Course Syllabus and Contents of Masters Degree

SWCE 501 Advanced Soil and Water Conservation Engineering 2+1

Objectives:
To acquaint and equip students with the advances in soil and water conservation measures, use of RS and GIS and Software's for design of soil and water conservation structures.

Unit-I
Concept of probability in design of soil and water conservation structures. Probability and continuous frequency distribution. Fitting empirical distributions.

Unit-II
Relevance of soil and water conservation in agriculture and in the river valley projects. Layout and planning of soil and water conservation measures.

Unit-III
Soil loss estimation models: MUSLE, RUSLE Productivity loss due to soil erosion. Water stress and water excess. Types and mechanics of soil erosion. Software's for soil loss estimation, WEAP, EPIC.

Unit-IV
Theories of sediment transport. Control of runoff and sediment loss. Sediment deposition process. Estimation of sediment load.

Unit-V
Design of soil and water conservation structures: Check dams, gully plugs, gabion structures, earth dams, silt detention dams, farm ponds, etc., and the alternate use of the stored water for agriculture. Software's for design of conservation structures.
Application of Remote Sensing and GIS in Soil and Water Conservation.

Practical:
Assessment of erosive status of a watershed through field measurement or analysis of morphometric properties. Estimation of erosivity index of rainfall. Determination of soil physical properties: Texture, grain size distribution, Atterberg's limits, various moisture percentages. Locating best possiblesites of soil and water conservation structures on the basis of map features and erosivity status. Estimation of costs of soil and water conservation measures.

Course Outcome:
The students will able to plan and design soil and water conservation measures in particular watershed using RS and GIS techniques. They can estimate the sedimentation and capacity losses, design of gully control structures and earthen dams using softwares.

Teaching Schedule

S.No.	Topic	No. of Lectures
1	Concept of probability in design of soil and water conservation structures	2
2	Probability and continuous frequency distribution	2
	Fitting empirical distributions	2
3	Relevance of soil and water conservation in agriculture and in the river valley projects	2
4	Layout and planning of soil and water conservation measures	2

5	Software's for design of conservation structures	1
6	Productivity loss due to soil erosion	1
7	Water stress and water excess	1
8	Types and mechanics of soil erosion	1
9	Software's for soil loss estimation, WEAP, EPIC	3
10	Theories of sediment transport	2
11	Control of runoff and sediment loss	1
12	Sediment deposition process and estimation of sediment load	2
13	Design of soil and water conservation structures: Check dams, gully plugs, gabion structures, earth dams, silt detention dams, farm ponds, etc., and the alternate use of the stored water for agriculture	6
14	Application of Remote Sensing and GIS in Soil and Water Conservation	3
	Total	**31**

List of Practicals

S.No.	Topic	No. of Practicals
1	Assessment of erosive status of a watershed through field measurement	2
2	Morphometric analysis of a watershed	2
3	Estimation of erosivity index of rainfall	1
4	Determination of Soil erodibility factor "K'	1
5-8	Design of Check dams, gully plugs, gabion structures, earth dams, silt detention dams and farm ponds	4
9	Locating best possible sites of soil and water conservation structures on the basis of map features and erosivity status	2
10	Use of Software for soil loss estimate	1
11	Use of Software for design of conservation measures	2
12	Estimation of costs of soil and water conservation measures	2
	Total	**17**

References:

1. Suresh R 2016.*SoilandWaterConservationEngineering*. Standard Publishers and Distributors, Delhi.
2. Garg SK 1987. *Irrigation Engineering and Hydraulic Structures*. Khanna Publishers, New Delhi
3. Kirkby MJ and Morgan PPC (eds). 1980. *Soil Erosion*. John Wiley and Sons. New York, USA.
4. Rajkumar Patel.2012. Watershed Management Planning Using Remote Sensing and GIS. Lambert Academic Publishing.
5. Soil and Water Conservation Structures. http://ecoursesonline.iasri.res.in/
6. Nandgude S.B. and Others 2011.Development of Software for Design of Soil and Water Conservation Structures in Watershed. International Journal of Computer Applications (0975 – 8887) Volume 14– No.5, January 2011
7. Yuriko Osakabe and others .2014.Response of plants to water stress. Front. Plant Sci., 13 March 2014.
8. WEAP: Water Evaluation And Planning System. https://www.weap21.org .
9. The EPIC Crop Growth Model.
10. Williams J. R, and others. The EPIC Crop Growth Model. TRANSACTIONS of the ASAE,PP497-511