### Freshwater 512-001 Practicum: Sewer School

**Instructors:** Dr. Sandra McLellan  
**Course Hours:** M 4:30-7:10 PM

**Meeting Room:** GLRF 3093, School of Freshwater Science, 600 E Greenfield Ave, Milwaukee  
Locations may vary. The instructors will advise students of location changes in d2L news items  
**Office:** McLellan- GLRF 3061, School of Freshwater Science

**Contact Information:** Sandra McLellan (mclellan@uwm.edu)  
**Office Hours:** By appointment

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<tr>
<th>Date/Week</th>
<th>Topic and Activities</th>
<th>Reading/Assignment (complete before class)</th>
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| Jan 24    | 1 Water quality monitoring and permitting self study (no class meeting)  
Participate in Online discussion | Reading: NR 102, Water quality permitting 101, WQS, DuFour & Schaub 2007 |
| Jan 31    | 2 Lecture: Course Overview and Expectations, Intro to Sewers, Global and Regional Issues, Intro to Permitting and Regulations | Reading: Brombach and Fuchs 2005  
Online Discussion |
| Feb 7     | 3 Lecture: Waterborne disease and indicators of sanitation concerns  
Lab: indicators and disinfection | Reading: Arone et al 2007  
McLellan et al 2013  
Indicator Lab Report assigned- due Feb 14; Online discussion |
Online discussion |
| Feb 21    | 5 Guest Lecture and Lab: Jeff McDonald Wastewater treatment microbiology | Lab reports assigned- due Feb 28; Online discussion |
| Feb 28    | 6 Guest Lecture: Pat Marchese Regulations, Permits, and Planning the Building of the Deep Tunnel | Reading: CWA 303d,NR151  
Online discussion |
| Mar 6     | 7 Guest Lecture: Kristina Surfus Water Legislation in Washington DC | Reading: TBA  
Online discussion |
Take home midterm assigned-due March 28  
Stormwater Scavenger Hunt assigned due April 4 |
| Mar 21    | 9 SPRING BREAK | |
| Mar 28    | 10 Stormwater scavenger hunt mapping and data analysis | Online discussion  
Field sampling prep assigned |
| Apr 4     | 11 Guest Lecture: Benjamin Benninghoff Stormwater Management and Watershed Based Permitting  
Student presentations | Stormwater scavenger hunt projects and presentations due  
Green Infrastructure Scavenger Hunt assigned |
| Apr 11    | 11 Guest lecture: Kim Siemens Creating TMDLs for Milwaukee’s waterways  
Prep for field sampling- review plans | Reading: Templar et al 2016 and TBD  
Climate project assigned |
| Apr 18    | 12 Field/lab day – Time/Date TBD Microbiology standard vs alternative methods | Lab 4:00; field sampling will be am-pm M or T  
Green Infrastructure Scavenger Hunt project and presentations due |
| Apr 25    | 13 Climate Change and Green Infrastructure Student presentations | |
| May 2     | 14 Climate Change and Green Infrastructure | |
Course Description

This course is designed to give students from diverse disciplines a broad understanding of stormwater and sanitary sewer systems, from design and construction to monitoring and regulations. Chemical and biological assessment with relevance to local water quality issues will be emphasized. Lectures, field sampling, and lab work will provide opportunities to integrate theory and practice. This year’s class will include a special focus on how stormwater and sewage are likely to be affected by regional and global climate change.

This course will require fieldwork, laboratory work, and online work outside of the classroom.

Learning Outcomes

This course is designed to help students:
- Become familiar with stormwater issues, both global and regional, and with policy and regulations relevant to these issues
- Understand the complexities of stormwater and wastewater systems, including structure and function of sewers, standard and alternative treatment methods, and potential system failures
- Learn about sampling and biological/chemical assessment methods for sewer and stormwater systems and apply this knowledge in field sampling and laboratory exercises
- Integrate theoretical information with hands-on experience and real-world data; incorporate ancillary biological studies into standard monitoring assessments
- Gain experience in incorporating knowledge into an investigative framework to identify causes of common infrastructure problems.

At the completion of this course, students should be able to:
- Discuss local regulations relevant to stormwater and wastewater management
- Explain the role of stormwater systems (in the context of urban infrastructure) in water quality management, both generally and specifically for Milwaukee/Great Lakes region
- Understand and interpret the biological and chemical data collected as part of regulatory sampling; apply these assessments to management decision-making
- Design investigation strategies for common problems found in sewer systems
- Describe mechanisms for contamination of stormwater, methods for detecting this contamination, and remediation strategies that can mitigate impacts to Lake Michigan
- Identify factors related to climate change that may affect stormwater and sewage infrastructure and their potential environmental impacts

Workload

Sewer School is a 3 credit-hour course. Students will be expected to devote an average of 9 hours per week to this course, including but not limited to:

- In-class time: Class will meet weekly for ~2-2.5 hours during the first two thirds of the semester. The remainder of the course will be devoted to a mix of lectures, field sampling, laboratory exercises, and student presentations
- Online participation: contributing to discussion topics, completing quizzes and surveys through D2L
- Assignments: problem sets, field report, presentations
- Individual projects: literature searches, data analysis, preparation of research paper and
Resources
Class notifications: The course will be coordinated through e-mail and D2L. Students must check their official UWM e-mail and D2L frequently as they are responsible for all announcements and course changes posted there. Assignments, course materials, lecture materials, and other important information will be posted on D2L. All assignments must be submitted by the due date and time using an official UWM email address.

Students with Special Needs: Students with special needs should arrange to speak with the instructors prior to or during the first week of classes so we can best accommodate needs. Verification of disability, class standards, the policy on the use of alternate materials and test accommodations can be found at the following:
http://www.uwm.edu/Dept/DSAD/SAC/SACltr.pdf

Required Text
Journal articles and reports will be provided in pdf format when they are assigned. Students are responsible for conducting their own literature searches to support the hypotheses, data interpretation, and conclusions for their field reports and final projects.


Course Requirements and Grading

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<th>Assessment</th>
<th>Grade%</th>
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<tr>
<td>Discussion forums</td>
<td>20</td>
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<tr>
<td>Problem sets, field and lab reports</td>
<td>30</td>
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<tr>
<td>Midterm Exam</td>
<td>10</td>
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<tr>
<td>Project: Research paper presentations</td>
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<tr>
<td>Attendance and participation</td>
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Grading scale:
- A 90-100%
- B 80-89%
- C 70-79%
- D 60-69%
- F <60%
Course Work and Assignments

Problem Sets: Problem sets will be assigned throughout the semester to complement and reinforce the material covered in lecture. Assignments must be submitted to D2L by the time and date due; any ancillary data (R scripts, Excel spreadsheets, etc.) must be provided electronically. No hard copy assignments will be accepted.

Field Report: Students will undertake a small field sampling and analysis project. The results of this study shall be reported in a journal article style that includes: a statement of the problem to be investigated and its relevance, field sampling and laboratory methods used, data analysis, results, and discussion/conclusions. Reports must be submitted to D2L and shall include electronic versions of data, field notes, analysis, etc., attached as appendices. A template for the report will be provided on D2L.

Oral Presentations: Students will make 3 oral presentations: 1) Stormwater systems and results from the scavenger hunts, 2) Green infrastructure results from the scavenger hunts and 3) Predicted climate change impacts for urban sewer infrastructure and implications for Milwaukee.

Digital copies of each presentation must be provided to the instructors before class on the day of presentation.

Project reports: Each student will prepare a 3-5 page document outlining the findings from Stormwater and Green Infrastructure Scavenger Hunts. A more extensive 10 page document should be prepared for the Climate Vulnerabilities report. Each of these reports should integrate and expand upon information presented in class by the instructor and guest speakers. The report should include figures, tables, and maps that illustrate the problem that was investigated and the results of analyses performed, as well as citations and a reference list. Electronic versions of all supporting materials (e.g., DNA sequence data, R scripts, Excel spreadsheets, etc.) must be supplied to the instructors via D2L. The instructors will provide feedback on a preliminary draft (see schedule for due date). A template for the format of the report will be provided on D2L.

Course Policies

Attendance: With the exception of emergencies, which require official documentation, class attendance is compulsory. If an absence is anticipated or an emergency occurs, contact the instructor as soon as possible to discuss the problem. Late assignments will be downgraded by 5% for each day past the due date; late assignments will not be accepted after 1 week.

Missed Exam Policy: Class presentations are considered examinations. No make-up exams can be given for presentations; in an emergency situation with documented excuse, presentations may be made up. Any un-excused absence will result in lost points for given exam or presentation. Policies regarding final examinations can be found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S22.htm .

Other Campus Policies

Students with disabilities. Verification of disability, class standards, the policy on the use of alternate materials and test accommodations can be found at the following: http://www.uwm.edu/Dept/DSAD/SAC/SACltr.pdf

Religious observances. Policies regarding accommodations for absences due to religious observance are found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S1.5.htm

Students called to active military duty. Accommodations for absences due to call-up of reserves to active military duty should be noted. http://www3.uwm.edu/des/web/registration/militarycallup.cfm
Incompletes. The conditions for awarding an incomplete to graduate and undergraduate students can be found at the following: http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S31.pdf

Discriminatory conduct (such as sexual harassment). Definitions of discrimination. Harassment, abuse of power, and the reporting requirements of discriminatory conduct are found at the following:

http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S47.pdf

Academic misconduct. In this course, you are expected to perform to the best of your ability in an honest manner. Cheating, plagiarism, or other acts of misconduct will result in a severe penalty to you, as per University of Wisconsin System Chapter 1.
http://www.uwm.edu/Dept/OSL/DOS/conduct.html
Plagiarism is a particular concern: many students seem unclear about what it involves. I recommend that you read:
http://www.plagiarism.org/learning_center/what_is_plagiarism.html because ignorance is not acceptable as an excuse.

Complaint procedures. Students may direct complaints to the head of the academic unit or department in which the complaint occurs. If the complaint allegedly violates a specific university policy, it may be directed to the head of the department or academic unit in which the complaint occurred or to the appropriate university office responsible for enforcing the policy.

Grade appeal procedures. Procedures for student grade appeal appear at the following:
http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S28.htm

Final examination policy. Policies regarding final examinations can be found at the following:
http://www.uwm.edu/Dept/SecU/acad%2Badmin_policies/S22.html