

**Course Syllabus  
Chemistry 100 – TPSL  
Spring 2009  
Oxford College of Emory University**

---

Class Meets MWF, 8:30-10:25am, Room 223 Pierce

Instructor: Jack F. Eichler, PhD

Office: 202 Pierce

Office Phone: (770) 784-8340

Email: jack.eichler@emory.edu

Office Hours: Tuesday/Thursday (11:30-1:00) or by appointment

---

### **What is a Liberal Arts Education?**

A liberal arts education is an interdisciplinary education including courses in humanities, natural sciences, social sciences, and physical education.

### **Why Pursue a Liberal Arts Education?**

This course aims to use chemistry as a springboard into a liberal arts education by helping YOU develop your human capacities, that is the “qualities, capacities, domains, and/or dispositions native to us as human beings that allow education to occur in the first place.”\* Marshall Gregory, Ice Professor of English, Liberal Education, and Pedagogy at Butler University, breaks down these capacities into eight categories:

- 1) Language
- 2) Reason
- 3) Imagination
- 4) Introspection
- 5) Aesthetic Responsiveness
- 6) Moral and Ethical Deliberation
- 7) Sociability
- 8) Physicality

One may see the goal of a liberal arts education as the advanced development of all of these human capacities. By doing so, YOU will be better equipped to live an “autonomous, socially responsible, intellectually perspicuous, and morally defensible life.”<sup>1</sup>

<sup>1</sup>Marshall Gregory, “Forgetting, Learning, and Living: A Pedagogical Theory of How Education Makes a Difference Even Though We Forget Most of What We Learn” 2006.

### **Course Description**

Chemistry 100 is the first course in a two-semester sequence for General Chemistry. This class fulfills the introductory chemistry requirement for pre-nursing students. It can also be taken by non-science majors to complete their laboratory science general education requirement. The topics covered in CHEM 100 include: 1) experimental design and measurement; 2) fundamental properties of matter; 3) states of matter and the properties of gases; 4) aqueous solutions; 5) chemical reactions; 6) energy; and 7) environmental sustainability.

\*Note: If you have taken and passed CHEM 141, you cannot receive credit for CHEM 100Z.

A unique feature of this course is the Theory-Practice-Service-Learning (TPSL) format. A TPSL component can deepen our understanding of the subject we are studying and develop our ability to reflect on, “practice,” and apply to a real life situation what we are learning in the classroom. Simply memorizing disciplinary information and reciting it in on an exam does not necessarily demonstrate deep understanding of the material, nor does it prepare you for real life experiences. Therefore you will be required to reflect on what you are learning by mentoring middle school students in our ground-level ozone detection study. In addition, you will have to opportunity to work for a local environmental agency called Keep Covington/Newton Beautiful. More detailed information about the TPSL component and the ground-level ozone study is given below.

## Course Goals

The general goal of CHEM 100 is to provide an introduction to the study of matter and the various changes it can undergo and to demonstrate how/why the study of chemistry is relevant to YOUR life. In the course of completing this goal, the various concepts of chemistry that are discussed will aid in developing your human capacities and contribute to your liberal arts education. More specifically, by completing the ground-level ozone study, you will begin to develop problem solving and critical thinking skills, become better acquainted with experimental design (including data collection and analysis), and practice effective communication (both orally and written). This experience will show you how a chemist can solve a real problem and reveal the interdisciplinarity of a social issue such as air quality.

## Materials and Resources

- Textbook (optional): Introduction to General, Organic, and Biochemistry, 8<sup>th</sup> edition, Bettelheim/Brown/March
- Student study guide and solutions manual (accompaniment to textbook; optional)
- Carbon-copy lab notebook (required)
- Safety Glasses (required)
- Non-graphing scientific calculator (required)
- PRS Interwrite student response clicker remote (required)
- Blackboard Class Conference (<https://classes.emory.edu>)

## Grading

Your grade will be broken down into the following categories:

Exam 1 (Unit 1 and 2)	20%
Exam 2 (Unit 3 and 4)	20%
Exam 3 (Unit 5 and 6)	20%
Final Exam (cumulative) <sup>1</sup>	20%
Laboratories <sup>2</sup>	15%
TPSL - Ozone Detection Project	
Talk	1%
Paper	4%

<sup>1</sup>Your final exam can be used to replace your lowest exam grade. If you miss one exam due to absence, your final exam grade will replace that exam grade, so you will not be able to drop any of the other exam grades.

<sup>2</sup>If you complete all of the Blackboard homework assignments, you will be able to drop your lowest lab grade.

## Laboratories

You will do 6 labs in the course of the semester:

- 1) Experimental Design Lab (formal report)
- 2) Atomic Spectra Lab (notebook sheets)
- 3) Lewis Structure Dry Lab (notebook sheets)
- 4) Imploding Can Lab (formal report)
- 5) Stoichiometry Lab (formal report)
- 6) Dilution lab/calibration curve for ground level ozone analysis (formal report)

Guidelines for the lab formal reports and notebook sheets will be provided in separate documents.

## **Ground-level Ozone Project - TPSL**

Each student will complete a ground level ozone detection study by working in a collaborative group with two other students. The initial problem will be given to you in the form of a case study. Once the major learning goals have been identified in the case study, each group will research the necessary background information required to address the major learning objectives. Included in this will be why ground-level ozone in Newton County needs to be measured and how one could actually go about measuring it. This information will be presented to students at Cousins Middle School (ground level ozone talk). Each group will then construct ground-level ozone detectors and design an experimental protocol for collecting ozone concentration data. The experimental work will be done in collaboration with the middle school students from Cousins. Subsequently, each group will write a report that summarizes all of the pertinent background information, as well as the ozone concentration data and analysis. This report will be given to the local environmental agency Keep Covington/Newton Beautiful. The ground-level ozone project will be graded based on the evaluation of the oral presentation, the written report, and student self-evaluations.

Final letter grades will be assigned as shown below:

A	(93-100%)
A-	(90-92%)
B+	(87-89%)
B	(83-86%)
B-	(80-82%)
C+	(77-79%)
C	(73-76%)
C-	(70-72%)
D+	(67-69%)
D	(60-66%)

## **Honor Code**

It is assumed that all Oxford College students will adhere to the highest standards of academic honesty and will uphold the Oxford College Honor Code.

Specific things to keep in mind for CHEM 100:

-you are expected to do your own work when taking an exam

- only a non-programmable calculator, pencil, and other pre-approved documents are permitted in the exam
- no cell phones are allowed in class during an exam period
- all work handed in for lab must be done as an individual unless otherwise stated by the lab instructor
- any idea or thought used in a laboratory assignment must be properly referenced
- even though you may collect data in groups, you are not to collaborate with other students when completing lab report sheets/formal summaries

It is my duty, according to the Honor Code, to report any incidences of misconduct to the Honor Council. Anyone who is found guilty of violating the Honor Code may receive a grade of F for the course. It is strongly recommended that each student carefully read through the Oxford College Student Honor Code.

### **Tentative Schedule**

Week 1: Course introduction / Read ozone case study

Week 2: Unit 1 (Experimental Design and Measurement – Ch1 Bettelheim)

Week 3: Unit 2 (Atomic Structure – Ch2 Bettelheim)

Week 4: Unit 2

#### **Exam I**

Week 5: Unit 3 (Chemical Bonding – Ch4 Bettelheim)

Week 6: Unit 3

Week 7: Unit 4 (States of Matter and Gas Laws – Ch 6 Bettelheim)

Week 8: Unit 4

#### **Exam II**

Week 9: Unit 5 (Chemical Reactions and Energy of Reactions – Ch 5 Bettelheim)

Week 10: Unit 5

Week 11: Unit 6 (Aqueous Solutions and Aqueous Reactions – Ch 5 & 7 Bettelheim)

#### **Exam III**

Week 12: Ground Level Ozone Detection Study

Week 13: Ground Level Ozone Detection Study

Week 14: Ground Level Ozone Detection Study

Week 15: Ground Level Ozone Detection Study

**Ground Level Ozone Final Project due April 27**

**Final Exam: Friday, May 1 (9-12am)**