

## ***FRSHWTR 300 Expedition to the Great Lake Michigan***

**Summer 2025 University of Wisconsin-Milwaukee and University of Wisconsin-River Falls.**

**Summer 2024 June 09 to June 20, 2025.**

**Course Number:** FRSHWTR 300 Undergraduate Special Topic  
(1st week Dr. Aguilar and Dr. Cuhel and 2nd-week Dr. Thaisen)

### **Expedition to the Great Lake Michigan**

3 credits

Date & Times:

June 09-14 8:30-6:30 pm

June 16-20 8:30-6:30 pm

#### **WEEK 1 Instructors:**

Dr. Carmen Aguilar and Office: GLRF 2031

Contact Information: 414-382-1755, aguilar@uwm.edu

Office hours: TBA

Dr. Russell Cuhel office: GLRF 146

Contact Information: 414-382-1760, rcuhel@uwm.edu

Office hours: TBA

#### **WEEK 2 Instructor:**

Dr. Kevin Thaisen

Office: AGS 313 River Falls Campus

Contact Information: 812-606-4006 (mobile) 715-425-4679 (office)

kevin.thaisen@uwrf.edu

Office hours: TBA

Course Meeting: Two-week Summer Session Course

Day/Time: M-F approximately 8:30 am – 6:30 pm, (one Saturday) schedule will vary by day depending on activities.

Location: University of Wisconsin-Milwaukee School of Freshwater Sciences

Final Presentations: In the schedule, one per week.

**Catalog Description:** This is an experiential two week course that will explore physical, chemical, optical, geological, and biological characteristics of Lake Michigan river, harbor, and near-shore environments, in the laboratory and onboard the Research Vessel Neeskay.

**Course Description:** The main basin of Lake Michigan is an economic, social, and ecological driver of life in the Upper Great Lakes area. The overwhelming majority of Wisconsinites know neither how far it is to the other side nor what the significance of offshore waters is to their

daily lives and to the prosperity of the region. Because few people go to the beach in winter and other cool seasons, sequences of biological, physical, and economic activities are unknown to many people, yet they hold keys to understanding both present day problems and predicting future behavior. The instructors, SFS Senior Scientists Dr. Aguilar and Dr. Cuhel, hold one of very few examples of repeated, seasonal and intense study of a river-harbor-nearshore-open Lake Michigan continuum from an interdisciplinary perspective. This course will use real expeditionary data from this work, hands-on demonstrations and at least two participatory expeditions per student to watershed and offshore stations frequented by the program. Students will experience strengths of seasonality, invasive species, regional climate moderation, and economic responses to events, with guidance to placing them in broader national and global contexts.

The goal is to enable students from diverse disciplines to view, collect, process, and understand local scientific data in a broad spatial and socioeconomic perspective. During the course the students will integrate conceptual, practical, and expeditionary resources to gain applicable knowledge, and reflections plus weekly exams will contribute to their grade.

#### **Learning Outcomes - Objectives:**

Students will surmount cognitive challenges of disciplinarity by visualizing, verbalizing, and constructively interacting with each different experiential focus from their many individual points of view. Instructors will provide guidance and examples interlaced with expeditionary practice to build conceptual stages upon which interdisciplinary thought may be initiated.

Students will:

- 1) learn and appropriately use vocabulary from disparate aquatic science disciplines.
- 2) gain knowledge about Lake Michigan aquatic systems from watershed to offshore to fully recognize the scale and application of large aquatic systems to regional and global interaction with weather and human resources.
- 3) measure, describe, and identify physical, chemical, optical, and biological characteristics of water in a seasonal context.
- 4) use three dimensional constructs to assess benefits and limitations of surface-limited survey sampling and remote sensing.
- 5) apply characteristics of seasonality to describe chemical and biological progressions in Lake Michigan ecosystem processes.
- 6) learn how to locate knowledge about specific individual scientific concepts and to put their work into differing professional and social perspectives.
- 7) begin to integrate research topics into multidisciplinary, community, regional, and national scale vision.
- 8) gain an understanding of past and present Oceanographic and Large Lake surveying techniques and limitations, including depth measurements, the use of single-beam sonar, side scan sonar, and ROV use to perform a bathymetric survey to locate shipwrecks and identify those wrecks.
- 9) explore circulation patterns and microplastic contamination within the Lake Michigan/Milwaukee near-shore environment and identify potential delivery sources.

10) appreciate the similarities and differences of working in freshwater and marine environments.

**Required Reading:**

- 1- Cuhel, Russell L. and Carmen Aguilar. 2013. Ecosystem transformations of the Laurentian Great Lake Michigan by nonindigenous biological invaders. *Annu. Rev. Mar. Sci.* 5: 289-320. doi: 10.1146/annurev-marine-120710-100952. Includes reference to a 19-year time series in SW Lake Michigan
- 2- Cuhel, R. and C. Aguilar, 2003. Coastal Intensive Site Network (CISNet): Environmental Monitoring Of The Coastal Waters Of Southwestern Lake Michigan. National Oceanic And Atmospheric Administration Award NA87OA0519. 01 October 1998 - 30 September 2002, Final Report April 2003. Great Lakes Wisconsin Aquatic Technology and Environmental Research Institute, University of Wisconsin-Milwaukee. 88pp.
- 3- Schmidt, G. 1998. All that is labeled data is not gold. *EOS*, 14 July 1998.
- 4- Miyazaki, K. 2014. *Perimeter: A Contemporary Portrait of Lake Michigan*. Wisconsin Historical Society Press. Will be provided.
- 5- DmitryBeletsky, James H. Saylor, and David J. Schwab, 1999. Mean Circulation in the Great Lakes, *Journal of Great Lakes Research*, Volume 25, Issue 1, 1999, Pages 78-93, ISSN 0380-1330, [https://doi.org/10.1016/S0380-1330\(99\)70718-5](https://doi.org/10.1016/S0380-1330(99)70718-5).
- 6- Peter L. Lenaker, Steven R. Corsi, and Sherri A. Mason, 2021. Spatial Distribution of Microplastics in Surficial Benthic Sediment of Lake Michigan and Lake Erie. *Environmental Science & Technology* 2021 55 (1), 373-384, DOI: 10.1021/acs.est.0c06087

\*\*And other readings added in the Canvas site.

Additional supplied paper resources will be given to students.

Required Supplies: Laptop to prepare PowerPoints, word documents, and access canvas, hat, sunscreen, closed toed shoes that can get wet (while on the Research Vessel Neeskay), keen sandals are not ok), closed toes shoes for indoor lab use.

You can log into our class canvas page at <https://uwm.edu/canvas/home/> .

**Course Expectations:**

- 1) Since this is a short and intensive course, it is important that you be on time and attend all days. Making up material will be extremely difficult or impossible due to ship schedules. If you miss the boat in the morning, you will miss the cruise that day.
- 2) The expeditionary portion of this course will involve activities on the RV Neeskay. All boat and lab safety guidelines must be followed to maintain a safe working environment for everyone. Boat conditions can vary due to changing weather conditions. Proper attire should be worn at all times (see suggested attire list). Should you need disability

accommodations, we encourage you to contact the ARC (Accessibility Resource Center at UWM) well before the course –<https://uwm.edu/arc/>.

- 3) Lunch will be provided during the expeditions on the RV Neeskay. Please notify the instructors if you have any food allergies or dietary restrictions as soon as possible. All other days lunch will be provided.
- 4) Active participation in all aspects of class, laboratory activities, and cruises, including preparation and clean-up, is expected and will be a part of the course grade.
- 5) Students will be split into groups to pursue different goals on each day based on the number of students enrolled and equipment available. Roles and assignments will be rotated so that everyone gets an opportunity to learn and experience each aspect of the course.

**Suggested attire list** - Closed toed shoes (no sandals) must be worn in the lab and on the RV Neeskay. A personal flotation device (PFD) will be provided for your use. Sunscreen and hats, long-sleeved shirts, and pants help prevent sunburns and can help keep you more comfortable while on Lake Michigan. Bringing a light jacket on cruise days may also be a good idea. When we are working on collecting or analyzing microplastics, you need to make sure that you are only wearing natural fiber fabrics. Otherwise, we may contaminate our own samples!

### Course Schedule 2025

#### **Week 1 Dr. Carmen Aguilar and Dr. Russell Cuhel.**

SUMMER	COURSE		READ	ASSIGNMENTS
<b>WEEK 1</b>				
MONDAY JUNE 09	08:30 AM	Introductions Course overview Tour of the School of Freshwater Sciences		
	10am – 11:00 am	Safety workshops Chemical Hygiene – certificate awarded when successfully finished with the quiz.		
	11am- 12pm	Course overview continued		
	12-1pm	LUNCH – provided		
MONDAY	1-330pm	<u>Introduction to the program</u> Wave Tank demonstration - Density discussion. Expeditionary use of multiple technologies Applications to research and development  Techniques — concepts of analysis leading to understanding of processes Application of water "state" changes: Solid-Liquid-Gas Ice –	#1  And  #2- p1-3 p17-22 p61-69	Reflection #1  QUIZ #1

SUMMER	COURSE			
		Water – Steam/Vapor. Conductivity, color, odor as we will use them on the expeditions. Tracing plumes: Rivers, Sewer outfalls, Industrial point source Color as measure of waterborne content. Food web interactions. Plankton and chemical constituents.		
MONDAY	3:30-430pm	Vessel safety and preparation for Tuesday Expedition Navigation and spatial recognition		
MONDAY	430-630pm	Pack for expedition.		
TUESDAY JUNE 10	830am	Expedition #1 to Lake Michigan – RV Neeskay Rivers-Harbors Different source waters reflected in river chemistry (surface samples) Surface vs 2 m under surface and near-bottom. Dilution of Rivers into Harbor and through breakwall – offshore to 3 mi depending on weather CTD profile – hydrographic characteristics, bottom analysis using an underwater camera. 4 standard depths 0, 2,10,19 m Plankton Nets and light measurement, PONAR grab.	#2- p17-22 p61-69 p73-74	Reflection #2  QUIZ #2
TUESDAY		LUNCH – provided onboard		
TUESDAY	6:30pm	Back to the dock, unload, clean up		
WEDNESDAY JUNE 11	0830-1200	Chemical and biological analyses of samples from Tuesday expedition	#2 p4-9 #3	
WEDNESDAY	12-1pm	Lunch provided		
WEDNESDAY	115-145pm	Invited speaker - Concept of harbor revitalization and national examples		Reflection #3  QUIZ #3
WEDNESDAY	2-330pm	Analysis of cruise samples continued Particulate and dissolved nutrients	#2 p10-16 p70-72	
	330-430pm	Discussion of spatial gradient outcomes	#4	
WEDNESDAY	430-630pm	Pack for the second, offshore expedition		

SUMMER	COURSE			
THURSDAY JUNE 12	0830	Expedition #2 on RV NEESKAY Transect samples JCT to LW20, to LW50, to GC50, to GC20/10 transects. Remotely Operated Vehicle. Water, nets, bottom grabs. LUNCH – provided onboard	#2 39-42 43-46	Reflection #4  QUIZ #4
THURSDAY	0630pm	Back to the dock, unload, clean up		
FRIDAY JUNE 13	0830 am - 1200pm	Biogeochemical analyses of samples from Thursday expedition	#2 p23-38	Reflection #5  QUIZ #5
	12-1pm	Lunch provided		
	1-530pm	Analyses continued. Data entry, result consideration		
	530 - 630pm	Discussion		
SATURDAY JUNE 14	9-12am	Summarize results. Hands-on activities and demonstrations.		EXAM #1
	12-130pm	Group lunch - provided		
	130 - 400pm	Discussion of results. Student presentations.		
		<b>END OF WEEK #1</b>		
<b>Week 2</b>				
<b>Dr. Kevin Thaisen</b>				
MONDAY JUNE 16	8:30 - 10:30 am	Lecture - History, technology, and environment	#5	Quiz #7
	10:30- 12pm	Data, data editing, and survey reports		Intro to survey reporting
	12 - 1 pm	lunch - provided		
	1 - 3 pm	data and data editing continued		data and data editing
	3 - 5 pm	Lecture - Intro to microplastic pollution and sample collection procedures	#6	Quiz #8
	5 - 6:30 pm	prepare for survey cruise		organize supplies for cruise, Reflection #7
TUESDAY JUNE 17	8:30 am - 6:30 pm	Expedition 3 on RV Neeskay - Bathymetric Survey Cruise to locate shipwreck(s), including collection of water samples,		data collection and end of survey stowing gear and samples,

SUMMER	COURSE			
TUESDAY JUNE 17		PONAR bottom samples to characterize lake floor, lunch provided, end of survey and unloading equipment		Reflection #8
WEDNESDAY JUNE 18	8:30 - 12 pm	Review data from cruise to identify shipwreck(s), select target for further exploration, analysis of water samples for microplastics		Use provided information to identify ship(s), select target for ROV exploration
	12 - 1 pm	lunch provided		
	1 - 3 pm	finish water sample analysis, Identify additional locations for water sampling		data collection
	3 - 5 pm	Introduction to hydrographic remotely operated vehicles (ROV)		
	5 - 6:30 pm	Prepare for survey cruise		organize supplies for cruise, Reflection #9
THURSDAY JUNE 19	8:30 - 4 pm	Expedition 4 on RV Neeskay - Shipwreck exploration cruise, ROV examination of shipwreck(s) and wreck identification, additional water sampling and bottom samples (as required), lunch provided, unload equipment after survey		data collection, end of survey stow gear and samples
	4 - 6:30 pm	Begin analysis of water samples for microplastics		data collection, Reflection #10
FRIDAY JUNE 20	8:30 - 11 am	Finish analysis of water samples for microplastics		data collection
	11 - 12 pm	Prepare survey reports		compile data from survey operations
	12 - 1 pm	lunch provided		
	1 - 4 pm	finish survey reports		
	4 - 6:30 pm	Presentation of survey report		Presentations, Reflection #11 - overall experience

Investment of Time:

Hours Activity per week

57 x2 Class and seminar meetings.

6 x2 Reading weekly literature and exploring for resources.

3 x2 Preparation of reflections from each week's topic

3 x2 Preparation of material for participating in class discussion on weekly topic.

3 x2 Final presentations by students.

**72 x2 144 hours Total investment for three credits.**

### **Course Requirements and Grading:**

- 10% Attendance and oral or other substantive classroom contribution
- 25% Written reflections M/T/W/TH/F of each week, discussing progressive experience.
- 25% Quizzes
- 10% Presentations of each week's accomplishments
- 30% Written Examinations (open book) for each week's sessions

### **Additional Requirements:**

10-minute oral presentation of course participation.

Letter grades will be assigned based on the percentage of total possible points earned using the following breakdown: Grade Percentage A 92-100% A-90-91% B+ 88-89% B 82-87% B-80-81% C+ 78-79% C 72-77% C-70-71% D+ 68-69% D 62-67% D-60-61% F Below 60.

Borderline grades (e.g. 79.5%) will be determined by rounding to the nearest percentage point.

University Policies Please find the academic policies and links here

<https://uwm.edu/secu/wp-content/uploads/sites/122/2016/12/Syllabus-Links.pdf>

1. Students with disabilities. In collaboration with the ARC, we will work with students to meet needs in a timely manner. <http://uwm.edu/arc/>
2. Religious observances. Accommodations for absences due to religious observance should be noted. <https://apps.uwm.edu/secu-policies/storage/other/SAAP%2012.%20Accommodation%20of%20Religious%20Beliefs.pdf>
3. Students called to active military duty. Accommodations for absences due to call-up of reserves to active military duty should be noted.

Students: <http://uwm.edu/active-duty-military/>

Employees: <https://www.wisconsin.edu/ohrwd/download/policies/ops/bn9.pdf>

4. Incompletes. A notation of "incomplete" may be given in lieu of a final grade to a student who has carried a subject successfully until the end of a semester but who, because of illness or other unusual and substantiated cause beyond the student's control, has been unable to take or complete the final examination or to complete some limited amount of term work. <https://apps.uwm.edu/secu-policies/storage/other/SAAP%201-13.%20Incomplete%20Grades.pdf>
5. Discriminatory conduct. Discriminatory conduct will not be tolerated by the University. It poisons the work and learning environment of the University and threatens the careers, educational experience, and well-being of students, faculty, and staff. <https://apps.uwm.edu/secu-policies/storage/other/SAAP%205-1.%20Discriminatory%20Conduct%20Policy.pdf>



6. Title IX/Sexual Violence. Title IX is a federal law that prohibits sex discrimination in education program or activities, and UWM policy prohibits such conduct (see Discriminatory Conduct, above). This includes sexual violence, which may include sexual harassment, sexual assault, relationship violence, and/or stalking in all educational programs and education-related areas. UWM strongly encourages its students to report any instance of sex discrimination to UWM's Title IX Coordinator ([titleix@uwm.edu](mailto:titleix@uwm.edu)). Whether or not a student wishes to report an incident of sexual violence, the Title IX Coordinator can connect students to resources at UWM and/or in the community including, but not limited to, victim advocacy, medical and counseling services, and/or law enforcement. For more information, please visit:

<https://uwm.edu/sexual-assault/>.

7. Academic misconduct. Cheating on exams or plagiarism are violations of the academic honor code and carry severe sanctions, including failing a course or even suspension or dismissal from the University. <https://uwm.edu/deanofstudents/conduct/academic-misconduct/>

8. 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. <https://apps.uwm.edu/secu-policies/storage/other/SAAP%205-1.%20Discriminatory%20Conduct%20Policy.pdf>

9. Grade appeal procedures. A student may appeal a grade on the grounds that it is based on a capricious or arbitrary decision of the course instructor. Such an appeal shall follow the established procedures adopted by the department, college, or school in which the course resides or in the case of graduate students, the Graduate School. These procedures are available in writing from the respective department chairperson or the Academic Dean of the College/School. <https://apps.uwm.edu/secu-policies/storage/other/SAAP%201-10.%20Grade%20Appeals%20by%20Students.pdf>

10. LGBT+ resources. Faculty and staff can find resources to support inclusivity of students who identify as LGBT+ in the learning environment. <http://uwm.edu/lgbtrc/>

11. Smoke and Tobacco-Free campus. UWM prohibits smoking and the use of tobacco on all campus property.

<https://apps.uwm.edu/secu-policies/storage/other/SAAP%2010-8.%20Smoke%20and%20Tobacco-Free%20Campus%20Policy.pdf>

12. Final Examinations. Information about the final exam requirement, the final exam date requirement, and make-up examinations.

<https://apps.uwm.edu/secu-policies/storage/other/SAAP%201-9.%20Final%20Examinations.pdf>