General Meteorology

ESCI – 2410
Spring Semester, 2021

Dr. Steven Gollmer
Office: ENS 357

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Office Hours: M, W, F: 2:00 – 2:50
T, Th: 1:00 – 1:50
Open Door Policy (See below)

Text: *Meteorology Today*, 12th Ed., by Ahrens. We will cover the content included in chapters 1 – 11 and portions of chapters 13-17 & 19-20. Some chapters and sections will be emphasized differently in order to get an over all picture of the driving forces behind our weather. The laboratory portion of the lab has no textbook. Any material you need for the lab will be provided for you.

Class Room:	ENS 207	Lab Room:	ENS 227
Class Time:	8:30 - 9:45 T, Th	Lab Time:	Section 1 3:30 – 5:20 T

Class Web Page: https://stevegollmer.people.cedarville.edu/esci2410/esci2410.htm

Course Description:

ESCI 2410 – General Meteorology **4 hours**

A survey of basic meteorological principles and weather systems. Topics covered will include the vertical structure of the atmosphere, cloud development and precipitation, optical effects of the atmosphere, wind systems, air masses, fronts, and severe weather. Labs will be used to develop basic meteorological skills such as observation of local weather, decoding and interpretation of meteorological data, and introductory weather forecasting. The course and lab will be taught at a level which requires the use of algebra and trigonometry. Three weekly lectures and one two-hour laboratory per week. This course satisfies the physical science component of the general education requirements. (Fee: $100)

Objectives:

Theory/Concepts: The student will be able to recall terminology related to meteorology, the basic measurements of the atmosphere, and the physical principles that affect atmospheric phenomena. In addition they will apply these principles by explaining the physical basis for observed meteorological phenomena.

Analysis: The student will be able to analyze standard atmospheric data using plots and appropriate mathematical techniques and provide interpretations of standard meteorological charts and forecast weather conditions based on current meteorological data.

Communication: The student will express the physical basis of meteorological theories and models with clarity and relate them to other disciplines such as biology, geography, history, etc.

Community: The student will be able to express how meteorology impacts their daily life and affects decisions relevant to society as a whole.

Assessment Mapping	Theory / Concepts	Analysis	Communication	Community
Exams	X	X		
Final Exam	X	X		
Quizzes	X	X		
Student Report				X
Laboratory	X	X	X	

Grading:

		Grading Scale	
300	3 Unit Exams (100 pts each)	90% and up:	A
150	1 Final Exam (comprehensive)	80% and up:	B
70	Quizzes (10 pts each, best 7 of 8 quizzes)	70% and up:	C
60	Class report	60% and up:	D
120	Laboratory (10 pts each)	Below 60%:	F
700	Total		

The results for all exams, quizzes, homework, etc. will be given a point score. For example a 8 on a quiz means 8 out of 10 points were earned on the quiz. The calculation of the final grade will be the result of a straight percentage from the points accumulated during the course of the semester. Although no "curving" of the final grade will be done, I reserve the option of raising a students final grade due to their good attitude, class participation and marked improvement during the course of the semester.

Topics:
The following topics will be covered during the course of the semester. Timing of these topics is reflected in the schedule.

Atmosphere	**Atmospheric Processes**	**Winds**	**Weather**
Vertical structure	Temperature	Pressure gradient	Air masses
Planetary atmospheres	Diurnal cycle	Coriolis effect	Fronts
Energy sources	Phases of water	Geostrophic winds	Cyclogenesis
Heat transfer	Evaporation	Vertical air motion	Weather forecasting
Equilibrium	Humidity measurement	Thermal circulation	Thunderstorms
Blackbody radiation	Condensation	Local wind systems	Tornadoes
Greenhouse effect	Fog & Clouds	Wind measurement	Tropical weather
Climate	Vertical stability	Global circulation	Hurricanes
Pollution	Cloud development	Jet stream	
	Precipitation processes	Ocean/Atmospheric coupling	
	Precipitation types		

Exams:
3 unit exams and one comprehensive exam will be given during the course of the semester. Though each unit exam only covers material from the previous unit exam, there is some building of concepts which will show up in later exams. Exams will be composed primarily of multiple choice, true/false, and matching questions. An understanding of terminology as well as the basic principles of meteorology will be tested. You will also be expected to draw conclusions based on presented data and an understanding of the course material. The final exam is comprehensive and will be similar to the unit exams except for length.

Quizzes:
8 quizzes are scheduled during the semester. These quizzes will give you a chance to see how I ask questions and will prepare you for the unit exams. The total of your best 7 quizzes will be used for your quiz grade. Each quiz is worth 10 points.

Class Report:
Since it is not possible to cover everything in the textbook, I will pick and choose material so that you have a working knowledge of meteorology. There are a number of topics that will not be covered in class. In order to fill in some of those gaps I will have you pick a topic in which you are interested. You will research the topic and give a 8 minute presentation during the last lab period. Along with your presentation you will hand in a typed outline which includes the key facts about your topic. Along with your outline you will include three questions about the material of your presentation. I will select some of these questions and ask them on the final exam. The report is worth 60 points and criteria for grading will be given when the report topics are chosen.

Laboratory:
The laboratory sessions are considered a vital part of this course. While the classwork will help you develop the general concepts and principles of meteorology, the labs will develop observation and interpretation skills. Each laboratory assignment is worth 10 points and will consist of a variety of activities. At the beginning of the semester we will emphasize the measurements of the physical properties of the atmosphere. During this time we will begin the lab with a standard weather observation which will then be coded into a METAR format. We will finish the lab with some instruction and additional exercises. During this portion of the semester the labs will be turned in at the end of the lab period. At the end of the semester our lab activities will be a little more involved and will require you to place some finishing touches on the lab before turning in. For these labs you will turn them in the following week.

Late Work:
Late work will be accepted with a penalty. Late homework and labs will be docked 10% if turned in within the first week and 20% thereafter. If late work is turned in during finals week, 50% of the value of the homework will be docked unless it falls under the category of being within the first week. Homework that is late due to an excused absence (prior arrangement with me or medical excuse) will not be docked if turned in the following class period.

Extra Credit:
No extra credit is available for this class. It is felt that spending time working on extra credit distracts from staying current on the material and preparing for the next graded activity.

Academic Integrity:
"The Academic Integrity Pledge is a commitment to live with integrity in all areas of life including the classroom. All forms of academic dishonesty violate this pledge and could result in dismissal from this community."

Although I encourage group efforts in studying, homework and lab work, I still expect you to turn in your *own* work. If your work appears to be copied from another person's lab or homework, your assignment will be returned with either a zero or returned with the intent of a redo with a loss of credit. Which of these two options is chosen is at the discretion of the instructor.

During quizzes and exams you are required to do your own work. If during the quiz or examination time you receive help from an unauthorized source (ie. class mates, wireless access to the network, etc.), your quiz or exam will receive a zero and the Office of the Academic Vice-President will be notified.

Appeal Process:
Our commitment as faculty is to provide you with the best possible educational experience this semester. If a concern arises during the semester about this course, I encourage you to discuss the issue with me. If you believe that the outcome of that meeting did not resolve the issue, you are encouraged to seek help from the department chair of Science and Mathematics, Dr. Mark McClain. The formal grade appeal process can be found at www.cedarville.edu/gradeappealprocess.Dr. McClain can be contacted by email (mcclain@cedarville.edu), by phone (937-766-7933), or at his office (ENS 380A).

Academic Accommodations:
Disability Services coordinates reasonable accommodations for students with documented disabilities. Students in need of academic accommodations because of the impact of a disability are invited to e-mail the Disabilities Compliance Coordinator at disabilityservices@cedarville.edu or visit www.cedarville.edu/disabilities for information and an application. **Disability Services** is located in **The Cove (Academic Enrichment Center)** on the second floor of the BTS.

Attendance:
Attendance will be taken each day of class. Although it does not get recorded as a grade, it will be to your benefit to be present for class. One example is that a missed quiz will be recorded as a zero unless the absence is excused. Excused absences are allowed for sickness. If you need to miss class for a different reason, you must contact me beforehand and let me determine if this constitutes an excused absence. If a quiz or a lab is to be made up as a result of an excused absence, it must be completed within two days of your return. Another benefit for attending class is that material will be presented differently than in the book since I will endeavor to illustrate some of the physical principles, generate discussion about issues related to meteorology and include a Biblical perspective. Faithful attendance also demonstrates a good stewardship of the time and money with which God has entrusted you.

Open Door Policy:
I have two hours per day scheduled for office hours. You may also drop by my office at any other time whether it is class related or not. As long as I am present in my office and I do not have any pressing work that needs to be done, I will meet with you. I am privileged to have this ministry at Cedarville College. Whether you recognize it or not, God has put me in your life this semester to minister to you.

Assessment Criteria:
This course is used by the following programs to satisfy assessment criteria.

Teacher Education Program
Teacher Education Program Unit and Program Assessments Assigned to Course

Unit Outcome	Program Outcome	Decision Points	Assessment
Competence	NSTA Std 1a.	4	#1 Content Knowledge
Competence	NSTA Std 1a.	1, 2, 3, 4	#2 Content Knowledge

Addendum to the Syllabus:
Due to dynamics present during the course of the semester, the instructor may make adjustments to the printed schedule. However, if any changes are made to content coverage or dates of exams, students will be notified either in class or by email.

Conclusion:
Use this semester in meteorology well. Meteorology does contain a lot of facts and information; however, by understanding the underlying principles these facts begin to fall into perspective. The textbook contains key terms, review questions, questions for thought, and exercises. Use these portions of the chapter to make sure you really understand the material covered. Just reading through the text will not adequately prepare you for quizzes and exams. I suggest you find a study partner or group that will help you assimilate the material from the class. I want you to develop a working knowledge of meteorology and that will take time. This course assumes that you have an adequate preparation in mathematics and an understanding of basic physics principles. If you find that these areas are wanting during the semester, you will need to put in extra study time to be successful in this class.

I hope your appreciation for meteorology will grow during this semester although it will require a sustained amount of effort. I continue to be amazed that we are able to understand as much as we do about the atmosphere in spite of its complexity. It demonstrates to me that we have an infinite God, who reveals himself in ways we can understand (Ro. 1:20).

COVID-19 and Online Resources

Due to the Covid-19 pandemic, timing and mode of delivery for course content may change. As stated above, I reserve the right to make changes as I feel are necessary. Students must comply with safety requirements as directed by the University. I expect students to wear masks and/or face shields in class and lab. In addition, disposable gloves will be available for use in the lab. Although we are operating with the assumption that we will have face-to-face instruction throughout the semester, there will be some students unable to attend due to infection or quarantine. I plan on recording each class session and making a link available through Canvas. As a result, you will show up on the posted videos. These videos will be for use by the class and will not be publicly distributed.

In Case of Illness: If you are ill or feel you are coming down with something, please do not come to class. I will work with you to make up any missed material, assignments, quizzes, exams or labs. **If your condition is doubtful, don't come. You will not be penalized for not attending class.**

ESCI2410 - General Meteorology

	Date	Ch.	Topic	Activities
T	1/19	1	Introduction	
Th	1/21	1	Structure of the Atmosphere	
			No Lab this Week	
T	1/26	17	Climate	
Th	1/28	2	Energy and Warming of Atmos.	Q1
Lab		1	**Weather Obs. / Station Model**	
T	2/2	2	Energy and Warming of Atmos.	
Th	2/4	3	Temperature	
Lab		2	**Weather Obs. / METARs**	
T	2/9	4	Moisture	Q2
Th	2/11	4	Moisture	
Lab		3	**Weather Obs./Nephanalysis**	
T	2/16		**Exam #1 Ch. 1 - 4, 17**	
Th	2/18	5	Condensation	
Lab		4	**MODIS and ASTER**	
T	2/23	5	Condensation	
Th	2/25	6	Stability	
Lab		5	**Meteorology Data on the Internet**	
T	3/2	6	Stability	Q3
Th	3/4	7	Precipitation	
Lab		6	**Vertical Sounding / Thermo Chart**	

	Date	Ch.	Topic	Activities
T	3/9	7	Precipitation	Q4
Th	3/11		**Exam #2 ch. 5 - 7**	
Lab		7	**Atmospheric Stability**	
T	3/16	8	Air Motion and Pressure	
Th	3/18	8	Air Motion and Pressure	St. Report
Lab		8	**Contouring Data**	
T	3/23	9	Small Scale Winds	
Th	3/25	10	Global Scale Winds	Q5
Lab		9	**Geostrophic Winds**	
T	3/30	11	Air Masses and Fronts	Q6
Th	4/1	11	Air Masses and Fronts	
Lab		10	**Frontal Analysis**	
T	4/6		**Exam #3 Ch. 8 - 11**	Q7
Th	4/8	13	Forecasting	
Lab		11	**Forecast Models**	
T	4/13	14	Thunderstorms	
Th	4/15	15	Tornadoes	
Lab		12	**Convergence and Divergence**	
T	4/20	16	Hurricanes	Q8
Th	4/22		Miscellaneous	
Lab			**Student Reports**	
Th	4/29		**Final Exam (8:00 - 9:50)**	