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ERTH 303N.50: Weather and Climate

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Spring 2019 Syllabus
Climate Change Studies/Earth Science 303N: Weather & Climate

Instructor: Dr. Anna E. Klene

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Teaching Assistant: Ryan Rock

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TA Office: 206 Stone Hall

Office hrs: Friday 9-11am & by appt.

Learning Objectives: By the end of this course, you should be able to describe why we have seasons, understand and evaluate the nightly TV forecast for normal and severe weather, and able to explain basic climate change principles to your friends.

Technology: A good internet connection, basic computer skills, and access to a printer are recommended. The course is available at: moodle.umn.edu/. For technical assistance, call UMLearn (243-4999, M-F, 8-5) or email umonline-help@umontana.edu. Use **Firefox** exclusively – it is the only browser supported by UM. Keep Java and Flash updated.

Texts: Recommended: The Atmosphere: An Introduction to Meteorology, by F.K. Lutgens and E.J. Tarbuck, 12th Ed., Prentice Hall, NY. 2013.) The 14th Ed. is newer but \$150 more with few changes. Two copies of the 12th Ed. are on reserve at the library; a digital interactive e-book is also available for purchase through the Bookstore. See Moodle for details and several alternative texts to consider.

Weekly deadlines: There are weekly assignments and quizzes due **each** Friday.

Schedule:	Topic	Reading	Homework
Week 1-4:	The Science of Meteorology	Ch.1&12&Appendices	
	Atmospheric Composition & Structure	Ch. 1	Wk. 1
	Radiation & Temperature	Ch. 2 & 3	Wk. 2 & 3
	Temperature Patterns	Ch. 3	Wk. 3
	Air Pollution	Ch. 13	Wk. 4
	Midterm Exam 1	Feb. 14, noon to Feb. 16, noon	
Week 5-9:	Water in the Atmosphere	Ch. 4	Wk. 6
	Cloud Development & Precipitation	Ch. 5	Wk. 6
	Pressure & Winds	Ch. 6	Wk. 7
	Atmospheric Motion	Ch. 7 & 8	Wk. 8
	Air Masses, Fronts, & Cyclones	Ch. 9 & 12	Wk. 9
	Midterm 2	Mar. 21, 5 noon to Mar. 23, noon	
Week 10-15:	Severe Weather: Thunderstorms & Tornadoes	Ch. 10	Wk. 11 & 12
	Hurricanes	Ch. 11	Wk. 12
	Climatology & Climate Change	Ch. 14	Wk. 13 & 14
	Exam 3	Apr. 28, noon to Apr. 29, midnight	
Grading Procedure:	Weekly Quizzes	80pts.	5 pts/week, lowest dropped
	Homework	220 pts.	20 pts each, lowest dropped
	<u>3 Midterm Exams</u>	<u>300 pts.</u>	
	Total	600 pts.	

For **Gen.Ed.** credit, this course must be completed with a traditional letter grade of C- or above.

Important dates: Jan. 31: Last day to drop/add in Cyberbear with partial refund or change to “Audit”.

Mar. 15: Last day to drop with drop/add form, \$10 penalty, and grade of “W”.

Apr. 26: Last Day to drop by petition, \$10 penalty, and grade of “WP” or “WF”.

**** This syllabus may be modified as necessary during the course.
 Any changes will be posted in Moodle and distributed by e-mail ****

Climate Change Studies/Earth Science 303N: Weather & Climate Course Guidelines and Policy Statements

1. Course Syllabus & Communication – Refer to this syllabus and to the Moodle website throughout the course. Any changes to the syllabus will be posted on Moodle and distributed by e-mail. Please note that I will only use your official UM email or Moodle to communicate with you. This is required to comply with FERPA (the Federal Educational Rights and Privacy Act).

2. Readings – The required reading assignments are listed in the syllabus and online. The text is intended (a) to provide further explanation of concepts covered in lecture videos and (b) to present **additional** information. You are responsible for material in these readings for all exams.

3. Homework – Are a vital component of this class. They account for **30%** of the final grade. The lowest score will be dropped. **Those received late will be penalized 10% off for each calendar day they are not submitted.** Those more than **7 days late will NOT be accepted** without documented family or medical emergencies. For example, if a homework is due Friday at 5 pm, it must be completed by the following Friday (70% off) to receive any credit.

4. Quizzes – Weekly to assess material from the reading and videos. These will allow you to get used to the format used for the exams but they also provide an opportunity for feedback. Same policies apply to quizzes as homework.

5. Exams – All exams will be comprehensive. Meteorology is a science that builds one concept upon another and therefore all tests must contain some previously covered material. However, the exams will be oriented toward the section of the course most recently presented. The exam format will be mainly objective (multiple choice and definitions) and will consist of (a) concepts covered in lecture and (b) concepts covered in the required course readings. A few questions may appear on each exam involve calculations or mapping. There is no provision for make-up exams. Exceptions will be made only for **documented** family or medical emergencies.

6. Time Expectations – Online classes do not require classroom attendance, but the amount of time needed to successfully complete the course will be generally the same or more. You are responsible for completing assignments by prescribed deadlines. Typically science classes expect 3-4 hours/week/credit hour, so plan to spend 9-12 hours/week for this course, including reading, videos, assignments, and exams. Incompletes will be given only for emergencies, and must be completed within 1 year (<http://www.umt.edu/catalog/academics/academic-policy-procedure.php>).

7. Disability Accommodations – For reasonable accommodation please contact me as soon as possible. Disability Services for Students can assist both of us in the modification process. For more information, visit the Disability Services website (<http://www.umt.edu/dss/>).

8. Academic Dishonesty - All students must practice academic honesty. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

9. Final Course Grade - At the end of the course, the distribution will be examined and letter grades assigned at approximately: A=>91%, B=81-89%, C=71-79%, D=61-69%, etc. The “+/-” grading system will be used. Credit/No Credit is available, but does not count for Gen Ed. **There will be no extra credit.**

**** This syllabus may be modified as necessary during the course.
Any changes will be posted on Moodle and distributed by e-mail ****

**Climate Change Studies/Earth Science 303N: Weather & Climate
Spring 2019 Schedule**

- Assignments (quizzes & homework) are **DUE by Friday at 5 pm each week**. Open work will submit itself automatically at 5 pm. Submit early to have time for questions and technical issues.
- It is recommended you complete all homeworks & quizzes for the week *before* taking exam.
- Exams 1 and 2 are open from noon Thursday to noon Saturday. Exam 3 is open from noon Sunday to noon Tuesday. All exams **MUST** be completed within 75 minutes of the time you begin. They will automatically close at that time.

Date	Reading	Assignments
Part 1: Atmosphere & Energy		
Week 1: Thursday, Jan. 10 –Friday, Jan. 18	Course Overview Page & Syllabus Ch. 1 (skip ozone depletion) & skim Ch. 12	Syllabus Quiz Week 1 Quiz Week 1 Homework – Atm Characteristics
Week 2: Jan. 21 – Jan. 25	Ch. 2: The Sun & Seasons	Week 2 Quiz Week 2 Homework – Solar Declination
Week 3: Jan. 28 – Feb. 1	Ch. 3: Temperature Patterns & Applications	Week 3 Quiz Week 3 Homework – Energy & Heat
Week 4: Feb. 4 – Feb. 8	Ch. 13: Air Pollution & Ch. 1 section on ozone	Week 4 Quiz Week 4 Homework – Applications
Week 5: Feb. 11 – Feb. 15	Ch. 4: Atmos. Moisture (This material is on Exam 2.)	Quiz but no Homework ☺ - start on Week 6's Exam 1: noon Thurs – noon Sat
Part 2: Moisture, Wind, and Weather		
Week 6: Feb. 18 – Feb. 22	Ch. 5: Atmos. Moisture continued	Week 6 Quiz Week 6 Homework – Humidity & Stability
Week 7: Feb. 25 – Mar. 1	Ch. 6: Wind & 4 Forces	Week 7 Quiz Week 7 Homework – Atm. Forces
Week 8: Mar. 4 – Mar. 8	Ch. 7: Global Circulation Ch. 8: Air Masses & El Niño	Week 8 Quiz Week 8 Homework – Circulation
Week 9: Mar. 11 – Mar. 15	Ch. 9: Mid-latitude Cyclones	Week 9 Quiz Week 9 Homework – WX Maps
Week 10: Mar. 18 – Mar. 22	Ch. 10: Thunderstorm & Severe WX (This material is on Exam 3.)	Week 10 Hmwk – Cycl & T-storms but no Quiz Exam 2: noon Thurs – noon Sat
Week 11: Mar. 25 – Mar. 29	Spring Break	
Part 3: Severe Weather & Climate Change		
Week 12: Apr 1 – Apr. 5	Ch. 10: Tornadoes & Ch. 11: Hurricanes	Week 12 Quiz Week 12 Homework – Tornadoes & Hurricane
Week 13: Apr. 8 – Apr. 12	Ch. 14: Paleoclimate	Week 13 Quiz Week 13 Homework – Paleo
Week 14: Apr. 15 – Apr. 19	Ch. 14: Climate Models	Week 14 Quiz Week 14 Homework – Modeling
Week 15: Apr. 22 – Apr. 26	Climate Change Wrap-up	Week 15 Quiz Feedback Quiz
Exam Week	Exam 3 – available from Sunday noon (April 28th) to Tuesday noon (April 30th)	

Greek letters used as Variables

Greek Letter		English	
capital	lower	name	equivalent
A	α	alpha	a
B	β	beta	b
Γ	γ	gamma	g
Δ	δ	delta	d
E	ϵ	epsilon	e
Z	ζ	zeta	z
H	η	eta	\hat{e}
Θ	θ	theta	th
I	ι	iota	i
K	κ	kappa	k
Λ	λ	lambda	l
M	μ	mu	m
N	ν	nu	n
Ξ	ξ	xi	ks
O	\omicron	omicron	o
Π	π	pi	p
P	ρ	rho	r
Σ	σ	sigma	s
T	τ	tau	t
Y	υ	upsilon	u
Φ	ϕ	phi	f
X	χ	chi	ch
Ψ	ψ	psi	ps
Ω	ω	omega	\hat{o}

** Δ is often used to refer to the change in something. For instance, ΔP means the change in pressure, so $P_a - P_b$, where a is the first pressure and b is the second.

Refer to Appendix A in your textbook for SI or metric units and conversions.

Order of Operations

1. Simplify any enclosure symbols: parentheses (), brackets [], or braces { }.
 - Work the enclosure symbols from the innermost and work outward.
 - Work separately above and below any fraction bars since the entire top of a fraction bar is treated as though it has its own invisible enclosure symbols around it and the entire bottom is treated the same way.
2. Simplify an exponents and roots working from left to right.
3. Do any multiplication and division in the order in which they occur, working from left to right; *Note: If division comes before multiplication then it is done first, if multiplication comes first then it is done first.*
4. Do any addition and subtraction in the order in which they occur, working from left to right; *Note: If subtraction comes before addition in the problem then it is done first, if addition comes first then it is done first.*

Common Symbols...

- $\sqrt{\quad}$ Square root
- x^2 the 2 is an exponent – this means we should multiply the x by itself (or multiply 2 x 's together). An exponent of 3 would mean x times x times x , and so forth. Multiplying like this is also called “raising x to a power.”
- π the ratio of circumference to diameter of a circle or about 3.141592653589
- e the natural logarithm base or about 2.718281828459. This is usually used with an exponent (e.g. e^x).

Chemical Notation

H_2O —means 2 hydrogen atoms & 1 oxygen
 CH_4 – means 1 carbon atoms & 4 hydrogen