WATER AND LAND MANAGEMENT INSTITUTE, AURANGABAD

Title of Course: Application of Remote Sensing and GIS in Water Resource Management

(Course duration - 5 days)

SYLLABUS

Day	Name of Subject/Topic
First Day	▪ Registration
	▪ Overview of Geo-information Technology and Its Application in Water Sector
	▪ Basics of RS, Platforms and Sensors
	▪ Fundamental and Principles of GIS
Second Day	▪ Terrain Modelling (DEM and DTM)
	▪ Introduction to India-WRIS & Bhuvan Project
	▪ Application of RS and GIS for ET Estimation
	▪ Runoff Estimation using RS & GIS Techniques
Third Day	▪ Image Processing Techniques and Softwares
	▪ Introduction & Demonstration of ILWIS Software for Image Processing
	▪ Hand on Practice-ILWIS software
	▪ Hand on Practice-ILWIS software
Fourth Day	▪ Geo Spherical Mapping
	▪ Introduction & Demonstration of Quantum GIS Software for GIS Analysis
	▪ Hand on Practice-Quantum GIS software
	▪ Hand on Practice-Quantum GIS software
Fifth Day	▪ RS and GIS application for Soil Resource Mapping and Crop Planning
	▪ Identification of Soil Salinity and Water Logging in Command Area using DIP Techniques
	▪ Reservoir Sedimentation Assessment using DIP Techniques

Title of Course: Orientation Course in IWM for newly promoted Executive Engineers.

(Course duration - 6 days)

Level of Participants: Newly promoted Executive Engineers

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration
	▪ Water Resources Development in Maharashtra: An Overview
	▪ Use of IT in WRD
	▪ Reservoir Operation Schedule & Gate Operation Schedule
Second day	▪ Micro Irrigation System
	▪ Piped Irrigation Network
	▪ Assessment & Recovery of Water Charges
	▪ Physical and Chemical Properties of Soil in relation to IWM
Third day	▪ O & M Practices in Maharashtra (PIP & CIP)
	▪ Economic Evaluation of Water Resources Project
	▪ Water User Association: Importance , Concept , Formation and present Status
	▪ Water Laws (MIA-76, MMISF-2005, MWRRA)
Fourth day	**Field Visit**
Fifth day	▪ Irrigation Scheduling based on Water Availability
	▪ Water Audit and Benchmarking of Irrigation Project
	▪ Flow Measurement in Irrigation Canal
	▪ Application of RS and GIS in Water Resources
Sixth day	▪ Conjunctive Use of Surface and Groundwater
	▪ IEC and Communication Skill
	▪ M & R of Irrigation Project

Title of Course: Workshop on Economic Evaluation of Irrigation Projects

(Course duration - 5 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration, Video film on WALMI ▪ Need for Economic Appraisal / Evaluation of Irrigation Projects. ▪ Different terms, concepts.-CWC guidelines. ▪ Feasibility tests &Techniques: Benefit-Cost Ratio method**.**
Second day	▪ Discounting & Discounted Benefit-Cost Ratio. Internal Rate of Return(IRR) / Economic Rate of Return(ERR) ▪ Discounting & Discounted Benefit-Cost Ratio. Internal Rate of Return(IRR) / Economic Rate of Return(ERR) -Contd ▪ Case study - Major Irrigation Project -Calculation of B/C Ratio / IRR ▪ Techno-Economic & Legal Scenario of Water Sector in Maharashtra
Third day	▪ Case study - Major Irrigation Project -Calculation of B/C Ratio / IRR [Contd.] ▪ Case study - Major Irrigation Project -Calculation of B/C Ratio / IRR [Contd.] computer use ▪ Estimations of Benefit cost Ratio & ERR of Minor Irrigation Project [Case Study] ▪ Estimations of Benefit cost Ratio & ERR of Minor Irrigation Project [Case Study]
Fourth day	▪ Benchmarking of Water Resources Projects ▪ Benchmarking of Water Resources Projects(Financial Indicators) ▪ Maharashtra policy for Project clearance, Revised estimations & Practical difficulties. And experience sharing-II (SLTAC – GF) ▪ Maharashtra policy for Project clearance, Revised estimations & Practical difficulties. And experience sharing-I (SLTAC – GF)
Fifth day	▪ Assessment & Recovery of Water Charges ▪ Water Audit ▪ Seminar presentations by Trainee officers followed by discussions regarding the problems faced by office

Title of Course: Reservoir/Gate Operation Schedule & Maintenance of Dam.

(Course duration - 3 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration
	▪ Introduction to ROS & GOS
	▪ Catchment hydrology
	▪ Various terminologies in ROS and GOS, Dependability concept
Second day	▪ Need of DSS in Reservoir Operation and Concept of RTDAS & RTDSS
	▪ Standard Operating Procedure(SOP) for flood control
	▪ Use of Source Software in reservoir Operation & Case study of UGB
Third day	▪ ROS of Selected project – Case Study
	▪ Integrated multi Reservoir Operation
	▪ Pre & Post Inspection of Dam

Title of Course: Benchmarking & Water auditing of Irrigation Systems.

(Course duration - 4 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration
	▪ Introduction and need of Water Auditing
	▪ Data Requirement for Water Auditing
	▪ Introduction and need of Benchmarking
Second day	▪ Performance Indicators for Benchmarking (System performance)
	▪ Water Auditing Report of Maharashtra
	▪ Data Requirement for Benchmarking
	▪ Benchmarking Report of Maharashtra
Third day	▪ Performance Indicators for Benchmarking (Agricultural Aspects)
	▪ Performance Indicators for Benchmarking (Financial & Social Aspects)
	▪ Water audit of Irrigation Projects- A Case study
	▪ Benchmarking Software & Practical
Fourth day	▪ Benchmarking of WUA- A Case Study
	▪ Water Auditing Software and Practical
	▪ Discussion

Title of Course: IWRM concept & Applications.

(Course duration - 4 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration
	▪ IWRM concept
	▪ Introduction to State Water Plan
	▪ National Framework for Water Laws
Second day	▪ Overview of Hydrological Models for Developing IWRM System
	▪ IWRM of Basins in Mahararashtra
	▪ Data Requirement, Analysis and Interpretation for Developing IWRM system
	▪ Integrated Multi Reservoir Operation and Gate Operation Schedule
Third day	▪ Demonstration of Source Model and Its Applicability for Developing IWRM System
	▪ Demonstration of Source Model and Its Applicability for Developing IWRM System
	▪ Role of RS and GIS in IWRM
	▪ Demonstration of Web GIS and its Utility for Resources Mapping
Fourth day	▪ Minimum Flow Concept and Approach of Environmental Flows in Basin Management
	▪ Stakeholders Participation and Water Users Institutional Framework in IWRM
	▪ Discussion

Title of Course: Climate Change, Adaptation, Mitigation.

(Course duration - 3 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration
	▪ Overview of Climate Change & its Implication on Water Resources
	▪ National Water Mission (NWM) under NAPCC for Climate Change, Adaptation and Mitigation
	▪ Maharashtra State Adaptation Action Plan on Climate Change (MSAAPCC)
Second day	▪ Agriculture in Maharashtra: Climate Change Impacts and Adaptation
	▪ Water Resources in Maharashtra: Climate Change Impacts and Adaptation
	▪ Conservation Agriculture Practices to Meet Challenges of Global Warming
	▪ Technical Aspects in Watershed Management in Context to Climate Change
Third day	▪ Role of IT in Climate Change Adaptation and Mitigation Strategies
	▪ Socio-economic Aspects of Climate Change Adaptation and Mitigation
	▪ Baseline Studies for Improving Water Use Efficiency of Irrigation Project to Cope Up with Climate Change

Title of Course: Canal Operation, Maintenance & Assessment and Recovery of Water Charges.

(Course duration - 4 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration
	▪ Introduction to Water Laws (MIA76,MMISF,MWRRA)
	▪ Maintenance of Canal
	▪ Assessment & Recovery: Socio-economic aspects
Second day	▪ Fundamentals of Canal Hydraulics
	▪ Flow measurements in Water Distribution Network
	▪ Assessment & Recovery: Computer Application
	▪ Agreement for Irrigation with WUAs
Third day	▪ Water Auditing related to Assessment & Recovery
	▪ Provisions for O & M in Water Laws
	▪ Role of Water Users' Association in Canal Operation (Below minor)
	▪ Computer application in IWM & GIS
Fourth day	▪ Farmer participation in maintenance of distribution network
	▪ Irrigation & Non irrigation Assessment & Recovery
	▪ M&R Norms: Present & Proposed

Title of Course: Planning & Design of Pipe distribution Net work with Micro irrigation.

(Course duration - 5 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration
	▪ Introduction to Pipe Distribution Network, Advantages of PDN & Case Study
	▪ Estimation of discharge for PDN
	▪ Components & layout of PDN
Second day	▪ Principles of planning and design of PDN by Gravity in command of an irrigation projects
	▪ Class room tutorial on Design of PDN for chaks / minors/ Dy.
	▪ Estimation of Water Requirement of pressurized Irrigated Crops
	▪ Soil characteristics & water quality aspects in pressurized irrigation system
Third day	▪ Components & Design Principles of Pressurized Irrigation System
	▪ Planning, Design of Drip Irrigation System – A Case study
	▪ Class room tutorial on Design of PDN for whole project
	▪ Planning, Design of Sprinkler Irrigation System.- A case study
Fourth day	▪ Exercise on Planning & Design of PDN
	▪ Exercise on Planning & Design of PDN
	▪ Exercise on Planning & Design of PDN
	▪ Exercise on Planning & Design of PDN
Fifth day	▪ Interface between gravity and pressurized irrigation system
	▪ Evaluation procedure, Chemigation, fertigation, Operation & Maintenance of pressurized irrigation system
	▪ Visit to WALMI Demonstration Farm

Title of Course: Advances in Water Resources Management: Course for Senior level Officers.

(Course duration - 2 days)

SYLLABUS

Day	Name of Subject/Topic
First day	▪ Registration and Tea
	▪ IWRM Concept and Need of Modeling in Water Resources Management
	▪ Conventional Models and Various Soft Computing Tools
	▪ Introduction to ANN and Fuzzy Logic
	▪ Application of ANN & Fuzzy Logic in Water Resources Management
	▪ Environmental Issues in Water Resources Management
Second day	▪ Irrigation Scheduling on the basis of Soil-Water-Plant Relationship
	▪ Role of IMD for Agriculture in View of Climate Change
	▪ Agricultural Meteorology
	▪ Aquifer Mapping of Maharashtra
	▪ Multi Reservoir Optimization using Genetic Algorithm
	▪ PIM (Participatory Irrigation Management)

Title of Course: Planning & Design of Drainage Systems in Canal Command.

(Course duration - 3 days)

SYLLABUS

Day	Name of Subject/Topic
First Day	▪ Registration
	▪ Introduction – Need of drainage in arid and humid areas, effect of poor drainage on soil and plants. Drainage properties of soils – Drainage porosity, Hydraulic conductivity, Drainage co-efficient, Flow of water to porous media (Darcy's Law)
	▪ Soil Physiochemical Properties & Water Quality Aspects Related to Drainage
	▪ Identification of drainage problems – Nature and extent of drainage problems, depth to water table contours, damage demarcation, Rainfall and runoff, causes of poor drainage
Second Day	▪ Design of Subsurface drainage design procedure for steady and unsteady State
	▪ Surface Drainage Systems: Layout & Design
	▪ Design of Surface Drainage Systems – A case study
	▪ Bio drainage an alternative method for physical drainage measures
Third Day	▪ Reclamation of Alkaline / Saline soils. Part I
	▪ Reclamation of Alkaline / Saline soils. Part II
	▪ Design of Subsurface drainage – A case study

Title of Course: Orientation Course on Soil and Water Conservation Techniques

(Course duration - 4 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Need of Soil & Water Conservation in Maharashtra & different Govt. Schemes/ Programmes ▪ Community Organization & Peoples Participation in Soil & Water Conservation Works ▪ Watershed Hydrology- Estimation of Runoff
Second Day	▪ Present Practices & Norms of Soil Conservation Works, Site Selection, Field difficulties & Impact Assessment of Soil Conservation works ▪ Present Practices & Norms of Water Conservation, Preliminary Survey, Site Selection, Field difficulties & Impact Assessment of Water Conservation Works ▪ Hydro-Geological conditions for Groundwater Recharge in Maharashtra ▪ Applications of Remote Sensing, GIS & GPS for Planning, Monitoring & Evaluation of Water Conservation Works
Third Day	▪ Field Visit to Watershed Area to Study the Soil & Water Conservation Structures/ Treatments ▪ Films on Soil and Water Conservation Techniques
Fourth Day	▪ Role of IEC in Watershed Development Works ▪ Role of GSDA in Planning & Implementation of Water Conservation Works & Groundwater Management in Maharashtra State ▪ Water Budgeting & Water Neutral Village in Jalyukta Shiwar Programme

Title of Course: Orientation Course on Soil and Water Conservation Techniques

(Course duration - 4 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Need of Soil & Water Conservation in Maharashtra & different Govt. Schemes/ Programmes ▪ Community Organization & Peoples Participation in Soil & Water Conservation Works ▪ Watershed Hydrology- Estimation of Runoff
Second Day	▪ Present Practices & Norms of Soil Conservation Works, Site Selection, Field difficulties & Impact Assessment of Soil Conservation works ▪ Present Practices & Norms of Water Conservation, Preliminary Survey, Site Selection, Field difficulties & Impact Assessment of Water Conservation Works ▪ Hydro-Geological conditions for Groundwater Recharge in Maharashtra ▪ Applications of Remote Sensing, GIS & GPS for Planning, Monitoring & Evaluation of Water Conservation Works
Third Day	▪ Field Visit to Watershed Area to Study the Soil & Water Conservation Structures/ Treatments ▪ Films on Soil and Water Conservation Techniques
Fourth Day	▪ Role of IEC in Watershed Development Works ▪ Role of GSDA in Planning & Implementation of Water Conservation Works & Groundwater Management in Maharashtra State ▪ Water Budgeting & Water Neutral Village in Jalyukta Shiwar Programme

Title of Course: Training course on Effective Public Relations & communication

(Course duration - 3 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Registration & WALMI story ▪ Effective Public Relations & communication concepts & Methods ▪ Effective skills of Presentation, organizing meetings, seminar, conferences & community meetings ▪ Effective speech & Report Writing skills
Second Day	▪ Right to Information Act ▪ Effective print media communication ▪ Role of J.E. as a Public Relation Officer ▪ Effective Mass media Communication (Radio & T.V. talks)
Third Day	▪ Personality Development & Positive attitude ▪ Interpersonal communications skills & Qualities of good communicator ▪ Action oriented programme of trainee ▪ Question-Answer & Concluding

Title of Course: Application of Soil Survey in IWM.

(Course duration - 5 days)

SYLLABUS

Day	Name of subject/Topic
First Day	Registration
	Soil properties in relation to irrigation
	Practical on determination soil Texture
	Available water capacity & deciding irrigation interval
Second Day	Infiltration characteristics & hydraulic conductivity of soil in relation to drainage
	Practical on infiltration & hydraulic conductivity of soil
	Salt affected soils & their reclamination measures
Third Day	Practical on determination soil properties (Soil pH ,EC, N, P & K)
	Soil survey techniques
	Soil and land irrigability classification
Fourth Day	Soil water relationship and practical on FC,PWP & BD
	Drainage measures for water logging
Fifth Day	Deciding suitable crops on soil parameters
	Soil-crop-climate data base for irrigation scheduling in command area
	Irrigation scheduling under inadequate water availability
	Concluding

Title of Course: Sustainable Land Management.

(Course duration - 5 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Registration
	▪ Sustainable land management ,Soil survey and land capability classification
	▪ Land utilization pattern of Maharashtra & India-A Review
	▪ Soil testing and fertilizer use
Second Day	▪ Soil fertility and integrated nutrient management (INM)
	▪ Agro Techniques for Soil and water conservation- I (Agronomic aspects)
	▪ Soil and water conservation- II
	▪ Agro forestry system for efficient land management
Third Day	▪ **Drainage Part I** (Methods of drainage management for sustainable land management)
	▪ Integrated farming system (IFS) for sustainable land management
	▪ Developing agribusiness skill among farmers for maximizing farm income
	▪ Conjunctive use of water
Fourth Day	▪ **Field Visit**
Fifth Day	▪ Catchment area treatment for sustainable land management
	▪ Water Quality for Irrigation
	▪ Salt affected soil and their management
	▪ **Drainage Part II (**Management of Waterlogged Area)

Title of Course: Basic Application of M.S. Excel in IWM.

(Course duration - 6 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Registration & Inauguration ▪ Review of Computer Hardware / Software (system & Applications),Internet securities (firewall & routers),Leased line fiber optics ,EMD platform basic ▪ Internet applications Android technology, open source software, mobile applications related to WRD ,Social media Mobile Applications, Cyber law ▪ Hands on above topics
Second Day	▪ Power Point Presentation ▪ Hands on practice on power point presentation ▪ Introduction MS Excel (Workbook, worksheet, Data entry, formatting etc.) ▪ Hands on practice (Exercise No. 1)
Third Day	▪ Introduction MS Excel (Constant variables, functions, formula , Hierarchy of operations) ▪ Hands on practice (Exercise No. 2) ▪ Copy command – relative, absolute, mixed cell referencing etc. ▪ Hands on practice (Exercise No. 3)
Fourth Day	▪ If condition – simple if, nested if, and , or operation ▪ Hands on practice (Exercise No. 4) ▪ Date & time function ▪ Hands on practice (Exercise No. 5)
Fifth Day	▪ MS Excel chart – create, edit, enhance etc. ▪ Hands on practice (Exercise No. 6) ▪ Linking sheet – insert, rename, delete sheet, Link worksheet etc. ▪ Hands on practice (Exercise No. 9)
Sixth Day	▪ Use of Marathi – Unicode in MS Excel ▪ VLOOKUP, Hands on practice ▪ Discussion & filling of evaluation forms ▪ Concluding session

Title of Course: Geospatial Technologies and Applications

(Course duration - 3 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Registration & Inauguration
	▪ Introduction to Geospatial Technologies and Applications
	▪ Fundamentals of Remote Sensing, Platforms and Sensors used for Remote Sensing
	▪ Introduction to Global Navigation Satellite System (GNSS)
Second Day	▪ Digital Image Processing, Data Analysis and Data Acquisition
	▪ Principles of Geographical Information System (GIS) and ILWIS Software
	▪ Hands on Practice – ILWIS Software
	▪ Introduction to Coordinate System, Map Projections, Geo-referencing
Third Day	▪ Introduction to Quantum GIS Software & Demonstration
	▪ DEM & Its Applications in Water Resources
	▪ Geospatial Applications in Watershed Management
	▪ Discussion & Concluding

Title of the Course : Discharge Measurements in Canal.

(Course duration - 6 days)

SYLLABUS

दिवस	विषय
पहिला दिवस	▪ नोंदणी
	▪ प्रस्तावना व विसर्गमापनासंबंधी विविध एकके / परिमाणे
	▪ विसर्गमापनासंबंधी महाराष्ट्र सिंचन कायद्यामधील निवडक तरतूदी
	▪ जलमापन प्रयोगशाळा भेट
दुसरा दिवस	▪ पिकाची पाण्याची गरज व सिंचन
	▪ कट थ्रोट प्ल्युम (CTF)प्रवाह मापक –(१)
	▪ कट थ्रोट प्ल्युम (CTF)प्रवाह मापक –(२)
	▪ दाबयुक्त सिंचन पध्दत व पाईपद्वारे प्रवाहमापन
तिसरा दिवस	▪ एस.डब्ल्यु.एफ. (SWF)प्रवाहमापकाच्या महत्वाच्या बाबी व बांधकाम करते वेळेस घ्यावयाची काळजी.
	▪ प्रवाहमापकांचे मूल्यमापन
	▪ प्रवाहमापनाच्या अपारंपारीक पध्दती
	▪ कट थ्रोट प्ल्युम (CTF) प्रवाहमापक चारीमध्ये बसविण्याची पध्दत व प्रवाहमापन प्रात्याक्षिक
चौथा दिवस	▪ आकारणी तक्ते तयार करणे
	▪ आकारणी तक्ते तयार करणेसंबंधी संगणकीय प्रणाली माहिती व हाताळणी
	▪ SWF व CTF प्रवाहमापक संगणकीय प्रणाली व हाताळणी
	▪ चर्चा व समारोप

Title of Course: Application of Advance M.S. Excel in IWM.

(Background of Excel necessary)

(Course duration - 6 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Registration & Inauguration ▪ Review of Computer Hardware / Software (system & Applications), Road map of WRD & vision 2020 Recent advances in GIS & GIS layers ▪ Model projects of India, Data mining, GPS, Mobile Applications for WRD ▪ Hands on practice on above topics
Second Day	▪ Review of MS Excel Basics ▪ Hands on Practice ▪ Goal Seek function & Practice Exercise ▪ Lookup & Table Search Practice Exercise
Third Day	▪ Regression Analysis ▪ Hands on Practice Exercise ▪ Economic Analysis Of Irrigation projects IRR ▪ Hands on Exercise on IRR
Fourth Day	▪ Database management – Create list , form ,append, edit ,delete data ▪ Hands on practice (Exercise) ▪ Database management – Sort, search, auto filter, subtotal , etc. & Practice ▪ Pivot Table
Fifth Day	▪ Hands on Practice ▪ Introduction to Macro & VBA ▪ Hands on practice ▪ User define function (UDF) using VBA macro ▪ & practice
Sixth Day	▪ Special exercise covering above aspects ▪ Special exercise ▪ Discussion & filling of evaluation forms ▪ Concluding

Title of Course: Basic Application of M.S. Excel in IWM.

(Course duration - 6 days)

SYLLABUS

Day	Name of subject/Topic
First Day	▪ Registration & Inauguration ▪ Review of Computer Hardware / Software (system & Applications),Internet securities (firewall & routers),Leased line fiber optics ,EMD platform basic ▪ Internet applications Android technology, open source software, mobile applications related to WRD, Social media Mobile Applications, Cyber law ▪ Hands on above topics
Second Day	▪ Power Point Presentation ▪ Hands on practice on power point presentation ▪ Introduction MS Excel (Workbook, worksheet, Data entry, formatting etc.) ▪ Hands on practice (Exercise No. 1)
Third Day	▪ Introduction MS Excel (Constant variables, functions, formula , Hierarchy of operations) ▪ Hands on practice (Exercise No. 2) ▪ Copy command – relative, absolute, mixed cell referencing etc. ▪ Hands on practice (Exercise No. 3)
Fourth Day	If condition – simple if, nested if, and , or operation ▪ Hands on practice (Exercise No. 4) ▪ Date & time function ▪ Hands on practice (Exercise No. 5)
Fifth Day	▪ MS Excel chart – create, edit, enhance etc. ▪ Hands on practice (Exercise No. 6) ▪ Linking sheet – insert, rename, delete sheet, Link worksheet etc. ▪ Hands on practice (Exercise No. 9)
Sixth Day	▪ Use of Marathi – Unicode in MS Excel ▪ VLOOKUP & Hands on practice ▪ Discussion & filling of evaluation forms ▪ Concluding session