NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF CIVIL ENGINEERING
CIVIL ENGINEERING PROGRAM

SYLLABUS - GENERAL HYDROLOGY

I. GENERAL INFORMATION

CODE : HH113 General Hydrology
SEMESTER : 7
CREDITS : 3
HOURS PER WEEK : 4 (Theory – Practice)
PREREQUISITES : HH224 Fluid Mechanics II, MA611 Statistics and Probabilities
CONDITION : Compulsory
DEPARTMENT : Hydraulics and Hydrology

II. COURSE DESCRIPTION

This course is theoretical and practical and provides students with the main fundamentals and concepts of the characteristics of water resources behavior present in hydraulic projects. Its main purpose is to build professionals with kwowledge in hydrology and watershed management.
This course uses base elements and methods to be employed for carrying out a rational exploitation of hydraulic and hydrologic resources. Contents of subjects such as application of statistics and hydraulics are given for designing civil works destined to Peruvian hydraulic projects.

This course will facilitate the study of hydrographic watersheds and their potentialities, analyzing through inductive and deductive methods, likewise, quantitative, qualitative and explanatory methods also will be applied for the explanation of hydrologic and watershed phenomena.

III. COURSE OUTCOMES

1. Identify the scientific-experimental nature of hydrology and hydraulics.
2. Assess with equations and basic mathematical tools the study of hydraulics and hydrology.
3. Organize data for their adequate analysis and interpretation and calculate and interpret its fundamental statistics properties (average value and variance).
4. Analyze the fundamental fluid laws and apply them to certain situations in watersheds.
5. Interpret the concept of distributions and apply it to calculate the probability of an event or variable.
6. Built linear regression models to represent the relationship between the representative parameters of a set of data in hydrologic watersheds.

IV. LEARNING UNITS

1. APPLIED STATISTICS / 16 HOURS

Introduction / Basic statistics application / Population, sample and variable / variable classification /Methods for presenting and organizing data / Qualitative data / Quantitative data / Frequency distribution tables / Graphic representations /Central tendency measures: average, medium average weighted / Dispersion measures: variance, standard deviation, variation coefficient / Hydrologic cycle / Hydrology objectives / hydrology in Peru / Hydro-meteorological information / Time series / Characteristics curves / Hydrometrical methods / Statistics in applied to hydrology / Basic considerations / Statistic analysis / Empirical distributions / Theoretical distributions / Assessment methods / Normal density function / Logarithmic normal density function / Extreme events function / Maximal events / Gumbel's method / Pearson's method / Minimal events / Gumbel's method / Pearson's method / Application to the hydrographic watershed.

2. WATERSHED HYDROGRAPHIC MORPHOLOGY / 28 HOURS

Introduction / Basic Information / Activities planning / Basic information gathering / Consistency analysis / Graphic analysis / Double mass analysis / Statistic analysis / Computer program elaboration / Analysis of falls in the average / Identification / Assessment / Interpretation / Application / Analysis of falls in the standard deviation / / Identification / Assessment / Interpretation / Application / Analysis of tendencies / Properties / Analysis procedure / Tendency in average / Identification / Assessment / Interpretation / Application / Tendency in standard deviation / Identification / Assessment / Interpretation / Application / Meteorology and hydrology / Meteorological elements / Relative humidity / Total evaporation / Winds / Precipitation / Discharges.

3. APPLICATIONS TO HYDROLOGICAL WATEERSHEDS, PROJEECTS / 12 HOURS

Group work: HYDROLOGICAL SURVEY / Cartography / Thematic maps / Hydrographic plan / Roadway plan / Basic information gathering / topographic plan / Geologic plan / Mining plan / Soil plan / Season plan / Statistic analysis / Basic Information gathering / Soil classification plan / Irrigation infrastructure plan / Ecology plan / Precipitation analysis / Average precipitations / Assessment methods / Elaboration of Isohyets plan / Mass curve / Histogram / Storm Analysis / Frequency-intensity-duration survey / hydrometrics / Concepts / Assessment methods / RIPPL diagram / Reservoir characteristic curves / Gagging methods / Domestic projects.

V. METHODOLOGY

The course is carried out in computing lab, theory and practice sessions. In theory sessions, the instructor introduces concepts, theorems and applications. In practice sessions, several problems are solved, and their solutions are analyzed. In lab sessions, Hydrology application software is used to solve problems and analyze their solution. At the end of the course, students must hand over and expose a paper or project on watersheds. In all sessions student's active participation is encouraged. Software HEC-HMS is used.

VI. EVALUATION FORMULA

The average grade PF is calculated as follows:

PF = 0,33 EP + 0,33 EF + 0,34 PC

EP: Mid-Term Exam EF: Final Exam
PC: Average of Quizzes and Project

VII. BIBLIOGRAPHY

1. **GUIDE TO HYDROLOGYCAL PRACTICE N° 168 .**
   OMM, 2008

2. **RAY LINSLEY – MAX KOHLER – JOSEPH PAULUS**
   Hydrology For Engineers
   Mc Graw – Hill Book Company Inc., 2005

3. **VEN TE CHOW – DAVIS MAIDMENT – LARRY W. MAYS**
   Applied hydrology
   Mc Graw – Hill Science Ed. 2005.