Chemistry 349  Chemical and Biological Warfare

Winter, 2007

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Office Hours:  MW 2-4. Th 12-1

Grading:  Students will be evaluated on several assignments and a final exam as described below. For each assignment, the learning outcomes being assessed are listed:

1. (30%) Presentations: each student will participate in a group presentation on a specific topic related to the general topics listed in the weekly outline. In addition, each student will give one short (10 –15 minute) talk on a current aspect of chemical and biological warfare based on recently published material. These presentations will assess:
   - the student's ability to relate scientific and technical material from different areas coherently
   - the student's understanding of how scientific principles are used to solve technical problems
   - the student's understanding of the ethical implications of technology and impact of technology not only on war but on the society waging war or preparing for war
   - the student's knowledge and understanding of the historical effects on and future implications of CBW

2. (25%) Research paper: each student will submit a 5-10 page research paper on a topic unrelated to their presentation. References must include printed and electronic media. A minimum of six references are required. Primary sources should be obtained whenever possible. The paper will assess:
   - the student's understanding of history, industry, politics, and values and their relation to their topic
   - the student's understanding of how scientific principles are used to solve technical problems
   - the student's ability to relate scientific and technical material from different areas coherently
   - the student's ability to examine relevant technology from multiple perspectives

3. (25%) Final examination: the final exam will include essay and objective questions testing:
   - the student's understanding of basic science and technology involved in CBW
   - the student's understanding of the application of science and technology to solve problems in developing, destroying, and protecting against CBW
   - the student's understanding of the relation between science, technology, values and ethics in deciding whether or not to pursue a type of warfare, and once developed, how to decide if and when it should be used or destroyed
   - the history of chemical and biological warfare

4. (20%) Class participation, in-class assignments, quizzes: students are expected to be prepared to discuss each topic, to participate in all discussions, and demonstrate knowledge of assigned readings. Students are allowed one “free” absence. Each additional absence will result in a loss of 5% of the possible points in the class (this is separate from the 20% for participation)
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### Course Schedule (tentative)

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<tr>
<th>Week</th>
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<td>1/8</td>
<td>overview</td>
<td>1/10</td>
<td>general chemistry</td>
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<td>1/15</td>
<td>holiday</td>
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<td>organic chemistry</td>
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<td>3</td>
<td>1/22</td>
<td>WWI</td>
<td>1/24</td>
<td>group 1</td>
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<td>4</td>
<td>1/29</td>
<td>Nerve agents, WWII, US arsenal</td>
<td>1/31</td>
<td>group 2</td>
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<td>5</td>
<td>2/5</td>
<td>Microbiology</td>
<td>2/7</td>
<td>group 3</td>
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<td>2/12</td>
<td>Biological agents</td>
<td>2/14</td>
<td>group 4</td>
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<td>7</td>
<td>2/19</td>
<td>Southeast Asia</td>
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<td>group 5</td>
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<td>8</td>
<td>2/26</td>
<td>Iran/Iraq</td>
<td>2/28</td>
<td>group 6</td>
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<td>9</td>
<td>3/5</td>
<td>Terrorism</td>
<td>3/7</td>
<td>group 7</td>
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<td>3/12</td>
<td>Destruction, treaties</td>
<td>3/15</td>
<td>group 8</td>
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**Final exam: Tuesday March 20, 7-10 p.m.**
Course Topics

1 Chemical warfare in World War I - chlorine, phosgene, mustard agents, delivery systems, protection, uses, US efforts, chemical industry. Was chemical warfare viewed as ethical war? Why was public so revolted by chemical warfare?

2 Development of nerve gases. Effects of nerve agents. Protection from chemical weapons. Why were chemical and biological weapons not used on any large scale in WW II? The U.S. Arsenal. How was it built? Where were weapons stored? What developments were made after WWII? Binaries. Protection from modern CW agents.

3 Biological warfare - biological agents and their development, production, and effects.

4 Impact of biotechnology. Protection from biological agents. Uses of biological agents

5 C&BW in Southeast Asia - defoliants, napalm, and riot gases in the Vietnam war, yellow rain, mycotoxins. Ethics of crop destruction and use of gaseous agents to aid in destroying enemy forces.

6 Chemical warfare in Iran/Iraq and Gulf War - modern use of nerve agents, how obtained, actions of Western nations, Gulf War syndrome. Threat of biological agents. Ethics of Western nations supplying Iraq with tools to fight war with Iran.

7 C&BW and Terrorism - the mind of the terrorist, public reaction, threats and actions, actual cases.

8 Destruction and conversion of chemical and biological weapons and agents - competing technologies, current facilities, other countries. Current disarmament efforts - the Chemical Warfare Convention, biological warfare treaties, US role. Prospects for further control efforts.
Chem 349 Research Paper

**Due Date:** All research papers are due in class on Monday, March 12. No late papers will be accepted. You may submit your paper early. Do not come to class and say “my printer would not work and I could not print the paper”.

**Topic:** You must choose your topic and submit it to me for approval by **Wednesday, January 24.** Submit a sheet with your name, your topic, your group topic and your e-mail address. These should be typed, not handwritten. This will count for 10% of your paper grade. You must submit an outline with list of references to me on **Monday, February 13.** Submit a typed sheet with your topic, the outline, your references in proper format (see below) and your e-mail address. This will count for 15% of your paper grade.

**Length:** 5-10 pages typed, either single or double spaced, font size 10-12, reasonable margins, typing only on one side of page. Staple pages together. No cover page, no binder of any kind.

**Abstract:** You first page should have your name, the title of the paper, and an abstract of your paper. Begin the body of the paper on the second page.

**References:** Use either MLA (Modern Language Association) format or ACS (American Chemical Society) format for all quotes, paraphrasing and ideas/concepts which are not your own! The only portions of the paper which may be without reference are your introductory thesis statement, your incorporation/application of lecture concepts, your original analysis throughout the body of the paper, and your conclusion.

**Bibliography/ Works Cited :**
- Six sources minimum in addition to text, dictionaries and encyclopedias. Four sources (at least) must be non-internet sources. A video counts as a source. Must be in either MLA or ACS format.

American Chemical Society style guides:
  - chemistry.library.wisc.edu/instruction/acstyle.htm
  - pubs.acs.org/books/references.shtml

Modern Language Association style guides:
  - webster.commnet.edu/mla/index.shtml
  - www.bedfordstmartins.com/online/cite5.html

**General tips:**
- Attempt to avoid “to be” verbs (is, are, was, were).
- Do not use “a lot”. Do not use “when” unless it refers to time.
- Do not begin a sentence with “There”.
- Never use “very”
- Use “etc.” only if you have three or more in a series.
- Do italicize foreign words, book, video and periodical titles
- **Use primary sources!** These include interviews (phone, e-mail, in person), diaries, and transcripts of first-hand accounts.

- **Apply terms from course** (lectures, text, other presentations).
- **Keep your paper chemical/biological in nature.** If appropriate/pertinent, explain the role of history, politics, culture and religion in relation to chemistry/biology.

**Contrast, compare, analyze.**
- Do not give your opinion as fact. If your source is biased, recognize that.
- Do not e-mail me your paper!
SHORT REPORT

Each student on his/her designated date is to report on a current aspect of chemical and biological warfare or a directly related topic. Choose a topic of interest to you. The topic must have been discussed in the media or other published work within the past two years. The more recent the better. **Your event must be chemical/biological in nature. It must incorporate terms and topics from this course. This requirement increases as the course proceeds. Compare/contrast to previous course material or past presentations if appropriate.**

Note: You may present information obtained from interviewing someone (faculty or student or relative) who has first-hand experience with a topic related to the course.

The presentation should be 10-15 minutes in length. You should make use of some sort of visual aid – overheads, charts, props, or PowerPoint.

You will stand at the front of the class. Try to make eye contact with at least three students. Do not address only the instructor. Speak clearly and loudly enough for all to hear. No gum, please. Do not read your report. Know your topic well enough that you can just tell us about it **without reading. You must practice your report at least three times all the way through before giving it. Be sure to cite your sources.**

You must clear your topic with me at least **one week** before your give your report. You may not report on a topic already reported on!!

Your topic may be related to another topic but must contain new information.

Sources may include radio, TV, newspapers, magazines, scientific journals or online versions of same. Primary sources are encouraged. A primary source is a source reporting first-hand experience.