GEOG 484

Advanced Topics in Geography:
Advanced Studies in Weather and Climate

Spring 2016

Classes: Wednesday and Thursday, 14:30 – 15:50
in Clearihue Building D130
Labs in Geography Grad computer room

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Office hours: Tuesday 13:00-14:00 and Friday 14:30 – 15:30,
or please email for other times

Introduction:

By now you have taken GEOG 272 and GEOG 373. In those courses you learned about the basics of radiation transfer and surface heating, ideas of vertical stability and thermodynamic charts, how the large scale climate system and major climate patterns on earth work, a bit about storm systems, and several major areas of weather/climate application, including in agriculture, transportation, and urban settings. You also have seen by now several examples of weather charts, specifically the surface analysis chart and an example of an upper-air chart, and we briefly overviewed topics including instrumentation packages, for large weather stations and for detailed studies, e.g. of the urban climate setting, as well as real-time information available on the websites of the Meteorological Service of Canada and the US National Weather Service.

This course is an introduction to synoptic meteorology, with an emphasis on data handling, presentation, and the analysis of weather situations. Here you will build upon previous coursework and learn more about the weather. This includes how weather observations are gathered and recorded, how data are prepared for analysis, and how analyses are performed such that you can understand how the weather we observe around us comes to be and the trajectories it is likely to take into the immediate future. This is a field of endeavor called “synoptic meteorology”. Within may be found the disciplines of weather analysis and weather forecasting, professions that critically support the smooth operation of today’s societies. Also in this course we will have a look at research considerations in this field and practice presenting information.

There are mandatory readings but you do not have to purchase a text because it is ridiculously expensive. It will be placed on reserve in the library. Readings from the text will be regularly assigned. The course will follow these readings because the textbook was designed for this type of course, and you should keep up with them. In class we will emphasize certain topics. You will learn how to analyze weather data using modern computer tools and you will give a presentation.

Course Mission:

This course seeks to equip you with an understanding of how the weather forecast process operates, from data gathering considerations up to integrated continental-scale forecast delivery and interpretation. There are several broad objectives for the course.

1. Learn about weather data and how it gets handled. This includes, for all types of data, the process of getting it from the single reading, through the worldwide transmission system to global national weather services, and onto your radio or newspaper each day.

2. Learn to recognize and use the weather analysis tools. This includes the many charts and plots that inform the weather analysis professional. This also includes customizing your extraction of information using the computer tools that the pros use.

3. Gain experience in the practical application of your theoretical knowledge. The laws and processes governing atmospheric behavior are integrated in the weather analysis tools. Through them you will learn how your theory translates into the visible weather around you.

4. Gain further experience presenting information. Oral conveyance and good communication skills are essential tools in today's world. Thus as part of this class you will be giving presentations on various topics that will include one of: a research paper summary, weather briefing or climate/weather description, or instrument project report.

5. Gain exposure to research aspects of this topic. Although the popular perception of synoptic meteorology is the weather forecaster and the charts, this subject also possesses a research component that helps to bring new analysis techniques into the forecast process. We will examine a selection of weather forecasting and weather data research papers.

6. Gain direct experience handling professional meteorological equipment. A generous offer from Campbell Scientific Canada Corp. will allow you to gain direct experience on research-grade equipment via a "workshop-practicum" within our course. This will be led by Claude Labine, former president and founder of CSC and now the Chief Scientific Officer. .

These course objectives are translated into specific **learning objectives:**

- Describe how the worldwide system of weather observation gathering and forecasting works
- Know how to use modern computer-based forecasting tools to extract data from standard weather data packages
- Know how to set up an instrumented data gathering system, including understanding appropriate equipment selection, power consumption issues for remote installations, and how to wire the equipment.
- Recognize a variety of operationally used weather charts and other sources of weather data (satellite, radar, surface observation formats such as METAR and the station model)
- Understand how numerical weather forecast models work and how they are operationally applied
- Interpret charts and data in a synthetic manner to explain observed weather and be able to produce a rudimentary, short-term forecast of the weather trajectory
- Give a weather briefing

Laboratories:

This course does not have a formal laboratory component scheduled, however we will take some time in class during which you will gain experience using the GEMPAK system of weather analysis tools. You will also learn a little bit about one particular version of linux computer system, a friendly version of RedHat known as CentOS.

We will also take time for the workshop. We want to take advantage of Claude's time throughout his stay. Claude and I realize that integrating this workshop into the existing curriculum requires greater flexibility and requirements on the part of you the students. To this end, in order to assist you in giving more time to this course, Claude wants to make this as easy as possible. Thus, meals on **Saturday Jan 30** will be provided. Based on his recent experiences at Aurora College in Inuvik and UNBC in Prince George, Claude reminds us that student participation and cooperation is essential to make this as beneficial as possible. Yes, it's the old "you get what you put in" and there is much to be gotten here. Claude will only be able to visit for a limited time and we want to maximize his generous offer. When you get out of school, the type of professional training course he is offering would easily cost you $3000+. (I paid $3000 for 3 days' training on an ocean wave buoy system, and they didn't so much as buy me coffee!).

Claude will be staying on or near campus and will be available as a resource.

Textbook and readings:

Djuric, Dusan. 1994. *Weather Analysis*. Prentice-Hall/Pearson. **do not purchase unless you want to purchase it online. It will be available on 2hr reserve in the library**

There is also an online introductory meteorology textbook available, that the author (Prof. Richard McNulty from Kansas State University). (let me know if you spot any errors).

Journal article readings will be made available on the CourseSpaces site.

Assignments

There will be a number of general homework assignments, usually one per week unless the reading load is too great. These will consist of (a few) written or (more typically) graphical/numerical analytical work which will be graded. The assignments near the beginning of the course focus on instruments and skills development. Assignments are handed out on Thursday and due the following Thursday.

In a real forecast office there is no such thing as a "late" forecast (by definition!). Here however there is some leeway, thus: **Late assignments will be reduced by 20% per day.**

Weather discussion

Each week we will conduct a weather discussion – essentially a standard weather situation briefing. Initially I will do this, but later the students will be responsible for this activity. Presentations will be graded for participation and clarity. This will cover description and analysis of recent weather events as well as overview of prognoses. A set of on-line references will be made available for your use.

Paper discussion

A selection of research papers will be assigned for reading. Papers will be made available on the CourseSpaces site. Each student will rotate through presentation of detailed analysis of a paper and all students will be expected to participate in discussion. Marks will be given for participation and clarity of presentations.

CourseSpaces: This course is hosted on the UVic CourseSpaces system. http://coursespaces.uvic.ca/ I will post various course-related materials or news items here from time to time; make sure you keep a regular eye on the site. Readings will be posted here ahead of classes for which they are required.

Evaluation: The course grade will be based on the following:

		Date (or date due)	Weight	Grading considerations
1	Assignments	Listed below	30%	Accurate numerical or graphical solution, correct steps followed and presented, or if written, thorough assessment, clearly expressed. Emphasis will be placed on clarity of expression because of the crucial role communication will play in your futures
2	Weather presentation	Assigned in class	10 %	Depiction of weather situation at hand that captures relevant weather forming parameters. Marks also given for style and clarity of presentation. Non-binding peer evaluation will be conducted.
3	Paper discussion engagement	No due date	10 %	Active engagement (and presence) in in-class discussions. **Post comments on CourseSpace blog.**
4	Mid-term tests	Listed below	23 %	Two mid-term theory tests (11.5% each)
5	Final theory exam	Listed below	15%	In class final exam focusing on theory
6	Instruments practicum project	Listed below	12%	Instrument practicum data analysis project.

Tests and evaluation:

My evaluation philosophy centers around providing numerous opportunities to demonstrate understanding such that it is not one large all-or-nothing exam. Thus there are two small mid-terms and one final that cover GEMPAK material and theory (final is held *in-class*). Tests comprise 40% of your grade. Midterm tests will not take up the entire class time. 40% of your mark comes from assignments, including an assignment covering the instrument practicum. 10% will be your weather briefing. Finally, engagement is important – the real challenge in the workforce is often just showing up – thus 10% of your grade will center around participation and attendance.

Guides will be provided for how to structure a paper discussion and how to conduct a weather briefing.

Tentative scheduling

I reserve the right to modify lecture subjects, computer subjects, and the reading schedule in response to how fast we are progressing.

Wk	Date	Lecture subject (Wednesday)	Computer (Thursday)	Reading assigned
1	W Jan 6 Th Jan 7	Intro, what is weather analysis, weather instruments *(Assignment 1 – T measure)*	CentOS intro. Vmware intro. GEMPAK intro.	Cogley&McCann
2	W Jan 13 Th Jan 14	Meteorological data, reporting standards, GTS, station model, station lists, model data *(Assignment 2 – Wind measure)*	GEMPAK intro. Online global data repository	DD Ch1 Willmot
3	W Jan 20 Th Jan 21	Spatial representation of met data – surface plot, upper air plots, contouring methods and issues	GEMPAK SF packages	DD Ch2 Yarnal
4	W Jan 27 Th Jan 28	Chart analysis, features on the plotted contour fields	LABINE intro to Campbell dataloggers	DD Ch 3 Knaff
5	W Feb 3 Th Feb 4	Kinematics	LABINE data dump and processing	DD Ch 3 Colby
6	W Feb 10 Th Feb 11	**Reading Break**	**Reading Break**	
7	W Feb 17 Th Feb 18	Vertical soundings, hydrostatic stability	**Theory/GEMPAK midterm 1** Sounding plots on computer	DD Ch 4 Monfredo
8	W Feb 24 Th Feb 25	The extratropical cyclone	GEMPAK GD packages	DD Ch 4 Cana
9	W Mar 2 Th Mar 3	Wind and forces in the atmosphere	GEMPAK work	DD Ch 5 Steinacker
10	W Mar 9 Th Mar 10	Fronts, Jets, air masses	GEMPAK work	DD Ch 7 Karst
11	W Mar 16 Th Mar 17	Satellite data interpretation	**Theory/GEMPAK midterm 2**	DD Ch 8, 9
12	W Mar 23 Th Mar24	Advanced data sources, reanalysis	Online tools	DD Ch 10
13	W Mar 30 Th Mar 31	Overflow	**In class Final Exam**	

Undergraduate Grading**

Passing Grades	*Description*
A+ A A-	**Exceptional, outstanding and excellent** performance. Normally achieved by a minority of students. These grades indicate a student who is self-initiating, exceeds expectation and has an insightful grasp of the subject matter.
B+ B B-	**Very good, good and solid** performance. Normally achieved by the largest number of students. These grades indicate a good grasp of the subject matter or excellent grasp in one area balanced with satisfactory grasp in the other area.
C+ C	**Satisfactory, or minimally satisfactory**. These grades indicate a satisfactory performance and knowledge of the subject matter.
D+ D	**Marginal** Performance. A student receiving this grade demonstrated a superficial grasp of the subject matter.
COM	**Complete** (pass). Used only for 0-unit courses and those credit courses designated by the Senate. Such courses are identified in the course listings.

** As stated in the 2009-2010 Calendar

A+	A	A-	B+	B	B-	C+	C	D	F
90-100%	85-89%	80-84%	77-79%	73-76%	70-72%	65-69%	60-64%	50-59%	49% or Less

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous survey regarding your learning experience (CES). The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. The survey is accessed via MyPage and can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.

Geography Departmental web site: http://geography.uvic.ca/
Undergraduate Advisor: Dr. Phil Wakefield (undergraduateadvisor@geog.uvic.ca)
Graduate Advisor: Dr. Dennis Jelinski (jelinski@office.geog.uvic.ca)

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to

approach me and/or the Resource Centre for Students with a Disability (RCSD) as soon as possible. The RCSD staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations http://rcsd.uvic.ca/. *The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.*

The University of Victoria is committed to promoting, providing and protecting a positive and safe learning and working environment for all its members.