

**CHE 490 CHEMISTRY SEMINAR**  
**Fall 2007**  
**“The influence of Darwinian principles on modern thought”**  
**Marian College**  
**3200 Cold Spring Road, Indianapolis IN 46222**

Instructor: Dr. Roderick M. Macrae (but see note below)  
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Office Hours: MWF 10.00-10.50 am R 2.00-4.00 pm and by appointment  
Schedule: 2 semester hours (TBD)

**Course Description:** Discussion of major issues in chemistry with emphasis on student presentations (oral and written) on general and specific topics discussed in chemical journals. Integrates the general education theme and readings, together with portfolio preparation. Attendance at convocations is required. Two recitation hours per week.

Textbooks: The Third Chimpanzee, Jared Diamond, Harper Perennial, 1993, 2006.

**Course Summary:** CHE 490 is a required course for chemistry majors. It is a capstone course, with the objective of allowing students to explore chosen areas of chemistry at a high level, incorporate research, and create oral and written presentations. At the same time, the college-wide general education theme is discussed critically, making use of the common reading text and selected ancillary readings. Additionally, the course includes the ETS major field test in chemistry, and formal preparation for career or graduate school.

Assessment of the Course Objectives is through the completion of written and oral presentations on chemistry themes and the general education theme, fulfillment of reading requirements, participation in discussions, completion of the ETS test and the required general education end-of-semester assessment, and portfolio work including preparation of a resume, job search printout and/or the results of research on appropriate graduate school programs.

The course will be modular and team-taught, with the semester divided evenly as follows: (1) General education theme (Macrae); (2) Organic chemistry (Lecher); (3) Pharmaceutical chemistry (Buben); (4) Physical chemistry (Macrae). Various aspects of career options as a professional chemist will be presented throughout.

## General Education Learning Objectives

A student completing the GE capstone experience will demonstrate:

1. the ability to integrate multiple perspectives regarding a single theme of social/cultural importance;
2. the ability to contribute effectively to a serious conversation about a single theme of social/cultural importance;
3. an appreciation for the importance of life-long learning;
4. an appreciation for the importance of serious intellectual and interdisciplinary reflection to citizenship in a democratic society.

**Further Course Objectives:** Students successfully completing this course will:

1. demonstrate understanding of their knowledge bases in chemistry and in the general education areas.  
Students will use appropriate perspectives, chemical background, theories, and analytical methods in written and oral presentations.
2. demonstrate informatics skills.  
Students will use appropriate online and offline data resources in preparation of oral and written work.
3. demonstrate scientific numeracy and the ability to manipulate symbolic (algebraic) expressions.  
Students will carry out quantitative chemical calculations accurately.
4. demonstrate research skills.  
Students will show competence in laboratory or theoretical chemical research, literature and software use, and time management skills.
5. demonstrate critical thinking skills.  
Students will integrate concepts and resources and use scientific approaches to judgment regarding data.
6. demonstrate computer literacy.  
Students will use computers appropriately in obtaining and analysing chemical data.
7. demonstrate communication skills.  
Students will demonstrate verbal communication skills through oral and written presentations and discussion.
8. demonstrate goal setting skills.  
Students will prepare a portfolio indicating clear planning for career or academic goals.

**Assessment Method:**

1. Students will write response papers to readings on and around the general education theme which will be collected and graded.
2. Students will work through current research papers and complete homework problems on several advanced chemistry topics.
3. Students will carry out library-based research on a topic of their choice, and present the results of their work in the form of a structured research or review paper (following ACS structural guidelines) and as an oral presentation
4. Portfolios will be prepared containing a complete, professional, and goal-directed resume, together with a job search printout and a list of appropriate graduate programs with all relevant details included.
5. Students will take the ETS major field test in chemistry. (This is a graduation requirement.) The test will take place in December, on a date to be announced. Results will be available early next semester.
6. Students will attend the performance event (dates below) and participate in the discussion afterwards.
7. Students will participate in the required convocation, which will occur on Reading Day (December 7).
8. Students will take part in the General Education assessment exercise, which will consist of an essay related to the seminar theme and a knowledge-based test ranging over the entire General Education curriculum. This exercise is expected to be held on the day before Reading Day.

**Grading Criteria:**

The overall grade is calculated as follows:

GE responses	10%
GE assessment	10%
topical homework	30%
written research report	20%
oral research report	20%
portfolio	10%

Grading: Letter grading scale, with >90% corresponding to A, 80-89% corresponding to B, 70-79% corresponding to C, 60-69% corresponding to D, and <60% corresponding to F.

## Convocations, events, and assessment:

**Performance:** *Presentation* in two performances by Art, Music and Theater faculty - dates and times TBA

Thursday, December 6, 2007, 3:30-5.45: **General Education Program assessment** (multiple choice test and essay) - meet in regular seminar/capstone classroom at 3:30. (Bring text and pens/pencils.)

**Convocation on Reading Day** (Friday, December 7, 2007):

9:00-10:30 General Convocation presentation

Location: Civic Theatre

Panel: Speakers TBA

10:30-11.15 Small group discussions in assigned rooms in Marian Hall.

Attendance by all seniors graduating in December 2007 or May or August 2008 and by senior seminar faculty is required.

## Overall schedule:

<b>Week 1</b>	Introduction: read chapters 1-3; prepare written response 1
<b>Week 2</b>	Discussion; read ch. 4-6; prepare written response 2
<b>Week 3</b>	Discussion; read ch. 7-8; prepare written response 3
<b>Week 4</b>	Identify research topic; draft goal list; job/grad school search
<b>Week 5</b>	Short course I begins: <i>organic chemistry</i> (Lecher)
<b>Week 7</b>	Draft résumé due
<b>Week 8</b>	Approximate date of performance event
<b>Week 9</b>	Short course II begins: <i>medicinal chemistry</i> (Buben)
<b>Week 13</b>	Short course III begins: <i>modern computational theory</i> (Macrae)
<b>Week 15</b>	Portfolios due; ETS field test
<b>Week 16</b>	Convocation; General Education assessment; all materials due

### Suggestions for further reading:

#### Molecular evolution (these two are textbooks):

Molecular Evolution: A Phylogenetic Approach, by Roderic D. Page

Computational Molecular Evolution (Oxford Series in Ecology and Evolution), by Ziheng Yang

#### Cellular evolution:

Symbiosis in Cell Evolution, by Lynn Margulis

The Way of the Cell: Molecules, Organisms, and the Order of Life, by Franklin M. Harold

#### Language evolution:

The Language Instinct, by Steven Pinker

Animals in Translation: Using the Mysteries of Autism to Decode Animal Behavior,  
by Temple Grandin, Catherine Johnson

#### Darwinian theory and other views:

The Ancestor's Tale: A Pilgrimage to the Dawn of Evolution, by Richard Dawkins

Darwin's Dangerous Idea: Evolution and the Meanings of Life, by Daniel C. Dennett

#### Evo-devo:

Endless Forms Most Beautiful: The New Science of Evo Devo and the Making of the Animal Kingdom, by Sean B. Carroll

The Making of the Fittest: DNA and the Ultimate Forensic Record of Evolution, by Sean B. Carroll

#### Evolution and Design:

Living With Darwin: Evolution, Design, and the Future of Faith, by Philip Kitcher  
Kitzmiller et al. vs Dover Area School District, memorandum opinion of Judge Jones:  
[http://www.pamd.uscourts.gov/kitzmiller/kitzmiller\\_342.pdf](http://www.pamd.uscourts.gov/kitzmiller/kitzmiller_342.pdf)