



Mississippi State University
Department of Civil and Environmental Engineering
CE 4883-6883 Engineered Environmental Systems

Fall 2016

- Instructor:** VEERA GNANESWAR GUDE, PH.D., P.E., BCEE, M.ASCE
Class Schedule: TR 9:30 - 10:45 AM, McCain 185
Office: 235 G Walker Engineering Building
Office Hours: MWF, 1:00-2:00; others by appointment
Email: gude@cee.msstate.edu
Phone: 662.325.0345
Objectives: (Prerequisite: CE 3503 & CE 3803 with grade of C or better). Three hour lecture - Evaluation and characterization of storm water quality; selection, design and application of various treatment technologies; surface water quality management and modeling; and sustainable engineering
Textbook: *To be determined*

Course Topics: (tentative, subject to change)

1) Introduction to Stormwater Quality Management

- a) Construction Stormwater management and Stormwater Pollution Prevention Plans (SWPPP) - Clean water Act Requirements; MDEQ Requirements, Permitting and Guidance Manual; SWPPP steps (from MDEQ); Overview of Controls (BMPs)
- b) Post-Construction Urban Stormwater management - CWA and State Laws, Local Ordinances and Permitting; Conventional stormwater management; LEED buildings and certifications; Low Impact Development
- c) Agricultural, Industrial and Rural Stormwater management - CWA and agricultural permitting; farm Bill; Agricultural BMPs

2) Treatment Technologies

- a) Active treatment systems: Chemical filtration, chemical treatment, electrocoagulation, filtration, ion exchange, reverse osmosis
- b) Passive treatment systems: Bioretention/filtration, drain inlet insert, hydrodynamic separation, media filtration, oil/water separator
- c) Screening and selection of appropriate technologies
- d) Design of detention and treatment systems

3) Water Quality Management, Natural systems

- a) Issues :Nutrients and Eutrophication, Harmful algal blooms, Metals and Mercury, Organic chemicals, Emerging Pollutants
- b) Water Quality characteristics of Rivers and Streams, Lakes and Reservoirs, Estuaries and Coastal systems, Introduction to Water Quality Modeling

Course goals

- To learn the principles and theories of stormwater quality management and treatment processes and sustainable water quality management
- To learn to design engineered stormwater collection, detention and treatment systems

- To learn to design natural/passive stormwater/wastewater treatment processes

Summary of Learning Outcomes

- Understand regulations and policies applied in stormwater and distributed wastewater management
- Interpret engineering problems and provide sustainable solutions using sound engineering judgment
- Design stormwater detention and treatment components based on given conditions of a site (location) and other pertinent information.
- Sound knowledge of the design strategies, management and practices involved; the ability to undertake problem solving and design calculations; an integrated understanding of the relevant theory and practice

Grading

Component	Percent
Writing exercises	25 %
Partial exam 1	25 %
Partial exam 2	25 %
Quiz/Activities	10 %
Homework	15 %
Total:	100 %

General policies

There are two partial exams in this course. The student is expected to take both exams ([see dates in syllabus](#)). Homework problems will be assigned during the term and due dates will be one week following the assignment date. The assignments can be handed on the due date by 5.00 PM with no penalty. These problems may be worked out in teams, but **each student is expected to turn his/her own assignment prepared by the individual**.*

Expect to invest at least three hours out of class for each lecture hour in self-study, reading, homework, and report writing. Questions related to homework should be asked during instructor's office hours.

- All homework must be completed on 8½x11 paper, using neat engineering lettering or produced on a computer.
- A problem statement must be included, with all given facts listed. All assumptions must be listed.
- All final solutions must be boxed or indicated by a dotted triangle. Solutions to selected textbook questions are located within the problem sections.

Note: If there are any disability matters requiring special accommodations, please inform instructor.

Title IX:

MSU is committed to complying with Title IX, a federal law that prohibits discrimination, including violence and harassment, based on sex. This means that MSU's educational programs and activities must be free from sex discrimination, sexual harassment, and other forms of sexual misconduct. If you or someone you know has experienced sex discrimination, sexual violence and/or harassment by any member of the University community, you are encouraged to report the conduct to MSU's Director of Title IX/EEO Programs at 325-8124 or by e-mail to titleix@msstate.edu. Additional resources are available at <http://www.msstate.edu/web/security/title9-12.pdf>, or at <http://students.msstate.edu/sexualmisconduct/>.

*MSU honor code: Mississippi State University has an approved Honor Code that applies to all students. www.honorcode.msstate.edu/pdf/honor-code.pdf

MIWE Exercises

1. **Informal Writing:** Critical review of existing alternatives for stormwater management (compare, contrast and comment). Discuss from the sustainability point of view (environment, economic and social elements) [5 Pts]

Due date: 08/23/2016

Requirement: 5-10 page report

Evaluation heuristic: To be developed

2. In-Class Exercise: **Free Write** – Describe the stormwater pollution prevention plan concept (SWPPP) in your own words including the various steps involved in planning and management. [2.5 Pts]

When: 08/25/2016

Requirement: 1-2 paragraphs, not less than 200 words

Evaluation: Classroom discussion and superficial remarks

3. In-Class Exercise: **Exploratory writing** – How to evaluate sustainability of SWPPP? (Think-Pair-Share-Square) [2.5 Pts]

When: 08/30/2016

Requirement: 1-2 page report

Evaluation: Peer-review, Classroom discussion and superficial remarks

4. **Case study:** Develop a stormwater pollution prevention plan [10 Pts] (may be in teams of two)

Final Draft due: 10/15/2016

Requirement: 5-10 page report

Evaluation heuristic: To be developed

Preliminary draft due: 10/01/2016

Requirement: 5-10 page report

Evaluation: Peer-review, review by writing center, and instructor

5. **Reflective Writing:** Formal Writing - what, why, how, who, when and where of SWPPP and student learning experiences of writing exercises in CE 4883 [5 Pts]

Submission date: 10/31/2016

Requirement: 5- page report

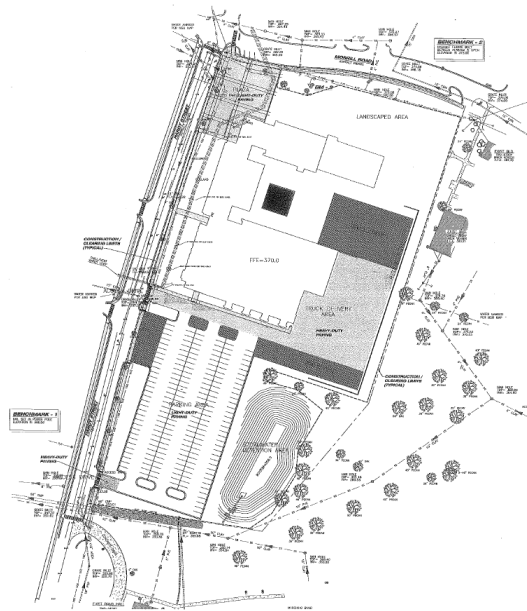
Evaluation heuristic: To be developed

Construction SWPPP
Due 31st October 2016

Your consulting firm has been asked to generate a construction storm water pollution prevention plan (SWPPP) for the proposed civil and environmental engineering complex at the Mississippi State University. Assume that the area of the construction site is less than 5 acres. About 93,000 ft² of the land area is to be developed into a teaching and learning facility with classrooms, laboratories, student/faculty/staff offices, auditoriums and conference rooms. An outline (topography) of the site map and the location details are provided in the handout.

You are required to do the following:

1. Conduct a site visit to identify the pre-construction conditions and research any available documentation on the site at the library and other online sources.
2. Prepare a complete SWPPP for the proposed site development activity which should include “during-construction” and “post-construction” BMPs for the site.
3. Provide detailed justification of chosen “control measures” or “BMPs” for the given site on their purposes including working principles.
4. Provide an appendix with important assumptions, calculations, site maps and other pertinent information on the site and the SWPPP



Notes:

- You are allowed to work in teams of two to complete this assignment. You must name your consulting/engineering firm
- Provide additional documentation to describe participation or contribution of the team members with their approvals and signatures.
- Sample SWPPPs are available in the CE 4883-6883 Course materials
- This assignment will be assessed by using a “relative grading” method.