School of Architecture, Science & Technology

Yashwantrao Chavan Maharashtra Open University

SYLLABUS:
T105: POST GRADUATE DIPLOMA IN STATISTICS (PGDS)

2019

AST, YCMOU, NASHIK-422 222, MS, INDIA

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T105 Post Graduate Diploma In Statistics (PGDS) {2019 Pattern}

Programme Objective and Scope

This programme is designed to provide knowledge about basic methods and applications of Statistics with basic exposure of mathematics and software knowledge also.

After successful completion of this PG Diploma Programme, students may get opportunities in various fields/sectors to work as

- Field investigator: where collection, analysis, presentation of numerical data is required. For ex: the fields like marketing, economics, biology, public health, sports, medicines and many others.
- Assistant Statistician : Professionals utilizing the norms to collect and interpret data in different fields of industry.
- R and D : in many research field we need to analyse data and make inference about data using statistics.

Mode of Education

Blended/ Hybrid Mode of education with face-to-face teaching-learning, conduction of practical activities, continuous assessment, etc at recognized Study Centers and examination at recognized Exam Centers of the University

Profile of Prospective Students

Prospective students are those who have successfully completed any Graduation.

Medium of Instruction

Medium of instruction shall be only in English.

Attendance

Minimum 80**%** attendance **only for** all Practical/ Activity type of courses is mandatory.

Minimum Programme Duration

Minimum programme duration for each of these proposed Post Graduate diploma programme shall be 1 year after Graduation.

Teaching-Learning Hours

Description	**Total 6 (six) Theory Courses in Programme** **For each Theory Course of 4 Credits, Study Hours – 60** **Total 2 (two)Practical Courses in Programme** **For each Practical Course of 4 Credits, Study Hours– 120**
Face-to-face Counselling Sessions for interaction, problem solving and conduction of practical activities at Study Center	**12 hrs each of 01 clock hour duration for each Theory Course**
	12 hrs each of 02 clock hour duration for each Practical/ Activity Course
Delivery of Information	(1) **06** eBooks in SLM format: **30**Hours/ for each (2) **18 - 22** Video lecture Modules: **10** Hours (Will be developed in future, if possible)
Self-Study, Learning Evaluation and Feedback	(1) Solving Problems, Self-Tests, SAQs and Exploring more Details on Text-Book: **30** Hours
Total Study Hours	(6 x 60 = **360** Hours + 2 x 120 = **240** Hours) = 600 Hours

Self-Learning Material (SLM)

eBooks in SLM format shall be provided online only in electronic format. **Printed books shall not be provided**. In future, if developed, video lectures shall be provided online only in electronic format.

Required Study Efforts

Total **600** Hours of total study efforts for all 6- theory type and 2- practical type of courses, during **this** Programme.

Equivalence Status

1. As per the letter No F.No. 2-10/2016 (DEB-III) Dated 16-Dec-2016 from UGC, UGC approval or recognition is not required or applicable for any Diploma programmes of **01**-year or less duration. Hence this diploma is approved by the University and UGC automatically.

Courses at Each Semester

T105 – Post Graduate Diploma in Statistics (PGDS)

SN	Code	Name	CA	EE	TM	Type	Credits
Semester 01: 16 Credits							
01	DSS011	Basic Mathematics 01	20	80	100	T	4
02	DSS012	Basic Mathematics 02	20	80	100	T	4
03	DSS013	Fundamentals of Statistics	20	80	100	T	4
04	DSS014	Excel Applications in Statistics	NA	100	100	TW	4
Semester 02: 16 Credits							
05	DSS021	Inferential Statistics	20	80	100	T	4
06	DSS022	Sampling Theory and Regression	20	80	100	T	4
07	DSS023	Design of Experiment	20	80	100	T	4
08	DSS024	R Programming for Statistics	NA	100	100	TW	4

Eligibility and Fees

<table>
<tr><th>Admission Eligibility</th><th>Certification Eligibility</th><th colspan="2">Fees for Each Year
UF is payable for “2 Semesters in an academic year” to the university along with admission form during online admission</th></tr>
<tr><td rowspan="4">Any Graduation from recognized university.</td><td rowspan="4">Min 40% or better marks, in all Theory type of courses, with total 32 credits at Semesters 01 and 02</td><td>Description</td><td>INR ₹</td></tr>
<tr><td>University Fee (UF) for “02Semesters during each academic year” {includes Exam Fee for regular Semester End Exam attempts}</td><td>2000</td></tr>
<tr><td>Study Center Fee (SCF)for“02Semesters during each academic year”</td><td>2000</td></tr>
<tr><td>Total Fees for 02 Semesters during each academic year {includes Exam Fee for regular Semester End Exam attempts}</td><td>4000</td></tr>
</table>

Admission Policies

1. Admission shall be offered as per University Admission Policy during July/Aug in each academic year

Student Evaluation Policies

Total student evaluation consists of following essential component:

- **Continuous Assessment (CA)**: 20% Weightage in Total Student Evaluation

- **End Examination (EE)**: 80% Weightage in Total Student Evaluation

GRADING SYSTEM

1. "**Absolute Grading**": the marks are converted to grades based on pre-determined class intervals.
2. "**Letter Grade**": It is an index of the performance of students in a said programme. Grades are denoted by letters O, A+, A, B+, B, C, P and F.
3. "**Grade Point**": It is a numerical weight allotted to each letter grade on a 10-point scale. Grade Point shall be "0 (Zero)" for Letter Grade "Ab" and "F". The marks scored by the examinee shall be converted into grade points by dividing the marks scored in the aggregate and dividing the resulting number by maximum marks, multiplying the result by ten, retaining the integer part (ignore the fractional part). Thus if a person has secured 56 marks out of 100 marks in aggregate for a course, we get (56/100) x 10 which is 5.6. Ignoring the fraction, we get 5 as the grade point.

Class Level	Letter Grade	Grade Point	Marks %
Outstanding	O	10	95.00 – 100.00
Excellent	A+	9	85.00 – 94.99
Very Good	A	8	75.00 – 84.99
Good	B+	7	65.00 – 74.99
Above Average	B	6	55.00 – 64.99
Average	C	5	45.00 – 54.99
Pass	P	4	35.00 – 44.99
Fail	F	0	00.00 – 34.99
Absent	Ab	0	0

4. "**Credit Point**": It is the product of grade point and number of credits for a course.

5. "**Semester Grade Point Average (SGPA)**": It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
6. "**Cumulative Grade Point Average (CGPA)**": It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
7. "**Transcript or Grade Card or Certificate**": Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

EVALUATION PATTERN

SN	Type of Course	Continuous Assessment	End Examination
1	Theory (T) of 4 Credits	"Continuous Assessment (**CA**)" of total **20** marks and total 4 SAQs, each of 5 marks, 1 SAQ on **each** CR in a **Single attempt only**	"End Examination (**EE**)" of total **80** Marks and **16** "Short Answer Questions (SAQs)" **each** of **05** marks (**4 out of 5 SAQs on each Credit**), during **150** Minutes.

1. **Separate and independent passing @ 40% in EE and (CA+EE) shall be essential for Theory course.** "CA, EE and Total marks" shall be separately reported for each course in the transcript or mark-statement.
2. **Only 1 attempt** for CA and EE for **each** course shall be allowed in **each** semester.
3. **Only best of past performance shall be reported in transcript or mark statement**.
4. **Total student evaluation for**

a. **Each** semester shall be for **400** marks.
b. **Each** year shall be for **800** marks

Successful Completion of Course or Programme

1. "Successful Completion of the Course" means - either course is exempted or student gets minimum specified or better grade, either in end examination of that course or by credit transfer. A student obtaining grade "F" shall be considered failed and will be required to reappear in the examination. The student obtained minimum "P" (Pass) letter grade required for successful completion of the each course.
2. "Successful Completion of the Programme" means – all courses at all semesters are successfully completed and the student obtained "P" (Pass) letter grade for all courses at all semesters along with minimum specified SGPA and CGPA.

Award of Diploma

2. Only after student fulfills all specified certification eligibility conditions, respective PG Diploma shall be awarded immediately in electronic format.
3. Payment of convocation fees and convocation shall not be essential pre-requisites for the award of PG diploma in electronic format.
4. Payment of convocation fees and convocation shall be essential pre-requisites for the award of PG diploma in print format.
5. The award of PG diploma in print format shall be optional for students.

T105 –Post Graduate Diploma in Statistics (PGDS)

Semester 01

DSS011: Basic Mathematics 01

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105– Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
01	DSS011	Basic Mathematics 01	4	20	80	100	T	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ Any Graduation	After successful completion of this course, student should be able to ❖ Explain Concepts of Set, Logic, counting, Functions.

Syllabus for Theory Units

UN	Detailed Syllabus of the Unit	Credit
01	**Logic:** Statements, And, Or, Not, Conditional Statements, Bi-conditional Statements, Truth tables, Logical equivalence.	Credit 01 – 04

02	**Quantifiers**: Propositional function on set, Negation of composite statements, Counter example.	
03	**Sets Preliminaries:** Introduction to sets, Operations on set: The Cartesian product, Subsets, Power sets, Union, Intersection, Difference of sets, Complement, Properties of set operations, Venn Diagrams, Function or Mapping	
04	**The Real Number System:** Natural numbers, Integers, Rational numbers, Irrational numbers, Real numbers, Algebraic Properties of R, Inequalities, Absolute Values, Extended Real Number System, Intervals in R, Bounded sets, Completeness Axiom, Archimedean property of R , Open, Closed and Countable sets in R.	
05	**Algorithm**: Division Algorithm, Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Prime Numbers.	
06	**Basics of Sequences:** Definition of Real Sequences, Some special sequences, Sum, Product, Quotient of Sequences, Limit o sequence, Convergence of Sequences, Important theorems of Convergence of sequences.	
07	**Preliminaries of Convergent Series:** Definition, Convergent Series, Necessary Condition for Convergence of Series, Zero test of Divergence of series, Cauchy Convergence Criterion, Series of Non negative terms: p- Series, Geometric Series, Tests for convergence of series.	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures (5) OER			
DSS011-T1	Basic Mathematics 01	2019	YCMOU Nashik
DSS011-R1	V92 BSc.- Sem 3 Maths-03	1st eBook 2016 2nd eBook 2018	YCMOU Nashik

DSS012: Basic Mathematics 02

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105– Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
01	DSS012	Basic Mathematics 02	4	20	80	100	T	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ DSS011: Basic Mathematics 01	After successful completion of this course, student should be able to ❖ Calculate limits, derivatives, integration of functions. ❖ Understand Concepts in Matrix Algebra.

Syllabus for Theory Units

UN	Detailed Syllabus of the Unit	Credit
01	**Limit and Continuity:** Limit of function, Theorems on limit, Continuity, Types of discontinuity, Theorems on Continuity, Some special types of functions.	Credit 01 - 04

02	**Differentiability:** Derivative of function, Differentiation Rules, Successive Differentiation, Leibnitz's Theorem, Partial Differentiation, Euler's Theorem, Mean Value Theorem, Indeterminate Forms and L' Hospital Rule, Maximum and Minimum Values.	
03	**Integration:** Definite Integrals, Properties of Definite Integrals, Integrals of Irrational function	
04	**Matrix Algebra:** Matrix, Various types of Matrices, Arithmetic Operations on Matrices, Multiplication of Matrices, Determinant of Square Matrices, Inverse of Matrix, Elementary Transformation of Matrix, Rank of matrix, System of simultaneous Linear Equations, Linear Independence of Vectors, Eigen Value Problems, Cayley-Hamilton Theorem.	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures (5) OER			
DSS012-T1	Basic Mathematics 02	2019	YCMOU Nashik
DSS012-R1	V92: B.Sc. Sem 1 S41141 Mathematics 01 Book	1st eBook 2016 2nd eBook 2018	YCMOU Nashik
DSS012-R2	V92: B.Sc. Sem 5 S41541 Matrix Algebra	2018	YCMOU Nashik

DSS013: Fundamentals of Statistics

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105 – Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
01	DSS013	Fundamentals of Statistics	4	20	80	100	T	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ DSS011: Basic Mathematics 01 ❖ DSS012: Basic Mathematics 02	After successful completion of this course, student should be able to ❖ Understand Concepts in Descriptive Statistics. ❖ Understand Concepts in Probability.

Syllabus for Theory Units

UN	Detailed Syllabus of the Unit	Credits
01	**Introduction:** Basic Definitions and Concepts, Variables, Levels of Measurement, Distributions: Definition, Interpret Frequency Distribution, Distinguish between frequency distribution and probability distribution, Construction of Grouped Frequency Distribution for Continuous Variables, Skew of Distributions, Shapes of Distributions, Graphing Distributions: Frequency Tables, Pie Charts, Bar Charts, Graphing Quantitative Distributions: Stem and Leaf Displays, Histogram, Frequency Polygon, Box Plots, Line Graphs, Dot Plots.	Credit 01-04
02	**Descriptive Statistics:** Measure of Central Location- Arithmetic Mean, Median, Mode, Geometric Mean. Measure of Variability- Range, Coefficient of Range, Variance, Standard Deviation, Percentiles, Quartiles, z-score, Empirical Rule, Chebyshev's Theorem Moments, Skewness and Kurtosis.	
03	**Basic Concepts of Probability:** Permutation and Combination, Sample Space, Events and their Probabilities, Complements, Intersections, Unions, Conditional Probability and Independent Events.	
04	**Discrete Probability Distributions:** Discrete Random Variables, Probability Distributions for Discrete Random Variables, Mean, Standard Deviation, Binomial Distribution, Cumulative Probability Distribution Function for Binomial, Standard Discrete Distributions – Uniform, Poisson, Multinomial, Hypergeometric, Geometric, Negative Binomial.	

05	**Continuous Distributions:** Continuous Radom Variables, Probability Density functions, Standard Normal Distribution, Probability computations for general Normal random variable, Areas of tails of Distributions, Standard Continuous Distributions – Uniform, Exponential, Gamma, Chi-Square, t - distribution, F- distribution.	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures (5) OER			
DSS013-T1	Fundamentals of Statistics	2019	YCMOU Nashik
DSS013-OER1	Introductory Statistics http://www.saylor.org/books		Saylor Foundation
DSS013-OER2	Introduction to Statistics Online Edition https://open.umn.edu/opentextbooks/textbooks/introduction-to-statistics		Rice Univ, Univ. of Houston Clear Lake, and Tufts Univ
DSS013-OER3	Introductory Statistics https://cnx.org		Rice University

DSS014: Excel Applications in Statistics

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105 – Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
01	DSS014	Excel Application in Statistics	4	NA	100	100	TW	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ DSS013: Fundamentals of Statistics	After successful completion of this course, student should be able to ❖ Do Statistical computations using Excel.

Practical Activities

UN	Detailed Syllabus of the Unit	Credit
01	To start MS Excel, Enter Data, Edit and Manage Data.	
02	To apply simple arithmetic operations on data.	
03	To represent raw data using graphs and diagrams: line plot, bar plot, subdivided bar plot, pie diagram, and histogram.	Credit

04	To draw frequency table for given data (raw, grouped), draw frequency curve, less than and more than cumulative frequency curve, frequency polygon.	01-04
05	To draw Stem and Leaf diagram, box plot.	
06	To calculate Mean (AM, GM, HM), Median, Mode for Raw Data.	
07	To calculate Mean (AM, GM, HM), Median, Mode for Grouped Data.	
08	To calculate Range, Variance Standard Deviation, Coefficient of Variation.	
09	To calculate Mean Deviation about Mean, Median, Mode.	
10	To find Covariance and Correlation.	
11	To generate random numbers.	
12	To find probabilities for Bernoulli, Binomial, Poisson Distribution.	
13	To find probabilities for Normal, Exponential, Chi-Square, t-Distribution, F- Distribution.	
14	Fitting of Binomial Distribution.	
15	Fitting of Poisson Distribution.	
16	Fitting of Normal Distribution.	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures (5) OER			
DSS014-OER1	Beginning excel Noreen brown, barbara lave, julie romey, mary schatz, diane Shingledecker	2017	Open Oregon Educational Resources, [2017]

SEMESTER 02

DSS021: INFERENTIAL STATISTICS

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105 – Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
02	DSS021	Inferential Statistics	4	20	80	100	T	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ DSS013: Fundamentals of Statistics	After successful completion of this course, student should be able to ❖ Do Estimation using Statistical Tests.

Syllabus for Theory Units

UN	Detailed Syllabus of the Unit	Credit
01	Sampling Distributions: The Mean and Standard Deviation of the Sample Mean, The Sampling Distribution of Sampling Mean, The Sample Proportion.	

02	Estimation: Large Sample Estimation of Population Mean, Small Sample Estimation of Population Mean, Large Sample Estimation of Population Proportion, Sample Size Determination.	
03	Testing Hypotheses: The Elements of hypotheses Testing, Large Sample Tests for Population Mean, Observed Significance of Test, Small Sample Tests for Population Proportion, Large Sample Tests for Population Proportion, Examples.	
04	Two Sample Tests: Comparison of Two Population Mean: Large, Independent Samples. Comparison of Two Population Mean: Small, Independent Samples. Comparison of Two Population Mean: Paired Samples, Comparison of Two Population Proportions, Sample Size Determination.	
05	Chi-Square Tests and F- Tests: Chi-Square Test for Independence, Chi-Square One Sample Goodness of Fit Test, F-test for Equality of Two Variances, F- Test in One Way ANOVA, Examples.	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures			
DSS021-R1	Introductory Statistics http://www.saylor.org/books		Saylor Foundation

DSS022: Sampling Theory and Regression

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105 – Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
02	DSS022	Sampling Theory and Regression	4	20	80	100	T	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ DSS013: Fundamentals of Statistics	After successful completion of this course, student should be able to ❖ Explain Concepts in Sampling Theory. ❖ Apply Correlation and Regression Analysis.

Syllabus for Theory Units

UN	Detailed Syllabus of the Unit	Credit
01	**Sampling Theory 1:** Fundamentals of sampling, Simple Random Sampling, Stratified Sampling, Ratio Method of Estimation, Regression Method of Estimation.	Credit 01-04

02	**Sampling Theory 2:** Varying Probability Sampling, Double Sampling, Two Stage Sampling, Systematic Sampling, Cluster Sampling, Sampling in Successive Occasion, Non Sampling Errors.	
03	**Correlation Analysis:** Types of Correlation–Positive, Negative, Simple, Multiple, Linear, Nonlinear, Methods of studying Correlation- Scatter Diagram Method, „ Graphic Method, „ Karl Pearson's Coefficient of Correlation „ Method, Method of Least Squares, Linear Relationships Between Variables, Linear Correlation Coefficient.	
04	**Regression Analysis:** Simple Linear Regression Model, Goodness of fit of Straight Line to Data, The Least Square Regression Line, The Sum of Standard Errors, Confidence Interval for β_1, Testing Hypotheses about β_1, The Coefficient of Determination, Estimation and Prediction.	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures (5) OER			
DSS022-T1	Sampling Theory and Regression	2019	YCMOU Nashik
DSS022-OER1	Introductory Statistics http://www.saylor.org/books		
DSS022-OER2	NPTEL Notes https://nptel.ac.in/courses/		

DSS023: DESIGN OF EXPERIMENT

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105 –Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
02	DSS023	Design of Experiment	4	20	80	100	T	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ DSS021: Inferential Statistics ❖ DSS022: Sampling Theory and Regression	After successful completion of this course, student should be able to ❖ Understand concepts of Experimental Design. ❖ Do Analysis of Covariance.

Syllabus for Theory Units

UN	Detailed Syllabus of the Unit	credit

01	**Experimental Design and Models:** One way classification, Two way classification under Fixed Effect Model, Two way classification without interaction, Two way classification with interaction, Tukey's Test for nonadditivity, Comparison of Variances, Fixed Effects Models, Random Effects Models, Mixed Effects Models.	Credit 01-04
02	**Experimental Designs and Their Analysis:** Basic terms, Principles of Experimental Design: Randomization, Replication, and Local Control. Complete and Incomplete Block designs, Completely Randomize Designs (CRD): Layout of CRD, Procedure, Analysis, Expectations, Distributions, Decision Rules. Randomized Block Design (RBD): Layout and Analysis. Latin Square Design (LSD): Latin Square, Standard form, Orthogonal Latin Square, Greco- Latin Square, Analysis of LSD. Missing Plot Technique.	
03	**Factorial Experiments:** Factorial Experiments with Factors at 2 levels (2^2 Factorial Experiments) 2^3 Factorial Experiments, 2^n Factorial Experiments, Standard Order for Treatment Combinations.	
04	**Confounding:** Confounding Arrangement, Orthogonal Treatment Combinations, Analysis of Variance in case of Confounded effects.	
05	**Analysis of Covariance:** Introduction to Analysis of Covariance Model, One way classification, Two way classification (with one observation per cell).	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures (5) OER			
DSS023-T1	Design of Experiment	2019	YCMOU Nashik
DSS023-OER1	NPTEL Notes https://nptel.ac.in/courses/		

DSS024: R PROGRAMMING FOR STATISTICS

Programme Information

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: http://www.ycmou.ac.in/ & http://ycmou.digitaluniversity.ac.in/
2	School	School of Architecture, Science and Technology
3	Discipline	Science
4	Level	PG Diploma
5	Course Used in	T105 – Post Graduate Diploma in Statistics (PGDS)

Course Information

Sem	Code	Course Name	Credits	CA	EE	TM	Type	Cat
02	DSS024	R Programming for Statistics	4	NA	100	100	TW	CC

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have successfully completed: ❖ DSS013: Fundamentals of Statistics ❖ DSS021: Inferential Statistics ❖ DSS022: Sampling Theory and Regression ❖ DSS023: Design of Experiment	After successful completion of this course, student should be able to ❖ Do Statistical computations using R. ❖ Analyze data using R.

Practical Activities

UN	Detailed Syllabus of the Unit	Credit
01	Introduction to R, R-commands (creating Vectors, Replication of Numbers, Sequence Generation), Arithmetic Operations on Vectors, Matrix Operations.	Credit 01-04
02	To Draw Bar Plot, Multiple Bar Diagram, Sub-divided Bar Diagram, Pie Chart, Stem and Leaf Diagram, Box Plot.	
03	To Draw Frequency Distribution Table, Histogram, Frequency Polygon, Ogive Curve.	
04	To Calculate Mean (A.M., G.M. ,H.M.) Median, Mode, Quartiles, Percentile.	
05	To Calculate Range, Mean Deviation about (Mean, Median, Mode,), Variance, Coefficient Of Variation, Standard Deviation, Skewness, Kurtosis.	
06	To Find Probabilities Based On Real Life Examples.	
07	To Find Probabilities for Binomial, Poisson, Geometric, Negative-Binomial Distributions	
08	To Find Probabilities for Uniform, Exponential, Normal, Standard-Normal, Chi-Square, t, F Distributions.	
09	Fitting Of Negative Binomial Distribution.	
10	Fitting of Normal Distribution.	
11	To Find Correlation Using Scattered Plot, Karl –Pearson's Coefficient Of Correlation.	
12	To Find Simple Linear Regression.	
13	To Draw Sample From-Simple Random Sampling With Replacement and Without Replacement, Stratified Sampling, Systematic Sampling.	
14	One Sample Z-Test, One Sample t-Test, Two Sample t-Test, Paired t-Test.	
15	Chi-Square Goodness Of Fit Test, Chi-Square Test Of Independence.	
16	One-Way ANOVA, Two-Way ANOVA.	

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Course Website Link for (1) Text-EBook (2) Video Lectures (3) Discussion Forum for online interaction (4) Live Virtual Class Lectures (5) OER			
DSS024-OER1	Learning statistics with R Danielle Navarro University of New South Wales http://compcogscisydney.org/learning-statistics-with-r	2015	University of New South Wales