



UNIVERSITY OF JAMMU

NOTIFICATION
(17/May/Adp./07)

It is hereby notified for the information of all the concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Courses of Study in the subject of **Statistics** under **Choice Based Credit System** at Undergraduate level for the examinations to be held in the years as under:-

<u>Subject</u>	<u>Semester</u>	<u>For the Examinations to be held in the years</u>
Statistics	Semester-III	Dec. 2017, 2018 and 2019
	Semester-IV	May 2018, 2019 and 2020
	Semester-V	Dec 2018, 2019 and 2020
	Semester-VI	May 2019, 2020 and 2021

Sd/-
DEAN ACADEMIC AFFAIRS

No. F.Acd/II/17/2372-92
Dated: 18/05/2017

Copy for information and necessary action to:

1. Special Secretary to the Worthy Vice-Chancellor
2. Sr. P.A. to the Dean Academic Affairs
3. Sr. P.A. to the Registrar / Controller of Examinations
4. Dean, Faculty of Sciences
5. Convener, Board of Studies in Statistics
6. All members of the Board of Studies
7. C.A. to Controller of Examinations
8. Asst. Registrar (Conf. /Exams. UG/ Inf. /Pub.)
9. Website Office.
10. S.O (Confidential)

[Signature]
18/5/17
Assistant Registrar (Academic)

[Signature] 18/5/17
[Signature] 18/5/17
[Signature] 18/5/17

UNIVERSITY OF JAMMU
SYLLABI FOR BACHELOR DEGREE PROGRAMME
IN STATISTICS

The following Courses of Study are prescribed for 1st to 6th Semester/s Bachelor Degree (UG) Programme under CBCS in the Subject of **Statistics**:

Semester	Course No.	Title	Credits	Nature of Course
I	USTTC 101	DESCRIPTIVE STATISTICS AND PROBABILITY THEORY	4	CORE
	USTPC 102	STATISTICAL COMPUTING-I	2	CORE
II	USTTC 201	DESCRIPTIVE STATISTICS AND PROBABILITY DISTRIBUTIONS	4	CORE
	USTPC 202	STATISTICAL COMPUTING-II	2	CORE
III	USTTC 301	STATISTICAL INFERENCE	4	CORE
	USTPC 302	STATISTICAL COMPUTING-III	2	CORE
	USTPS 303	COMPUTATIONAL STATISTICS (SOFTWARE) - 1	4	SKILL ENHANCEMENT
IV	USTTC 401	SAMPLING AND DESIGN	4	CORE
	USTPC 402	STATISTICAL COMPUTING-IV	2	CORE
	USTPS 403	COMPUTATIONAL STATISTICS (SOFTWARE) - 2	4	SKILL ENHANCEMENT
V	USTTE 501	APPLIED STATISTICS-1	4	DSE/GE
	USTPE 502	STATISTICAL COMPUTING-V	2	DSE/GE
	USTPS 503	RESEARCH METHODOLOGY	4	SKILL ENHANCEMENT
VI	USTTE 601	APPLIED STATISTICS-2	4	DSE/GE
	USTPE 602	STATISTICAL COMPUTING-VI	2	DSE/GE
	USTPS 603	SOFTWARE SKILLS	4	SKILL ENHANCEMENT

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ANNEXURE A

Syllabus and Courses of Study in Statistics for B. Sc./B.A. (Semester III) Under CBCS For the Examination to be held in December 2017, 2018 and 2019

Paper Code: USTTC 301

Title: STATISTICAL INFERENCE

Credits: 4

Total Marks: 100

Internal Test: 20(1 Hour)

End semester Exam: 80(2½Hours)

Objectives: The main objectives of this course is to provide knowledge to the students about the theory of estimation, obtaining estimates of unknown parameters using different methods, testing of Hypothesis, Test of significance and use of non-parametric test in the situations where parametric tests are not applicable.

Unit-I

The concept of sampling distribution, standard error and its significance, sampling distribution of Chi Square, t and F with derivations, properties of these distributions and their inter relations.

Unit-II

Estimation: Problem of estimation; point estimation, interval estimation, criteria for a good estimator, unbiasedness, consistency, efficiency and sufficiency with examples. Method of moments and maximum likelihood and application of these method for obtaining estimates of parameters of binomial, Poisson and normal distributions, properties of M.L.E's (without proof), merits and demerits of these methods.

Unit-III

Testing of Hypothesis: Statistical hypothesis, Null and alternative hypothesis, simple and composite hypothesis, two types of error, critical region, power of test, level of significance. Best Critical Region, NP Lemma, its applications to find most powerful in case of binomial. Poisson and normal distributions.

Unit IV

Small sample tests based on t, F and Chi-square distribution and test based on normal distribution, confidence interval for single mean, difference of means and variance (only for normal case) confidence interval for single mean, difference of means and variance (only for normal case). Test of significance for large samples for attributes and variable, proportions and means, single sample, two samples (both paired and independent).

Unit V

Non- parametric tests: Concept of Non-parametric tests, advantages of Non-parametric tests over parametric tests. Sign test for single sample and two sample problems (for paired and independent samples), Wilcoxon-signed rank test, Mann-Whitney U-test, run test. Median test and test for independence based on Spearman's rank correlation.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING

(EXCEPT FOR SKILL BASED COURSES)

(a) **Internal Assessment Test:** **Time Duration-1 Hour**

(20 Marks)

Section A- 5 Very Short Answer questions of 2 marks each to be attempted from 8 given questions covering 50% of the syllabus, set across all Units(atleast 2) covered.
(10 marks)

Section B- 1 Long Answer question of 10 marks to be attempted out of 2 given questions set from at least two different units of the 50% syllabus covered.
(10 marks)

(b) **External End Semester University Examination:** **Time Duration--2 $\frac{1}{2}$ Hours**

(80 Marks)

Section A- 5 Short Answer compulsory questions representing all units/syllabi i.e., at least one from each unit having 70-80 words answer/ attempted in about 6 minutes and of 3 marks each with atleast one question set from each Unit.
(15 marks)

Section B- 5 Medium Answers compulsory questions representing all units/syllabi i.e., at least one from each unit having 250-300 words answer/attempted in about 12 minutes and of 7 marks each with at least one question set from each Unit .
(35 marks)

Section C- 2 Long Answer Questions of 15 marks each to be attempted from 4 given questions set from/across(covering) all units of the Syllabus having 500-600 words/attempted in 30 minutes.
(30 marks)

Books Recommended

1. Goon, Gupta and Dass Gupta: An outline of statistical inference, Vol-II
2. H.C. Saxena; Statistical inference.
3. Gibbons, J.D.: Non-parametric statistical inference.
4. Kendall and Stuart: The advanced theory of statistics Vol-II
5. Connor W.J.: Practical Non-parametric Inference
6. Hogg.V. and Craig A.T.: Introduction of Mathematical Statistics.
7. Mood and Graybill: An introduction to theory of Statistics.
8. Srivastava and Srivastava: Statistical Inference: Testing of Hypothesis.
9. Gupta, R.K. and Hakak, A.K.: An Introduction to Statistics.

III SEMESTER

Paper Code: USTPC 302

Title: Statistical Computing-III

Credits: 2

Total Marks: 50

Internal : 25

External: 25(Exam: 20 Viva-Voce: 05)

Objectives: The objective of the course is to expose the students to the real life applications of Statistical Tools.

There shall be atleast twenty computing exercises covering the applications of Statistics based on the entire syllabus of course USTTC301.

Practical Examination/Evaluation

(a) Internal- 25 Marks

Components: Attendance- 5 marks

Viva Voce- 5 marks

Day to day Performance/Practical Work- 10 Marks

Internal Test(before semester end)- 5 marks

(b) External- 25 Marks

Components: External Test(Semester End)- 20 marks

Viva Voce- 5 marks.



III SEMESTER

Paper Code: USTPS 303

Title: Computational Statistics(Software)-1

Credits: 4

Total Marks: 100

Internal 1 : 40(2 Hrs)

Internal Final: 60(3 hrs)

Objectives: The objective of the course is to expose the students to the real life skills for statistical computing, analysis and graphical interpretation using Software skills.

Course: Introduction to Computers: Historical evolution of computers, Generations of Computers, Classification of Computers, Hardware : CPU, I/O Devices, Block diagram.

Windows : The user Interface, The Desk Top, The Task Bar, The Control Panel, The Find Features, Properties, Font Management, Systems Tools, Character Map, Note Pad, The My Computer ICON, Folders, Short-Cuts.

Word Processing : Creating and Saving a document, Editing the text; Printing , saving and importing Documents, Basics of Excel, Data Entry. Built in functions in Excel.

Introduction to statistical computing,: analysis and graphical interpretation using spread sheet. The following problems can be done on spread sheet to enhance data analysis skills.

Graphical representation of data by histograms, frequency polygon, Pie chart, ogives, box plot and stem-leaf. Measures of central tendency, Partition Values and Measures of dispersion.

Hands on training on the problems related to all topics above can be done on any one of the statistical software to enhance data analysis skills using software.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING

(FOR SKILL BASED COURSES)

Theory Cum Practical Skill Evaluation

(a) Internal Mid Semester Test:
(40 Marks)

Time Duration-2 Hours

Two long answer type exercises of 15 marks each to be attempted out of Three exercises using computational facilities and Five short answer type theoretical questions of 2 marks each are to be set with no choice.

(b)Internal End Semester Examination:
(60 Marks)

Time Duration- 3 Hours

Three long answer type exercises of 15 marks each to be attempted out of Four exercises using computational facilities and Five short answer type theoretical questions of 3 marks each are to be set with no choice.



Books Recommended:

V Rajaraman: **Fundamentals of Computers**. PHI.

S Cashman: **Discovering Computer and MS office 2013**. Cengage Learning.

Sanders, H.D.: **Computer Today**. Mc Graw Hill.

Rusen and Ballew : **Windows 8.1 Step by Step**. Microsoft Press.

S P Gupta: **Statistics**, S Chand and Co.

Levine, Stephan and Szabat: **Statistics for managers using MS Excel**. Pearson.

Andy Field: **Discovering Statistics Using SPSS**. Sage publications.

Conard Carlberg (2011): **Statistical Analysis**, Pearsons Education, Inc.

Gopal K. Kanji (2006): **100 Statistical Tests**, 3rdEd., Sage Publication.

Brend Held (2007): **Microsoft Excel Functions and Formulas**, Wordware Publishing, Inc.

D. Remenyi, G. Onofrei, J. English (2011) :**An Introduction Statistics using Microsoft Excel**, Academic Publishing Limited.

J. Artymiak (2011): **Beginning Open Office Calc: From Setting Up Simple Spreadsheets to Business Forecasting**, A press Publisher.

Note: The practical/hands on training for the academic semester should not be less than 50 Hours and for related theoretical concepts and their applications should be atleast 10 Hours.



Scheme of Examination(Except Skill based Courses)

The 20% of the marks allotted to each theory paper and 50% of the marks allotted to each practical paper including field work, wherever prescribed, shall be reserved for internal assessment. The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY			
	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test (Pattern: As proposed by the concerned BOS and approved by Academic Council)	Upto 50%(after 45 days)	1 hour	20
External End Semester University Exam (Pattern: As proposed by the concerned BOS and approved by Academic Council)	Upto 100%(after 90 days)	2 $\frac{1}{2}$ hours	80
Total			100
PRACTICAL			
Daily evaluation of practical records/Viva voce/attendance etc.			50(25 marks)(including 20% for attendance, 20% for Viva-voce, 20% for internal test and 40% for day to day performance)
Final Practical Performance + viva voce (External Examination)	100% Syllabus		50 (25 marks) 40 External Test 10 viva-voce
Total			100

Scheme of Examination(for Skill based Courses)

The 20% of the marks allotted to each skill based paper shall be reserved for internal assessment test -1 . The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the Regulations prescribed for the purpose under the CBCS as per the following:

THEORY CUM PRACTICAL			
	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test-1 (Pattern: Two long answer type exercise of 15 marks using computational facilities and Five short answer type theoretical questions of 2 mark each)	Upto 50%(after 45 days)	2 hour	40
Internal Final End Semester Exam (Pattern: Three long answer type exercises of 15 marks each using computational facilities and Five short answer type theoretical questions of 3 mark each)	100% Syllabus(after 90 days)	3 hour	60
Total			100

ANNEXURE B
Syllabus and Courses of Study in Statistics for B. Sc./B.A. (Semester IV)
Under CBCS For the Examination to be held in
April-May 2018, 2019 and 2020

Paper Code: USTTC 401
Credits: 4

Title: SAMPLING AND DESIGN
Total Marks: 100
Internal Test: 20(1 Hour)
End semester Exam: 80(2½Hours)

Objectives: To introduce the techniques of sampling designs and experimental designs for drawing inferences from data.

Unit- I

Complete enumeration Vs sample enumeration; advantages and disadvantages of sample survey, objectives of sampling, principal steps in a sample survey, limitations. of sampling, sampling and non sampling errors, types of sampling, probability sampling purposive sampling and mixed sampling, random numbers. Simple random sample from finite population, S.R.S. with & without replacement, estimation of mean and variance and their unbiasedness, merits and demerits of SRS.

Unit- II

Meaning of Stratification, Method of Stratified sampling and its advantages and disadvantages. Mean and Variance of Stratified sampling, Method of allocation: equal allocation, Proportional allocation, optimum allocation/Neyman allocation, comparison of stratified random sampling with SRS.

Unit- III

Systematic sampling, Cluster sampling with equal and unequal cluster sizes, estimation of mean and variance.

Unit- IV

Analysis of variance for one way and two way classification, basic principles of design of experiment, concept and analysis of completely randomized design, randomized block design, advantages and disadvantages of these design.

Unit- V

Concept and analysis of Latin square of design, one missing plot technique for RBD and LSD. Factorial experiments, their advantages, Factorial experiments for 2^2 and 2^3 design, main effects, interaction and their analysis.

EVALUATION/EXAMINATION PATTERN/NOTE FOR PAPER SETTING

(EXCEPT FOR SKILL BASED COURSES)

(a) Internal Assessment Test: Time Duration-1 Hour
(20 Marks)

Section A- **5 Very Short Answer questions of 2 marks each to be attempted**
(10 marks) **from 8 given questions covering 50% of the syllabus, set across all**
 Units(atleast 2) covered.

Section B- **1 Long Answer question of 10 marks to be attempted out of 2**
(10 marks) **given questions set from at least two different units of the 50%**
 syllabus covered.

(b)External End Semester University Examination: Time Duration--2 $\frac{1}{2}$ Hours
(80 Marks)

Section A- **5 Short Answer compulsory questions representing all units/syllabi**
(15 marks) **i.e., at least one from each unit having 70-80 words answer/**
 attempted in about 6 minutes and of 3 marks each with atleast one
 question set from each Unit.

Section B- **5 Medium Answers compulsory questions representing all units/syllabi**
(35 marks) **i.e., at least one from each unit having 250-300 words answer/attempted**
 in about 12 minutes and of 7 marks each with at least one question set
 from each Unit .

Section C- **2 Long Answer Questions of 15 marks each to be attempted from**
(30 marks) **4 given questions set from/across(covering) all units of the**
 Syllabus having 500-600 words/attempted in 30 minutes.

Books Recommended

1. F.S. Choudhary and Daroga Singh: Sampling Theory
2. Cochran W.J.: Sampling Technique
3. Sukhatme P.V. and Sukhatme B.V. :Sampling theory survey with applications.
4. Murty, M.N.: Sampling theory and methods
5. Honson and others: Sample survey methods and theory Vol-I
6. Gupta and Kapoor; Fundamental of applied Statistics.
7. Fisher, RA. ; Design of experiments
8. Panse V.G. and Sukhatme P.V. :Statistical methods of agricultural workers.
9. Umaraji, RR: Probability and Statistical methods.

10.Srivastava S.R; Applied statistics.

11.Goon, Gupta, Dass Gupta; Fundamentals of Statistics ,Vol-II.

12. Gupta, R.K. and Hakak, A.K.: An Introduction to Statistics.

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IV SEMESTER

Paper Code: USTPC 402

Title: Statistical Computing-IV

Credits: 2

Total Marks: 50

Internal : 25

External: 25(Exam: 20 Viva-Voce: 05)

Objectives: The objective of the course is to expose the students to the real life applications Statistical Tools.

There shall be at least twenty computing exercises covering the applications of Statistics based on the entire syllabus of course USTTC401.

Practical Examination/Evaluation

(a) Internal- 25 Marks

Components: Attendance- 5 marks

Viva Voce- 5 marks

Day to day Performance/Practical Work- 10 Marks

Internal Test(before semester end)- 5 marks

(b) External- 25 Marks

Components: External Test(Semester End)- 20 marks

Viva Voce- 5 marks.

