# Course Outline Form: Winter 2016

## General Information

**Course Title:** ENVS\*3050 Microclimatology

**Course Description:**

Natural and intentionally‐modified microclimates near the earth’s surface; energy budgets; transport of mass and heat. Familiarization with some instruments for microclimatic measurements.

**Credit Weight:** 0.50 credits

**Academic Department (or campus):** School of Environmental Sciences

**Campus:** Guelph Campus

**Semester Offering:** Winter 2016

**Class Schedule and Location:** Mon., Wed., Fri., 12:30-1:20. Room 218, Alexander Hall

## Instructor Information

Instructor Name: Shannon Brown

Instructor Email: [sbrown06@uoguelph.ca](mailto:sbrown06@uoguelph.ca)

Office location and office hours: ALEX 204, Mon., Wed., Fri., 11:30-12:20, or by appointment.

## Course Content

### Specific Learning Outcomes:

At the end of this course, students will be able to…

1. Identify and describe basic principles (e.g., energy budget and Ohm’s law analogy) underlying mass and energy exchange in the environment;

2. Apply and interpret these principles to specific microclimates (e.g., non-vegetated, vegetated surfaces);

3. Apply microclimatic principles to broad environmental issues (e.g., climate change);

4. Solve, interpret and communicate results of simple numerical models of microclimates;

5. Use simple microclimatic instruments to characterize contrasting microclimates and relate results to microclimatic principles.

### Lecture Content:

|  |  |  |
| --- | --- | --- |
| Week | Topic | Textbook Readings (Chapter/ Section)  *(Pages)* |
| (1) Jan 11 | Introduction: scales in Microclimatology. Fundamental concepts: modes of energy transfer. Review of radiation laws, and radiative properties of materials. | 1/1,3a; 2/1a p. 3-6, 8-17; 33-34 |
| (2) Jan 18 | Radiation, energy and mass balance; consumer vs. supplier and sign convention. | 1/2,3c, 4  p. 7, 20-32 |
| (3) Jan 25 | Profiles of temperature, and gases: spatial and temporal variability. Ohm’s law analogy. Computer model for surface temperature: development and testing. Assignment 1 due (Jan 29) | 2/1c, 3e  p. 37-41, 69-71 |
| (4) Feb 1 | Wind speed profile and aerodynamic resistance; atmospheric surface layer: turbulence and sensible heat, latent heat and momentum flux; stability effects. Assignment 2 due (Feb 5). | 2/3a, 3b, 3c, 3d  p. 51-76 |
| (5) Feb 8 | Review. MID-TERM EXAM 1 (Feb 12). | - |
| (6) Feb 22 | Sub-surface climates: heat storage in the soil. Computer model: soil temperature wave | 2/1b, 2a  p. 34-36, 46-48 |
| (7) Feb 29 | Microclimates of simple non-vegetated surfaces: snow. Assignment 3 due (Mar 4). | 3/2a,2b,2c  p. 84-98 |
| (8) Mar 7 | Microclimates of simple non-vegetated surfaces: water. Assignment 4 due (Mar 11). | 3/3a,3b,3c  p. 98-107 |
| (9) Mar 14 | Microclimates of vegetated surfaces: crops and forests. Ecosystem-atmosphere carbon exchange. Assignment 5 due (Mar 18). | 4  p. 110-158 |
| (10) Mar 21 | Review. MID-TERM EXAM 2 (Mar 23). | - |
| (11) Mar 28 | Climates of Animals. | 6  p. 190-197, 206-226 |
| (12) Apr 4 | Human Comfort. Wind Chill Temperature. Review. | Handouts |
| Apr 22 | FINAL EXAMINATION |  |

### Course Assignments and Tests:

| **Assignment or Test** | **Due Date** | **Contribution to Final Mark (%)** | **Learning Outcomes Assessed** |
| --- | --- | --- | --- |
| Assignment 1 | Friday Jan 29 | 5% | 1 |
| Assignment 2 | Friday Feb 5 | 5% | 1, 2, 4 |
| Mid-Term Exam 1 | Friday Feb 12 | 15% | 1,2 |
| Assignment 3 | Friday Mar 4 | 5% | 2, 4 |
| Assignment 4 | Friday Mar 11 | 5% | 1-4 |
| Assignment 5 | Friday Mar 18 | 5% | 1-4 |
| Mid-Term Exam 2 | Wed Mar 23 | 15% | 1-4 |
| Final Exam (cumulative) | Friday Apr 22  (2:30-4:30 PM) | 35% | 1-4 |
| Microclimate group project (Oral presentation during class time throughout the semester; please see CourseLink for instructions) | See additional notes | 10% | 5 |

Additional Notes (if required):

A sign-up sheet will be circulated in class during the first week of classes where you will be able to identify 1 classmate to collaborate with and where you will choose a date for your presentation. Once groups are formed and dates for presentations are set, I will post this schedule on Courselink and also e-mail it you.

### Final examination date and time: April 22 2:30-4:30

### Final exam weighting: 35%

## Course Resources

### Required Texts:

Oke, T.R. 1990. Boundary layer climates. Routledge, 435 pp. (QC 981.7.M5 O34) (on reserve)

### Recommended Texts:

Bonan, G.B. 2002. Ecological Climatology: concepts and applications. Cambridge, 678 p. (QK754.5 .B66) (on reserve)

### Other Resources:

Course handouts, slides and review/discussion questions will be posted on CourseLink ([http://courselink.uoguelph.ca](http://courselink.uoguelph.ca/)) as we progress through the course topics.

## Course Policies

### Grading Policies:

Assignments are to be handed in ALEX Rm 218 at the start of class on the dates shown above. No late submissions will be accepted without medical or compassionate documentation. Late assignments or projects will be assessed a penalty of 10% of the total available marks for that assignment per day (including weekends).

### Course Policy on Group Work:

Assignments must be completed individually. Components of the microclimatic measurement project and presentation are to be completed by all group members.

### Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

## University Policies

### Academic Consideration:

The University of Guelph is committed to supporting students in their learning experiences and responding to their individual needs and is aware that a variety of situations or events beyond the student's control may affect academic performance. Support is provided to accommodate academic needs in the face of personal difficulties or unforeseen events in the form of Academic Consideration.

Information on regulations and procedures for Academic Consideration, Appeals and Petitions, including categories, grounds, timelines and appeals can be found in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml).

### Academic Misconduct:

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Detailed information regarding the Academic Misconduct policy is available in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml).

### Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS), formerly Centre for Students with Disabilities (CSD), as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or visit the [Student Accessibility Services website (http://www.uoguelph.ca/csd/)](http://www.uoguelph.ca/csd/).

### Course Evaluation Information:

End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions used as an important component in the Faculty Tenure and Promotion process, and as valuable feedback to help instructors enhance the quality of their teaching effectiveness and course delivery.

While many course evaluations are conducted in class others are now conducted online. Please refer to the [Course and Instructor Evaluation Website](https://courseeval.uoguelph.ca/) **for more information.**

### Drop period:

The drop period for single semester courses starts at the beginning of the add period and extends to the Fortieth (40th) class day of the current semester (the last date to drop a single semester courses without academic penalty) which is listed in [Section III (Schedule of Dates) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/).

The drop period for two semester courses starts at the beginning of the add period in the first semester and extends to the last day of the add period in the second semester.

Information about Dropping Courses can be found in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/).

**Additional Course Information**

None