• Wang HF and Anderson MP. 1982. *Introduction to Groundwater Modeling: Finite Difference and Finite Element Methods*. 237 pp, W.H. Freeman and Co., San Francisco.

I. Course Title : Dryland Water Management Technologies

II. Course Code : SWCE 510

III. Credit Hours : 2+0

IV. Aim of the course

To provide detail knowledge about analysis of severity of drought assessment and various dry land water management technologies suitable for conservation, harvesting and enhancing productivity of rainfed areas.

V. Theory

Unit I

Drought severity assessment: Meteorological, hydrological and agricultural methods. Drought indices. GIS based drought information system, drought vulnerability assessment and mapping using GIS. DPAP programme, drought monitoring constraints, limiting crop production in dry land areas. Types of drought, characterization of environment for water availability, crop planning for erratic and aberrant weather conditions.

Unit II

Stress physiology and crop resistance to drought, adaptation of crop plants to drought, drought management strategies. Preparation of appropriate crop plans for dry land areas. Mid contingent plan for aberrant weather conditions.

Unit III

Land shaping and land development for soil moisture conservation. Improvement of tillage and soil management by implements and engineering practices. Soil and moisture conservation for rainfed lands through improved implements and engineering practices. Gel technology.

Ex-situ measures: Water harvesting-micro catchments. Design of small water harvesting structures: Farm Ponds, percolation tanks their types and design, recycling of runoff water for crop productivity.

Unit IV

Crops and cropping practices related to soil and moisture conservation. Fertility management in dryland farming. Planning and development of watersheds from engineering view point. Case studies.

Unit V

Application of aerial photography in surveys and planning of watersheds for rainfed agriculture.

Use of Remote Sensing in soil moisture estimation.

VI. Learning outcome

The students will be able to understand drought severity assessment techniques alongwith new and appropriate methods of rainwater conservation and harvesting technologies for rainfed areas.

VII. Lecture Schedule

S.No.	Topic	No. of Lectures
1.	Drought severity assessment: Meteorological, hydrological and agricultural methods	2
2.	Drought indices	1
3.	GIS based drought information system, drought vulnerability assessment and mapping using GIS	2
4.	DPAP programme, drought monitoring constraints, limiting crop production in dry land areas	2
5.	Types of drought: characterization of environment for water availability	1
6.	Types of drought: crop planning for erratic and aberrant weather conditions	1
7.	Stress physiology and crop resistance to drought	1
8.	Adaptation of crop plants to drought and drought management strategies	1
9.	Preparation of appropriate crop plans for dry land areas	2
10.	Mid contingent plan for aberrant weather conditions	1
11.	Land shaping and land development for soil moisture conservation	1
12.	Improvement of tillage and soil management by implements and engineering practices	2
13.	Soil and moisture conservation for rainfed lands through improved implements and engineering practices	2
14.	Introduction of Gel technology for conservation measures	1
15.	*Ex-situ* measures: Water harvesting-micro catchments	1
16.	Design of small water harvesting structures: Farm Ponds	1
17.	Design of small water harvesting structures: percolation tanks their types and design	2
18.	Recycling of runoff water for crop productivity	1
19.	Crops and cropping practices related to soil and moisture conservation	1
20.	Fertility management in dryland farming	1
21.	Planning and development of watersheds from engineering view point	2
22.	Planning and development of watersheds - Case studies	1
23.	Application of aerial photography in surveys and planning of watersheds for rainfed agriculture	1
24.	Use of Remote Sensing in soil moisture estimation	1
	Total	**32**

VIII. Suggested Reading

- Das NR. 2007. *Tillage and Crop Production*. Scientific Publishers.
- Dhopte AM. 2002. *Agro Technology for Dryland Farming*. Scientific Publ.
- Gupta US. 1995. *Production and Improvements of Crops for Drylands*. Oxford & IBH
- Singh RP. 1988. *Improved Agronomic Practices for Dryland Crops*. CRIDA.
- Singh RP. 2005. *Sustainable Development of Dryland Agriculture in India*. Scientific Publ.
- Singh RV. 2003. *Watershed Planning and Management*. Second Edition. Yash Publishing House, Bikaner.
- Singh SD. 1998. *Arid Land Irrigation and Ecological Management*. Scientific Publishers.