UNIVERSITY OF SARGODHA

DEPARTMENT OF SOIL & ENVIRONMENTAL SCIENCES, UNIVERSITY COLLEGE OF AGRICULTURE

COURSE OUTLINE **Spring 2020**

Course Title: **Soil and water conservation**

Course Code: **SES-308**

Credit Hours: **3(3-0)**

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DESCRIPTION AND OBJECTIVES

Soil and water are limited resources that are available for agriculture. Conservation of soil and water resources is important for sustainability of agriculture and environment. Soil and water resources are under immense pressure due to ever increasing population thereby ensuing growing demand for food, fiber and shelter. Soil and water resources are being deteriorated due to different anthropogenic and natural factors. Soil erosion is one of the several major deteriorative processes which results in deterioration of the soil. Soil erosion is removal of soil due to movement of water and/or air. Soil erosion may lead to the significant loss of soil productivity and thus may lead to the desertification under sever conditions. Water and wind are the major agencies which are responsible of soil erosion. Deforestation, over-grazing, intensive cultivation, mismanagement of cultivated soils and intensive urbanization are major factors triggering the soil erosion. For sustainable agriculture and environment, it is pertinent to protect the soil resources against erosion. Different control measures should be adopted to protect the soil resources against erosion. The concept of soil conservation cannot be materialized without conserving and efficient use of water resources. It is therefore pre-requisite that soil conservation practices should be adopted. Soil conservation practice include soil management, crop management, engineering, range management and forestry operations. In this course students will learn various ways means of soil and water losses and how these losses can be decreased with various strategies for their conservation.

INTENDED LEARNING OUTCOMES

After learning this course students will be able to know the importance of soil and water conservation and suitable measures to conserve soil and water. Various techniques of soil and water conservation will be introduced. Various types of soil erosions, water erosions and gravity erosions will be demonstrated. Students will be able to know various approaches (mechanical, engineering and bioengineering) of controlling soil and water erosion.

COURSE CONTENTS

Theory

1. Soil erosion, description, types and impact on environment
2. Water and wind erosion forms, causes and damages
3. Gravity erosion and land slides
4. Erosion predication, modified universal soil loss equation, wind erosion eqution
5. Erosion control and management agronomic, engineering and bio engineering practices
6. Hydrological cycle and components

7. Soil conservation and management practices and water harvesting techniques
8. Strategies for soil, water and environmental conversation
9. Socio-economic issues of soil and water conversation

READINGS

1. Bhushan, L.S., I.P. Abrom, and M.S.R.M. Rao. 1998 soil and water Conservation: Challenges and Opportunities. Vol. 1 & 2 A. A. Balkema, Rotterdam, The Netherlands.
2. Ehlers, W. and G. Michael. 2003. Water Dynamics in Plant Production CAB Publishing, Cambridge, UK,
3. Morgan, R.P.C. 2005. Soil Erosion and conservation. 3rd Ed. Longman Group Ltd., Essex, UK.
4. Unger, P.W. 2006. Soil and water Conservation Handbook. Policies, practices, Conditions and Terms. Haworth Food and Agriculture Products Press, NY, USA.
5. Fangmeier, D.D., W.J. Elliot and S.R. Workman. 2006. Soil and Water Conservation Engineering. 5th Ed. Thomson Delmar Learning, NY, USA.

COURSE SCHEDULE

Week	Topics and Readings	Books with Page No.
1	Introduction to soil erosion, description, types and impact of soil erosion on environment	Soil and water Conservation: Challenges and Opportunities page 274-278 National Book Foundation, Page 509-510
2	Measurement of slop gradient and discharge in water course, Water erosion; its type; magnitude of the erosion in Pakistan	The Nature and Properties of Soils. Page 333-337 Soil Science. National Book Foundation, Page 511-513
3	Mechanics of water erosion and forms of water erosion; Causes of water erosion	Water Dynamics in Plant Production, page 157-198 National Book Foundation, Page 515-524
4	Calculation of runoff and soil losses; Soil conservation prevention of water erosion, Principle of soil conservation	Soil and water conservation page 172-194 National Book Foundation, Page 516-517
5	Wind erosion and its type of mechanics of soil erosion; Control of wind erosion (physical, chemical and biological)	National Book Foundation, Page 532-535.
6	Gravity erosion and landslides; Erosion predication, modified universal soil loss equation, wind erosion equation	Soil Erosion and conservation page 267-278 Soil erosion page 121-128 The Nature and properties of soils page 437-445
7	Erosion control and management agronomic practices to control erosion	National Book Foundation, Page 517-523 Soil and water conservation engineering page 134-172
8	Engineering technique to control soil erosion, bio engineering practices of erosion control	Soil and Water conservation Engineering Page 234-256 and page, 314- 319

9	Erosion control and management agronomic , engineering and bio engineering practices	Soil Science. National Book Foundation, Page 482-490
10	Soil conservation and management practices and water harvesting techniques, Strategies for soil, water and environmental conversation	Soil Science. National Book Foundation, Page 482-490
11	Socio-economic issues of soil and water conversation, Stubble management, Stubble and mulch used for the controlling erosion	Soil Science. National Book Foundation, Page 475-482
12	Water-logging, sources of water logging effect on plant growth and controlling measuring of water logging	Salt affected soils principles and management page 174-178
13	Salt effect soil origins and processes of formation of slat effect soil	National Book Foundation, Page 471-475
14	Classification criteria of salt affected soils	National Book Foundation, Page 475-477
15	Categories of salt effected soils	National Book Foundation, Page 477-479
16	Extent of problems of soil reclamation and management of soil affected soil	National Book Foundation, Page 480-490

RESEARCH PROJECT/PRACTICAL/LABS/ASSIGNMENTS

1. Collection of data regarding extent of soil and water erosion and salt- affected soils

ASSESSMENT CRITERIA

Sessional: 20 % of the total theory marks (Project, Presentation, Participation and Assignment)
Project: -
Presentation: -
Participation: -
Mid Exam: 30 % of the total theory marks
Final Exam: 70 % of the total theory marks