# Bachelor of Science (Hons.) in
# Applied Statistics and Analytics

## Introduction:

In today's world the enormous amount of data is being generated continuously. This data flood has the potential to transform the way business, government, science and healthcare are carried out. The emerging discipline of data analytics holds the key to unlocking that potential. It uses automated methods to analyze massive amounts of data and extract knowledge from that. Data science combines aspects of computer science, applied mathematics and statistics.

With the exponential growth of Big Data over the past few years, the need for Data Scientists becomes more and more pronounced and urgent. The Bachelor of Science (B.Sc.) Hons. programme in Applied Statistics and Analytics is designed to meet such demands and train the next generation of data scientists. This is a three years undergraduate interdisciplinary course spread over six semesters.

The curriculum covers subjects such as probability and statistics, linear algebra, calculus, forecasting methods, operations research, Hadoop, R, Python, cloud computing and analytics using large data sets. Students have the opportunity to gain hands-on experience with a variety of analytical tools available for the purpose of structuring large data sets to unearth hidden information to allow the organizations to build and sustain a long-term competitive advantage. The capstone of the programme is a dissertation during final semester in which students apply the acquired theoretical knowledge in data science to solve real-world business problems. Ethical and leadership aspects will also be given covered.

## Objectives:

The broad objectives of the programme are as follows:

- To train and develop in depth understanding of the key technologies in data science and analytics: applied statistics, data mining, data visualization techniques, and forecasting methods.
- To provide opportunities of higher studies in the area of Applied statistics and data science.
- To impart knowledge on various theoretical and practical aspects of statistics and data science.
- To practice problem analysis and decision-making.
- To gain practical, hands-on experience with statistical programming languages and big data tools.

# SCHOOL OF STATISTICS &
# SCHOOL OF DATA SCIENCE AND FORECASTING

## Eligibility:

Higher Secondary (10+2) with Mathematics as a subject with at least 50% marks in aggregate or an equivalent grade for General/OBC candidates, and 45% marks in aggregate or an equivalent grade for SC/ST and Differently Abled (DA) category candidates from a recognized Board.

## Age Limit:

As decided by the Devi Ahilya Vishwavidyalaya or State Govt. for U.G. programmes.

## Admission Procedure:

The admission of Indian students will be done as per merit in the entrance test. No admission test will be conducted for NRI/ Foreign Students.

**Seats:**    Seats for Indian Students: 40 (reservation as per state Govt. rules).

**Duration: Six Semesters** (Three Years).

## Fee Structure for Batch 2020-23:

| Semester | Academic Fee | Development & Maintenance Fee | Students' Services Fee | | Examination Fee | Total (Rs.) | |
|---|---|---|---|---|---|---|---|
| | | | Boys | Girls | | Boys | Girls |
| First | 15000 | 7500 | 3300 | 3111 | 2500 | 28300 | 28111 |
| Second | 15000 | 7500 | 2911 | 2722 | 2500 | 27911 | 27722 |
| Third | 15000 | 7500 | 3300 | 3111 | 2500 | 28300 | 28111 |
| Fourth | 15000 | 7500 | 2911 | 2722 | 2500 | 27911 | 27722 |
| Fifth | 15000 | 7500 | 3300 | 3111 | 2500 | 28300 | 28111 |
| Sixth | 15000 | 7500 | 2911 | 2722 | 2500 | 27911 | 27722 |

- Caution money (Refundable) of Rs. 4000/- will be charged additionally in the first semester.
- Alumni fee of Rs. 500 will be charged extra in the first semester.
- If a student repeats a paper(s) in a semester, an additional fee of Rs.500/- per paper shall be payable.
- Hostel Fee and Central Library Fee will be extra.

## Learning Outcomes:

Students after completing the B.Sc. programme in Applied Statistics and Analytics will be able to:

- Apply statistical techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques.

- Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
- Apply principles of Data Science to the analysis of business problems.
- Use data mining software to solve real-world problems.
- Employ cutting edge tools and technologies to analyze Big Data.
- Apply algorithms to build machine intelligence.
- Demonstrate use of team work, leadership skills, decision making and organization theory.

## Curriculum:

### First Semester:

| Code | Title | Credits (L T P) |
|------|-------|-----------------|
| **CORE COURSES** | | |
| ST4A-101 | Descriptive Statistics | 4 (2-1-2) |
| ST4A-103 | Introduction to Probability Theory | 3 (2-0-2) |
| ST4A-105 | Fundamentals of Economics | 3 (2-1-0) |
| ST4A-107 | Programming in C++ | 4 (2-1-2) |
| **ABILITY ENHANCEMENT COURSE** | | |
| ST4A-109 | Communication Skills | 3 (2-1-0) |
| **ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)** | | |
| ST4A-121 | Discrete Mathematics | 4 (3-1-0) |
| ST4A-123 | Mathematical Analysis | 4 (3-1-0) |
| **ELECTIVE GENERIC:** The students can choose following course or any other UG level generic course being run in this campus. | | |
| ST4A-131 | Computer Applications | 3 (2-1-0) |
| **Comprehensive    Viva-Voce** | | |
| ST4A-151 | Comprehensive Viva-Voce | 4 |
| **VALUE ADDED (ADD-ON COURSE):** It is an additional course. Its credits shall not be counted in calculating SGPA/ CGPA. | | |
| ST4A-161 | Business Ethics | 3 (2-1-0) |

### Second Semester:

| Code | Title | Credits (L T P) |
|------|-------|-----------------|
| **CORE COURSES** | | |
| ST4A-102 | Probability Distributions | 4 (3-1-0) |
| ST4A-104 | Calculus | 3 (2-1-0) |
| ST4A-106 | Micro Economics | 3 (2-1-0) |
| ST4A-108 | Database Management Systems | 4 (2-1-2) |
| **ABILITY ENHANCEMENT COURSE** | | |
| ST4A-110 | Environmental Studies | 3 (2-1-0) |
| **ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)** | | |
| ST4A-122 | Numerical Methods | 4 (3-1-0) |
| ST4A-124 | Demography and Vital Statistics | 4 (3-1-0) |
| **ELECTIVE GENERIC:** The students can choose following course or any other UG level generic course | | |

| | being run in this campus. | |
|---|---|---|
| ST4A-132 | Advanced Excel | 3 (2-1-0) |
| **Comprehensive** | **Viva-Voce** | |
| ST4A-152 | Comprehensive Viva-Voce | 4 |
| **VALUE ADDED (ADD-ON COURSE):** It is an additional course. Its credits shall not be counted in calculating SGPA/ CGPA. | | |
| ST4A-162 | Survey Sampling and Indian Official Statistics | 3 (2-1-0) |

## Third Semester:

| Code | Title | Credits (L T P) |
|---|---|---|
| **CORE COURSES** | | |
| ST4A-201 | Operations Research | 4 (3-1-0) |
| ST4A-203 | Estimation Theory | 3 (2-1-0) |
| ST4A-205 | Macro Economics | 3 (2-1-0) |
| ST4A-207 | Python | 3 (2-0-2) |
| **ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)** | | |
| ST4A-221 | Linear Algebra | 4 (3-1-0) |
| ST4A-223 | Data Mining and Data Warehousing | 4 (3-0-2) |
| ST4A-225 | Statistical Inference | 4 (3-1-0) |
| **ELECTIVE GENERIC:** The students can choose following course or any other UG level generic course being run in this campus. | | |
| ST4A-231 | Statistical Techniques for Research Methods | 3 (2-1-0) |
| **Comprehensive** | **Viva-Voce** | |
| ST4A-251 | Comprehensive Viva-Voce | 4 |
| **VALUE ADDED (ADD-ON COURSE):** It is an additional course. Its credits shall not be counted in calculating SGPA/ CGPA. | | |
| ST4A-261 | Data Analysis | 3 (2-1-0) |

## Fourth Semester:

| Code | Title | Credits (L T P) |
|---|---|---|
| **CORE COURSES** | | |
| ST4A-202 | Sampling Theory and Applications | 4 (3-1-0) |
| ST4A-204 | Designs of Experiments | 3 (2-1-0) |
| ST4A-206 | R Programming | 3 (2-1-0) |
| ST4A-208 | Econometrics | 3 (2-1-0) |
| **ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)** | | |
| ST4A-222 | Multivariate Calculus | 4 (2-1-2) |
| ST4A-224 | Machine Learning | 4 (2-1-2) |
| ST4A-226 | Statistical Quality Control | 4 (2-1-2) |
| **ELECTIVE GENERIC:** The students can choose following course or any other UG level generic course being run in this campus. | | |
| ST4A-232 | Research Writings | 3 (2-1-0) |
| **Comprehensive** | **Viva-Voce** | |
| ST4A-252 | Comprehensive Viva-Voce | 4 |
| **VALUE ADDED    (ADD-ON COURSE):** It is an additional course. Its credits shall not be  counted in calculating SGPA/ CGPA. | | |
| ST4A-262 | Statistical-Data Analysis Using Software Packages | 2 (1-0-2) |

## Fifth Semester:

| Code | Title | Credits (L T P) |
| --- | --- | --- |
| **CORE COURSES** | | |
| ST4A-301 | Sampling Distributions | 4 (3-1-0) |
| ST4A-303 | Stochastic Processes | 3 (2-1-0) |
| ST4A-305 | Time Series Forecasting | 3 (2-1-0) |
| ST4A-307 | Data Visualization | 3 (2-1-0) |
| **ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)** | | |
| ST4A-321 | Principles of Marketing | 4 (3-1-0) |
| ST4A-323 | Fundamentals of Financial Risk | 4 (3-1-0) |
| ST4A-325 | Linear Models | 4 (2-1-2) |
| **ELECTIVE GENERIC:** The students can choose following course or any other UG level generic course being run in this campus. | | |
| ST4A-331 | Project | 3 (0-0-6) |
| **Comprehensive Viva-Voce** | | |
| ST4A-351 | Comprehensive Viva-Voce | 4 |
| **VALUE ADDED (ADD-ON COURSE):** It is an additional course. Its credits shall not be counted in calculating SGPA/ CGPA. | | |
| ST4A-361 | Decision Analysis | 3 (2-1-0) |

## Sixth Semester:

| Code | Title | Credits (L T P) |
| --- | --- | --- |
| **CORE COURSES** | | |
| ST4A-302 | Multivariate Analysis | 4 (2-1-2) |
| ST4A-304 | Actuarial Statistics | 4 (2-1-2) |
| **ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)** | | |
| ST4A-322 | Marketing Analytics | 4 (2-1-2) |
| ST4A-324 | Financial Risk Analytics | 4 (2-1-2) |
| **ELECTIVE GENERIC:** The students can choose following course or any other UG level generic course being run in this campus. | | |
| ST4A-332 | Project | 8 (0-0-16) |
| **Comprehensive Viva-Voce** | | |
| ST4A-352 | Comprehensive Viva-Voce | 4 |

Note: The above course contents can be modified as per requirement from time to time in accordance with University Ordinance No. 14.