STA-MN-06014	Demography and Vital Statistics	4
	Total			**20**
4th Year	**7th Semester**	STA-MJ-07014	Advanced Mathematical Analysis	4
		STA-MJ-07024	Advanced Probability Theory	4

		STA-MJ-07034	Econometrics	4
		STA-MJ-07044	Research Methodology	4
		STA-MN-07014	Linear Models	4
	Total			**20**
	8th Semester	STA-MJ-08014	Time Series Analysis	4
		STA-MJ-08024	Bayesian Inference	4
		STA-MJ-08034	Queuing Theory	4
		STA-MJ-08044	Dissertation	4
		STA-MN-08014	Operations Research	4
	Total			**20**

B.A./B.Sc. IN STATISTICS PROGRAMME (FYUGP)

DETAILED SYLLABUS OF FYUGP 1st SEMESTER

Title of the Course	Statistical Data Analysis Using Excel
Course Code	STA-SEC-01013
Nature of Course	Skill Enhancement Course
Total Credit	03 (Theory -02 + Practical - 01)
Contact Hours	30 (Theory) + 30 (Practical)
Distribution of Marks	End Semester (30) + In Semester (20) + End sem Practical (25)
Course Level	100-199

Course Objectives: This course will review and expand upon core topics in probability and statistics, particularly by initiating the beneficiaries of the course to at least one of the software packages viz., Microsoft Excel for statistical computing.

Learning Outcomes: At the end of this course, the students will be able to solve real life problems by applying the statistical tools and techniques using the software skills imparted through this course.

Course Outcomes:

CO1: Learn how to load data, plot a graph viz. histograms (equal class intervals and unequal class intervals), box plot, stem-leaf, frequency polygon, pie chart, ogives with graphical summaries of data

CO2: Generate automated reports giving detailed descriptive statistics, correlation and lines of regression.

CO3: Compute auto-covariance and auto correlation function of a time series, fitting auto-regressive series.

Unit	Content	L	T	P	Total hrs
I	**Graphical Representation:** Introduction to MS Excel**,** Basics of statistical tools, Preparation of frequency table**.** Learn how to load data, plot a graph viz. histograms (equal class intervals and unequal class intervals), box plot, stem-leaf, frequency polygon, pie chart, ogives with graphical summaries of data	08	02	-	10
II	**Report Generation:** Generate automated reports giving detailed descriptive statistics, correlation and lines of regression.	08	02	-	10
III	**Statistical Analysis:** Simple analysis of different measure of central tendency and dispersion, create and manage statistical analysis projects, import data, Fitting of polynomials and exponential curves.	08	02	-	10
IV	**Practical:** Based on Unit I, II and III	-	-	15	30

SUGGESTED READING:

1. Moore, D.S. and McCabe, G.P.and Craig, B.A. (2014): Introduction to the Practice of Statistics, W.H. Freeman
2. Albright, S. C., Winston, W. L., & Zappe, C. J. (2016). Data Analysis and Decision Making with Microsoft Excel (5th ed.). Cengage Learning.
3. Field, A., & Miles, J. (2010). Discovering Statistics Using Microsoft Excel. Sage Publications Ltd.
4. Triola, M. F. (2017). Elementary Statistics Using Excel (6th ed.). Pearson.
5. Kvanli, A. H., Pavur, R. J., & Guynes, C. S. (2019). Introduction to Business Statistics: A Microsoft Excel Manual (8th ed.). Pearson.
6. Nelson, M. R., & Crouch, G. I. (2016). Business Analytics Using Excel. Cengage Learning.

B.A./B.Sc. IN STATISTICS PROGRAMME (FYUGP)

DETAILED SYLLABUS OF FYUGP 2nd SEMESTER

Title of the Course	Statistical Data Analysis Using SPSS
Course Code	STA-SEC-02013
Nature of Course	Skill Enhancement Course
Total Credit	3 (Theory -2 + Practical - 1)
Contact Hours	30(Theory) + 30 (Practical)
Distribution of Marks	End Semester (30) + In Semester (20) + End sem Practical (25)
Course Level	100-199

Course Objectives: This course will review and expand upon core topics in probability and statistics, particularly by initiating the beneficiaries of the course to at least one of the software packages viz SPSS for statistical computing.

Learning Outcomes: At the end of this course, the students will be able to solve real life problems by applying the statistical tools and techniques using the software skills imparted through this course.

Course Outcomes:

CO1: Learn how to load data, plot a graph viz. histograms (equal class intervals and unequal class intervals), box plot, stem-leaf, frequency polygon, pie chart, ogives with graphical summaries of data

CO2: Generate automated reports giving detailed descriptive statistics, correlation and lines of regression.

CO3: Apply the various schemes to draw samples with and without replacement using SPSS sample design and estimate the population parameters under these schemes along with their variance.

CO4: Compute auto-covariance and auto correlation function of a time series, fitting auto-regressive series.

Unit	Content	L	T	P	Total hrs
I	**Introduction to SPSS:** Basic idea of SPSS software, The Data Editor, creating variables and Entering data, Types of variables, assigning values to the variables, Selecting and sorting Cases, Splitting and Merging Files, Computing and Recoding variables**.**	08	02	-	10
II	**Visualization:** Diagrammatic and Graphic representation of data (using Pie Diagram, Bar Diagram, Line Diagram and Histogram).	06	02	-	07
III	**Statistical Analysis:** Frequency distribution, Tables (Cross tables and contingency tables). Measures of location: Mean, Median, Mode and Partition values; Geometric Mean and Harmonic Mean. Measures of Dispersion: Range, Mean Deviation, Quartile Deviation, Standard Deviation; Skewness and Kurtosis, Bivariate Data: Scatter plots, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation and lines of regression.	10	02	-	13
IV	**Practical:** Based on Unit I, II and III	-	-	15	30

SUGGESTED READING:

1. Moore, D.S. and McCabe, G.P.and Craig, B.A. (2014): Introduction to the Practice of Statistics, W.H. Freeman
2. Cunningham, B.J (2012): Using SPSS: An Interactive Hands-on approach
3. Gupta, S.C. and Kapoor, V.K. (2020). Fundamentals of Mathematical Statistics. Sultan Chand & Sons. New Delhi. (12^{th} Edition).
4. Field, A. (2018). Discovering Statistics Using IBM SPSS Statistics (5th ed.). Sage Publications Ltd.
5. IBM Corporation. (2020). IBM SPSS Statistics 27 Documentation. IBM Corporation.

B.A./B.Sc. IN STATISTICS PROGRAMME (FYUGP)

DETAILED SYLLABUS OF FYUGP 3rd SEMESTER

Title of the Course	Statistical Data Analysis Using R
Course Code	STA-SEC-03013
Nature of Course	Skill Enhancement Course
Total Credit	3 (Theory -2 + Practical - 1)
Contact Hours	30(Theory) + 30 (Practical)
Distribution of Marks	End Semester (30) + In Semester (20) + End sem Practical (25)
Course Level	200-299

Course Objectives: This course will review and expand upon core topics in probability and statistics, particularly by initiating the beneficiaries of the course to at least one of the software packages viz R for statistical computing.

Learning Outcomes: At the end of this course, the students will be able to solve real life problems by applying the statistical tools and techniques using the software skills imparted through this course.

Course Outcomes:

CO1: Learn how to load data, plot a graph viz. histograms (equal class intervals and unequal class intervals), box plot, stem-leaf, frequency polygon, pie chart, ogives with graphical summaries of data

CO2: Generate automated reports giving detailed descriptive statistics, correlation and lines of regression.

CO3: Apply the various schemes to draw samples with and without replacement using SPSS sample design and estimate the population parameters under these schemes along with their variance.

CO4: Compute autocovariance and autocorrelation function of a time series, fitting auto-regressive series.

Unit	Content	L	T	P	Total hrs
I	**Introduction:** About R programming language, Features of R, R as a calculator, using the command-line interface of R; About R Studio, Features of R Studio, Install packages. Features of an R script, Creating and saving an R script from the user interface (UI) of R Studio, Shortcut keys to create an R script, using auto-completion of commands, running an entire script, running a block of a script, adding comments, Loading one script into another script. Working directory in R using getwd() function, Setting a working directory using setwd() function, Reading and storing a CSV file in R using read.csv() function, view() function; Methods of data input, Data accessing or indexing, Some useful built in functions.	08	02	-	10
II	**Data Import and Export:** Storing information in vectors, constructing a data frame using vectors, plotting one vector of a data frame vs. another one, adding a vector to a data frame, saving a data frame into a CSV file, Preventing the writing of row numbers into the CSV file, Changing the contents of a CSV file through a text editor, loading a CSV file into a data frame, Accessing the data sets that come with R.	06	02	-	08
III	**Descriptive statistics:** Tabulation and frequency distributions, Measures of central tendency, measures of dispersion, Measures of skewness and Kurtosis, Simple correlation and regression. Graphics with R: Basics of graphs in R, Drawing and customizing Histogram, Bar charts, Scatter plot and Box plot in R.	05	02	-	07
IV	**Data Frames:** Converting a data frame into a matrix, creating a matrix with known data, Basic matrix operations: adding, subtraction, multiplication, transpose, determinant,	04	01		05

	inversion, Calculating the sum of elements in a matrix using for loop, sum of elements in a matrix using the sum function, Calculating the time elapsed in an operation, finding out the sum of rows/columns of a matrix, Adding a new column or row to an existing data-frame, cbind() and rbind() functions.				
IV	**Practical:** Based on Unit I, II,III & IV	-	-	15	30

SUGGESTED READING:

1. Crawley, M. J. (2005). Statistics: An Introduction Using R. Wiley.

2. Dalgaard, P. (2002). Introductory Statistics with R (2nd ed.). Springer.

3. Faraway, J. J. (2009). Practical Regression and ANOVA Using R. Chapman and Hall/CRC.

4. Fox, J. (2002). An R and S-Plus Companion to Applied Regression. Sage Publications Inc.

5. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An Introduction to Statistical Learning: With Applications in R. Springer.

6. Peng, R. D. (2010). Exploratory Data Analysis with R. Springer.

7. Bora, D., Bhattacharjee S. (2025): *Statistical learning with R*, Kalyani Publishers.

- CRAN website: https://cran.r-project.org/
- https://prowessiq.cmie.com,
- https://data.worldbank.org/indicator,
- https://rstudio.com/products/rstudio/download/(Rstudio)
- http://r-statistics.co