Syllabus

Course Location, Textbook, Instructor Contact Information

Class meetings:	2:00-3:20PM, T-TH, IE205 (Section 001)
Instructor:	Theodore G. Cleveland, CE Room 203F
TA:	TBD
Office Hours:	TBD
Telephone:	(806)834-5101
Cell Phone:	(832)722-4185 (more reliable than office phone)
E-mail:	`theodore.cleveland@ttu.edu`
Web:	`www.rtfmps.com/ce3354-2016-1/`
Textbook(s) :	**?** (Copy on Server)
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Catalog Description

> **3354. Engineering Hydrology (3:3:0).** Prerequisite: CE 3305. Analysis and design methods related to the occurrence and distribution of surface and groundwater; precipitation, infiltration, runoff, and frequency analysis. (Writing Intensive)

Course Objectives

The purpose of this class is to study the theory and application of hydrologic concepts; learn how to use predictive tools such as charts and computer programs, and apply these tools to the analysis and design of collection and drainage systems. Preparation of professional reports is a substantial component of this course.

Knowledge, Skills, Abilities (KSA)

During this course the student will

1. Read, synthesize, and communicate ideas presented in current and historical technical literature.
2. Delineate watersheds from maps and determine common metrics (area, slope, main channel length) using digital planimetry.

3. Perform hydrologic computations using Excel, as needed[1].
4. Perform hydrologic simulation using HEC-HMS.
5. Size and select engineering materials (pipes) for use in drainage engineering.
6. Prepare professional reports for the design of a stormwater management system.

ABET Program Outcomes

A subset of the ABET Program Outcomes are addressed in CE 3354, these outcomes are listed below:[2]

`3[a].` Ability to apply knowledge of mathematics, science, and engineering.

`3[b].` Ability to design and conduct experiments, as well as to analyze and interpret data.

`3[c].` Ability to design a system, component, or process to meet desired needs.

`3[e].` Ability to identify, formulate, and solve engineering problems.

`3[i].` Recognition of need for life-long learning.

`3[k].` Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

`8[e].` (Civil Engineering) Proficiency in water resources engineering.

`8[a].` (Environmental Engineering) Proficiency in mathematics through differential equations, probability and statistics, calculus-based physics, general chemistry, an earth science, e.g., geology, meteorology, soil science, relevant to the program of study, a biological science, e.g., microbiology, aquatic biology, toxicology relevant to the program of study, and fluid mechanics relevant to the program of study.

`8[d].` (Environmental Engineering) Ability to perform engineering design by means of design experiences integrated throughout the professional component of the curriculum.

`8[f].` (Environmental Engineering) Data acquisition for hydrologic design is explained and the role of certain organizations in providing information and guidance is emphasized.

[1] This task is principally to develop understanding of how the professional tools function. Excel is a professional tool in its own right, but the skill level to use for engineering is beyond the scope of this class.

[2] Item 3[b] below is only partially fulfilled — in this course students will analyze and interpret data, design of experiments is beyond the scope of the class.

TEXAS TECH UNIVERSITY™

Operating Policy and Procedure

OP 10.08: Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act (Section 504)

DATE: March 26, 2013

PURPOSE: The purpose of this Operating Policy/Procedure (OP) is to ensure understanding of the university's responsibilities under the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act (Section 504).

REVIEW: This OP will be reviewed in November of even-numbered years by the senior vice provost and the associate vice provost for student affairs with substantive revisions forwarded to the provost and senior vice president.

POLICY/PROCEDURE

1. **Policy**

   a. The Americans with Disabilities Act (ADA) of 1990 (PL 101-336) mandates equal opportunities for persons with disabilities in all public facilities, programs, activities, services, and benefits derived from them. Section 504 of the Rehabilitation Act of 1973 (PL 93-112), as amended, and PL 93-516 mandate equal opportunity for qualified persons with disabilities in all programs, activities, and services of recipients of federal financial assistance. Both ADA and Section 504 are civil rights statutes that prohibit discrimination on the basis of disability, obligate colleges and universities to make certain adjustments and accommodations, and offer to persons with disabilities the opportunity to participate fully in all institutional programs and activities. Texas Tech University adheres to these regulations and the Texas Commission on Human Rights Act.

   In addition, on September 23, 1996, the U.S. Department of Justice issued certification that the Texas Accessibility Standards, the Texas Architectural Barriers Act, and the Architectural Barriers Administrative Rules meet or exceed the new construction and alterations requirements of Title III of the Americans with Disabilities Act. Texas Tech University is compliant with these regulations.

   b. Texas Tech University provides that all educational and other programs and activities are available to persons with disabilities in the most integrated setting appropriate. Students, employees, applicants, and other individuals with disabilities served by Texas Tech are not segregated, separated, or treated differently on the basis of a disability. Texas Tech University will make reasonable accommodation for the known physical or mental impairment of qualified individuals with disabilities. Reasonable accommodation includes modification or adjustment of a job process that will enable a qualified individual with a disability to perform the essential functions of his or her job.

   c. Texas Tech University does not require persons with disabilities to take advantage of all adjustments, accommodations, or special services that might be available to persons with similar disabilities.

d. Any qualified individual with a disability may request a reasonable accommodation if her/his disability limits one or more life activities, has a record of such impairment, or is regarded as having such impairment. A qualified individual with a disability can perform the essential functions of the position with or without reasonable accommodation.

2. **Procedures**

a. Communications and printed materials for students, employees, and program participants, as well as prospective students, employees, and participants, are accessible to persons who require Braille, large print, taped formats, sign language interpreters, or by Telecommunications Device for the Deaf (TDD). Those requiring such accommodation are requested to notify the appropriate program sponsor within 72 hours of the need for such accommodation so that there will be time to provide accessible materials. Classroom accommodation may take three to five working days notice.

b. The president of Texas Tech University or designee will be responsible for overseeing the reasonable workplace accommodation policy and procedures to ensure compliance. The campus ADA and Section 504 coordinator is the managing director of Student Disability Services, located in West Hall, Room 335, (806) 742-2405. The ADA and Section 504 coordinator will take complaints and concerns regarding compliance issues and direct them to the appropriate entity for attention.

c. Any employee requiring an accommodation shall notify her/his supervisor and inform the supervisor of the nature of the disability. The employee shall provide a medical statement that contains a diagnosis, prognosis, and an evaluation explaining the impact the impairment will have on the employee's ability to perform the essential functions of the employee's position. The statement should also identify the major life activity that is substantially limited as a result of the disability.

d. If the employee is a faculty member, copies of this documentation should be provided to the ADA compliance officer for faculty, the senior vice provost, in the Administration Building, Room 104, (806) 742-2184. In the case of an accommodation for a member of the staff, documentation should be provided to the Office of the Managing Director of Human Resources, Doak Conference Center, Room 166, (806) 742-3851. In the case of a request for accommodation from a student, copies of the documentation should be provided to the managing director of Student Disability Services in West Hall, Room 335, (806) 742-2405. Students should also refer to OP 34.22 for guidelines on establishing reasonable accommodation.

e. Based on the information provided, the university designee assigned to the relevant group, along with the immediate supervisor, will establish procedures for providing reasonable accommodation. In the case of a student, Student Disability Services will consult with all parties to assure that reasonable accommodation is accomplished.

f. If accommodation would constitute an undue hardship for the university in the form of costs involved, impact on operations and business, or risk to the safety of the requestor or others, the university designee and the immediate supervisor, or staff of Student Disability Services in the case of a student, shall prepare documentation stating the reasons for such a decision.

g. Texas Tech University will maintain the confidentiality of all medical and ADA information concerning employees and students. These records will be kept separate from personnel files and will be accessible only to authorized personnel.

3. **Notices**

a. Faculty

(1) Faculty members are required to insert the following into each course syllabus:

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as possible to make necessary arrangements. Students must present appropriate verification from Student Disability Services during the instructor's office hours. Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services office in 335 West Hall or call 806-742-2405.

(2) Faculty members are required to announce the following within the first two class periods:

"I would appreciate hearing from anyone who has a disability that may require special accommodation. I am sure we can work out whatever arrangements are necessary. Please make an appointment with me during my office hours."

b. General Public

(1) The following statement should be included in materials developed and available through the university:

Texas Tech University provides for program accessibility for members of the public. Those requiring accessible materials in Braille, large print, tape format, use of a sign language interpreter, or Telecommunications Device for the Deaf are requested to notify the university at least 72 hours before the need for such services in order that time will be adequate for their preparation.

(2) Such notice should be inserted in university-related programs open to the public.

4. **Grievance**

a. ADA provides for private right of action for injunctive relief, attorney fees, and compensatory damages against both individuals and institutions. At least one person is required to be designated to receive ADA and/or Section 504 grievances and to coordinate an institution's effort under ADA and Section 504. At Texas Tech University, they are as follows:

(1) Employee and Public Concerns – Senior Vice Provost, Administration Building, Room 104, (806) 742-2184.

(2) Student Concerns –Associate Vice Provost for Student Affairs, Student Union Building, Room 201AA, (806) 742-2984.

b. Texas Tech University fully complies with ADA and Section 504 guidelines on employment of people with disabilities. Skills or aptitudes necessary to perform the job are clearly stated and available to applicants.

Course Specific Policies

Disability:

Texas Tech policy provided as part of syllabus (see preceding section).

Religious Holidays:

"A student who intends to observe a religious holy day (as defined by OP 34.19) should make that intention known to the instructor prior to the absence in order to receive accommodations prescribed by OP 34.19."

Cellphones/Pagers:

Please set your personal communication devices to silent ring or off during class. Do not take calls in class. Disturbance during class time is not acceptable.

Prerequisites:

Mastery of material from CE 3305 or equivalent is expected.

Attendance:

Roll will be taken to determine attendance for class participation. Please let the instructor know in advance if you must miss a class for a legitimate reason[3].

Evaluation Instruments and Grading

Student performance will be evaluated using attendance (coming to class), exercises (homework), project reports, and examinations. The exams will derive much of their content from the exercises. At the end of the semester students are to turn in a portfolio of all graded work. The portfolio should be comprised of photocopies of exercise materials, and exams 1 and 2. The project report should be submitted under separate cover. The portfolio should be bound using a binder clip. The portfolio will not be returned.

[3]Legitimate reasons include: Academically-related extracurricular activities (ASCE, AGU, etc.); Illness with documentation; Federal Family Leave Act Policies; Orders to activate (Military, Peace Officer, Public Health, etc.). Bring me some kind of documentation for such absences.

Exercises:

Team assignments will be assigned during the semester. These exercises will be graded on a ten point criteria[4].

1. Every homework assignment is to be accompanied by a descriptive report containing your analysis of the problem. Report materials should be prepared with a word processor. Hand computations may be turned in on engineering paper; important steps in each solution must be shown for credit. Legibility is determined by the grader; illegible materials will receive no credit.
2. Assignments are due at the beginning of class. Late assignments are not accepted. Be sure the team number and team members are on each page.
3. Due dates are shown in Table **??**; Exercises are denoted by `ES-#`

Engineering Report:

A project report comprised of various components developed during the course is to be completed. The project is introduced early in the semester and is related to the hydrologic analysis of a watershed. A draft report is due and shown as `RP-1`. This report will be critiqued and suggestions for the final report provided. An intermediate report is due and shown as `RP-2`. The final report, incorporating the suggestions is due at the last class meeting and is shown as `RP-3`.

Exams:

Three examinations will be given, they will be of approximately equal difficulty.

1. Examinations are open notes.
2. Examinations are comprehensive, even though the main focus will be the materials discussed prior to the examination.
3. Full credit for problems will only be given if all computations are documented.
4. Examination dates are shown in Table **??**.

[4]Legibility, correct method, and correct answer are components of the criteria. The grader will not diagnose sources of arithmetic or algebra errors unless the errors are obvious. Solutions are presented in class and posted on the server

Grading:

Final grades are determined based on performance during the semester. Letter grades will be assigned using University standards. The **approximate** weighting of graded material in determining the final grade is as follows[5]:

Item	Percent of Grade
Attendance	10%
Exercises	20%
Project Report	20%
Examinations	50%

Cheating: Dont.

[5]Graded materials with fewer than 100 points will have raw scores reported and will be normalized to 100 points for calculating the final grade.

Schedule

Table 1: Spring 2016 Course Schedule

DATE	TOPIC	READINGS	DUE
21JAN16	Introduction	CMM 1-9	
26JAN16	Hydrologic Systems	CMM 201-212; LS 1-42	
28JAN16	Hydrologic Data; Watersheds	CMM 24-31; SN	ES-1
2FEB16	Watershed Properties	SN	
4FEB16	Hydrologic Cycle	CMM 1-12, LS 12-17	ES-2
9FEB16	Probability Estimation Modeling	CMM 350-379; SN	
11FEB16	Flood Frequency (Bulletin 17B)	CMM 380-415; SN	ES-3
16FEB16	Design Storms (USA)	CMM 444-492	
18FEB16	Rational Runoff Method	CMM 493-506;522-527; LS 75-84	ES-4
23FEB16	Report Writing; Rainfall-Runoff	CMM 127-174;	
25FEB16	Workshop/Review	SN	*RP-1*
1MAR16	**Exam 1**		
3MAR16	Watershed Loss-ET	CMM 53-98	ES-5
8MAR16	Watershed Loss-Infiltration	CMM 99-126;140-154	
10MAR16	Unit Hydrograph-Theory	CMM 201-220; SN	ES-6
22MAR16	Unit Hydrograph-Analysis	CMM 216-229; LS; SN	
24MAR16	Unit Hydrograph-Synthesis	CMM 218-241	ES-7
29MAR16	Unit Hydrographs and HEC-HMS I	CMM 507-514; SN	
31MAR16	Level Pool Routing	CMM 242-252	ES-8
5APR16	Muskingum-Cunge Routing	CMM 302-304	
7APR16	Workshop/Review	SN	*RP-2*
12APR16	**Exam 2**		
14APR16	Reservoir Storage/Discharge – I	CMM 507-514; SN	
19APR16	Reservoir Storage/Discharge – II	CMM 507-514; SN	
21APR16	Groundwater Hydrology – I	SN;VM	ES-9
26APR16	Groundwater Hydrology – II	SN;VM	
28APR16	Well Hydraulics	SN;VM	ES-10
3MAY16	Flow Nets	SN;VM	
5MAY16	Contaminant Transport	SN	ES-11
10MAY16	Workshop/Review	SN	*RP-3*
13MAY16	**Exam 3**	IE-205@ 4:30-7:00 PM	

CMM = **?**; LS = **?** ; VM =**?**; SN = Server Notes

References

Chow, V.T., Maidment, D.R., Mays, L.W., 1988, Applied Hydrology: New York, McGraw-Hill.

Dooge, J.C.I. 1973. Linear Theory of Hydrologic Systems. ARS Technical Bulletin No. 1468. US Department of Agriculture, Washington, D.C.

Richard H. McCuen, Peggy A. Johnson, Robert M. Ragan, 2002. Highway Hydrology; Hydraulic Design Series Number 2, Second Edition. Federal Highway Administration, National Highway Institute, 4600 North Fairfax Drive, Suite 800, Arlington, Virginia 22203. 424p.

Viessman,W., Knapp, J.W., Lewis, G. L., and Harbaugh, T.E. 1977. "Groundwater Hydrology – Chapter 8" *in* Introduction to Hydrology 2ed. IEP Publishers, New York, 704p.