Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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ક્રમાંક :ઓથો./પરિપત્ર/૬૬૨૪/૨૦૨૫
તા.૧૭/૦૩/૨૦૨૫

પ્રતિ,
વડાશ્રી,
આંકડાશાસ્ત્ર વિભાગ,
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી,
સુરત.

વિષયઃ– M.Sc. Statistics & M.Sc. Applied Statistics Sem.-3 નો Skill based Course અંગે.

સુજ્ઞશ્રી,

સવિનય જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૫–૨૬ થી અમલમાં આવનાર આંકડાશાસ્ત્ર વિષયની અભ્યાસ સમિતિ દ્વારા તૈયાર કરેલ M.Sc. Statistics & M.Sc. Applied Statistics Sem.-3 નો Skill based Course-Programming Language - Python નાં અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૨/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ પર વિચારણા કરતા વિજ્ઞાન વિદ્યાશાખાની તા.૨૭/૦૨/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ૩૯ થી સ્વીકારી મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણને એકેડેમિક કાઉન્સિલની તા.૦૪/૦૩/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ૨૮ થી સ્વીકારી મંજુર કરેલ છે, જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૨૭/૦૨/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ૩૯

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૫–૨૬ થી અમલમાં આવનાર આંકડાશાસ્ત્ર વિષયની અભ્યાસ સમિતિ દ્વારા તૈયાર કરેલ M.Sc.Statistics & M.Sc.Applied Statistics Sem.-3 નો Skill based Course-Programming Language -Python નાં અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૨/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ સ્વીકારી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૦૪/૦૩/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ૨૮

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૫–૨૬ થી અમલમાં આવનાર આંકડાશાસ્ત્ર વિષયની અભ્યાસ સમિતિ દ્વારા તૈયાર કરેલ M.Sc.Statistics & M.Sc.Applied Statistics Sem.-3 નો Skill based Course-Programming Language-Python નાં અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૨/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૨૭/૦૨/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ૩૯ થી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

કુલસચિવ

પ્રતિ,
૧) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા,
૨) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત. .....જાણ સારૂ.

Department of Statistics, V.N.S.G.U., Surat
M.Sc. Statistics
Skill Based Course
To be effective from: 2025-2026
306: Programming Language- Python

Semester-III

Name of Program	Master in Science (Statistics)
Objective of Program	The core objective of the programme is to prepare the students to be capable of doing any kind and every kind of data analysis and to be helpful to the society and academia by providing an outstanding environment of teaching and research in the core and emerging areas of the discipline.
Program Outcome	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core statistics knowledge. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that are being used in the industry/ research. The continuous syllabi review adds value to the programme for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the statistical techniques and software architecture, planning and managing the process of complex real life problems in statistical frame work. It also makes students understand the decision making for an appropriate technique selection capability. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry/research. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the project management team.
Program Specific Outcomes	PSO1 : Develop and strengthen the fundamental core concepts that are required to solve complex problems PSO2 : Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem

	PSO4 : Develop students for self-learning and practicing challenging problem solution PSO5 : Train students to apply statistical skills to analyze and interpret output for applications/solution of statistical analysis of real life problems. PSO6 : Train students to use recent techniques and software/programmes for application domain specific knowledge PSO7 : Train students to take-up the real world challenges to develop workable solution to a domain specific problem PSO8 : Inculcate the passion for continuous learning and doing research for making a successful professional career

Course Code	306
Course Title	Programming Language- Python
Credit	2
Teaching per Week	2
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Effective From	2025-26
Purpose of Course	The purpose of this course is to provide students with practical skills in Python programming for statistical analysis and data visualization. It aims to enhance their ability to apply statistical techniques and models to real-world data problems through Python.
Course Objective	To equip students with Python programming skills for statistical analysis.
Course Outcomes	After completing this course, students will be able to: **CO1**: Develop a foundational understanding of Python programming, including data structures, control statements, and basic libraries. **CO2**: Perform data handling operations such as reading, writing, merging, and sorting files etc. efficiently. **CO3**: Apply Python for descriptive statistics, data exploration, and visualizations using different types of plots and charts. **CO4**: Conduct different types of inferential statistical analysis, including hypotheses testing and estimation. **CO5**: Implement advanced multivariate statistical techniques such as PCA, factor analysis etc.in Python. **CO6**: Use Python for time series analysis and multivariate techniques to address complex real-world data problems.

Mapping between COs with PSOs

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓			✓		✓		
CO2	✓	✓	✓	✓	✓	✓	✓	
CO3	✓			✓	✓	✓		
CO4	✓		✓	✓	✓	✓	✓	✓
CO5	✓		✓	✓	✓	✓	✓	✓
CO6	✓		✓	✓	✓	✓	✓	✓

Pre-requisite	Basic knowledge of statistics, logical thinking, and basic knowledge of computer.
Course Content	**Unit I** Overview of the Course, Installing Python, Learning Jupyter note book and Spyder, variable types, mathematical and logical operator, conditional statement. If.. Else, For loop, while loop. Data structure in python part1 defining: List, tupple, array, set, dictionary, Lemda function. Data structure in python part: operations on Inbuilt methods. Installing and understanding various basic libraries viz Numpy, Pandas, statsmodel, matplotlib and seaborn, sklearn. Reading file, writing Files, merging files, sort, index **Unit II** Descriptive statistics and Visualization Data Frequency, Mean, median, Range, Quartile max, min, correlation, percentile. Exploring the data, Summarizing the Data, handling missing value, visualizing the data and interpret summaries for univariate and multi variate data, Scatter plot, Stem and Leaf plot, Line plot, Bar and pie plot, Histogram, Box plot, Heat map. **Unit III** Inferential Statistical Analysis in python-ANOVA, Correlation, Construction of confidence Interval, Parametric Test and Non parametric test. **Unit IV** Multivariate techniques- Principal component analysis, Factor analysis, MANOVA and Statistical Modelling- Time series, Linear Regression, Logistic regression and Non-linear regression techniques.
Reference Books	1. Matthes, E. (2019). **Python Crash Course: A Hands-On, Project-Based Introduction to Programming.** No Starch Press. 2nd edition. ISBN: 9781593279288 2. Sweigart, A. (2015). **Automate the Boring Stuff with Python: Practical Programming for Total Beginners.** No Starch Press. ISBN: 9781593275990 3. Zelle, J. M. (2004). **Python Programming: An Introduction to Computer Science.** Franklin, Beedle & Associates Inc. 2nd edition. ISBN: 9781590282755 4. McKinney, W. (2017). **Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython.** O'Reilly Media. 2nd edition. ISBN: 9781491957660 5. Ramalho, L. (2015). **Fluent Python: Clear, Concise, and Effective Programming.** O'Reilly Media. ISBN: 9781491946008 6. Lutz, M. (2013). **Learning Python.** O'Reilly Media. 5th edition. ISBN: 9781449355739 7. Slatkin, B. (2019). **Effective Python: 90 Specific Ways to Write Better Python.** Addison-Wesley Professional. 2nd edition. ISBN: 9780134853987
Teaching Methodology	Lab work, Discussion, Self-Study, Seminars and/or Assignment

Department of Statistics, V.N.S.G.U., Surat
M.Sc. Applied Statistics
Skill Based Course
To be effective from: 2025-2026
306: Programming Language- Python

Semester-III

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CO5	✓		✓	✓	✓	✓	✓	✓
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