



**University  
of Manitoba**

**University of Manitoba**

**Clayton H. Riddell Faculty of Environment, Earth, and Resources**

**Department of Environment and Geography**

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**Course Details**

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<b>Course Title &amp; Number:</b>	GEOG 3320 Introduction to Microclimates and Micrometeorology
<b>Number of Credit Hours:</b>	3
<b>Class Times &amp; Days of Week:</b>	Tuesdays and Thursdays: 10:00 am - 11:15 am
<b>Room:</b>	Wallace, Room 245
<b>Lecture Materials:</b>	UM Learn
<b>Pre-Requisites:</b>	GEOG 2310 (Hydrology) or permission of instructor

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**Instructor Contact Information**

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<b>Instructor(s) Name:</b>	Dr. Tim Papakyriakou
<b>Preferred Form of Address:</b>	Tim
<b>Office Location:</b>	584 Wallace Building
<b>Office Hour:</b>	By appointment, and generally available after class:
<b>Email:</b>	<a href="mailto:Tim.Papakyriakou@Umanitoba.ca">Tim.Papakyriakou@Umanitoba.ca</a> I try to reply to emails within 24 hours of them being received during weekdays, excluding holidays. It may be that emails received later in the day of Fridays or weekends won't be answered until the following Monday.
<b>Contact:</b>	Email is my preferred mode for contact. Also, I will often be available right after class to discuss course material in person.

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### Course Description

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This course introduces the concept of microclimatology and examines relationships among climate, surface energy balance, microclimate, and environments, both natural and human modified.

The Earth's surface continually exchanges energy and mass with the atmosphere. Energy flows are associated with radiation, sensible and latent heat. Mass exchanges include many important gases, including potent greenhouse gases H<sub>2</sub>O, CO<sub>2</sub> and CH<sub>4</sub>. The nature of these exchanges impact microclimates and microenvironments. These processes effect both climate and weather on coarser scales.

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 regional climate. Its characteristics are well described by such factors as temperature, humidity, wind, water availability, solar radiation (among other variables), while the microclimate itself, as alluded to above, owes its characteristics to the vertical exchanges of radiation, heat, water, and other important atmospheric constituents such as carbon dioxide.

The properties of the surface (e.g., vegetation, snow/ice cover, water, topography, etc.), and ecosystem functions are important factors in determining microclimate through their control on vertical exchanges.

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### General Course Information

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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 the lecture slides, some sample calculations and exercises may be done interactively in class and not included in the slides made available to the students.

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### Course Goals

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The goals of this course are for the student to develop an understanding and appreciations for: (i) the nature and controls over microclimates, (ii) the relationship between microclimates and properties of the atmosphere and surface, and (iii) the linkages between ecosystems and climate.

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### Using Copyrighted Material

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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](mailto:um_copyright@umanitoba.ca).

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### Recording Class Lectures

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The course instructor (Tim Papakyriakou) 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.

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### Textbook, Readings, Materials

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#### Recommended Text:

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

- While not compulsory, it is recommended that students are able to access this book. Many modules of this course will closely follow material contained in this text, and it is a well written book;
- Other reading material, compulsory and supplementary, will be provided online through the UM Learn course webpage throughout the term.

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### Course Technology

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It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. While the lectures are preferably in-person, there is the possibility that one, or some lectures are on-line, using the software Zoom. Students require a computer with web connection with video and audio capability. Ideally the student's computer should also have basic software for spreadsheet and word processing. It will be difficult to complete the course assignments without software like MS Excel and MS Word, or their equivalents.

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](#).

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### Class Communication

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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](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](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**

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Please be courteous to your fellow students by showing up to class on time, and refrain from social talk once the class has begun. While in class cellular phones should be in silent mode, and under no circumstances should phones, or computers be used in class for reasons other than required by the course (e.g., note taking).

Class attendance is compulsory. Lecture discussions not on digital copies of lecture presentations can be on term tests. 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](http://umanitoba.ca/student/studentdiscipline/academic_misconduct.html)), and Academic supports (<http://umanitoba.ca/student-supports/academic-supports/academic-integrity/>).

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**

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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](mailto: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 energy balance	Chapter 2
5	Wind and wind profiles	Chapter 2
6	Turbulent fluxes: momentum and heat	Chapter 2
7	Turbulent fluxes: water and gases	Chapter 2
8	Climates of arid surfaces	Chapter 3
9	Climates of snow and ice	Chapter 3
10	Climates of aquatic and marine environments	Chapter 3
11	Climates of vegetated surfaces	Chapter 4
12	Surface controls over biogeochemical cycles of greenhouse gases.	Supplementary Material

\*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 March 7.
- Four term assignments (4 @ 10% each): 40%
  - Details, including expectation and due dates surrounding the term assignments will be outlined in class and posted through UM Learn.
- Final Exam: 40%
- Total is 100%

There will be four course assignments over the term. Assignments will consist of short- answer questions associated with the application of basic equations, synthesis of data and other resources for characterizing processes and phenomena relevant to this course. In addition, long- answer questions focusing on 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 through UM Learn. It is expected that students have some basic literacy with either a spreadsheet application, e.g., MS Excel, or programming environment like R, or Matlab.

The mid-term and final exam will draw from material covered in lectures, assignments and readings. The mid-term is tentatively scheduled for March 7 during class period. The final exam may include all course material, with emphasis on material covered after the mid-term test.

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### Grading

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Letter Grade	Percentage out of 100
A+	90-100
A	80-89
B+	75-79
B	70-74
C+	65-69
C	60-64
D	50-59
F	Less than 50

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### Referencing Style

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Assignments should use the APA reference style as outlined [here](#).

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### Voluntarily Withdrawal from Course

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The final date for voluntarily withdraw from this course is March 20, 2024. Students are encouraged to discuss with the instructor before a decision to withdraw is made.

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### Assignment Extension and Late Submission Policy

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Assignment due dates will be explicitly stated on the instructions for tests and assignments. 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.