CEE 415 - Geometric Design of Roads
CEE 453 - Urban Hydrology and Hydraulics

Spring 2026 - Course Syllabus

Table 1: Instructor Information

Geometric Design	Drainage Design
Professor: Alireza Talebpour **Office location**: 1206 Newmark **Phone**: 847.644.2870 **Email**: ataleb@illinois.edu **Office hours**: Book an Appointment	**Professor:** Arthur Schmidt **Office:** 2022 CEE Building (Hydro Lab) **Email:** aschmidt@illinois.edu **Cell:** 217.649.9561 **Office Hours: TBD** or by appointment
TA: Eden Lin **Email:** ichenl2@illinois.edu	**TA Office Hours: TBD** **Location:** TBD

Course Website: Canvas

Course Description and Objectives

This course is the undergraduate integrated design class for students with a primary in Transportation Engineering or Water Resources Engineering and Science, as well as a graduate course for students without prior background in geometric design or drainage design. As an integrated design course, the principles of geometric and drainage design are presented in the context of the design of a roadway and associated drainage infrastructure. The objective of the course is to introduce students to modern and future challenges, design principles, and standards that control the geometric, drainage, and safety aspects of roadway and roadside design, using analysis tools for roadway, roadside, and drainage design. This course is designed to provide the students opportunity to get instruction and hands-on experience in applying some of the most commonly used models and methods to "real-world" engineering problems. The course is planned to force students to experience and work through some of the pitfalls associated with these models and methods. The range of problems is planned to give students enough background and experience that they will recognize circumstances that violate the assumptions behind the methods they are using and guide them to appropriately select an alternative approach.

The course emphasizes applying the materials presented in class to real-world engineering calculations. **Regular attendance is therefore expected**, since the material presented in class will provide much greater detail than the text or supplemental material. This course meets the integrated design project requirements detailed in the Civil Engineering Undergraduate Handbook. The semester-long design project will involve designing a roadway segment in the State of Illinois. This project will include several geometric challenges (existing geographic features, developing a preferred horizontal and vertical alignment and cross-section design, etc.) and hydrological and hydraulic challenges (designing for multiple stream and flood plain crossings, designing drainage features). Multidisciplinary teams of approximately 4-5 students will be assigned to balance complimentary technical knowledge, specialty skills, experience, and student level.

Prerequisites

While the Course Catalog lists the prerequisites as CEE 310 & CEE 350, we realize with merging the two courses it is likely that some students may lack one or the other of these courses. Therefore, we will provide the necessary background material on Canvas for students that have not had these prerequisite courses. All students are encouraged to review the materials and consult the instructors or TA for additional guidance.

Course Topics

A detailed account of topics to be covered in the course is presented at the end of this document (Table 5), and a topic summary is presented in Table 2 below.

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Table 2: Overview of Course Topics

Geometric Design	Drainage Design
• Analysis of factors in transportation facility design • Vehicle, driver, pedestrian, and cyclist characteristics • Roadway and roadside features • Design of horizontal and vertical alignment • Intersections • Roadway geometrics and design standards • Earthwork, mass haul, and economics • Automated and Connected Vehicles	• Hydrologic analysis of urban and urbanizing watersheds • Hydraulics design of drainage channels, conduits, and structures • Design of conventional (grey) storm water infrastructure • Design of 'water-sensitive' or 'green' stormwater management practices • Analysis of impact of floodplain encroachments

Course Expectations

Students are expected to:

1. Arrive on time and contribute actively to classroom discussions. On-line students are expected to watch the on-line lectures no later than midnight on the day after the scheduled lecture date and to contribute actively to meetings and discussions of their project team.
2. Attend each lecture, lab, in-class homework session, and project team session.
3. Contribute actively to your project team. On-line students are expected to use on-line tools to continue to actively contribute to your project team. This includes *In-class exercises, homework*, and work on your semester project deliverable. The details of the on-line tools will be provided in the first session of this class.
4. Refrain from distracting practices, e.g., conversations with classmates, watching movies, working on homework, texting, or browsing on your computer during lectures. These activities hinder your ability to learn the material and impact the learning of your classmates.
5. Communicate ideas, questions, and concerns promptly to the instructor. This will help you as well as other students in the class.

The instructors are committed to:

1. Arrive on time and contribute actively to classroom discussions.
2. Being well prepared on course subject materials.
3. Provide clear explanations and examples.
4. Help to assess each student's abilities and areas of growth.
5. Provide relevant and challenging homework and in-class exercises, quizzes, and exams.
6. Maximize the potential for learning by giving useful and timely feedback. The instructors will provide additional resources (e.g., on-line office hours, supplemental videos) to provide on-line as well as in-person students with timely feedback to questions.

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7. Start and finish class on time.
8. Maintain a positive, respectful learning environment.

Class Format

This course has scheduled meeting times for approximately six hours per week (MWF 3:00 to 4:50). The general format for these times is a lecture/discussion for the first hour, *i.e.*, from 3:00 to 3:50 MWF. In general, the second hour (4:00 to 4:50) will be used for:

- Homework and exercises;
- Computer lab sessions; and
- Semester project activities.

Please see Table 5 at the end of the document for a weekly breakup of class activities. Note that this schedule is tentative and subject to change to maximize students' learning. Project lab sessions will demonstrate and train students on the required software packages that will be needed for the semester project. Team project activities include regular time for students to work on their project teams and guest speakers. The instructors and TA will also be available during these sessions to provide guidance.

On-line instruction will be provided both synchronously using *Zoom* and asynchronously using recorded videos on the lectures. The recorded videos will be available from the *CEE 415/453 Spring 2026* channel in Illinois MediaSpace (link in the course homepage on Canvas). We will schedule a synchronous *Zoom* meeting for each class (3:00 – 4:50 PM MWF) so that on-line students can seek input/coaching on course materials, homework, *in-class exercises*, and project work. Once project teams have been assigned, we will enable breakout rooms in Zoom to facilitate team collaboration on in-class work. Computer lab sessions will be recorded and posted to *CEE 415/453 Spring 2026* channel in Illinois MediaSpace. Some of the specialized software used in the course is available in the Mechanical Engineering Workstation Lab. Much of the software also is available for *Windows* users to download and install on their computers.

Zoom. All lectures and office hours for this course will also have a Zoom session enabled to allow on-line students access. The Zoom session links are imbedded within the Canvas Course web site. Using your Illinois e-mail address, login to Canvas and go to the Zoom Link on the course Homepage to locate the appropriate Zoom link (listed by date for each class session). Be sure to update your Zoom software regularly, so you can take advantage of all the latest features.

Required Technology: All students should have high-speed, reliable Internet connections and a computer that can handle the course software. Some of the software used in this course only runs on Windows computers. We will try to ensure that all project teams have some team members with Windows computers.

Evaluation and Grading

Student evaluation will be based on homework exercises, quizzes, two exams, an integrated design project, and in-class activities. The relative weights assigned to each of these components is shown in Table 3.

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Table 3: Course Evaluation and Weights for Grades

Assessment	Percent of grade
Homework	20%
All About Me Video	3%
Mastery exercises	[4% extra credit]
Quizzes (drop 2)	15%
Exams (2)	30%
Design Project	32%
Total	**100%**

Homework

This class is going to have two types of 'homework' exercises: <u>*Homework*</u> and *Mastery* exercises. Both serve to give the students an opportunity to develop their technical competency on the lectures and reading materials. The *Homework* exercises provide an opportunity for you to practice and demonstrate your competence on the concepts taught in class. . The *Mastery* exercises are not a required part of your grade but will allow you to earn extra credit points (up to 4% of total semester grade). The *Mastery exercises* will be the same exercises as the *Homework* exercises but will be available throughout the semester to allow you to individually practice these exercises until you have mastered them. The *Mastery* exercises will allow unlimited attempts without penalty. In order to get the full potential credit for the *Mastery exercises,* you will have to successfully complete each exercise at least two times Most of the homework exercises will use the *PrairieLearn* platform because *PrairieLearn* allows students multiple attempts at randomly generated variants of the problem, which helps to develop mastery of each exercise

Homework assignments will be posted at the beginning of class and will be due *at the beginning of class* on the date mentioned on the assignment. While teams are strongly encouraged to work together to learn the concepts of each exercise, all students are expected to **<u>individually</u>** submit their solution to each exercise. Because *PrairieLearn* will generate a unique problem variant for each student, the solution approach will be the same for all students, but each student will have a unique problem variant and solution. **As in professional practice, submissions submitted after the deadline will not be accepted.**
Please note that each individual exercise contributes a different amount of the total semester grade depending on the relative points assigned.

All About Me Video Introduction*:* Creating community is a vitally important aspect of meaningful and enjoyable learning. Being a part of a learning community helps students feel more involved and connected, and thus, helps them want to learn the course content more deeply. The goal of the *All About Me* assignment is to help build community in CEE 415/453 by sharing a little about yourself with your classmates and the instructor. In this assignment you will produce a short video (2 to 4 minutes) in which you tell us a little bit about yourself. Be sure to include your name, where you are from or where you live, what you are currently doing (e.g., 'I'm a junior specializing in EWES with secondary in construction materials', 'I'm a M.S. student in Transportation doing research on autonomous vehicles', 'I'm an on-line M.S. student and work full time at a water-resources consulting company', etc.,), how you got interested in studying Civil & Environmental Engineering, and 3 things you love to do. You will upload your video to the Media Gallery on the course Canvas website. You are encouraged to watch the videos posted by the instructor and your classmates. The *All About Me* assignment is worth 3% of your final grade.

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Quizzes

This class will include multiple quizzes (approximately weekly) that cover the material presented in that day's lecture. These are due 19 hours after the scheduled end of that day's class time (noon Tuesday, Thursday, and Saturday). The objectives of these quizzes are to: 1) promote regular lecture attendance, and 2) encourage students to keep up with lecture material and assigned readings. **We will drop your lowest two quiz scores** in calculating your overall quiz grade. Therefore, there will be **no make-up quizzes, even for valid excuses**.

Exams

This course will have two exams over the course of the semester, *taken individually* by each student. The exams will cover lecture material, assigned readings, other supplemental reading/manuals, and homework exercises. We are planning for the exams to be open-book, open-notes take-home exams where **students will have the flexibility to select a 90- to 120-minute window within the exam week to complete the test**. However, the instructors reserve the right to change the exam format to an in-class examination if we become concerned that students are relying on their teammates or generative A.I. rather than doing their own work. If the format of an exam is changed to in-class, we will provide at least one week notice of the change in format. The exams will be made available via *Canvas* and *PrairieLearn* and must be submitted online. The primary tool for the exam is *PrairieLearn*. However, *PrairieLearn* has limited capability to accept additional supporting material (e.g., scans of hand calculations, spreadsheets, explanatory text). Therefore we will provide a Canvas Assignment for each exam that will allow you to upload time-stamped supporting documents. Because the end time of the exam is fixed, students need to ensure that they have sufficient time after completing the exam on *PrairieLearn* to scan any hand-written work, upload all the files to *Canvas,* and submit the exam before *Canvas* closes the submission. The last exam will be scheduled during the final exam period.

Any questions regarding your exam score must be discussed with the instructor *within one week* after the exam score is returned to you. Any student registered with the **Division of Rehabilitation Services** must self-identify with the instructor at least one week prior to the first exam.

Design Project

The graded work related to the semester project consists of **three project reports**. These will be due at the *beginning* of the class on the specified date. **As in professional practice, submissions submitted after the deadline will not be accepted.**

If you cannot turn your assignment in on time and feel you have a valid excuse, please see the instructors ***before the due date*** about making alternate arrangements for submitting your assignment.

The semester project is a team effort and a grade will be assigned for each team based on the submitted deliverable. Our expectation is that each team functions well and distributes work in a manner that all team members make significant, valuable contributions to the work and therefore equal grades for all team members are appropriate. However, we realize that sometimes there are issues with team dynamics and some team members may not contribute as much to the final deliverable. Our hope is that issues with team dynamics can be resolved internally. If a team cannot resolve issues internally, we hope that they will involve the instructors early in the semester to facilitate a resolution acceptable to all team members. After each project deliverable we will provide an on-line assessment of your team's performance. In cases where there is a significant discrepancy between team members' contributions to the Deliverable, the Instructors may apply a point deduction (up to 30% of the total points on that Deliverable) to team members whose conributions were significantly less than those of their teammates.

Grading

Based on the weighted score of each student obtained through the rubric in Table 3, grades will be assigned as shown in Table 4.

Table 4: Grade Distribution

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A+	98%+	C+	78 - <80%
A	92 - <98%	C	72 - <78%
A-	90 - <92%	C-	70 - <72%
B+	88 - <90%	D+	68 - <70%
B	82 - <88%	D	62 - <68%
B-	80 - <82%	D-	60 - <62%

Grades will not be curved. It is possible that everyone earns an "A." Collaboration with team members is encouraged, but final grades are based on individual performance except for the team activities.

Classroom and Course Behavior

Classroom lectures will be informal, and you are encouraged to ask questions, comment, and participate in relevant discussion before, during and after class as well as in office hours. Making a favorable or unfavorable impression through your classroom etiquette could influence your grade enough to change a borderline grade and influence future recommendations from the instructors. **It is strongly encouraged to discuss academic or personal matters that may affect performance in the course with the instructors as soon as possible and not the last week of class.**

Students will be expected to respect and to maintain the university policy on academic integrity. For a discussion of academic integrity, please refer to the *Code on Campus Affairs and Regulations Applying to All Students*. If you are uncertain as to whether a certain action constitutes an infraction of academic integrity, please discuss it with the instructor before carrying out that action. Cheating on quizzes, homework, or exams will result in an automatic zero and reporting to the FAIR system.

Absence Policy: The University requires an absence/attendance policy, so here goes: You are all responsible adults. You are experienced enough to realize that learning is a privilege and that your success in learning is related to your active participation in course discussions and exercises. In addition, your contributions to classroom discussions are important to us and valuable to enhance your learning as well as that of your classmate. We hope that you will enhance this class by regularly sharing your observations and ideas in course discussions and in working with your classmates on exercises. Hence, we strongly encourage you to attend in-person lectures to the extent it is possible. All lecture slides will be available on Canvas and all lectures are recorded and available in MediaSpace, so if you are unable to attend lecture you can still see the material, although you will miss out on the opportunity for in-class discussion. When possible, please let the instructional team know in advance of your missing lecture as this helps us plan in-class activities.

Course Resources

Textbook

Traffic and Highway Engineering, by Nicholas J. Garber and Lester A. Hoel, CENGAGE Learning, 5th Edition.

The e-book or hardcopy can be purchased from the publisher:

https://www.cengage.com/c/traffic-and-highway-engineering-5e-garber/9781133605157/

All reading assignments for the Hydrology/Hydraulics portion of the course are available in the *Course notes for Drainage Hydraulics and Hydrology Portion of CEE 415/453* on *Canvas*.

Additional Reference Texts

- *A Policy on Geometric Design of Highways and Streets*, American Association of State Highways and Transportation Officials (AASHTO), 2018. 7th edition.

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- *Bureau of Design and Environment Manual* (2019), *Bureau of Local Roads and Streets Manual* (2018) - Illinois Department of Transportation (IDOT), Division of Highways.
- Mays, L.W., (2001). *Storm Water Collection Systems Design Handbook*, McGraw-Hill.
- Additional reference materials are available on the course web site.

Design Project Expectations

The design project is intended to help students synthesize the knowledge acquired in your CEE education and apply it to a complex, interdisciplinary infrastructure problem. Part of the knowledge required to complete the semester project will come from content in this course, while other information will come from other CEE classes and reference materials.

The integrated design project is based on a proposal to design a roadway. This project requires students to design a facility that addresses a wide variety of real-world challenges including safety, drainage impacts on roadway and nearby residents, economics, and societal impacts (e.g., relocating landowners, avoiding vulnerable areas/communities). The project design teams will consist of *4 to 5 students*, with each team composed of approximately an equal number of students with transportation and water resources focus.

One of the key learning outcomes of this course is to build skills in working in multi-disciplinary teams. To facilitate this learning experience, we will use the *CATME TeamWork* software. To fairly distribute individual student strengths, we will assign interdisciplinary project teams with the *CATME* software at the beginning of the semester. The members of each team will work together by sharing data and calculations and submitting three reports. After each project deliverable, each team member will be asked to complete a team assessment with the *CATME* software where they assign each team member (including themselves) a percentage of contributed work. These self-assessments by the team members will be considered in assigning students' interim project grades.

Project teams are first expected to resolve disputes and perceived inequality in the work completed by each team member. Since learning team functioning skills is part of this course, the instructors will be available to facilitate resolution of unresolvable issues. In addition, if *CATME* assessments indicate a problem within a team, we will meet with the individuals and team to try to facilitate a resolution to the issues. If a student consistently contributes significantly less than their teammates, their project grade may be reduced to reflect the unequal effort.

The format of the project deliverables is a major requirement. All deliverables must be communicated *professionally*[1]. Neatness and organization are important, with a penalty assessed for work that cannot be read, understood, or interpreted. Graphs should have captions that clearly indicate what is being shown, axes and significant points should be clearly labeled, units of measurement should be specified in the axis labels, and a legend clearly showing the meaning of symbols, line styles, etc. should be included when more than one relation is included in the figure. When you include a figure, graph, or table, it must be numbered and given a title that must be referred to in the text (e.g., 'Figure 2.1 shows the plan and profile of the proposed roadway between stations 150+00 and 200+00.').

Pay attention to neatness, consistency and page layout when using spreadsheets, word processing software, model results, and other computer tools. Be especially careful when printing results from a spreadsheet, as studentsoften neglect to document (in words and/or equations) their approach and findings and often forget to highlight their final solution. Also, if you present the results from a spreadsheet, be careful to present only enough *significant digits* to be reasonable from an engineering perspective (e.g., reporting the earthwork as 1,302.356 yd^3 is not reasonable if the uncertainty is ±10 yd^3). Similarly, when presenting results from numerical models or analysis packages, do not simply paste figures from the software. A display figure from a model often does not translate directly into a good report illustration.

[1] We have provided documents in Canvas about preparing professionally formatted reports and technical memoranda. Please read and follow these guidelines.

CEE Honor Code

To foster and promote integrity among students, the CEE Honor Code was developed with input from several CEE undergraduate organizations, the CEE Graduate Student Advisory Committee, and the CEE Graduate Affairs Committee. You (the student) commit to honor the code each time you sign an exam or quiz, and implicitly whenever you turn in the class project assignments. The CEE Honor Code pledge is the following:

> I pledge to uphold the highest levels of professional and personal integrity in all of my actions, including 1) never assisting or receiving unfair assistance during exams, 2) never assisting or receiving assistance on class assignments beyond that specified by an instructor, and 3) always fully contributing to group activities that are part of a course activity.

Statement of Academic Integrity: The Code of Policies and Regulations Applying to All Students will be applied in all instances of academic misconduct committed by CEE 415/453 students. This applies to all exams, assignments, and on-line materials distributed or used in this course. [return to top]

Mental Health: Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Student Health Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

Counseling Center (217) 333-3704

McKinley Health Center (217) 333-2700

National Suicide Prevention Lifeline (800) 273-8255

Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

If you are in immediate danger, call 911.

*This statement is approved by the University of Illinois Counseling Center

Students with Disabilities

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor as soon as possible and provide the instructor with a Letter of Academic Accommodations from Disability Resources and Educational Services (DRES). To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class should apply for services with DRES and see the instructor as soon as possible. If you need accommodations for any sort of disability, please speak to the instructors after class, or make an appointment to see us. DRES provides students with academic accommodations, access, and support services. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-1970, e-mail disability@illinois.edu or visit the DRES website at http://www.disability.illinois.edu/.

Here is the direct link to apply for services at DRES:
https://www.disability.illinois.edu/applying-services.

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CEE 415/453 COURSE OUTLINE

Table 5: Course Schedule and Topic Outline

Date	Assigned Reading	Lecture Topic
21-Jan	Drainage_Hydrology&Hydraulics_Background.pdf	Hour 1: Overview, objectives, and syllabus Hour 2: Introduction to drainage concepts for transportation.
23-Jan	BTS Pocket Guide (Canvas); 1,2 - G & H, pp. 1-50	Hour 1: Transportation Safety & Geometric Design Intro Hour 2: Semester project overview
26-Jan	15 - G & H, pp. 771-779 ; 15 - G & H, pp. 779-788	Hour 1: Functional Classification & Roadway/Roadside Design Elements Hour 2: CATME Survey
28-Jan	3 - G & H, pp. 53-60	Hour 1: Vehicles Static, Kinematic, Dynamic Characteristics Hour 2: In-class Exercise #1
30-Jan	3 - G & H, pp. 60-75	Hour 1: Driver-Pedestrian-Cyclist Characteristics Hour 2: Introduction to semester project (geometric design)
2-Feb	Handout	Hour 1: Intelligent & Autonomous Vehicles Hour 2: Homework #1
4-Feb	3 - G & H, pp. 75-82	Hour 1: Braking Distance and Side Friction Hour 2: Lab Session (Google Maps)
6-Feb	3 - G & H, pp. 82-84	Hour 1: R_{min} and Stopping Sight Distance Hour 2: Project Session: Working in teams
9-Feb	3 - G & H, pp. 84-87	Hour 1: Decision and Passing Sight Distance Hour 2: In-class Exercise #2
11-Feb	15 - G & H, pp. 802-814	Hour 1: Horizontal Alignment Hour 2: Lab Session EH 406B1- Civil3D
13-Feb	15 - G & H, pp. 817-820	Hour 1: Horizontal Alignment *con't* Hour 2: Project Session
16-Feb	15 - G & H, pp. 814-817	Hour 1: Curve Transitions Hour 2: Homework #2 *Project Deliverable #1*
18-Feb		Hour 1: Curve Transitions *con't* Hour 2: Lab Session EH 406B1- Civil3D
20-Feb	15 - G & H, pp. 788-802	Hour 1: Vertical Alignment Hour 2: Project Session

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Table 5: Course Schedule and Topic Outline, cont'd.

Date	Assigned Reading	Lecture Topic
23-Feb	-	Hour 1: Vertical Alignment *con't* Hour 2: Exam Review
25-Feb	-	Hour 1: Vertical Alignment *con't* Hour 2: Lab Session EH 406B1- Civil3D
27-Feb	14 - G & H, pp. 757-765	Hour 1: Profiles Cut/Fill Hour 2: In-Class Exercise #3
2-Mar	14 - G & H, pp. 736-757	Hour 1: Mass Haul Hour 2: Lab Session EH 406B1- Civil3D
4-Mar	7 – G&H, pp. 305-313	Hour 1: Intro to Intersections Hour 2: Project Session
6-Mar	7- G&H, pp. 315-324, 330-338	Hour 1: Intersection Design Hour 2: Homework #3
9-Mar	7- G&H	Hour 1: Intersection Design (con't)
11-Mar		Roadway Design Section Team Presentation Project Deliverable #2
13-Mar	-	**Exam #1**
Spring Break March 14-22		
23-Mar	Hydrology & Hydraulics (H&H) Course Notes, pp 26-30	Hour 1: Overview of Urban H&H Hour 2: Project Session
25-Mar	H&H Notes, pp 51-64	Hour 1: Catchment Hydrology Hour 2: Lab
27-Mar	H&H Notes, pp 38-51; 74 – 85 (§6.2); pp.94-96; pp 100-104 (stop at §4.2.1)	Hour 1: Design Rainfall Hour 2: Project
30-Mar	H&H Notes, pp104 110(§4.2.1)(especially 107-109); pp110 - 113(§4.2.1); pp 122 - 128	Hour 1: Rainfall Losses (NRCS CN, overview of Green-Ampt) Hour 2: In-class exercise
1-Apr	H&H Notes, pp. 58-62; pp. 69-73 (Eq. 5.28 & 5.29; Table 5.7); pp. 86-94; pp. 115-122; pp 510-512 (top half p. 512)	Hour 1: Peak Discharge (Time of concentration, Q_{peak}) Hour 2: Lab Session
3-Apr	USGS StreamStats Fundamentals	Hour 1: Peak Discharge Hour 2: Project Session
6-Apr	H&H Notes, pp 134-133; pp 387- 390 (§3 & 4)	Hour 1: Introduction to Hydraulics (Energy, Weirs, Orifices) Hour 2: Homework
8-Apr	H&H Notes pp 138-139; 145-152; pp 378-383 (skim examples that follow); pp 386- 387	Hour 1: Uniform Flow, Ditches/swales Hour 2: Lab Session
10-Apr	H&H Notes pp 141-144; pp153-166 (particularly §5.5 Grass-lined Stable Channel Design)	Hour 1: Ditch scour Hour 2: Project Session

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Table 5: Course Schedule and Topic Outline, cont'd.

Date	Assigned Reading	Lecture Topic
13-Apr	H&H Notes pp 580 - 588	Hour 1: Wrap up ditches/swales, start storm sewers Hour 2: In-class exercise
15-Apr	H&H Notes read pp 512 - top of 520; skim: pp 235 - top of 239; read §7.2, skim §7.3; read §7.4	Hour 1: Storm Sewers Hour 2: Lab Session
17-Apr	H&H Notes: read pp. 167-169 §4.1; Skim §4.3 (pp 169-174); Read pp. 174 - 176; §4.3.6 (pp. 179-181)	Hour 1: Wrap up storm sewers, start Pavement Drainage Hour 2: Project Session
20-Apr	H&H Notes: Skim §4.4.1 through §4.4.3; Skim §4.4.5 (pp 209-212); Read §4.4.6 (pp. 220-224); Read §4.3.6.3 (pp. 232-234)	Hour 1: Pavement Drainage (Inlets) Hour 2: Homework
22-Apr	H&H Notes Skim: pp 601 - 607; Read: §6.1 "Hydraulic Design: (pp. 607 - 611); Read: §6.4 - 6.8 (pp.612-613)	Hour 1: Permeable Pavement Hour 2: Lab Session
24-Apr	H&H Notes pp 327-337 (particularly §1.2 & §1.4); pp 359-360; pp 363-373; p. 377; 295-309 (especially pp. 363-364 & 368-370); Skim pp. 338-359 for additional information	Hour 1: Conveyance Design (Culverts) Hour 2: Project Session
27-Apr	H&H Notes pp 523-533 (particularly the example)	Hour 1: Conveyance Design (Culverts) Hour 2: In-class exercise
29-Apr	H&H Notes pp 392-402	Hour 1: Floodplain Analysis (HEC-RAS) Hour 2: Lab Session
1-May	H&H Notes: pp 403-410 (§ 9-11); pp 417-423 (§14)	Hour 1: Floodplain Analysis (HEC-RAS) continued Hour 2: Project Session
4-May	H&H Notes pp 490-495 (§5.4.1)	Hour 1: Water-sensitive highway design: permeable landscape detention systems Hour 2: Project Session
6-May		Hour 1: Hour 2: *Project Session*
7-May	Reading Day No Class	
Finals week	-	**Exam #2**

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