Aquatic science and management (ENSC/GEOG 3106)
Course outline – Fall 2017

INSTRUCTOR: Dr. Jesse Vermaire
Office: Herzberg Building – room 4439
Phone: 613-520-2600 ext. 3898
Email: jesse.vermaire@carleton.ca

OFFICE HOURS: Thursdays 3:00 – 4:00 pm or by appointment (just email)

PREREQUISITES: Third year standing or permission of the program director.

SCHEDULE: Tuesdays & Thursday 4:05 – 5:25 pm
Paterson Hall 115

REQUIRED TEXTBOOK: None! The instructor will email links to readings through CULearn. This will require accessing materials from the library. If you want to do extra reading some excellent relevant texts are:


EVALUATION:

Mini-review (Sept 28th) 10%
Mid-term (Oct 17th) 30%
Oral presentation (throughout the semester) 15%
Take Home final exam 35%
Participation* 10%
(*carrying out assigned readings and submitting very short write-ups based on readings)

Total 100%
**Academic Accommodation:** You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

**Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

**Academic Accommodations for Students with Disabilities:** The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your **Letter of Accommodation** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (*if applicable*) at [http://www.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/](http://www.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/)

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

**Late Policy:** The late policy of this class is designed to be fair to students who handed their work in on time. Without a legitimate excuse, all late submissions are docked 10% per day.

**Plagiarism and Academic Integrity:** Students will be held to high standards of academic integrity. Academic misconduct related to plagiarism and academic integrity has serious consequences (see [http://www.carleton.ca/cu0607uc/regulations/acadregsuniv14.html](http://www.carleton.ca/cu0607uc/regulations/acadregsuniv14.html)).
COURSE OVERVIEW:
This course will cover the fundamentals of aquatic science bringing together the physical, chemical, and biotic aspects of lake, river, and estuary systems including how humans are changing aquatic ecosystems and management techniques for the use and conservation of these resources. Topics covered during the class will include the structures and function of aquatic systems; the dynamics of the pelagic and littoral zones, human impacts and environmental change, and monitoring and management of aquatic ecosystems.

Learning Outcomes:
1. Integrate foundational knowledge in limnology with aquatic ecosystem management.
2. Define established and emerging environmental stressors of aquatic ecosystems.
3. Identify relevant environmental policy related to aquatic ecosystems in Canada
4. Understand the design, implementation, and strengths/weakness of aquatic monitoring programs
5. Evaluate, synthesize, and communicate data on aquatic ecosystems to inform evidence-based management

Mini-review (10%)
The goal of this assignment is for you to summarize a research topic in aquatic sciences that you find interesting and to get you writing early in the term.

Assignment:
Find and read at least two peer-reviewed publications related to a topic you find interesting in the aquatic sciences. Use these publications to help you write your summary and cite them in the text and in a references section.

This assignment should be kept brief and to the point (absolute max 500 words) but should accurately summarize the content of the articles and explain why you find the topic/research interesting and how the research has contributed to our understanding of aquatic science.

For your references, base the formatting on the style of the journal article you selected.

Mini-review marking scheme:
Mini-review assignment /10
Explains and properly summarizes content /4
Clearly summarized, concise, accurate

Contribution to our understanding and why you find the article interesting /4
Clearly explained Accurate
Linked to broader body of work

Proper formatting /2
Proper sentence structure Referencing style Spelling & Grammar

Comments:
**Oral presentation (15%)**
Each student will give a 5 to 8 minute talk focused on an environmental issue and management policies related to aquatic ecosystems. Topics will be selected at a later date.

**Marking Scheme: /15**

- **Introduction /4**  
  Immediately engages the audience  
  Clear introduction to topic

- **Content /8**  
  Organized and logical progression  
  Clearly explained  
  Shows depth of knowledge Information is correct

- **Conclusions /3**  
  Summary of key points

- **Delivery /2**  
  Enthusiasm for subject  
  Audible, good voice projection and clearly enunciated sentences  
  Confidence, good eye contact  
  Well-paced, not too rushed or too short

- **Discussion /3**  
  Encouraged and facilitated on-topic discussion among group

**Comments:**
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Content</th>
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<tbody>
<tr>
<td>1</td>
<td>Sept 7</td>
<td>Course introduction, general introduction to aquatic systems</td>
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<tr>
<td>2</td>
<td>Sept 12,14</td>
<td>Distribution and forms of inland waters, physical structure, watersheds as management units</td>
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<td>3</td>
<td>Sept 19,21</td>
<td>Chemical cycles of key elements in aquatic systems</td>
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<td>4</td>
<td>Sept 26,28</td>
<td>Algae and aquatic plants, primary production, and spatial food-web subsidies</td>
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<td>5</td>
<td>Oct 3,5</td>
<td>Zooplankton, food-webs, and trophic cascades</td>
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<td>6</td>
<td>Oct 10</td>
<td>Rivers and Estuaries</td>
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<td>Oct 12</td>
<td>Tropical and arctic limnology</td>
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<td>7</td>
<td>Oct 17</td>
<td>Mid-term exam</td>
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<td>Oct 19</td>
<td>Tropical and arctic limnology</td>
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<td>8</td>
<td>Oct 24,26</td>
<td>Winter break – No class</td>
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<td>9</td>
<td>Oct 31, Nov 2</td>
<td>Human modification of watersheds lakes, rivers and estuaries</td>
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<td>10</td>
<td>Nov 7,9</td>
<td>Pollution of lakes, rivers, and estuaries</td>
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<td>11</td>
<td>Nov 14,16</td>
<td>Invasive species, Climate change, and multiple stressors</td>
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<td>12</td>
<td>Nov 21,23</td>
<td>Watershed monitoring, reference conditions, and paleolimnology</td>
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<td>13</td>
<td>Nov 28,30</td>
<td>Governance of aquatic resources, successes in management and emerging stressors</td>
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<td>14</td>
<td>Dec 5,7</td>
<td>Freshwater resources in the Anthropocene</td>
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