University of Manitoba
Clayton H. Riddell Faculty of Environment, Earth, and Resources
Department of Environment and Geography

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Course Details

Course Title & Number:	GEOG 3320 Introduction to Microclimates and Micrometeorology
Number of Credit Hours:	3.000
Class Times & Days of Week:	Tuesdays and Thursdays, 10 am - 11:15 am
Location for classes:	Wallace 247
Pre-Requisites:	GEOG 2310 (Hydrology) or permission of instructor

Instructor Contact Information

Instructor(s) Name:	Dr. Matthew Morison
Preferred Form of Address:	Matt
Office Location:	Sinnott 220B
Office Hours:	Unless otherwise noted in class, Tuesdays 9 am – 10 am Thursdays 11:20 am – 12:20 pm Starting on Tuesday, January 7th, and continuing to Tuesday, April 7th, and not held on February 18th or 20th (reading break).
Email:	Matt.Morison@umanitoba.ca I will generally return emails during business hours (9 AM to 5 PM) within 24-48 hours that they are received, Monday through Friday, excluding holidays. Emails received on Friday will likely be answered by the following Monday.
Contact:	Email is my preferred mode for contact. Also, I will often be available right after class to discuss course material in person.

Course Description

This course introduces the concept of energy balance climatology and examines relationships among climate, microclimate, and environments of the Earth's surface and human-made environments, including studies of bioclimates and hydroclimates.

The Earth's surface continually exchanges heat and mass with the atmosphere. The nature of these exchanges both impact and are impacted by specific microclimates, which in turn moderates regional climate and weather. By definition the microclimate is the climate near to the ground - extending from the surface to the height in the atmosphere where the effects of the underlying surface on the climate can no longer by distinguished from the general climate. Its characteristics depend on such factors as temperature, humidity, wind, water availability, solar radiation, and as alluded to above vertical exchanges of heat, water, and other important atmospheric constituents such as carbon dioxide. Vegetation and topography are important factors in determining microclimate through their control on evapotranspiration, temperature and availability of solar radiation.

General Course Information

This is a lecture only course (no laboratory section). Assignments (for credit) and practice questions (not for credit) will be posted online periodically over the term to practice the application of theory and methods discussed in class. Although the instructor will provide many of the lecture slides, some problem solving exercises may be done interactively in class and not included in the slides made available to the students.

Course Goals

The objective of this course is to understand the nature and controls over microclimate, and its relationship to properties of the atmosphere and surface. Fundamentally the student will develop an understanding of the linkages between ecosystems and climate.

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, unless an exception to the *Copyright Act* applies or written permission has been confirmed. For more information, see the University's Copyright Office website at http://umanitoba.ca/copyright/ or contact um_copyright@umanitoba.ca.

Recording Class Lectures

The course instructor (Matthew Morison) and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission by the course instructor. Course materials (both paper and digital) are for the participant's private study and research.

Textbook, Readings, Materials

Recommended Text: Oke, T. R., 1987: Boundary Layer Climates – 2nd Edition, Methuen, New York. pp 435.

- While not strictly compulsory as to avoid financial barriers to academic success, readings from this text will accompany much of the lecture material and provide an additional foundation of understanding for the course, and is therefore recommended.

Other compulsory reading material may be provided online through the UM Learn course webpage throughout the term.

Course Technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Disability Services. Student should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking (e.g. Facebook) online and offline "gaming" during scheduled class time. If student is on call (emergency) the student should switch his/her cell phone on vibrate mode and leave the classroom before using it.

Course material will be provided through UM Learn, for information on access and navigation of this resource, see the Centre For The Advancement Of Teaching & Learning.

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit: http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf

Please note that all communication between myself and you as a student must comply with the electronic communication with student policy (http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Expectations: I Expect You To

Please be courteous to your fellow students by showing up on time, and refrain from social talk once the class has begun - although you are encouraged to get to know each other before or after class. Students can use technology (e.g., tablets and notebook computers) in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Disability Services. Students must not use technologies (e.g, cell phones, computers, tablets) for social applications during the class period. Cell phones should be switched off or at least with

ringer off. Class attendance is compulsory. The expectation is that everyone participates in class discussions.

I will treat you with respect and would appreciate the same courtesy in return. See the University of Manitoba Respectful Work and Learning Environment Policy.

Academic Integrity:

Students should acquaint themselves with the University's policy on academic misconduct. (http://umanitoba.ca/student/studentdiscipline/academic_misconduct.html). Below are some tips:

- Learn what is meant by plagiarism, cheating, impersonation and academic fraud
- Unless otherwise specified all work is to be completed independently.
- Keep track of references and sources of information used in written assignments (including web references with date)
- Attribute the source of ideas and material in your written submission
- If in doubt, consult your instructor.

Students Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services http://umanitoba.ca/student/saa/accessibility/
520 University Centre
204 474 7423
Student_accessibility@umanitoba.ca

Class Schedule

Course material will be organized according to the following modules. Some modules require more than one lecture to cover. Modules may be subject to change, removal, or presented in a different order depending on the class dynamics. Text chapters associated with the module are given. Lectures will also incorporate material from sources other than the course text.

Module	Class content	Associated readings from course text*
1	Introduction	Chapter 1
2	Atmospheric scales, systems, and balances	Chapter 1
3	Radiation	Chapters 1, 2
4	Subsurface climatology	Chapter 2
5	Wind and wind profiles	Chapter 2

6	Turbulent heat fluxes	Chapter 2
7	Climates of arid surfaces	Chapter 3
8	Climates of snow and ice	Chapter 3
9	Climates of aquatic environments	Chapter 3
10	Climates of vegetated surfaces	Chapter 4
11	Land-use and climatic change	Chapters 7,8

*Lectures will also incorporate material from sources other than the course text.

Course Evaluation Methods

You are responsible for all material covered in class lectures, readings, and assignments. Allocation of marks is as follows:

- One mid-term test: 20%
    - Tentative date for term test is: Thursday, February 13. Students will have the entire class duration (75 minutes) to complete the term test.
- Two term assignments (2 @ 10% each): 20%
    - Details, including expectation and due dates surrounding the term assignments will be outlined in class and posted/submitted through UM Learn.
- Seminar presentation: 20%
    - Each will prepare, deliver, and lead a ~35 minute seminar presentation over the last several weeks of class. Details will be posted on Learn and discussed in class.
- Term and seminar participation: 10%
    - Students should participate regularly in class discussion and while other students lead seminar discussions. Everyone will begin the semester with all of these marks assumed to be given to them but can be forfeit if the student fails to adequately participate in class over the term.
- Final Exam: 30%
- Total is 100%

The mid-term and final will draw from material covered both from lectures, material posted on UM Learn, and assignments. The mid-term is tentatively scheduled for Thursday, February 13. The final exam will include all course material, with some additional emphasis on material covered after the mid-term test. The exam will be 2 hours in length and will be scheduled by the Registrar's Office.

Grading

Letter Grade	Percentage out of 100
A+	95-100
A	86-94
B+	80-85
B	72-29

C+	65-71
C	60-64
D	50-59
F	Less than 50

Referencing Style

Assignments should use the APA reference style as outlined here.

Assignment and Seminar Descriptions

There will be two course assignments over the term. Term assignments will consist of short-answer questions associated with the application of basic equations for the estimation of surface fluxes and properties. The assignments will include working with representative micrometeorological data, including techniques of data collection, quality control, analysis, and discussion. In addition, long-answer questions focusing on supplementary assigned readings will focus the student on important methods, outcomes, and/or implications of the research contained in the material. Specific details for each assignment, including expectations and due dates will be outlined in class and posted/submitted through UM Learn.

For the seminar assignment, each student will be responsible for researching and delivering a presentation on a topic in micrometeorology and bringing discussion prompts to class in order to facilitate a class discussion on their topic. Students will use their own judgement on the breadth and depth of information to include, and are encouraged to contact the instructor in order to discuss further if they are uncertain of the extent of detail to explore, or with assistance in being pointed towards the right direction in finding reliable sources for material. Further details will be discussed in-class.

Assignment Grading Times

Assignments which are submitted on time will be graded within 2 weeks of submission or sooner. The final date for voluntarily withdraw from this course is March 18, 2020. If completed and submitted on-time, students will have access to the results of the mid-term (worth 20% of the course grade) and two assignments (worth 20% of the course grade each) for a total of 40% of their course grade prior to this date. Students are encouraged to discuss with the instructor before a decision to withdraw is made.

Assignment Extension and Late Submission Policy

Unless otherwise stated, assignments are due at **4 pm** of the due date and submitted through UM Learn. Students will not be permitted to write make-up tests or hand in assignments late, except for documented medical or compassionate reasons. Assignments will be penalized -10% for each day, or part therein, late.