HWRM-101 INTRODUCTION TO HYDROLOGY (THEORY) (03 Credit hrs)

PRE-REQUISITE: F.Sc. or equivalent

COURSE LEARNING OUTCOMES

- This course will provide an introduction to the hydrology and hydrological cycle to the students.
- The students will learn about the surface water resources
- They will have the knowledge about the occurrences and importance of ground water resources and different water bearing formations
- The students will get used to the different methods for measurement of streamflow

CONTENTS

This course provides an introduction to the hydrological cycle, branches of hydrology, surface and ground water resources. This course will also provide basic knowledge about the streamflow measurements.

THEORY

Unit-I: Introduction

1.1. Occurrence of Water on Earth
1.2. Physical and chemical properties of water
1.3. Importance of Water

Unit-II: Hydrology as a Science

2.1. Introduction to Hydrology, origin and history
2.2. Importance of Hydrology
2.3. Branches of Hydrology

Unit-III: Hydrological Cycle

3.1. Introduction and importance of hydrological cycle
3.2. Components of Hydrological Cycle
3.3. Global Water Budget
3.4. Hydrological Losses (Interception, Infiltration, Evaporation, transpiration)

Unit-IV: Surface Water

4.1. Occurrence of fresh Water on Earth on earth
4.2. Runoff Process and hydrological losses
4.3. Rivers
4.4. Lakes and reservoirs
4.5. Glacier
4.6. Surface water resources of Pakistan

Unit-V: Ground Water

5.1. Ground water resources, occurrence and importance
5.2. Aquifers and types of aquifers
5.3. Hydraulic properties of aquifers

Unit-VI: Streamflow Measurements

6.1. Stage measurement
6.2. Velocity measurements using different methods
6.3. Velocity-Area method for streamflow measurement
6.4. Stream gauges

TEACHING – LEARNING STRATEGIES

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

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm 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	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	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	40%	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. Mays, L,W., (2011) *Ground and Surface Water Hydrology* 1st Edition Wiley ISBN-13: 978-0470169872
2. Guthrie, M., (2018) *Ground and Surface Water Hydrology* Larsen and Keller Education ISBN-13: 978-1635496949
3. John C. Manning (1996) *Applied Principles of Hydrology* 3rd Edition Prentice Hall ISBN-13: 978-0135655320.
4. Ghuman, A. R. (2013). *Introduction to Hydrology*. Department of Civil Engineering, the University of Engineering & Technology, Taxila, Pakistan.
5. Davie, T. (2008). *Fundamentals of Hydrology*. Routledge, Oxon, UK.
6. Raghunath, H.M. (2006). *Hydrology Principles, Analysis and Design*. New Age International Ltd.