

SEMINAR ON HARMFUL ALGAL BLOOMS

EVPP-692-002

EVPP-991-004

Spring Semester, 2020

INSTRUCTOR: Ling Ren
3047 David King Hall
Phone: 610-888-2498
Email: LRen2@gmu.edu;

MEETING TIME: Fridays, 4:30-7:10pm

MEETING PLACE: Innovation Hall 333

OFFICE HOURS: Fridays 2-4 pm, or by appointment *

*please send the request for appointment via my GMU email. Please allow 24 hours or more for scheduling either a phone call or Webex (or Skype).

COURSE DESCRIPTION

Harmful algal blooms (HABs) have become increasing problems in the US and worldwide. HABs, characterized as rapid and excessive growth of some phytoplankton species, have detrimental effects on water quality, fishery resources and public health, leading to huge losses in economic and recreational resources. There are several major groups of HABs, each contains high diversity of species and unique characters. The occurrence of HABs has been closely linked to human-induced eutrophication in freshwater, estuarine and coastal areas, but the complex physical, chemical and biological conditions makes HABs study and management unique and complicated in most areas. In the meantime, various methods and techniques have been developed and applied to monitor, predict and mitigate HABs.

Through literature readings, discussion and presentations, students will navigate through different aspects of HABs and various research topics and methods. During the seminar, students will be engaged to analyze and evaluate information in technical and scientific publications. They are encouraged to develop their own interests and topics on HABs-related research and practice communication skills to present their research ideas and topics of interest.

COURSE STRUCTURE

The seminar will consist of several modules covering various aspects on HABs. Each week, prior to the class, readings, mostly peer-reviewed journal articles will be assigned to students. The instructor will give an overview at the beginning of each class, followed by student-led discussion on the topic(s) of the week. A tentative course schedule with readings and assignments is listed in Table 1.

GRADES AND ASSIGNMENTS

The final grade point will be based on your attendance and active participation (40), student-led discussion (30), and presentation (30).

Attendance and active participation: The class is to meet every week unless it is noted in the course schedule. Students are expected to attend each class. Students should read the assigned papers prior to each class, and ready to participate and lead. Please contact me, as soon as you can, if there is emergency or things beyond control that you cannot make to the class. Any unexcused absence will result to point reduction (2 points/class).

If for some uncontrollable circumstances, I can not make it to the campus (since I don't live in the area), a WebEx meeting with Video and Audio will be arranged. Any changes in the schedule will be notified to students via emails and the Blackboard. Students are expected to check emails and the Blackboard on daily basis.

Student-led discussion: Students are encouraged to lead the discussion and ask competent and probing questions. They are expected to search for supplemental reading for their topics of interest. They are also encouraged to evaluate and comment fellow students work.

Presentations: As the final assignment, all students will give a 15 minutes oral presentation on the topics of their choosing, followed by 5 minutes Q&A session. In addition, students signed for EVPP991 is expected to submit a literature review on their interested topics.

ELECTRONIC DEVICES

The use of laptop computers is restricted to work on material related to the class. The use of cell phones is not permitted during the class. Engaging in activities not related to the course (e.g., gaming, email, chat, etc.) will result in a significant deduction in your participation grade.

Table 1: Course Schedule (subject to changes)

Date	Module	Readings and Assignments
January 24		Introduction to the Course and Ourselves; Overview of HABs
January 31		<ul style="list-style-type: none"> ○ Heisler, J., P.M. Glibert, J.M. Burkholder, D.M. Anderson, et al., 2008. Eutrophication and harmful algal blooms: A scientific consensus. <i>Harmful Algae</i>, 8:3-13 ○ Granéli, E. and J.T. Turner (Eds.) (2006) Ecology of Harmful Algae. - Harmful Cyanobacteria, P95-109. http://www.jlakes.org/uploadfile/news_images/hpkx/2018-04-24/10.10072F978-3-540-32210-8.pdf
February 7	Class Discussion on Major HAB groups	<ul style="list-style-type: none"> ○ Granéli, E. and J.T. Turner (Eds.) (2006) Ecology of Harmful Algae--Harmful Dinoflagellates, P53-66 ○ The Ecology of Harmful Diatoms. P81-88. ○ Lassus P., Chomérat N., Hess P., Nézan E. (2016) Toxic and Harmful Microalgae of the World Ocean. 523 pp. https://unesdoc.unesco.org/ark:/48223/pf0000247767.
February 14		<ul style="list-style-type: none"> ○ Granéli, E. and J.T. Turner (Eds.) (2006) Ecology of Harmful Algae--Brown tides. P111-122; & Harmful flagellates within Prymnesiophyceae and Radiodophyceae, P67-79. ○ Hallegraeff, G.M., 1993. A review of harmful algal blooms and their apparent global increase. <i>Phycologia</i>, 32(2)79-99
February 21		<ul style="list-style-type: none"> ○ Esenkulova, S., A. Tabata, B.J.G. Sutherland, N. Haigh, 2019. Combining metabarcoding and morphological approaches to identify phytoplankton taxa associated with harmful algal blooms. doi: https://doi.org/10.1101/816926 ○ Weigand, H., A.J. Beermann, F. Čiampor c, et al., 2019. DNA barcode reference libraries for the monitoring of aquatic biota in Europe: Gap-analysis and recommendations for future work <i>Science of the Total Environment</i> 678:499–524 ○ Hering D., A. Borja, J. I. Jones , D. Pont, et al., 2018. Implementation options for DNA-based identification into ecological status assessment under the European Water Framework Directive. <i>Water Research</i>, 138:192-205.
February 28	Class Discussion On Detection and Monitoring	<ul style="list-style-type: none"> ○ Rutkowska, M., J. Płotka-Wasyłka, T. Majchrzak, et al., 2019. Recent trends in determination of neurotoxins in aquatic. <i>Trends in Analytical Chemistry</i>. 112:112-122. ○ Shi, K., Y. Zhang, Y. Zhou, X. Liu, G. Zhu, B. Qin, and G. Gao, 2017. Long-term MODIS observations of cyanobacterial dynamics in Lake Taihu: Responses to nutrient enrichment and meteorological factors environmental samples. <i>Nature, Scientific Reports</i>, 7:40326. DOI: 10.1038/srep40326 ○ Tomlinson, M.C., T.T. Wynne, R.P. Stump, 2009. An evaluation of remote sensing techniques for enhanced detection of the toxic dinoflagellate, <i>Karenia brevis</i>. <i>Remote Sensing of Environment</i>, 113:598–609.

Date	Module	Readings and Assignments
March 6	Dr. Ren not available Students work on readings and assignments	<ul style="list-style-type: none"> ○ Trainer V.L, S.S. Bates, N. Lundholm, A.E. Thessen, W. P. Cochlan, N.G. Adams, C.G. Trick, Pseudo-nitzschia physiological ecology, phylogeny, toxicity, monitoring and impacts on ecosystem health. Harmful Algae, 14:271-300. ○ Reguera, B., L. Velo-Suárez, R. Raine, M. G. Park, 2012. Harmful Dinophysis species: A review. Harmful Algae, 14:87-106 ○ Carmichael, W. Chapter 4: A world overview — One-hundred twenty-seven years of research on toxic cyanobacteria — Where do we go from here? In: Hudnell H.K. (eds) Cyanobacterial Harmful Algal Blooms: State of the Science and Research Needs. Advances in Experimental Medicine and Biology, vol 619. Springer, New York, NY. P. 105-125.
March 9-15	Spring Break	
March 20	Presentation Topics & Outline	<ul style="list-style-type: none"> ○ Alexandrov, A. V. and M. G. Hennerici (2013). How to Prepare and Deliver a Scientific Presentation. Cerebrovasc Dis 35:202–208. DOI: 10.1159/000346077 ○ Doumont, J., ed. English Communication for Scientists. Cambridge, MA: NPG Education, 2010 ○ Reference management software (EndNote) ○ List of resources (posted on Blackboard)
March 27	Class Discussion Case Studies	<p>Harmful Cyanobacteria in the freshwater lakes_the case of the Great Lakes</p> <ul style="list-style-type: none"> ○ Harmful Algal Blooms and Hypoxia in the Great Lakes Research Plan and Action Strategy: an interagency Report. https://www.whitehouse.gov/wp-content/uploads/2017/12/Harmful-Algal-Blooms-Report-FINAL-August.2017.pdf. <p><i>Karenia brevis</i> (dinoflagellates) blooms in Florida</p> <ul style="list-style-type: none"> ○ Wei-Haas, M., 2018. Red Tide Is Devastating Florida's Sea Life. Are Humans to Blame? https://www.nationalgeographic.com/environment/2018/08/news-longest-red-tide-wildlife-deaths-marine-life-toxins/#close
April 3		<p><i>Pseudo-nitzschia</i> blooms in West coast</p> <ul style="list-style-type: none"> ○ Kudela, R.J., J. Birch, J., M. Blum, et al., 2017. Causality of an extreme harmful algal bloom in Monterey Bay, California during the 2014–2016 northeast Pacific warm anomaly. Geophys. Res. Lett. 44 (11), 5571–5579. <p>Brown tides (<i>Aureococcus anophagefferens</i>) in US East Coast</p> <ul style="list-style-type: none"> ○ Gastrich M.D., R. Lathrop, S. Haag, M.P. Weinstein, M. Danko, D.A. Caron and R. Schaffner, 2004. Assessment of brown tide blooms, caused by <i>Aureococcus anophagefferens</i>, and contributing factors in New Jersey coastal bays: 2000-2002. Harmful algae 3:305-320.

Date	Module	Readings and Assignments
April 10	Class Discussion Case Studies	<ul style="list-style-type: none"> ○ Schindler, D. W.; Carpenter, S. R.; Chapra, S. C.; Hecky, R. E.; Orihel, D. M. Reducing phosphorus to curb lake eutrophication is a success. <i>Environmental Science and Technology</i>, 50:8923-8929 ○ Paerl, H.W., J.T. Scott, M. J. McCarthy, S.E. Newell, W.S. Gardner, K.E. Havens, D.K. Hoffman, S.W. Wilhelm, and W.A. Wurtsbaugh, 2016. It Takes Two to Tango: When and Where Dual Nutrient (N & P) Reductions Are Needed to Protect Lakes and Downstream Ecosystems. <i>Environmental Science and Technology</i>, 50:10805-10813. ○ Cotner, J.B., 2017. Nitrogen is Not a 'House of Cards'. <i>Environmental Science and Technology</i>, 51:3-3.
April 17	Prepare for oral presentation	Student presentation powerpoint (PPT) file due, and to be sent to Dr. Ren for review comments.
April 24		Dr. Ren done commenting on PPT, and class gets together for questions and discussion
May 1	Oral Presentations	EVPP-991 students review paper * due on May 4th.

*Review paper: I will review the paper and send my comments back before the end of the course. In addition, I may send the paper to 1-2 department faculty or outside scientists for their review, depending on the quality of the paper.

ACADEMIC INTEGRITY

GMU students and faculty are responsible to follow the GMU Honor Code. Plagiarism cannot be tolerated in all assignments. Students should follow the three fundamental and simple rules: 1) all work submitted be your own; 2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; 3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. You can find the GMU Honor Code in the following link if you are not familiar with it.

<https://oai.gmu.edu/wp-content/uploads/2019/08/George-Mason-University-Honor-Code-2019-2020-final.pdf>

DISABILITY ACCOMMODATIONS

Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit <http://ds.gmu.edu/> for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email:ods@gmu.edu | Phone: (703) 993-2474.

DIVERSITY AND INCLUSION

George Mason University, as an intentionally inclusive community, promotes and maintains an equitable and just work and learning environment. We welcome and value individuals and their differences including race, economic status, gender expression and identity, sex, sexual orientation, ethnicity, national origin, first language, religion, age, and disability.

EMAIL USAGE

Students must use their MasonLive or Gmu email account to communicate related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.

SEXUAL HARASSMENT, SEXUAL MISCONDUCT, AND INTERPERSONAL VIOLENCE

As a faculty member and designated “Responsible Employee,” I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason’s Title IX Coordinator per university policy 1412. If you wish to speak with someone confidentially, please contact the Student Support and Advocacy Center (703-380-1434) or Counseling and Psychological Services (703-993-2380). You may also seek assistance from Mason’s Title IX Coordinator (703-993-8730; titleix@gmu.edu).