

**DEPARTMENT OF ENVIRONMENT & GEOGRAPHY
- COURSE OUTLINE -**

**GEOG 3320 A01 – Introduction to Microclimates and Micrometeorology
Winter 2016**

Instructor:

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Lecture Timeslot: Tuesdays and Thursdays: 10:00 and 11:15

Lecture Room: Wallace Bldg, Room 245

Office hours: By appointment

Required Text

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

Course Description & Objectives

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 be distinguished from the general climate. Its characteristics depend on such factors as temperature, humidity, wind, availability of water, solar radiation, and as alluded to above vertical exchanges of heat and water. Vegetation and topography are important factors in determining microclimate through their control on evapotranspiration, temperature and availability of solar radiation.

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.

Course format: This is a lecture only course (no laboratory section). Activities (for credit and not for credit) will be scheduled 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, most of the problem solving exercises will be done interactively in class and not included in the slides made available to the students. Class attendance is compulsory. Students with excessive unexcused absences may be subject to debarment. The required textbook is for your independent study. Not all of the textbook will be covered in class. You are responsible for all material covered in class lectures, readings, assignments and designated areas of the textbook.

Classroom etiquette: Please be courteous to your fellow students by showing up on time, refrain from social talk and turn off cell phones and other electronic devices.

Term Work and Allocation of Marks

- Midterm tests: 1 @ 25% = 25%

- Term assignments: 2 @ 10% = 20%
- Reading assignments: 1 @ 15%=15%
- Final Exam: 1 @ 40% = 40%
- Total is 100%

The tentative date for the term test is **March 3**.

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 focus respectively in the areas of radiation and radiation transfer, subsurface climates and conductive heating, and air-surface exchange of heat and mass via turbulence. The assignments will be assigned at the end of these course modules.

The reading assignment will involve a short research paper on a topic of relevance to the course using information from peer-reviewed publications. The student will select from a short list of possible topics to research.

The mid-term will draw from material covered both from lectures, and assigned readings including pertinent sections of the course text.

The final exam will include all course material, with emphasis of material covered after the mid-term test.

Policy regarding assignments: Unless otherwise stated, assignments are due at the beginning of class and submitted as hard copies. 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% each day late.

Students will not be permitted to write a make-up test (or hand in a late assignment) except for documented medical or compassionate reasons. A grade of zero will be recorded for a missed test.

The final **date for voluntarily withdraw** from this course is **March 18**. Students may have access to their marks prior to this date and are encouraged to talk with the instructor before a decision to withdraw is made.

An assigned grade will correspond to the corresponding range in marks:

A+	90% and over;	C+	65-69%
A	80-89%;	C	60-64%
B+	75-79%	D	50-59%
B	70-74%	F	49% or less

Avoiding Academic Dishonesty: Students should acquaint themselves with the University's policy on plagiarism and cheating and examination impersonation.

(http://umanitoba.ca/student/studentdiscipline/academic_misconduct.html). Below are some tips:

- Learn what is meant by plagiarism, cheating, impersonation and academic fraud
- 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.

Communication: The University of Manitoba has introduced a new policy on electronic contact with students that requires all email contact on university business to use students' official email addresses. The policy is at:

http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html

This means that professors will no longer simply hit the reply button to answer an email question from a non-official student account, nor accept electronic submission of assignments from a non-official email address. This policy is valid for both undergraduate and graduate students.

General course outline and schedule:

Course material will be organized according to the following modules. Some modules require more than one lecture to cover. Modules may be substituted, removed or presented in a different order depending on the class dynamics. Text chapters associated with the module are given.

Microclimate – The Basics

1. Energy and Mass Exchanges: Oke – Chapter 1
2. Physical Basis of Boundary Layer Climates: Oke – Chapter 2
3. Evaluation of Energy and Mass Fluxes in the Surface Boundary Layer:
Oke – Appendix A2

Controls on and Implications of Microclimate

4. Climates of Non-vegetated Surfaces: Oke – Chapter 3
 - Snow and ice
 - Water bodies – marine and freshwater
5. Climates of Vegetated Surfaces: Oke – Chapter 4
 - Crops & forests
6. Climates of Non-uniform Terrain – Chapter 5
7. Inadvertent Climate Modification.: Oke – Chapter 8
8. Air pollution in the Boundary layer: Oke – Chapter 9