ENV 4101 Elements of Air Pollution (Sec 4268)/ENV 5105 Foundations of Air Pollution (Sec 8775)

Class Periods: T & H | Periods 9&10, 4:05 PM – 6:00 PM; Location: LIT 109

Academic Term: Spring 2019

- Instructor: Dr. Chang-Yu Wu
- Office Hour: T&H 11:45 am – 12:35 pm or by appointment
- Teaching Assistant: Joshua Udvardy (j0603000194u@ufl.edu, BLK 412)
  - Office Hours: Mon. Period 6 (12:50 pm to 1:40 pm) & Tues. Period 8 (3:00 pm to 3:50 pm)
- Prerequisite: CHM 2046, PHY 2049, EES 4203
- Professional component: 3 credits of Engineering Science
- Textbook:
  Lecture PPT slides are available under Module on CANVAS.

- Course Description: Sources, effects and regulations of air pollutants. Meteorology and dispersion of air pollutants. Sampling and analysis of gaseous and particulate air pollutants. Photochemical air pollution and mobile sources. Policy and regulations.
- Course Objectives:
  By the end of the course, the student will be able to do the following:
  1. To explain the structure and composition of atmosphere and determine the properties of gases and aerosols.
  2. To explain the atmospheric, health and welfare effects of air pollution.
  3. To calculate the kinetics and equilibrium of gas phase reactions in combustion systems and in the atmosphere.
  4. To explain the scales of air motion, to determine the atmospheric stability and to calculate air dispersion.
  5. To describe the principles of gaseous and particulate monitoring systems
  6. To describe air regulations
  7. To explain air resources topics to the professional society and general public

### Evaluation of Grades

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Total Points</th>
<th>% of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>UG</td>
</tr>
<tr>
<td>In-class activities</td>
<td>0.3 each</td>
<td>6%</td>
</tr>
<tr>
<td>Homework Sets (3)</td>
<td>80-120 each</td>
<td>20%</td>
</tr>
<tr>
<td>Post-Class Quizzes (10)</td>
<td>8 each</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exams (3)</td>
<td>100 each</td>
<td>40%</td>
</tr>
<tr>
<td>Term Project</td>
<td>100</td>
<td>20%</td>
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<tr>
<td></td>
<td></td>
<td>106%</td>
</tr>
</tbody>
</table>

### Grading Policy

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.0 - 100</td>
<td>A</td>
<td>4.00</td>
<td>75.0 - 79.9</td>
<td>B-</td>
<td>2.67</td>
<td>55.0 - 59.9</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>90.0 - 94.9</td>
<td>A-</td>
<td>3.67</td>
<td>70.0 - 74.9</td>
<td>C+</td>
<td>2.33</td>
<td>50.0 - 54.9</td>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>85.0 - 89.9</td>
<td>B+</td>
<td>3.33</td>
<td>65.0 - 69.9</td>
<td>C</td>
<td>2.00</td>
<td>45.0 - 49.9</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>80.0 - 84.9</td>
<td>B</td>
<td>3.00</td>
<td>60.0 - 64.9</td>
<td>C-</td>
<td>1.67</td>
<td>0 - 44.9</td>
<td>E</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Syllabus

More information on UF grading policy may be found at: 
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Grade is NOT curved in this course. It is theoretically possible for everyone in the class to get an A (or an F). Your performance depends only on how you do, not on how everyone else in the class does. It is therefore in your best interest to work with your classmates in every legally possible way.

Graduate option: A graduate student can choose to follow the undergraduate or graduate formula and needs to settle this with Dr. Wu by the end of Add/Drop deadline. If the graduate formula is selected, homework and project will be individual submission.

Attendance Policy, Class Expectations, and Make-Up Policy
Attendance is expected and monitored based on in-class activity completion, which provides the opportunity for bonus credit (i.e. if absent, students will not have the opportunity to make up that day’s bonus credit). There is NO LIMIT of the bonus points a student can get. Excused absences are consistent with university policies (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

General Assignment Policy
Assignments are due at the beginning of class time on specified dates. 20% will be deducted for any late assignment submitted on the same day after class, and 40% for that submitted on the 2nd day. Any assignment submitted late for more than 2 days will NOT be accepted unless with a certified medical excuse or if it is agreed by Dr. Wu prior to the due time with justification accepted by Dr. Wu.

Sign up your Group, consisting of 4 people, on CANVAS (under People). A group needs to comprise at least two genders. For the homework, each group only needs to submit 1 group copy. Select an air pollutant as your group’s name. Those who do not belong to any group by the due date will be assigned by Dr. Wu and will forfeit their right to object the assignment. Each member's performance and contribution will be evaluated by team members in the middle and the end of the semester. If a member is determined by the group for not contributing his/her share, Dr. Wu may request the member to submit his/her assignment individually.

Homework Policy: For each homework assignment, there will be 2 versions submitted. Homework questions are posted on CANVAS at 1 week before the first deadline unless otherwise specified. The first version of the homework is to be completed by the group and scanned/submitted to CANVAS to the best of your ability. After the first deadline, the solutions to the homework will be posted. Each group is then responsible for grading their own assignment (e.g. -2 points deducted for calculation error and total final score of 98) and making all corrections that are necessary on the second version. Clearly mark/explain what the error in first version was and what the correction of the second version was. Then the group-graded and corrected version of the homework (hardcopy) will be submitted by the second deadline 5 days later in class, which will be re-graded by the TA. Both versions have the same weighting of the grade.

Homework assignments are to be completed in groups. For the homework problems, you must figure out how to solve the problems through GROUP EFFORTS instead of assigning problems to individual group members. According to past years’ experiences, those groups that simply split homework questions into individual assignments always did poorer in exams. Note...
that at least 40% of the midterm problems will be similar to homework questions. Discussion among different groups is encouraged, but copying from other group's work is unacceptable (e.g. same mistakes) and both groups will be reported to the University.

If your procedure is correct but there are errors in calculation, you get partial credit. It's important to **SHOW YOUR PROCEDURE CLEARLY.** You won't get any credit if your procedure is wrong or unclear, even if the numbers are mysteriously correct. If you use any number from any table or graph, you need to CITE the source (e.g. Table 1.1). There will be no credit for magic numbers that appear in the solution.

For questions that involve calculation, the following steps should be followed:

i. List all given conditions and parameters, e.g. $T = 298 \text{ K}$, $P = 1 \text{ atm}$, $R = 8.314 \text{ J/mole·K}$ and their sources, e.g. Textbook Appendix B; Fig. 14-1 in textbook.

ii. For each calculation step, the equation used for calculation should be listed, followed by the specific numbers replacing the parameters. Units should also be included in the calculation.

iii. The most important thing for the homework is to show the flow of your thought in solving the problem. Hand-writing is perfectly fine, but it needs to be readable, clear, neat and organized.

An example of homework preparation is given below. Be sure to follow the format before you submit your homework. It also helps you to get more scores in your exams.

<table>
<thead>
<tr>
<th>Q1</th>
<th>The secondary NAAQS for SO$_2$ is 0.5 ppm (for a 3-hr avg). Calculate the equivalent conc. in $\mu$g/m$^3$ at standard temperature and pressure (STP: $T = 25^\circ\text{C}$, $P = 1 \text{ atm}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Given:</strong></td>
<td>$C_{\text{ppm}} = 0.5 \text{ ppm}$</td>
</tr>
</tbody>
</table>
| **Solution:** | Since it is at STP, use Equation 1.9  
$\text{MW}_p = 64 \text{ g/gmol}$  
$C_{\text{mass}} = \frac{1000 \times C_{\text{ppm}} \times \text{MW}_p}{24.45 \text{ L/gmol}} = \frac{1000 \times 0.5 \text{ ppm} \times 64 \text{ g/gmol}}{24.45 \text{ L/gmol}}$  
$= 1309 \text{ }\mu\text{g/m}^3$ |

- **TA is here to help you.** If you have questions regarding your homework, **TA is your first aid.** If you have questions regarding homework grading, also check with your TA. However, if still you don’t get satisfactory response, be sure to discuss with Dr. Wu.

**Quiz Policy:** Following each class there will be a 12-minute post-class quiz. Contents covered in lecture, class discussion as well as textbook, are included. You should be able to answer the questions without calculations. The quizzes are available on e-learning (CANVAS) after every 2 lectures and due after 1 week. **NO make-up** quiz is allowed, but you have **unlimited** attempts.

**Mid-term Exam Policy:** Smile©, there is no final. We only have midterms.

The exam consists of **two parts.** The first part is **closed book,** and you can expect to answer the questions without any calculation. It’s designed to test your conceptual understanding of the subject. Once you have turned in the first part to the proctor, you can start the second part, which is **open book, open note and open web,** but no discussion. You will need a calculator for this part. It’s your call to determine how you want to allocate time for each part but you’ll have to finish both parts in the time period specified above. See schedule for topics to be included in each exam. The exam is due in **30 minutes** after 60% of the class have
submitted their answer sheets; the exam may continue in a different room if it takes longer than the scheduled class time.

A make-up for the midterm will be allowed only with certified medical excuse or if it is discussed with Dr. Wu prior to the exam. Only one make-up exam is administered, which is comprehensive and will be offered at a designated time near the end of the semester at the place set by Dr. Wu. It will be fair but challenging (i.e. Dr. Wu strongly encourages you not to do so).

Project Policy:
Select a topic related to Indoor Air Pollution or Emerging Air Pollution with a goal to argue why there should be (more stringent) regulation for your chosen pollutant together with economical and/or social benefits the regulation will bring OR why there shouldn’t be such a regulation. Some examples are listed below (but not limited to):
- Problem Buildings: residential
- Problem Buildings: occupational
- Cooking stoves in developing countries
- Gas cooking appliances, wood burning appliances, or space heaters
- Asbestos
- Aldehydes
- Indoor VOCs and SVOCs
- Radon
- Biological contaminants
- Noise
- Electromagnetic wave
- 3D printing
- Tobacco smoking, e-cigarette
- Candles and incense
- PFAS

Each group should discuss with Dr. Wu for the topic of its choice. To avoid multiple groups choosing the same topic, the first group to finalize the topic with Dr. Wu gets the right; meanwhile, two groups who want to play on opposite sides of the topic are encouraged. A 2-Page Proposal (1.5 line spacing, 12 Times New Romans, 1-inch margin on each side, letter size paper, in Word) should be submitted on CANVAS by the deadline. A Presentation in front of Paradise City Council with your Campaign Flyer will be scheduled at the end of the semester.

The weight of the grade: proposal 20%, presentation 40% and flyer 40%.

Graduate students who choose to do an individual project will submit a report in place of presentation and flyer.

Guidelines for the proposal/flyer/presentation are available on CANVAS.

Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter, which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.
**Course Evaluation**
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at [https://evaluations.ufl.edu/evals](https://evaluations.ufl.edu/evals). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at [https://evaluations.ufl.edu/results/](https://evaluations.ufl.edu/results/).

**University Honesty Policy**
UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code ([https://www.dso.ufl.edu/scer/process/student-conduct-honor-code/](https://www.dso.ufl.edu/scer/process/student-conduct-honor-code/)) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

**Software Use**
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

**Student Privacy**
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: [http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html](http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html)

**Campus Resources:**

*Health and Wellness*

<table>
<thead>
<tr>
<th>U Matter, We Care:</th>
</tr>
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<tbody>
<tr>
<td>If you or a friend is in distress, please contact <a href="mailto:umatter@ufl.edu">umatter@ufl.edu</a> or 352 392-1575 so that a team member can reach out to the student.</td>
</tr>
</tbody>
</table>

| Counseling and Wellness Center: | http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies. |

| Sexual Assault Recovery Services (SARS) |
| Student Health Care Center, 392-1161. |

| University Police Department at 392-1111 (or 9-1-1 for emergencies), or [http://www.police.ufl.edu/](http://www.police.ufl.edu/). |

**Academic Resources**

| E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu, [https://lss.at.ufl.edu/help.shtml](https://lss.at.ufl.edu/help.shtml). |

| Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling, [https://www.crc.ufl.edu/](https://www.crc.ufl.edu/). |

| Library Support, [http://cms.uflib.ufl.edu/ask](http://cms.uflib.ufl.edu/ask). Various ways to receive assistance with respect to using the libraries or finding resources. |
## Syllabus

| Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. | ![Image](https://teachingcenter.ufl.edu/) |
| Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. | ![Image](https://writing.ufl.edu/writing-studio/) |

### Commitment to a Safe and Inclusive Learning Environment
The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination.

It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@ufl.edu

### Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the Office of Title IX Compliance, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Prepared by Dr. Chang-Yu Wu