TO: The Engineering Faculty

FROM: Agricultural and Biological Engineering

RE: New undergraduate course – ABE 42500 (Water Quality Engineering)

The Faculty of the Department of Agricultural and Biological Engineering has approved the following course for a permanent number. This action is now submitted to the Engineering Faculty with a recommendation for approval.

FROM:

ABE 49500 Water Quality Engineering Sem. 2, Class 2, Lab 1, Cr. 3. Prerequisites: ABE 325 Soil and Water Conservation Engineering or equivalent.

Temporary course number. Course was taught in Spring 2019 (6) and will be offered in Spring 2021.

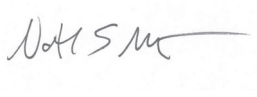
TO:

ABE 42500 Water Quality Engineering Sem. 2, Class 2, Lab 1, Cr. 3. Prerequisites: ABE 32500 Soil and Water Conservation Engineering

Description: This course provides in-depth perspectives on water quality in source and environmental water systems (lakes, rivers, groundwaters, and coastal waters) including sources and causes of water quality impairments and design of workable and cost-effective management solutions. The course integrates hydrology, chemistry, biology, and ecology as foundations of water quality management and incorporates operation mechanisms of management practices in designing solutions for pollution control. Students will have opportunities to engage with lectures, water quality measurements and data analysis, computer modeling, case studies, design, and discussion sessions.

BACKGROUND:
This course has been taught by Dr. Margaret Gitau to (primarily) undergraduate and graduate students in Environmental and Natural Resources Engineering and related areas as an ABE 49500 variable title course. The course builds on soil and water engineering fundamentals covered in ABE 32500 to engage students in design of solutions for water quality management. It also covers water quality measurements, data analysis, and computer modeling giving students tools they need for a successful career in environmental and natural resources engineering and related fields. The course comprises lectures, labs, class exercises, assignments, quizzes, and course projects and presentations and is designed to have three sessions a week (2 1-hr lectures, 1 2-hr lab). Lab sessions are reserved for design exercises, computational work, in-field measurements, and wet lab work.

REASON:
Current concerns regarding water quality impairment by pollutants from agricultural, rural, and urbanizing lands point to a dire need for sustainable solutions. With its specific focus on solutions for source and environmental water protection, this course fills an important gap in ABE's Environmental and Natural Resources Engineering curriculum and plays an important role in supporting the BioEnvironmental Engineering curriculum. Additionally, this course provides a resource to environmental and water-related programs university-wide. With the skills that they develop through this course, students will be able to assess water quality status and design much-needed solutions to protect water quality.



Nathan S Mosier - Head of ABE

ABE 4XXXX: Water Quality Engineering

Instructor's Name: Dr. Margaret Gitau	**Course Information**
Office: LILY 2-114	Spring 2019
Phone: 765-494-9005 Email: mgitau@purdue.edu	**Class**: MWF 11:30-12:20 **Lab**: F 11:30-1:20
Office Hours: By Appointment Virtual Office Hours: By Appointment Best way to Reach Instructor: Via Email	Class Location: TBA Online Location: TBA Lab: TBA (will vary)
Course Materials: Brightspace	Course Credit Hours: 3

Course Levels
Undergraduate, Graduate, Professional

Course Description
This course provides in-depth perspectives on water quality in source and environmental water systems (lakes, rivers, groundwaters, and coastal waters) including sources and causes of water quality impairments and design of workable and cost-effective management solutions. The course integrates hydrology, chemistry, biology, and ecology as foundations of water quality management and incorporates operation mechanisms of management practices in designing solutions for pollution control. Students will have opportunities to engage with lectures, water quality measurements and data analysis, computer modeling, case studies, design, and discussion sessions.

Prerequisites
ABE 325 Soil and Water Conservation Engineering or equivalent.

Required Texts
Chin, D.A. 2013. *Water-Quality Engineering in Natural Systems*: fate and transport processes in the water environment. Second Edition. John Wiley & Sons, Inc. ISBN 978-1-118-07860-0. E-textbook available through Purdue Libraries (older edition)

NRCS National Conservation Practice Standards. Available at: https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849

Agency-developed guides and handbooks to be communicated during class.

Learning Outcomes

Upon successful completion of this course, the student will be able to:

1. Identify causes and sources of water quality impairments (ABET 1, 4)
2. Explain the health, ecological, and societal consequences of impaired waters (ABET 4)
3. Collect in-field water quality measurements (ABET 6)
4. Analyze water samples and associated data (ABET 6)
5. Design watershed-based solutions for pollutant control and water quality protection (ABET 2)

ABET Student Outcomes Addressed

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Course Requirements

Lectures, Labs, Class Exercises, Assignments, Course Projects and Presentations

Assignments and Deliverables

The grade for this course will be determined as follows (see Class Schedule at the end of this syllabus for submission details):

Homework Assignments	25 %
Labs and Lab Assignments	30 %
Course Project	20 %
Class Exercises	20 %
Quizzes	5%

Grading Scale

All grading will be absolute (i.e. not graded on a curve). The following scale will be used to determine the final letter grade: A+, A = (93-100)%, A- = (90-92.9%), B+ = (87-89.9)%, B = (83-86.9)%, B- = (80 – 82.9)%, C+ = (77-79.9)%, C = (73-76.9%), C- = (70-72.9%), D+ = (67-69.9)%, D = (63-66.9)%, D- = (60-62.9)%, F = (59-0)%.

Policies

General Course Policies

1) Assignments are due at or before the Monday class period. All submissions will be through Brightspace. Students must submit their work by the deadline to receive full credit. Late submissions will be accepted for up to 48 hours after the associated deadline but will be graded at 75% of the earned marks.
2) Attendance is expected. Attendance will not be a factor in final grades. However, please note that your ability to do the homework will greatly depend on your attendance in the lecture and lab sessions, in-person or virtual as appropriate, and you actively accessing and utilizing materials posted in Brightspace. For absences, see Purdue Policies on Attendance and Absences. A link to Purdue University policies on Attendance and Grief Absence is also available in Brightspace under the University Policies menu.
3) Cell phones and other hand-held electronic devices must be silenced and put away during in-person sessions, unless instructed otherwise by the instructor. Use of E-readers and/or relevant e-resources is permitted.
4) Communication: Purdue email and Brightspace will be the primary means of communication. Please check your Purdue email and Brightspace frequently for important updates, changes, or other communications.

Academic Integrity

Students are expected to abide by academic honesty and ethics described in Purdue's student guide for academic integrity available at: https://www.purdue.edu/odos/academic-integrity/. Any academic dishonesty will automatically result in Grade F and will be reported to the Dean of Students.

Use of Copyrighted Materials

Students are expected, within the context of the Regulations Governing Student Conduct and other applicable University policies, to act responsibly and ethically by applying the appropriate exception under the Copyright Act to the use of copyrighted works in their activities and studies. The University does not assume legal responsibility for violations of copyright law by students who are not employees of the University.

A Copyrightable Work created by any person subject to this policy primarily to express and preserve scholarship as evidence of academic advancement or academic accomplishment. Such works may include, but are not limited to, scholarly publications, journal articles, research bulletins, monographs, books, plays, poems, musical compositions and other works of artistic imagination, and works of students created in the course of their education, such as exams, projects, theses or dissertations, papers and articles.

In general, notes are considered to be derivative works of the instructor's presentations and materials, and they are thus subject to the instructor's copyright in such presentations and materials. As such, thy cannot be sold or bartered without the instructor's express written permission.

The University Regulations on copyrighted materials is available at:
http://www.purdue.edu/policies/academic-research-affairs/ia3.html

Violent Behavior Policy
Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity. For additional information, see: http://www.purdue.edu/policies/facilities-safety/iva3.html

Emergencies
In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted on Brightspace or can be obtained by contacting the instructors via email. You are expected to read your @purdue.edu email on a frequent basis. For additional information, see: https://www.purdue.edu/ehps/emergency_preparedness/

Accessibility and Accommodations
Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

CAPS Information
Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

Nondiscrimination
Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. For the complete policy, see:
http://www.purdue.edu/purdue/ea_eou_statement.html

Attendance Policy During COVID-19
Please check the Protect Purdue website (https://protect.purdue.edu/) frequently for information related to COVID-19. Information on the Protect Purdue Website supersedes any associated information provided in class. All course content will be available online through Brightspace. In-person attendance will not be considered in assigning final grades. However, students will be expected to inform the instructor of any absences including anticipated, unanticipated absences or absences due to an emergency.

Purdue Honors Pledge

As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.

Class Schedule

Wk	Topic/Content	Notes
1	Introductions, Syllabus, Quiz 1, Course format, Course overview Water quality; state of our waters; causes and sources; concepts	Quiz 1
2	Source and Environmental Waters (Rivers and streams; Lakes and Reservoirs, Groundwater; Oceans and estuaries)	Quiz 2
3	Fate and Transport of Pollutants	
4	Fate and Transport of Pollutants	Homework 1 Due
5	Introduction to Climate Data	
6	Introduction to Water Quality Data	Homework 2 Due, Quiz 4
7	Water Quality Modeling	
8	Agricultural Drainage and Water Quality	Homework 3 Due, Quiz 3
9	Environmental Stewardship, Best Management Practices (BMPs)	
10	SPRING BREAK	
11	Water Quality Measurements I (in-field)	Lab Report 1 Due
12	Water Quality Measurements I (in-field)	
13	Analysis of Water Quality Samples I (Env. Qual. Lab)	Lab Report 2 Due
14	Analysis of Water Quality Samples II (Env. Qual. Lab)	
15	Class Projects	Lab Report 3 Due
16	Project Presentations	Project Presentation Due
17	Project Reports	Project Report Due

Disclaimer

This syllabus is subject to change.