#### NRM 85 Course Outline as of Fall 2015

## **CATALOG INFORMATION**

Dept and Nbr: NRM 85 Title: WATERSHED HYDRO

Full Title: Watershed Hydrology

Last Reviewed: 2/14/2011

Units		Course Hours per Week		Nbr of Weeks	<b>Course Hours Total</b>	
Maximum	4.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	4.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 210.00

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

### **Catalog Description:**

This course serves as an introduction to forest and wildland hydrology and the management of water resources on a watershed scale, including urbanization and urban ecology impacts. The material covered will include the fundamental concepts of the hydrologic cycle: precipitation, interception, evaporation, evapotranspiration and runoff, infiltration, and groundwater. The fundamentals of protection, management, and monitoring of water in California will be emphasized.

# **Prerequisites/Corequisites:**

## **Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100 and Course Eligibility for MATH 150A

#### **Limits on Enrollment:**

#### **Schedule of Classes Information:**

Description: This course serves as an introduction to forest and wildland hydrology, and the management of water resources on a watershed scale, including urbanization and urban ecology impacts. The material covered will include the fundamental concepts of the hydrologic cycle:

precipitation, interception, evaporation, evapotranspiration and runoff, infiltration, and groundwater. The fundamentals of protection, management, and monitoring of water in California will be emphasized. (Grade or P/NP)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 100 or ESL 100 and Course Eligibility for MATH 150A

Limits on Enrollment: Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

# **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

AS Degree: Area Effective: Inactive: CSU GE: Transfer Area Effective: Inactive:

**IGETC:** Transfer Area Effective: Inactive:

**CSU Transfer:** Transferable Effective: Fall 1999 Inactive: Fall 2019

**UC Transfer:** Effective: Inactive:

CID:

# Certificate/Major Applicable:

Both Certificate and Major Applicable

# **COURSE CONTENT**

### **Outcomes and Objectives:**

Upon completion of this course, students will be able to:

- 1. Define the hydrologic cycle and explain the various processes of the cycle.
- 2. Construct a stream hydrograph and analyze its various components.
- 3. Inventory and appraise various watershed characteristics such as area, drainage density, relief ratio, circularity ratio, stream order, etc.
- 4. Calculate the average precipitation of a drainage basin using various approaches including Theissen polygon method, Isohyetal method, and arithmetic average method.
- 5. Recognize and demonstrate runoff and infiltration principles and processes.
- 6. Describe the effects of various resource management practices on water yield.
- 7. Recognize and discuss important water issues in California.

# **Topics and Scope:**

- I. Introduction to Water Resources in California
  - A. History of water development.
  - B. Regional basis of supply and demand for water.
  - C. Conflicts among the different user groups.
  - D. State, federal and local water projects in California.
- II. The Hydrologic Cycle, Water and Energy Budgets
  - A. Physical processes, storage and transport of water.
  - B. Water: physical properties, molecular structure and phases.
  - C. Energy exchange and effect on hydrologic functioning.
  - D. Analysis of urbanization and urban ecology to watershed health.

## III. Atmospheric Precipitation

- A. Types of precipitation: rain, snow, fog.
- B. Measurement: annual amounts, intensity and seasonal variation.
- C. Geographic and topographic variation of precipitation.
- D. Basin precipitation: measurement and analysis, Theissen polygon method, Isohyetal method, and arithmetic average method.
- IV. Canopy Interception and Redistribution of Water
  - A. Vegetation canopy characteristics and water storage capacity.
  - B. Canopy throughfall and stemflow.
  - C. Litter interception and potential infiltration.
  - D. Evapotranspiration of water.
- V. Infiltration and Runoff
  - A. characteristics, vegetation disturbance and effect on infiltration rates.
  - B. Surface and subsurface flow of water.
  - C. Measurement of water yield, and stream hydrograph construction and analysis.
- VI. Measurement of Watershed Characteristics
  - A. Basin area, aspect and topographic relief.
  - B. Stream order, drainage density, and total length of perennial and intermittent streams.
  - C. Streamflow, discharge rates, erosion and sedimentation.
- VII. Resource Management Activities and Effect on Water Quality and Quantity
  - A. Timber harvesting and log road construction.
  - B. Gravel mining and related impacts
  - C. Wildland fire and cumulative management effects.

### **Assignment:**

- 1. Reading assignments from the text (approximately 15-20 pages per week).
- 2. Four field lab reports during the semester, such as measurement of water flow, and stream cross section construction, and sediment and channel analysis.
- 3. Skill demonstration of use of field equipment.
- 4. Construction of a river hydrograph.
- 5. Design of drainage structures from information gathered in the field.
- 6. Mid-term and final.

#### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.

Writing 0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems, river hydrograph, lab reports

Problem solving 30 - 50%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Class performances, river hydrograph, field work, performance exams, design of drainage structure

Skill Demonstrations 40 - 60%

**Exams:** All forms of formal testing, other than skill performance exams.

Midterm and Final: Multiple choice, true/false, matching items, completion

Exams 10 - 25%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category 0 - 0%

# **Representative Textbooks and Materials:**

Watersheds: Processes, Assessment and Management, by Paul A. DeBarry. Wiley, John & Sons, publisher. 2004. (Classic)