Summer Session 2018

BIOB 439 Stream Ecology
Syllabus

3 credits; Lectures, Labs, Field Work
Course dates: August 6-17, 2018
Location: FLBS, Ecology West Classroom
Instructor: Dr. Robert Hall
117 Elrod, Flathead Lake Bio Station, University of Montana
Email bob.hall@flbs.umt.edu

Prerequisites: One year of college-level biology, chemistry, and mathematics, and an ecology course (can be met via BIOE342 Field Ecology at FLBS) or equivalents; or consent of instructor.

Course Description:
Stream Ecology (BIOE 439) is the study of the physical, chemical and biological processes in streams. F.-A. Forel coined limnology as the “oceanography of lakes”. Here we will do the same for streams and rivers by studying the ecology of streams rather than simply ecology in streams. This goal requires student integrating across scientific disciplines to learn principles, concepts and methods of stream ecology in a field, lecture, laboratory, and discussion settings. Daily participation, examinations, and written and oral reports of independent or group studies as directed by the professor are required.

Text: None, but lots of required readings on Dropbox.

Student Learning Outcomes:

Course Learning Objectives
1) Engage students in stream ecology concepts such as the interactions of physical, chemical, and biological processes through lectures, discussions, readings, and field investigations.
2) Students collect and analyze data and present written findings from field research, working both independently and as a team.

Expected Learning Outcomes
After completing this course, students will be able to:
1) Identify and explain ecological relationships pertaining to a variety of stream organisms and environments. Students accomplish this task using terms, concepts, and models familiar to professional stream ecologists.
2) Evaluate and communicate ideas from stream ecology literature.
3) Conduct a quantitative and repeatable study design that addresses a research question of relevance in stream ecology.

Evaluation and Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation (daily)</td>
<td>20%</td>
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<tr>
<td>Short papers (5)</td>
<td>20%</td>
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<tr>
<td>Research paper (1)</td>
<td>30%</td>
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<tr>
<td>Final exam (1)</td>
<td>30%</td>
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Evaluation:

- A ≥94% A- 90–93%
- B+ 87–89% B 84–86% B- 80–83%
- C+ 77–79% C 74–76% C- 70–73%
- D+ 67–69% D 64–66% D- 60-63%
- F <60%

Participation is based on discussions, attendance and short exercises that you will do, we will discuss, but won’t become a full blown paper. Short papers are 1 pagers turned in on new papers in the field. Description
for these is on Dropbox. Final paper is a research report that you will write about the field data that we collect in the course.

**Course and Field Supplies/Equipment:** (*Available for purchase at the FLBS Bookstore*)

- Rite in the Rain field notebook*
- Pencils*
- Hot/cold mug*
- Water bottle*
- Lunch pack-up container (re-sealable)*
- Bear spray*
- Wading shoes or sandals
- Flashlight (headlamp) and batteries
- Laptop computer with MS Excel or RStudio
- Personal first aid kit
- Mess kit

**Required Overnight Field Gear and Other Items to Bring Checklists:** [http://flbs.umt.edu/urls/lists](http://flbs.umt.edu/urls/lists)

**Computers:** We will do lots of data analysis and writing in this course. You are free to use the software of your choice. I use R (via RStudio) for data and graphing, LaTeX for difficult writing (papers), and MS Word for easy writing (this syllabus), and Excel for arranging data. You are welcome to use Excel, any other spreadsheet program, R, Matlab, MS Word, open office, R Markdown, etc. For those who care about such things, Rstudio and LaTeX are free, have cloud options (RStudio Cloud, Overleaf), but are difficult to learn in a 2 week stream ecology class. One of the exercises (stream metabolism) requires R, but we can use my computer. Please hand is all assignments as printed paper; I have a much easier time grading them that way.

**Course Policies:**
Students will adhere to University of Montana Student Conduct Code and Discrimination, Harassment, Sexual Misconduct, Stalking, and Retaliation Policy (policy website: [http://www.umt.edu/safety/policies/](http://www.umt.edu/safety/policies/)) and to the Biological Station Code of Conduct form signed during student registration. Students must also follow FLBS Rules and Regulations and abide by the Safety Orientation Checklist. Students who have not already completed the University of Montana PETSA training may access the Moodle module at this link: [http://www.umt.edu/petsa/](http://www.umt.edu/petsa/).

**Schedule:** The schedule below is subject to change.

**Note:** Make sure you pack your brown bag lunch each day at breakfast!

<table>
<thead>
<tr>
<th>Date</th>
<th>Lectures – Labs – Field Work</th>
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<tbody>
<tr>
<td>6-Aug-18 (M)</td>
<td>08:00am Lecture: Intro to geomorphology &amp; hydrology</td>
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<td></td>
<td>10:00am Roy's Creek</td>
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<td></td>
<td>12:00am Lunch @ Yellow Bay Creek</td>
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<td></td>
<td>13:00pm Sampling Yellow Bay Creek</td>
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<td></td>
<td>17:00pm Dinner</td>
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<tr>
<td>7-Aug-18 (T)</td>
<td>08:00am Lecture: Nutrient Cycling</td>
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<td></td>
<td>10:00am TBA</td>
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<tr>
<td></td>
<td>12:00pm Lunch</td>
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<tr>
<td></td>
<td>13:00pm Trip Prep</td>
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<td></td>
<td>15:00pm Depart for the Nyack/Drive to S. Fork Stop</td>
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<tr>
<td></td>
<td>16:00pm South Fork Stop</td>
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<tr>
<td></td>
<td>17:00pm Dinner</td>
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<tr>
<td></td>
<td>Camp overnight at Nyack</td>
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<tr>
<td>8-Aug-18 (W)</td>
<td>08:00am Start Diel O2, CO2 Nutrient addition experiment</td>
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<tr>
<td></td>
<td>Fieldwork around Nyack</td>
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Students with disabilities may request reasonable modifications by contacting the instructor. The University of Montana assures equal access to instruction for students with disabilities in collaboration with instructors and Disability Services for Students (406.243.2243, [http://www.umt.edu/dss/default.php](http://www.umt.edu/dss/default.php)). The University does not permit fundamental alterations of academic standards or retroactive modifications.

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
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| 9-Aug-18 (Th) | 16:00pm Rosemond Discussion  
17:00pm Dinner  
Camp overnight at Nyack |
| 10-Aug-18 (F) | 08:00am Lecture: Food Webs / RCC  
10:00am Wallace Discussion  
12:00pm Lunch  
13:00pm Depart for Jewel Basin  
13:00pm Jewel Basin RCC  
17:00pm Dinner |
| 13-Aug-18 (M) | 08:00am Swan Valley / tributary sampling  
12:00pm Lunch  
13:00pm Swan River sampling  
17:00pm Dinner |
| 14-Aug-18 (T) | 08:00am Giersch or Muhlfeld discussion  
09:00am Process samples  
12:00pm Lunch  
13:00pm Data  
17:00pm Dinner |
| 15-Aug-18 (W) | 08:00am Litterbag pickup, Roy's Creek  
09:00am Sort and dry litter  
11:00am Lecture: Bioassessment  
12:00pm Lunch  
13:00pm Data of field  
17:00pm Dinner |
| 16-Aug-18 (Th) | 08:00am Lecture: Dams  
09:00am Kennedy Discussion  
10:00am Weigh litter, analyze  
12:00pm Lunch  
13:00pm Chill  
15:00pm Final  
17:00pm Dinner |
| 17-Aug-18 (F) | 08:00am Lecture: Nutrient Cycling  
10:00am TBA  
12:00pm Lunch  
13:00pm Trip Prep  
15:00pm Depart for the Nyack/Drive to S. Fork Stop  
16:00pm South Fork Stop  
17:00pm Dinner  
Camp overnight at Nyack |