

COURSE CODE: MATH-365
COURSE NAME: Probability and Statistics
CREDIT HOURS: Theory = 02 Practical = 01 Total = 03
CONTACT HOURS: Theory = 32 Practical = 48 Total = 80
PREREQUISITE: None
MODE OF TEACHING: Instruction: 2 hours of Lecture per week (67%)
 Lab Demonstration: 3 hours of Lab work per week (33%)

Course Description:

The course offers a basic understanding of Statistics and Probability. This course covers the use of statistical analysis in environmental science problems and gives a detailed review of descriptive statistics and probability, detailed study of important distributions such as binomial, exponential, Poisson, normal distributions etc. and their applications.

TOPICS COVERED:

| Week | Topic |
|-------------|---|
| 1 | Sampling Probability and non-Probability Sampling |
| 2 | Simple random sampling |
| 3 | Stratified random sampling |
| 4 | Systematic sampling error |
| 5 | Sampling distribution of mean and difference between two means |
| 6 | Interference Theory |
| 7 | Estimation and testing of hypothesis |
| 8 | Type-I and type-II error |
| 9 | Mid Semester Exam |
| 10 | Testing of hypothesis about mean and difference between two means using Z-test and t-test |
| 11 | Testing of hypothesis about mean and difference between two means using Z-test and t-test |

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| 12 | Paired t-test |
| 13 | Paired t-test |
| 14 | Test of association of attributes using X^2 (chi-square) |
| 15 | Test of association of attributes using X^2 (chi-square) |
| 16 | Testing hypothesis about variance |
| 17 | Testing hypothesis about variance |
| 18 | End Semester Exam |

Lab/Practical:

| Week | Practical |
|-------------|---|
| 1 | Lab Orientation and Introduction |
| 2 | Sampling random sampling |
| 3 | Stratified random sampling |
| 4 | Sampling distribution of mean |
| 5 | Testing of hypotheses regarding population mean |
| 6 | Testing of hypotheses about the difference between population means |
| 7 | Chi-square test |
| 8 | Chi-square test |
| 9 | Mid Semester Exam |
| 10 | Testing of Correlation Coefficient |
| 11 | Testing of Correlation Coefficient |
| 12 | Fitting of simple linear regression |
| 13 | Fitting of simple linear regression |
| 14 | One-way ANOVA |
| 15 | One-way ANOVA |
| 16 | Two-way ANOVA |
| 17 | Practice Examples |
| 18 | End Semester Exam |

Text and Material:

1. Introduction to Statistical Theory Part-II by Sher Muhammad and Dr. Shahid Kamal (Latest Edition)
2. Statistical Methods and Data Analysis by Dr. Faquir Muhammad
3. Introductory Statistical Procedures with SPSS by Muhammad Arslan Nasir, Hassan S. Bakouch, Farrukh Jamal, 2022
4. An Introduction to Statistical Learning: with Applications in R, by Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, 29 September 2017

ASSESSMENT SYSTEM:

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|--------------------------------|-------------|
| Theoretical/Instruction | 100% |
| Assignments | 10% |
| Quizzes | 15% |
| Mid Semester Exam | 25% |
| End Semester Exam | 50% |
| Practical Work | 100% |
| Lab Work | 70% |
| Lab Exam/Projects | 30% |