

THM 301(A): STATISTICS-I (PRACTICAL) PRE-REQUISITE: (01 credit hr)

F.Sc. or equivalent

LEARNING OUTCOMES:

- This course will get practical knowledge about the statistical applications in hydrology.
- The students will be able to calculate the measures of central tendency, dispersion and symmetry for different hydrometer logical variables.
- They will practice on distribution fitting and parameter estimation techniques.
- The students will be able to perform flood frequency analyses on real flow data
- They will become conversant with different software packages and their applications in performing statistical analysis on hydrological data.

SYLLABUS OUTLINE

This course is designed to make students learn about various statistical analysis on hydrological records along with the practical applications on probability distributions, frequency analysis using real hydrological data. This course also includes practical applications of different software's packages for statistical analyses in hydrology.

PRACTICAL

Module-1: Statistical Analysis of Hydrological Data

- Practical examples on measures of central tendency, dispersion and symmetry
- Estimation of correlation of different hydrometeorological variables
- Practical applications of simple and multiple regression analysis for hydrological data sets

Module-2: Probability Distributions

- Distribution fitting
- Parameter estimation problems
- Comparisons of different frequency distributions goodness of fit analysis

Module-3: Frequency Analyses

- Estimation return levels and return periods for hydrological data using frequency distributions
- Flood frequency analysis of different rivers of Pakistan

Module-4: Software Packages for Statistics

- Statistical Analysis using MS Excel
- Introduction to R- Programming for Statistical analysis of Hydrological data
- Introduction to MATLAB- Programming for Statistical analysis of Hydrological data

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

| Sr. No. | Elements | | Details |
|---------|----------------------|--|---|
| 1. | Mid Term Assessment | | It takes place at the mid-point of the semester |
| 2. | Formative Assessment | | It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc. |
| 3. | Final Assessment | | It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc. |

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Harvey J. E. Rodda, Max A. Little2016. *Understanding Mathematical and Statistical Techniques in Hydrology an Examples-based Approach* 1st Edition Wiley-Blackwell
2. Maity R., (2018). *Statistical Methods in Hydrology and Hydro climatology (Springer Transactions in Civil and Environmental Engineering) 1st ed*Springer
3. Haan, C.T., (2002) *Statistical Methods in Hydrology, 2nd edition*, Iowa State Press,
4. Maity, R. (2018). *Statistical methods in hydrology and hydroclimatology*. Springer.
5. Chatfield, C. (2018). *Statistics for technology: a course in applied statistics*. Routledge.
6. McCuen, R. H. (2016). *Modeling hydrologic change: statistical methods*. CRC press.
7. Rodda, H. J., & Little, M. A. (2015). *Understanding mathematical and statistical techniques in hydrology: an examples-based approach*. John Wiley & Sons.