

LWRS 229 Water and the Environment 3.0; 3 cr.

Physical hydrological processes, natural environment and the role of human activities and interactions. Topics covered include hydrologic cycle, watershed hydrology, runoff generation, precipitation, evapotranspiration, infiltration, stream processes, groundwater, erosion, and statistical hydrology.

LWRS 241 Farm Management 3.0; 3 cr.

A course that focuses on the application of modern principles and techniques of management to the farm sector. *Prerequisite: LWRS 212 or ECON 203.*

LWRS 265 Soil Fertility 2.3; 3 cr.

Behavior of native and applied fertilizer elements in soils in relation to crop production, soil fertility evaluation, fertilizer manufacture, fertilizer application in irrigation systems, and economics of fertilizer use. *Prerequisite: LWRS 215.*

LWRS 290 Project Planning and Appraisal 3.0; 3 cr.

Introduces different techniques commonly used in project planning and appraisal.

Elective Courses for the BS Degree in Agriculture**LWRS 243 Marketing and Food Products 3.0; 3 cr.**

A course that examines in detail the marketing of agricultural and food products, using case studies.

LWRS 261 Hydraulics 3.0; 3 cr.

Principles of mass and energy conservation, pipe flow, canal flow, measurement of fluid flow, and application of hydraulic principles to irrigation system design.

LWRS 262 Irrigation Methods 3.0; 3 cr.

Hydraulics of surface irrigation systems; design of border, furrow, and controlled flooding irrigation; hydraulics of sprinkler and drip irrigation systems; methods of evaluation of each system.

LWRS 263 Pesticide Application Technology 2.3; 3 cr.

Basics of sprayers, principles of operation of field and orchard sprayers, performance parameters and evaluation, drop size technology, spray transport and dispersal, drift and deposition measurement, pesticide reduction drift control, and safety in handling and storage.

LWRS 270 Environment Control in Agriculture 3.0; 3 cr.

Materials and design characteristics of farm structures; basics of heat and mass transfer; design of environment control systems for animals, plants, and storage of agricultural materials and products.

LWRS 273 Plant-Soil-Water Relationships 3.0; 3 cr.

Physical relationships of soil moisture and plant growth, soil physical properties, crop water use and irrigation requirement determination, and irrigation scheduling. *Prerequisite: LWRS 228 or consent of instructor.*

LWRS 277 Basic Hydrology 3.0; 3 cr.

Applied methods in hydrologic analysis and design; hydrologic cycle components including precipitation, infiltration, ground water, and surface runoff; basic considerations of reservoir flow routing and management.

LWRS 299 Special Topics in Land and Water Resources 2 cr.

Directed study. Tutorial. *Prerequisites: fourth year standing and consent of instructor.*

Graduate Programs

At the graduate level the department offers the MS degree, with a thesis or non-thesis option, in four majors: Agricultural Economics and Development, Irrigation, Mechanization, and Soil Science. Training is available in these areas.

LWRS 300 Graduate Tutorial 1-3 cr.
Special topics in land and water resources.

LWRS 309 Drainage of Agricultural Lands 3.0; 3 cr.
Soil properties, porous media flow, hydraulic conductivity measurement, soil leaching requirements, drainage investigations, and surface and subsurface drainage system design.

LWRS 310 Advanced Soil Physics 3.0; 3 cr.
Physical properties of soils in arid, semi-arid, and sub-humid regions; soil-water-plant-atmosphere relationships, plant water extraction, and evapotranspiration; salt and water flow in soils, soil heat flow, and modeling soil water extraction and evaporation.

LWRS 312 Fertilizer Technology and Use 3.0; 3 cr.
Fertilizers in agricultural development, current developments in fertilizer technology, fertigation, and special problems associated with fertilizer use and research methodology in soil fertility. *Prerequisite: LWRS 265.*

LWRS 316 Ground Water Hydrology 3.0; 3 cr.
Occurrence, storage, distribution, and movement of ground water; confined and unconfined aquifer properties, well-aquifer hydraulics and relationships, and ground water basin management.

LWRS 317 Surface Water Hydrology 3.0; 3 cr.
Relevant statistical concepts and extreme event distributions, rainfall frequency analysis, rainfall-runoff relationships, unit hydrograph theory, overland flow routing, and stochastic processes in hydrology.

LWRS 318 Soil Salinity and Management 3.0; 3 cr.
Diagnosis and properties of salt-affected soils; plant growth and salinity; water quality for irrigation, drainage, reclamation, and management of saline and sodic soils.

LWRS 320 Project Planning and Management 3.0; 3 cr.
Project preparation, evaluation, and management. *Alternate years.*

LWRS 321 Systems Analysis in Water Resources 3.0; 3 cr.
Basic concepts of formulation and modeling of simulation and optimization techniques in water resources; planning and operation of single and multi-reservoir systems; multi-basin river system simulation and management.

LWRS 324 Methods of Soil and Plant Tissue Analysis 2.3; 3 cr.
Analytical techniques, operation of instruments in plant analysis and in physical, chemical, and mineralogical analysis of soils.

- LWRS 325 Farmer Cooperatives and Credit 3.0; 3 cr.**
Focuses on the organization of farmers for higher income through improved resource use and competitive position. *Alternate years.*
- LWRS 326 Surface Irrigation Engineering 3.0; 3 cr.**
Principles of design, operation, and evaluation of surface irrigation systems; irrigation field design and field measurement techniques. *Prerequisite: consent of instructor.*
- LWRS 328 Sprinkler and Micro-Irrigation Engineering 3.0; 3 cr.**
Fundamentals of design, operation, evaluation, and selection of pressurized irrigation systems; pipeline economics, pump hydraulics, and pumping plant design considerations.
- LWRS 367 Soils Conservation 3.0; 3 cr.**
Mechanics and control of wind and water erosion of cultivated, range, and forest land; emphasis on land degradation and conservation problems of arid and semi-arid regions.
- LWRS 370 Materials Handling and Processing 3.0; 3 cr.**
Physical properties of agricultural materials; principles and practices in the transporting, conveying, grading, and processing of agricultural materials and products; storage and conditioning of grain and forage; transport and storage of fruits and vegetables.
- LWRS 372 Agricultural Machinery Management 3.0; 3 cr.**
Selection, adoption, and economics of agricultural machinery; machine, power, and labor performance; cost determination and management decisions; matching implements and tractors.
- LWRS 374 Operations Research Principles and Application 3.0; 3 cr.**
Introduction to different optimization techniques in operations research and their relations to applied problems in different fields of agriculture. *Prerequisite: MATH 201.*
- LWRS 375 Soil Mechanics in Tillage and Traction 3.0; 3 cr.**
Static and dynamic properties of soils, mechanics of tillage tools, design and analysis of tillage tools, design of traction and transport devices, traction performance and evaluation, and soil-machine systems. *Prerequisite: LWRS 225.*
- LWRS 376 Resource and Environmental Economics 3.0; 3 cr.**
Addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.
- LWRS 395 Graduate Seminar in Land and Water Resources 1.0; 1 cr.**
- LWRS 399 MS Thesis**