

HYDROLOGIC SCIENCES (GRADUATE GROUP)

College of Agricultural & Environmental Sciences

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Group Office

1152 Plant & Environmental Sciences Building; 530-752-1669; Hydrologic Sciences Graduate Group (<http://hsgg.ucdavis.edu/>); Faculty (<https://www.hsgg.ucdavis.edu/faculty/>)

- Hydrologic Sciences, Master of Science (<https://catalog.ucdavis.edu/departments-programs-degrees/hydrologic-sciences-graduate-group/hydrologic-sciences-ms/>)
- Hydrologic Sciences, Doctor of Philosophy (<https://catalog.ucdavis.edu/departments-programs-degrees/hydrologic-sciences-graduate-group/hydrologic-sciences-phd/>)

Hydrologic Sciences (HYD)

HYD 201A – Hydrologic Sciences Core Survey (3 units)

Course Description: Considers the primary sub-disciplines while reviewing the fundamental scientific concepts/processes of the hydrologic sciences research community, and includes a basic writing component.

Learning Activities: Lecture/Discussion 2 hour(s), Project.

Grade Mode: Letter.

HYD 201B – Hydrologic Sciences Core Seminar (1 unit)

Course Description: Exposes students to the research underway in the Hydrologic Sciences Graduate Group as well as provide them the opportunity to present and refine their research through interaction with other students in the Graduate Group.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 2 time(s).

Grade Mode: Pass/No Pass only.

HYD 210 – Vadose Modeling & Characterization (3 units)

Course Description: Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases.

Prerequisite(s): SSC 107; or consent of instructor.

Learning Activities: Lecture 1.50 hour(s), Laboratory 3 hour(s), Discussion 0.50 hour(s).

Grade Mode: Letter.

HYD 241 – Precision Irrigation Systems & Management (3 units)

Course Description: Advanced irrigation science and engineering for agricultural, horticultural, engineering, and hydrology graduate students. Precision irrigation techniques for application of water to meet specific requirements of individual plants or management units and maximum economic benefits of crop production.

Prerequisite(s): ABT 110; SSC 100; HYD 110; EBS 145.

Learning Activities: Lecture 3 hour(s).

Cross Listing: EBS 241.

Grade Mode: Letter.

HYD 242 – Hydrology & Sustainability of Irrigated Lands (3 units)

Course Description: Impact of irrigated agricultural on groundwater depletion, surface water and groundwater quality, soil salinization, downstream ecosystems, and seawater intrusion. Exploration of efficient resource use, and policies adopted in California to enhance sustainability of irrigated crop production.

Prerequisite(s): ABT 110 or ESM 110 or HYD 110 or EBS 145.

Learning Activities: Lecture 3 hour(s).

Cross Listing: EBS 242.

Grade Mode: Letter.

HYD 243 – Water Resource Planning & Management (3 units)

Course Description: Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models.

Prerequisite(s): HYD 141 or ECI 142.

Learning Activities: Lecture 3 hour(s).

Cross Listing: EBS 243.

Grade Mode: Letter.

HYD 245 – Climate Change, Water & Society (4 units)

Course Description: Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article.

Learning Activities: Lecture 4 hour(s).

Enrollment Restriction(s): Limited to 25 students.

Cross Listing: ATM 245, ECL 245.

Grade Mode: Letter.

HYD 252 – Hillslope Geomorphology & Sediment Budgets (4 units)

Course Description: Exploration of theoretical and empirical foundations of sediment production on hillslopes using computer models and field experiments to promote an understanding of how watersheds evolve naturally and with human impacts.

Prerequisite(s): HYD 141 or GEL 035 or ECI 142; or consent of instructor.

Learning Activities: Lecture 3 hour(s), Fieldwork 3 hour(s).

Grade Mode: Letter.

HYD 254Y – Ecohydraulics (3 units)

Course Description: Use of 2D hydrodynamic modeling to perform instream flow assessment by exploring flow-dependent hydraulic patterns at multiple spatial scales and extrapolating results with empirical and analytical functions to evaluate geomorphic resilience and ecological functions.

Learning Activities: Web Virtual Lecture 1 hour(s), Discussion 1 hour(s), Extensive Problem Solving.

Grade Mode: Letter.

HYD 256 – Geomorphology of Estuaries & Deltas (4 units)

Course Description: Survey of the processes and landforms associated with sediment deposition in the coastal zone. Application of geomorphic principles to coastal management issues.

Prerequisite(s): HYD 141 or GEL 035; or ECI 042 or consent of instructor.

Learning Activities: Lecture 3 hour(s), Fieldwork 3 hour(s).

Grade Mode: Letter.

HYD 264 – Modeling of Hydrologic Processes (3 units)

Course Description: Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises.

Prerequisite(s): HYD 141; STA 102; or the equivalents.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

HYD 269 – Numerical Modeling of Groundwater Systems (3 units)

Course Description: Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics.

Prerequisite(s): MAT 022B; (ECI 144; or HYD 145A); HYD 145B.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

HYD 273 – Introduction to Geostatistics (4 units)

Course Description: Statistical treatment of spatial data with hydrologic emphasis. Topics: theory of random functions, variogram analysis, Kriging/co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Geostatistical software use.

Prerequisite(s): STA 130A; STA 130B; or the equivalent.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

HYD 274 – Practice of Groundwater Flow & Transport Modeling (3 units)

Course Description: Selecting and building groundwater flow and transport models. Planning, preparation, execution, presentation, and review of modeling projects. Review of methods, assumptions, and limitations of groundwater models; practicing with MODFLOW, MT3D, associated GUI, and with other groundwater modeling software of choice.

Learning Activities: Lecture 2 hour(s), Lecture/Lab 0.50 hour(s), Lecture/Discussion 0.50 hour(s).

Grade Mode: Letter.

HYD 275 – Analysis of Spatial Processes (3 units)

Course Description: Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical applications.

Prerequisite(s): STA 102; or the equivalent; HYD 273 or STA 273A recommended.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

HYD 286 – Selected Topics in Environmental Remote Sensing (3 units)

Course Description: In depth investigation of advanced topics in remote sensing applications, measurements, and theory.

Prerequisite(s): ERS 186; consent of instructor, or equivalent; ERS 186L recommended.

Learning Activities: Discussion 2 hour(s), Lecture 1 hour(s), Project.

Repeat Credit: May be repeated.

Cross Listing: GEO 286.

Grade Mode: Letter.

HYD 290 – Seminar in Hydrologic Science (1 unit)

Course Description: Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics vary.

Prerequisite(s): Consent of instructor. Graduate standing and background in Hydrologic Science.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

HYD 298 – Group Study (1-5 units)

Course Description: Group study.

Prerequisite(s): Consent of instructor; graduate standing.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.

HYD 299 – Research (1-12 units)

Course Description: Research.

Prerequisite(s): Consent of instructor. Graduate standing.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.