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Personería Jurídica No. 192 de 1946 de Mingobierno  
Nit.: 860.013.798-5



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**FREE UNIVERSITY PEREIRA SECTION**

**UNDERGRADUATE PROGRAM IN ENVIRONMENTAL ENGINEERING**



**SUBJECT:                   HYDRAULICS II AND LABORATORY**

**CODE:                   -----**

**SEMESTER:           SEVENTH**

**HOURS                   WEEKLY: 6**

**THEORETICAL: 4**

**PRACTICES: 2**

**REQUIREMENTS:               HYDRAULICS I,  
FLUID MECHANICS II**

**GOALS.**

That the student acquires a solid knowledge of channel hydraulics and the associated hydraulic structures

That he can verify the theories of fluid mechanics in the laboratory, achieving find the difference between theoretical equations and practical results.





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That the student is trained in the laboratory, in measurement and analysis through data collection, calibration and determination of coefficients.

#### **METHODOLOGY.**

The course will be developed with master lectures by the professor on the content basics of the subject; for their part, students will strengthen their knowledge of the subject through recommended readings, consultations with the teacher and problem solving of application.

In the laboratory, students will perform the necessary calibrations and measurements until obtain the number and type of data sufficient to perform the calculations and present the respective reports on the problems determined by the teacher.



#### **WORK PROGRAM.**

##### **1. REVIEW QUESTIONS ON BASIC CONCEPTS OF MECHANICS OF THE FLUIDS AND THEIR APPLICATION TO CHANNEL HYDRAULICS**

- Open channel flow and its classifications
- Open channels and their properties

##### **2. CRITICAL FLOW: ITS CALCULATIONS AND APPLICATIONS**

##### **3. UNIFORM FLOW**





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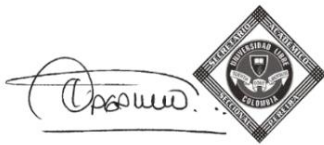
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- Development of uniform flow and its formulas
- Uniform flow calculations
- Channel design for uniform flow
- Theoretical concepts of boundary layer, surface roughness, velocity distribution and instability of uniform flow

#### 4. GRADUALLY VARIED FLOW

- Theory and analysis
- Calculation method
- Practical problems
- Spatially varied flow



#### 5. RAPIDLY VARIED FLOW

- Flow characteristics
- Development of the problem
- Runoff over landfills
- Hydraulic jump and its use as an energy dissipator
- Flow in non-linear channels
- Flow through non-prismatic channel sections





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## 6. NON-PERMANENT FLOW

- Gradually varied non-permanent flow
- Rapidly varying, unsteady flow
- Flood wave



## LABORATORY PRACTICES.

- Study of pressure losses caused by attachments in penstocks
- Study of the characteristics and behavior of an equilibrium chimney
- Study of the characteristics of the centrifugal pump
- Determination of the coefficient of friction in a smooth pipe
- Study of the hydraulic jump

Study of a gate



## LITERATURE.

VEN TE CHOW, Open Channel Hydraulics. McGraw Hill





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GILES RV, EVETT JB, LIU C., Fluid mechanics and hydraulics. McGraw Hill

SOTELO AVILA, General Hydraulics

RUSSEL GEORGE, Hydraulics

KING HW, BRATER EE, Hydraulics Manual. UTHEA

