

ENVS 4405 – Air Quality

3 credits, 3 hours lecture per week, 3 hours laboratory per week

The objective of this course is to provide an introductory understanding to the composition, evolution, and future of the earth's atmosphere. It will include human impact, mitigating initiatives and will examine the predictive methods and databases currently in use to predict future scenarios. It will examine the atmosphere as part of the biogeochemical cycling of its constituents.

Instructor

Dr. Tamar Richards-Thomas

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Office Hours

Monday 13:00-13:50

Tuesday 13:00-13:50

Wednesday 13:00-13:50

Thursday 13:00-13:50

Hours of Instruction

<i>Lecture:</i>	Mondays	2:30 – 3:50 PM	S110
	Wednesdays	2:30 – 3:50 PM	S110
<i>Laboratory:</i>	Fridays	9:00 – 11:50 AM	CC-236

Course Outcomes

Upon successful completion of this course, the student shall be able to:

- Outline the physical and chemical processes that influence air quality.
- Discuss atmospheric processes governing weather and climate to understand how they influence air quality. Including knowledge on the general circulation and global climate and urban microclimates. Evaluate both positive and negative feedbacks driven by climate change; processes or activities.
- Outline atmospheric reactions and discuss the health implications of poor air quality and control measures.
- Analyze and interpret data (e.g., weather, pollutant concentrations) related to local air quality issues
- Discuss global issues in air quality, including the scientific and political approaches to solutions.
- Analyze the current and potential impacts of the effects of climate change on human societies and consider the range of policy responses.

Proposed Schedule of Topics

General Topic	Details
Radiation Budget	Heat transfer. Air-sea exchange. Solar constant, Heat budget; radiative forcing by greenhouse gases.
Fundamentals of Meteorology	Precipitation-evaporation. Rainfall. Circulation. Moisture. Cloud formation. Geostrophic flow. Pressure. Fronts.
Carbon Dioxide	CO ₂ in the atmosphere and the role of marine plants, the phytoplankton multiplier. Implications for the long-term fate of carbon dioxide.
Sulphur Compounds	in the Atmosphere. The pathways for the production of dimethyl sulphide (DMS) and other sulphur compounds (DMSP; DMSO).
Global Circulation	Planetary circulation and the jet stream. El Nino and La Nina. Monsoons. Hurricanes, typhoons and tropical depressions. Mid-latitude weather and depressions. Cloud formations and precipitation. Impact of Climate change.
Marine Ecosystems	Ocean Acidification, oceanic carbon reservoir. Implications for phytoplankton and nitrogen and carbon fixation.
Sea Level Rise	Isostasy vs Eustasy, changes in relative sea level, causes of 20th Century sea level rise and predicted 21st century sea level rise.
Evolution on International Climate Policy	Development of national, international and global policy on climate change.

Required Resources

There are no required textbooks for this course.

Primary scientific literature, best-practices guidelines, websites and NGO publications will be identified, applied and/or provided, as required during the course.

Other supplies and requirements

1. Hard copy of completed current WHMIS course certificate for first lab (online resource)
2. Hard copy of completed, signed plagiarism course certificate. No assignments will be accepted until this requirement is met.
3. Wear full lab coats for Chem lab (CC-236) and Environmental lab (S114).
4. Moodle (<http://ilearn.keyano.ca>). The course outline, lecture notes and other resources will be made available on Moodle.
5. Keyano College email address. I will not correspond with students using their personal email addresses for a plethora of liability, security, and confidentiality reasons.

Evaluation

Laboratory (4 x 5%)	20%
Midterm Exam	15%
Assignments (4 x 5%)	20%
Short Term Project	15%
Final Exam	30%
Total	100%

A grade of C- or better is required for progression or transfer.

Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
Excellent	A+	4.0	95 – 100	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 94.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	73 – 76.9	
	B-	2.7	70 – 72.9	
Satisfactory Progression	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	63 – 66.9	
	C-	1.7	60 – 62.9	
Poor Minimum Pass	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support or is poorly written or did not use proper format.
	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

A grade of C- or better is required for progression or transfer.

Performance Requirements**Student Responsibilities**

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College credit calendar.

More specific details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

Laboratory Safety

In the science laboratories, safety is important and therefore students must complete the *WHMIS for Students* online training course on Moodle before entering the science laboratories.

Students must comply with the mandatory laboratory safety rules for this course as provided in the laboratory manual. Failure to do so will result in progressive discipline such as a verbal warning, refused entry into the laboratory, or suspension from the College.

Before entering the lab, students are responsible reviewing the lab manual and relevant Safety Data Sheets for the purpose of evaluating risks associated to health. Some hazards used in the laboratory may have additional risks to those with pre-existing medical conditions.

Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a students' learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found on ilearn.keyano.ca. Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate.

Specialized Supports

The Student Academic Support Services (SASS) department: Accessibility Services, Skill Centre, Wellness Services and Student Life Department work together to support student success at Keyano College.

Accessibility Services (CC167) supports student success through group and individualized instruction of learning, study and test taking strategies, and adaptive technologies. Students with documented disabilities, or who suspect a disability, can meet with the Learning Strategists to discuss accommodation of the learning barriers that they may be experiencing. Students who have accessed accommodations in the past are encouraged to visit our office at their earliest opportunity to discuss the availability of accommodations in their current courses. Individual appointments can be made by calling 780-791-8934.

Skill Centre (CC119) provides a learning space where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff. Students visiting the centre have access to one-to-one or group tutoring, facilitated study groups, and assistance in academic writing. The Skill Centre's Peer Tutor program provides paid employment opportunities for students who have demonstrated academic success and want to share what they have learned. Tutoring is available free to any students registered at Keyano College on a drop in basis, from 8:30 am to 5:00 pm Monday through Friday. Additional evening hours are subject to tutor availability and are posted in the Skill Centre.

Wellness Services (CC260) offers a caring, inclusive, and respectful environment where students can access free group and individual support to meet academic and life challenges. Mental Health Coordinators offer a safe and confidential environment to seek help with personal concerns. The Mindfulness Room in CC260 is available as a quiet space for students to relax during regular office hours. Wellness Service welcomes students to participate in any of the group sessions offered throughout the academic year addressing such topics as Mindfulness and Test Anxiety. Individual appointments can be made by calling 780-791-8934.

Student Life Department (CC210) is a place for students to go when they don't know who else can answer their questions. The staff will help students navigate barriers to success and if they don't know the answer, they will find it out. Student success is directly affected by how connected a student feels to their college. The student life department is there to help students get connected.

Please watch your Keyano email for workshop announcements from our Student Academic Support Services team.