Chemistry 366 Syllabus

Spring 2009
Instrumental Analysis

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<table>
<thead>
<tr>
<th>Office Hours</th>
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<tbody>
<tr>
<td>Mon 10:00-11:00</td>
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<tr>
<td>Mon 1:00-1:50</td>
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<td>Wed 1:00-1:50</td>
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<td>Th 11:00-11:50</td>
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<td>Fri 1:00-1:50</td>
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Schedule: Lecture is scheduled for M, W, F from 11:00 to 11:50 in KB 471.

Textbook: Skoog, Holler, Crouch *Principles of Instrumental Analysis*; Thompson

Course Description

CHEM 366 INSTRUMENTAL ANALYSIS A study of instrumentation and its applicability to structural determination and chemical analysis is made. Included are elementary electronics and circuitry, electrochemical, spectrophotometric, and chromatographic methods. Prerequisite: CHEM 365, CHEM 385, PHYS 232 or equivalent, MATH 142, or permission of instructor. Corequisite: CHEM 368. 3 class hours. 3 semester hours

Goals

1. Students will be able to compare and contrast instrumental techniques including the following:
   - Atomic Absorption
   - Graphite Furnace AA
   - Gas Chromatography
   - Liquid Chromatography
   - Fourier Transform Infrared
   - Ultraviolet/Visible
   - Fluorescence
   - Mass Spectrometry
   - Nuclear Magnetic Resonance
2. Students will be able to describe the function and purpose of the following components of an instrument:
   - Sources
   - Sample Introduction
   - Wavelength Selectors
3. Students will be able to identify an instrumental method to provide needed information
4. Students will be able to develop a procedure that includes the following:
   o Sample preparation
   o Calibration
   o Standardization
   o Standard Addition
   o Internal Standard
5. Students will be able to interpret experimental data
   o Statistics
   o Propagation of error
6. Students will be able to make a conclusion based upon experimental results
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<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>1</td>
<td>1/12/09</td>
<td>-Introduction (chapter 1A-C) -Literature (worksheet)</td>
<td>Sources for methods (worksheet) Gaussian -(appendix 1 a1A) -(mcd)</td>
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<tr>
<td>2</td>
<td>1/19/09</td>
<td>MLK – no classes</td>
<td>Intro to spec (chapter 6A-D) Light Sources -(chapter 7B) -(worksheet)</td>
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<td>3</td>
<td>1/26/09</td>
<td>Wavelength selection -(chapter 7C) -(worksheet)</td>
<td>Atomic Spec -(chapter 8, 9A1, 9B1) Atomic Spec (worksheet)</td>
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<td>4</td>
<td>2/2/09</td>
<td>Intro UV/VIS (chapter 13)</td>
<td>Aspirin Analysis design 1 (worksheet) UV/Vis apps (chapter 14)</td>
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<td>5</td>
<td>2/9/09</td>
<td>Sample Stats -(appendix 1 a1B) -(mcd)</td>
<td>S/N (Chapter 5) S/N (worksheet)</td>
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<td>6</td>
<td>2/16/09</td>
<td>Students t -(appendix 1 a1C) -(mcd)</td>
<td>Aspirin analysis design 2 (worksheet) Calibration (chapter 1D)</td>
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<td>7</td>
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<td>Intro to IR (chapter 16)</td>
<td>IR applications (chapter 17) IR instrumentation (worksheet)</td>
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<td>8</td>
<td>3/2/09</td>
<td>Spring Break</td>
<td>Spring Break Spring Break</td>
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<td>9</td>
<td>3/9/09</td>
<td>Intro Fluorescence (Chapter 15A and B)</td>
<td>Aspirin Analysis design 3 (worksheet) Electronics (chapter 2)</td>
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<td>10</td>
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<td>RC Electronics (mcd)</td>
<td>Intro to separations (Chapter 26) Intro to chrom (worksheet)</td>
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<td>11</td>
<td>3/23/09</td>
<td>LC (Chapter 28)</td>
<td>LC (worksheet) Op Amps (chapter 3)</td>
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<td>12</td>
<td>3/30/09</td>
<td>Aspirin Analysis Discussion</td>
<td>GC (Chapter 27)</td>
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<td>4/6/09</td>
<td>GC (worksheet)</td>
<td>GC lab design Spring Holiday</td>
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<td>14</td>
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<td>MS (Chapter 20)</td>
<td>MS (Chapter 20) Projects Day</td>
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<td>15</td>
<td>4/20/09</td>
<td>MS (worksheet)</td>
<td>MS lab design electrochemistry (Chapter 22)</td>
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<tr>
<td>16</td>
<td>4/27/09</td>
<td>voltammetry (chapter 25)</td>
<td>voltammetry (worksheet) Finals</td>
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Attendance:
You are expected to attend lecture. Lecture will supplement the textbook and a significant amount of time is spent working problems.

Grading:
+/- grades are used. A separate grade will be given for lecture and lab. Your grade for the semester is based upon performance on the following:

1. Lecture
   a. 50% Homework. 10% will be deducted from ALL late work. Work will not be accepted after 1 week from the due date. At the instructor's discretion, students may be required to redo any graded work for a 10% penalty. The redo will be due one week after receipt.
   b. 25% Take home exam (midterm).
   c. 25% In class final exam.

Make Up Exams:

a. If you have advance notice of an absence you must make arrangements with the instructor before the exam is given. Failure to do so will result in a ZERO for the exam.

b. If you are unable to take an exam and do not have advance notice you must; have an acceptable and documented excuse, be prepared to document your absence, and contact the instructor before the next class meeting.

c. Undocumented or unacceptable absences result in a zero on the quiz or exam.

d. If a makeup exam is given, your grade will be the LOWEST of the following:
   i. Your score for the makeup exam or quiz.
   ii. Your class weighted average for the final.

Cheating and Plagiarism:

Cheating and Plagiarism will not be tolerated and are grounds for FAILURE in the course. The University's policy on cheating and other forms of academic fraud will be strictly enforced. When in doubt about what is acceptable, ask the instructor. You will do some work in small groups and interaction is strongly encouraged in this setting. You, however, are ultimately responsible for the material. Working together on homework problems is acceptable, but you must reference other people's ideas. Quiz's and Exams must be your own work. You are allowed to use a calculator and a pen or pencil for quizzes and exams. No other materials are
allowed. For additional information read "What is Plagiarism". A copy of the appeal procedure for student academic grievances is available in the Science Division office.

Office Hours:

I will be available in my office during scheduled office hours. Any changes in these hours will be posted on my office door and on the Web site. At other times I am happy to help you, if I have time. Feel free to call and make an appointment if you need extra help. You are strongly encouraged to ask questions and seek help early. Chemistry is challenging. When you do not understand something, ask.

WWW:

Supplementary course material and a listing of course topics is posted on the WWW http://science.widener.edu/~svanbram.

Syllabus Modification:

Any Modification of this syllabus will be distributed in class and posted on the web.