

Course Name	Code\No.	Number of Credits			
		Theo.	Lab.	Train.	Credit
Statistical Hydrology	HWR 314	2	-	2	3
Pre-Requests	MATH 110 – HWR 221				

Course Objectives:

The objective of this course is to study how to statistically analyze the measurements in the field of hydrology and to make applications on the computer.

Course Contents:

1. Data records: What is the hydrological data? Time and space series, presentation of data, definition of sample and population.
2. Inference of statistical measures: temporal or spatial mean, central tendency measures, dispersion measures (e.g. Standard deviation), skewness and kurtosis in case of grouped and ungrouped data.
3. Theory of probability, types of probability, Venn shapes, laws of multiplication and addition of probability, examples in the field of hydrology.
4. Random variables: definition and types, examples in the field of hydrology.
5. Probability distribution: probability distribution functions (PDF), probability density functions, expected value, discrete and continuous distributions. Special probability distributions. Derivation of PDF from the data.
6. Normal distribution: characteristics of the distribution, how to calculate the probability from the distribution, using of the statistical tables, applications.
7. Frequency analysis: Probability papers, plotting position, ascending and descending orders, return period, risk and reliability.
8. Statistical inference: Parameter estimation, method of moments, point and interval estimations
9. Fitting of distribution functions: Testing hypothesis and Chi square test.
10. Relationship between two variables: Correlation, regression analysis. (Excel applications).
11. Generation of time series: uncorrelated time series, Ensemble averages and uncertainty, Monte Carlo method.

Course outcomes:

It is expected that the student will gain the following knowledge and skills:

- How to present data in the field of hydrology.
- How to make frequency Analysis for estimating future Values.
- How to estimate Statistical parameters and performing distribution function fitting using testing of hypothesis and chi square.
- How to generate time series using probability distribution.
- How to use some programs like (Excel, SMADA, SPSS) for applications.

Evaluation Method:

Student can be evaluated upon monthly exams, final exam and class homework, class discussions as well as lab experiments and lab reports

References:

- **Haan, C. T.** (1977) Statistical methods in hydrology, Iowa state university press.
- **Dekking F., Kraaikamp, C. Lopuhaa, H., Meester, L.** (2005). A Modern Introduction to probability and statistics: Understanding Why and how. Springer.
- **Viessman, Knapp, J.W., Lewis G.L. and Harbaugh, T.E.** (1977) Introduction to hydrology, Harper and Row publishers, N.Y.
- **Benjamin, J.R. & Cornell, C.A.** (1970) Probability, statistics, and decision for civil engineers, McGraw-Hill Book Company.