

## **Details of the syllabus (Ph. D. Course)**

### **SWC- 701 Socio-hydrology (2+1)**

Definition and scope – hydrology as a science and its use in planning of rural and urban areas – water resources, management in rural environment-use of water – classification and relation to overall planning - rural community structure and dependence on water - religious and social customs related to water resources / water bodies - definition of drought- sociological aspects of drought prone areas including agricultural practices - fishing activities in coastal areas, rivers and ponds- living habits of fishermen - possibility of fishing as a crop in paddy field.

**Practical:** Water quality tests in different water bodies including rainfall, Preparation of questionnaire and collection of data, Analysis of data and modeling.

### **SWC- 702 Environnement, pollution and management (2+0)**

Definition, classification and characters of environment. Pollution – definition and classification. UV- radiation and its impact on environment/ biosphere. Nature of pollution – inorganic, organic, natural and anthropogenic. Agricultural and industrial pollution – effect, sources, sink and impacts. C-Cycle, N-Cycle, S-Cycle, Hydrologic cycle and their influence on environment. Cause and effect of pollution on atmospheric, lithospheric and aquatic systems. Impact of deforestation, population explosion, overgrazing and other socio-economic factors on environmental pollution vis-à-vis biosphere. Laws of environmental pollution.

### **SWC-703 Advance water management technologies related to conjunctive use of surface and ground water (2+0)**

Introduction, definition and objectives, ground water, surface water – occurrence and distribution, conjunctive use – objectives, availability of water resource, water use in crop production. Possibilities of integrated and conjunctive use, constraints. Surface ground water resources and their status of development, artificial recharge of aquifers, its role in conjunctive use, quality of water from different sources – conjunctive use, selection of crops and their varieties and cropping pattern with conjunctive use of surface and ground water.

#### **SWC-704 Soil and water conservation measures for crop production (2+1)**

Concept of mechanical control of soil erosion, Factors affecting on soil erosion. Structural design and construction – Contour, contour bunding, terracing, Spillways- box, box-inlet, chute, modeling of diversion drains, dam and culverts.

**Practical :** Design criteria of different structures, project works and tour.

#### **SWC- 751 Advances in drainage management in relation to crop production (1+1)**

Drainage and agriculture, adoption of plants to soil moisture relations, drainage and physical condition, drainage and cultivation practices – tillage, weed control, drainage and waterlogging drainage and salinity, drainage and nutrient supply, ground water table and crop production grass lands, arable crop and fruit crops.

**Practical:** Determination of drainage requirement, drainage co-efficient, percolation rate, criteria for spacing of different drainage systems.

#### **SWC- 752 Irrigation water quality and crop productivity (2+1)**

Contents of irrigation water, quality of irrigation water, criteria and classification of irrigation water based on EC, SAR and boron content, interpretation of water quality, crop tolerance to salts use of saline water in agriculture, its effect on soil properties and crop growth, management practices to use saline water for irrigation, irrigation with brackish water.

**Practical:** Sampling of water from different sources. Measurement of irrigation water through flumes and weirs; Determination of EC, pH, carbonates, bicarbonates,  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  in irrigation water.

#### **SWC-753 Conservation agriculture (2+1)**

Concept of conservation farming, conservation irrigation, role of vegetation and cropping in conservation farming, mulching and tillage in conservation agriculture, conservation and recycling of natural resources – renewable and non-renewable natural resources and their conservation planning. Conservation tillage – definition, types, advantages, conservation tillage on soil fertility, soil water and crop production, no till, mulch till, and crop residue management

in conservation agriculture, water conservation techniques and water harvesting, water use efficiency and crop management, role of grasses and legumes in conservation purposes, environmental benefits of conservation agriculture.

**Practical:** Tillage implements, practice of no tillage, minimal tillage, mulch tillage, ridge tillage, identification of grasses and legumes, estimation of water use efficiency, water harvesting techniques.