THE SCIENCE OF CLIMATE AND CLIMATE CHANGE in Spring 2021 (SC1050)

Course Code	SC1050	**Professor(s)**	Claudio Piani
Prerequisites	None	**Office Number**	LTM108
Class Schedule	M: 09:00-10:20 in C-102 R: 13:45-15:05 in C-102	**Office Hours**	Every day 7am to 9pm on WhatsApp or TEAMS by appointment
Credits	4	**Email**	cpiani@aup.edu
Semester	Spring 2021	**Office Tel. Ext.**	676

Course Description

In the first component of this course, we will introduce the concepts of Climate and Weather. We will describe the physical and chemical structure of the atmosphere at equilibrium and show how energy and mass flow through the atmosphere as it is displaced from this state. The physical processes that constitute weather and climate will be described in terms of their role in the flow of energy and the oscillation of the atmosphere about its state of rest. Agents that play fundamental roles in these processes (radiation, moisture, greenhouse gases, etc.) will be first presented individually and later in terms of their interactions. The role of anthropogenic agents will be given special attention (land-use change and greenhouse gas emissions).

In the second component of this course, we will apply our recently acquired knowledge to critically examine the findings of the Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (WG1, AR5, IPCC). Students will choose, with some guidance, from a series of topics such as observational evidence, paleoclimate, future projections, ocean climate, etc.

Course Learning Outcomes

Develop a basic understanding of ecology, sustainability, and the anthropogenic impact on the environment
Students will apply the scientific method to solve problems
Think critically about possible means of preventing, adapting to, or mitigating major threats to the environment
Students will demonstrate effective academic writing and oral presentation skills
Students will demonstrate knowledge of core concepts in a scientific field, interpret scientific

data from a variety of sources, apply the scientific method to solve problems, and demonstrate written and oral presentation skills when communicating scientific knowledge (CCS LO)

General Education

This course can be used to fulfill the CCS requirement and as such has the following learning outcomes (Learning Outcomes for GLACC components are defined on the AUP GLACC Website):

- You will demonstrate knowledge of core concepts in a scientific field,
- interpret scientific data from a variety of sources,
- apply the scientific method to solve problems,
- and demonstrate written and oral presentation skills when communicating scientific knowledge.

Course Outline

Preliminary COURSE OUTLINE:

Lecture #1: Course Presentation

Lecture #2: Atmospheric composition (book chapter 1)

Lecture #3 Vertical structure of the Atmosphere (book chapter 1)

Lecture #4 Solar radiation. Seasonal and Daily temp. cycles. (book chapter 2)

Lecture # 5 Radiative balance (book chapter 3)

Lecture # 6 The Earth's temperature (book chapter 3)

Lecture #7 The hydrological cycle (book chapter 5)

Lecture #8 Condensation and saturation in the atmosphere (book chapter 5)

Lecture # 9 Clouds and fog formation (book chapter 6)

Lecture # 10 Precipitation Processes (book chapter 7)

Lecture #11 Recap of past material for midterm

Lecture # 12 Air masses and fronts (book chapter 9)

Lecture # 13 Introduction to the earth's climate (book chapter 16)

Lecture #14 Introduction..... Part II (book chapter 16)

Lecture #15 Presentation IPCC 5th Assessment report

Lecture # 16 Observed changes in climate and their effects

Lecture # 17 Causes of climate change.

Lecture #18 Impacts of climate change.

Lecture #19 Recap before final

Textbooks

Title	Author	Publisher	ISBN	Required
Understanding Weather & Climate, Global Edition	Burt & Aguado	Pearson	978129208780	Yes

Attendance Policy

AUP ATTENDANCE POLICY:

Students studying at The American University of Paris are expected to attend ALL scheduled classes, ar
should contact their professors to explain the situation. It is the student’s responsibility to be aware of an
policy that a faculty member might have set in the course syllabus. The French Department, for example
attendance policy, and students are responsible for compliance. Academic Affairs will excuse an absenc
participation in study trips related to their courses.

Covid-19 temporary amendments:

Students studying at The American University of Paris are still expected to attend ALL scheduled classes pandemic, students will have the option of attending classes remotely when special circumstances apply students are placed under quarantine by the French authorities or by their doctor, or when students pres Covid-19 and are directed, by their doctor or the AUP Health Office, to remain home. It is still the student aware of any specific attendance policy that their professor might have set in the course syllabus. In part attending remotely from distant Time Zones should check with their professors about the specific attenda learners.

Attendance at all exams is mandatory**.** In all cases of missed course meetings, the responsibility for com professor, and for arranging to make up missed work, rests solely with the student.

Whether an absence is excused or not is ALWAYS up to the discretion of the professor or the departmen absences can result in a low or failing participation grade. In the case of excessive absences, it is up to t department to decide if the student will receive an "F" for the course. An instructor may also recommend withdraw if absences have made it impossible to continue in the course at a satisfactory level.

Students must be mindful of this policy when making their travel arrangements, and *especially during the Periods.*

Quizzes and labs cannot be retaken. Students who are more than 10 minutes late for a lab or lectu allowed to attend and their absence will be considered unexcused.

Students who miss more than 4 labs will receive an "f" in this class.

Grading Policy

GRADING:

Item	Num.	Duration	Evaluation	Percentage

				weight on final grade
Class quizzes	~10	20 minutes	Grade corresponds to the percentage of right answers. Individual questions are associated with a specific Learning Outcome (1,2,&3). **Missed quizzes are graded as “0” and cannot be retaken.**	Average quiz grade (after removing lowest two quiz grades) 25%
Midterm	1	80 min.		20%
Lab reports	10	N/A	Laboratory reports will be graded according to the rubric below. Lab reports are due by the end of class. Lab reports assess learning outcomes # 3&4. **Missed labs are graded as “0” and cannot be retaken. Lab reports are NOT accepted after class.**	Average lab report grade (after removing lowest two lab report grades) 25% **More than 4 missed labs will automatically result in a failing grade.**
Climate Conference Participation	1	3 days	Participation in workshops during conference (Indirect assessment of LO#4)	10% (Extra Credit)
Final written	1	3 hours	Grade corresponds to the percentage of right answers. Individual questions are associated with a specific Learning	30%

Outcome (1,2,&3).

Other

Rubric for Laboratory Reports				
	Insufficient	**Developing**	**Good**	**Excellent**
Abstract	The abstract does not explain what the experiment will try to accomplish.	The abstract explains what the experiment will try to accomplish but may miss a few important aspects or be unclear.	The abstract explains what the experiment will try to accomplish but may miss some aspects.	The abstra the experi accomplis exhaustive
Experiment Design	The experiment design is full of holes. It looks more like random information and instructions. Nobody could reproduce the experiment unless they could ready the authors mind.	The experiment design carries most, but not all, the information required to allow another scientist to reproduce the experiment. The reader often has to make educated guesses regarding the exact steps taken by the author.	The experiment design may carry all the information required to allow another scientist to reproduce the experiment but the information is not presented in a clear step-by-step way. The reader may have to “extract” the information or have to “guess” what choices the author made.	The exper all the info allow anot reproduce has a clea descriptio instrument step-by-st experimen When app against ob
Results	The results are incomplete. Intermediate results are missing. Many units and errors are missing. The writing style is unclear.	The results are close to exhaustive. Some intermediate results may be missing. Units are correctly but not universally labeled. One or two errors may be missing. Errors are generally NOT justified. The writing style mostly scientific but the authors are occasionally prone to literary lapses. For example, when figure captions start with: “Upon careful examination of the above figure, one notes the thick red line which represents the period of the	The results are exhaustive. That is, all intermediate results are given as well. Units are correctly and universally labeled. One or two errors may be missing. Some errors may not be justified. The writing style is scientific with absolutely no use of metaphor, allegory, alliteration, or innuendo. Vocabulary should be selected based on meaning not esthetics.	The result That is all are given correctly a labeled. A carry error uncertainti justified. T scientific w use of me alliteration Vocabular selected b not esthet

		pendulum’s oscillations plotted versus the mass of the pendulum’s weight” instead of: “Pendulum oscillation period versus weight (thick red line).”		
Conclusions	The conclusion are unclear or unwarranted by the results. Or they are just wrong or unfalsifiable (not even wrong).	The conclusion are clear but worded in a way that does not make them entirely or easily falsifiable, they mostly derive from the results but may not respond to questions set forth in the abstract and may not be couched with any limitations or disclaimers.	The conclusion are scientific, that is, falsifiable, they mostly derive from the results and do respond to questions set forth in the abstract but they may not be couched in the necessary limitations and disclaimers.	The conclu that is, fals unequivoc and respo forth in the