Course Organization, Lecture Syllabus and Other Important Information

Lectures: MWF 10:00-10:50, Room: Currens 202, Lab: Th 8:00-1:50 Currens 519
Instructor: Dr. Tarab Ahmad
Office: Currens 324B, office phone: 298-1656, e-mail: TJ-Ahmad@wiu.edu
Office hours: MW 1:30-2:30pm, Th 2:00-3:00 or by appointment or walk in
Prerequisite: Chem 341, physical chemistry (first level)

laboratory notebook
A bound laboratory notebook is needed ($18-20). Alternatively, you can use a composition notebook ($1.00).

Western online: lecture notes, reading assignments, homework, lab manual, additional information, course news, changes, and announcements will be posted on the western online.

Teaching Assistants:
Vishnu Vardhan R Thakkalapally e-mail: vvr-thakkalapally@wiu.edu
Pavankumar Manasani email: p-manasani@wiu.edu

Material Safety Data Sheets (MSDS): information about all chemicals utilized in the laboratory can be found at the following web site. http://physchem.ox.ac.uk/MSDS/#MSDS
Approved eye protection used for the laboratory component of this class. E-copies are free of charge. As Eye protection is required in Labs, safety goggles must be purchased by the student ($3-5.00).
Students are expected to wear clothing that completely covers the body including arms and legs and to wear appropriate footwear in Labs (Sandals and shorts are not appropriate in lab). Lab coats or aprons are suggested but NOT required.

A simple scientific calculator is needed for this course.

Objectives

This course focuses on instrumental methods of analytical chemistry. The student will learn about the theoretical and practical aspects of instrumental chemical analysis and will develop critical and creative thinking skills in the areas of instrument selection, method development and data interpretation. By the end of this semester it is expected that the students should be able to:

1. To gain a fundamental understanding of the theoretical basis of measurements (spectroscopy and its dependence on molecular structure, the physical chemistry of underlying interaction of light and matter, and the chemical interactions among molecules that are the driving forces for analytical separations).
2. To be able to select and use appropriate instrumental methods of analysis to problems in different types of the sciences and in real-world problems.
3. To gain practical knowledge of how to do meaningful interpretation of data from analytical chemical measurements.
4. To develop an understanding of the role of the analytical chemist in measurement and problem solving in chemical analysis.
5. To provide practical experience in selected instrumental methods of analysis. The student should be able to operate, manipulate, and generate data for each instrument. The student should demonstrate appreciation of the state of the art of instrumental analysis. The student should know the complexity of each instrument, its strength, and its limitations.
6. To expand skills in the scientific method of planning, developing, conducting, reviewing and reporting
experiments.

The lecture material is divided into four sections. Section I is the shortest and section III is the longest.

Section I: Introduction
Section II: Spectrometric techniques
Section III: Electrochemical techniques
Section IV: Separation methods

Tentative course content, chapter coverage, HW and projected exams (subject to change)

<table>
<thead>
<tr>
<th>Lecture Topic</th>
</tr>
</thead>
</table>
| **Introduction to Instrumental Analysis,**  
Chapter 1: Problems: definitions, 9, 10, 11 |
| Spectrometric Methods, Chapters 6-7  
Problems: 6.1 a, b, c, d, m, 6.2, 6.4, 6.7, 6.8, 6.9, 6.12, 6.14 a, 6.15 a, 7.1, 7.3, 7.6, 7.16, 7.19, 7.21, 7.22 |
| Optical & Atomic Absorption Spectrometry, Chapter 8-9  
Problems: Ch8: 1, 5, 8, 11, 12 b, d13, 14, 15, Ch9: 11: 1, 4, 5, 6, 8, 9 |
| UV-VIS Absorption Spectroscopy, Chapters 13-14  
Problems: Ch13: 1a, b, c, 2a, b, c, 5, 8, 9, 13, 15, Ch14: 1, 2, 8 |
| Luminescence Techniques, Chapter 15  
Problems: Ch15: 1, 2, 3, 4, 7, 9, 10, 16 |
| Infrared Spectroscopy, Chapters 16-17  
Problems: C16: 1, 2, 3, 5, 6, 7, 8, Ch17: 2, 4, 5, 9 |
| Atomic & Molecular Mass Spectrometry Chapter 11 & 20  
Problems: 1, 2, 5, 6, 7, 11, 13, 1 |
| Introduction to Separation Science, Chapter 26  
Problems: Ch26: 1, 2, 3, 5, 6, 9, 10, 11, 12, 14, 15, 16, 23 |
| Gas Chromatography, Chapter 27,  
Problems: Ch27: 3, 5, 10, 12, 14, 28, 29, 30 |
| Liquid Chromatography, Chapter 28,  
Problems: 1, 2, 3, 7, 10, 11, 12, 14, 17, 19, 20, 21 |
| Electrochemistry, Chapter 22, 25  
Problems: ch 22: 8: 1, 2, 3, 5, 6a, 7a, 9, 11, 12, ch 25: 1, 3, 4, 5, 10, 11, 14, |

**If time allows**  
**Atomic X-ray spectroscopy, Chapter 12**  
**Electrophoresis, Chapter 30**

Exams (tentative schedule)  
Exam 1 (subject material from weeks 1 - 5), 02/15  
Exam 2 (subject material from weeks 5 - 8) 03/9  
Exam 3 (subject material from weeks 9 - 12) 04/16  
Exam 4 (subject material from weeks 13 - 14) 04/27*  
Final Exam, American Chemical Society Exam (ACS) of Analytical Chemistry, 10:00 am

Grading

- There are a total of 1000 points available for this course:  
- Ten points for attendance collected at 10 random times) (10 pts)  
- Quizzes: (Always on Mondays) (90 pts)  
- Homework sets (80 pts total)
- Student participation (20 pts)
- Three out of four Exams worth 100 points each. (300 points total)
- Final Exam worth 100 points (100 pts total)
- Lab grades worth of 400 points (See lab syllabus) (400 pts total)

For a “B” or “G” credit, a term paper assignment will be given for the students.

Note: Lab attendance is required and an average of 70% on the lab reports is necessary to pass the course regardless of whether other scores are passing.

Evaluation

Exams
Four examinations will cover the lecture materials presented during the regular semester. The exams will be worth approximately 100 points each. Your total number of points possible from regular semester examinations will be 300 points.

Quizzes
There will be approximately seven or eight short quizzes periodically during the semester. The best six to seven quizzes will be used to determine your grade. Your total number of points possible from the best five-six quizzes will be 90 points.

Homework
There will be eight 8-10 homework assignments periodically during the semester. The worst one will be dropped from your grade. Your total number of points possible from the homework assignments will be 80 points. The homework assignments are either problem from the textbook or occasionally from other sources.

Homework assignments are due by the beginning of the class on the dates given by the instructor (Friday following the end of chapter/unit). Unless other arrangements have been made in advance with the instructor, a 10% grade reduction will be given for each day late that your homework is not handed in.

Active participation
It is expected that the students attend the class regularly and to participate in the discussion. There are different forms of participation which include but not limited to student-lead summary of the previous lecture in the beginning of the class and/or a student-lead discussion of a homework assignment and small class room presentations (3-4 min). Each student should be prepared to lead these discussions. Failure to do so is a waste of time and will make the class boring. It will also results in a deduction from your participation grade.

Lab Grades
Twelve laboratory exercises are planned for this semester. Only your ten best laboratory exercises will be counted toward your final grade. The labs will be worth 25 points per lab. Your total number of points possible from lab reports will be 250 points. There will be grades also (total of 150 points) for other activities like the pre-lab quizzes, special project, lab final, lab notebook and TA points. You must score a minimum of 280 points (out of 400) in the laboratory exercises to pass CHEM 442.

Note: Save all assignments, quizzes, lab reports after they are graded and returned.

Final exam
The American Chemical Society (ACS) Examination in Analytical Chemistry will be used as the Final Examination for CHEM 442. The Final Exam will be worth approximately 100 points and cover all materials for both CHEM 341 and 442.

Graduate Students
Students taking the class for graduate (G) or B credit will be expected to perform at a higher level and to complete additional assignments. It will be the student’s own responsibility to make arrangements with the instructor early in the school term for those supplemental assignments. Notice that the grading scale is: A > 90 > B > 80 > C > 70 > D > 60.
Missed Tests

It is expected that the students will attend all the lectures and prepare for classes. You are responsible for all information and materials in sessions and classes whether you are present or not. In order to accommodate illness and/or other excused absences a comprehensive make up exam will be given at the end of the semester. You may use this to make up one, and only one, missed regular lecture exam. The make-up exam for all missed exams will be held on the last day of class. The make-up exam will be comprehensive over all materials covered in CHEM 442. Students who miss more than one exam should drop the course. No makeup quizzes will be given. If you miss a quiz it will count as one of your drop quizzes. Only the best eight quiz scores will be counted while ten quizzes will be given during the semester. A comprehensive final exam covering all material in CHEM 442 will be given (worth 100 pts) on Thursday, April 26, 2011 at 12:00 – 1:50 p.m.(after the presentations)

No make-up quizzes, home work, or laboratory exercises will be given. Missing more than one exam; having fewer than the required number of quizzes or home work assignments; or missing three laboratory exercises will ensure a zero will be incorporated into your final grade. **DO NOT MISS MORE THAN THE ALLOWED NUMBER.**

Exceptions to the above rules will only be made for University sponsored functions that require your presence during the class period (i.e. WIU band trips, field trips in other WIU classes, WIU athletics, etc.), and military commitment. Notification of the official WIU sponsored function, in the form of a signed memo from the faculty sponsor or coach, must be submitted to the instructor one week prior to the expected absence. Evidence of military commitment should be presented as soon as possible.

There are approximately 1,000 points possible during the Spring Semester. Your letter grade will be based on your total accumulated points NOT on percentages. Please note: the following grading scale is rigorously followed. Grades are based on point totals at the end of the semester. No unearned credit of any sort will be given to any student.
Grading Scale
Letter grades for the course will be assigned based on the following point system out of a maximum of 1000 points:

<table>
<thead>
<tr>
<th>Raw score (1000 max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;930</td>
</tr>
<tr>
<td>900&gt;A-&gt;929</td>
</tr>
<tr>
<td>850&gt;B+-&gt;900</td>
</tr>
<tr>
<td>800&gt;B-&gt;850</td>
</tr>
<tr>
<td>780&gt;B-&gt;800</td>
</tr>
<tr>
<td>750&gt;C+-&gt;780</td>
</tr>
<tr>
<td>720&gt;C&gt;750</td>
</tr>
<tr>
<td>680&gt;C-&gt;720</td>
</tr>
<tr>
<td>650&gt;D+-&gt;680</td>
</tr>
<tr>
<td>620&gt;D-&gt;650</td>
</tr>
<tr>
<td>580&gt;D-&gt;620</td>
</tr>
<tr>
<td>&lt;580</td>
</tr>
</tbody>
</table>

Statement on Ethics: Western Illinois University, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. Students have rights and responsibilities (http://www.wiu.edu/provost/student/). Plagiarism, cheating, and other forms of academic dishonesty constitute a serious violation of University conduct regulations. Students who engage in dishonesty in any form shall be charged with academic dishonesty. Please remember that you are expected to do your own work at all times.

Students with Disabilities: It is the policy of Western Illinois University and the Americans with Disabilities Act (ADA) to accommodate individuals with disabilities pursuant to federal law and the University's commitment to equal educational opportunities. It is the responsibility of the student to inform the instructor of any necessary accommodations and to provide the instructor by the documentation needed for accommodation through Disability Resource Center (DRC) at the beginning of the course. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire about such particular needs of students. Students who may require special assistance in emergency evacuations (i.e. fire, tornado, etc.) should contact the instructor as to the most appropriate procedures to follow in such an emergency. Contact Disability Resource Center (DRC) at 298-2512 for additional services.

Emergency Preparedness: WIU Office of Risk Management and Emergency Preparedness provides resources on how to respond to emergency situations. Please view the video resources at www.wiu.edu/rmep/ (Click “Resources” on the right side of the page). The following action is prohibited under the Student Conduct Code:

Teacher Education Program

“In accordance with Illinois State Board of Education certification rules, all candidates seeking teacher certification are required by Western Illinois University to obtain a grade of “C” or better in all directed general education course, all core courses, and all courses in the option. Note: A “C-” is below a “C”.” Please note: any secondary science teacher certification student wanting to see how this course is aligned with the State and National Standards should see their advisor and/or examine the Secondary Science Teacher Certification Western Online Advising site.
Conduct, Classroom and Course Policies:

The Following Action is Prohibited under the Student Conduct Code: Disorderly Conduct. Disorderly conduct is defined as any behavior which disrupts the regular or normal functions of the University community, including behavior which breaches the peace or violates the rights of others. (http://sjp.wiu.edu/CodeOfConduct/index.asp)

Plagiarism, cheating and other forms of academic dishonesty constitutes a serious violation of university conduct regulations. Students who are engaged in dishonesty in any form shall be charged with academic dishonesty. Any student convicted of academic dishonesty will receive a failing grade and may be subjected to further academic penalty. See the WIU academic dishonesty policy (http://www.wiu.edu/policies/acintegrity.shtml). CHEATING WILL NOT BE TOLERATED.

Data storage or data transfer devices (including but not limited to: notes, cell phones, graphing calculators, iPads, Kindles, and similar devices) are NOT to be used in CHEM 442. Cell phones and lap top computers must be turned off and put away during all class meetings. The use of any data storage or data transfer devices during any quiz, laboratory exercise, test or the final examination shall constitute CHEATING.

Simple scientific calculators without extensive memory functions (i.e. Texas Instruments model 30 and less sophisticated) may be used.

No hats, caps and hoods that cover your ears may be used during the taking of a quiz, exam, or the final examination without specific permission of the instructor.

Assigned seating, rearrangement of seats, and closing of selected seats and areas of the classroom are the option of the instructor.

Student Rights and Responsibilities:

It is essential that all the students know what is required from them in order to complete a course satisfactorily. Student rights and responsibilities are listed on the WIU website of the provost and academic vice president (http://www.wiu.edu/provost/students/).

Student evaluations/suggestions

In case you have any problem (course or lab related) of any kind, please let me know so that I can help you to solve the problem. If you have a problem and I don’t know about it, you don’t expect your problem to be solved. You have to take the initiative to let us know about it. If you don’t want to talk directly to me, you can alternatively explain your problem and place it in the suggestion’s box that I will place in front of my office. There will be another one in the lab. Also, I will run frequently student evaluations. I’ll post some questions for you to answer in the western line or I will distribute them in the class. If you have any comments of any kind please write them in these evaluations. If the comments/suggestions are meaningful, I will take them into consideration when I teach the class.

Important dates

☐ January 16, Mon. -- Dr. Martin Luther King Day -- No Classes/University Closed
☐ January 17, Tues. -- Classes Begin
☐ February 13, Mon. -- Lincoln's Birthday -- No Classes/University Closed
☐ February 14, Tues. -- Classes Resume
☐ March 12-16, Mon.-Fri. -- Spring Break -- No Classes
☐ March 19, Mon. -- Classes Resume
☐ April 1, Sun. – Last day to drop course
☐ May 7-11, Mon.-Fri. -- Final Exam Week
Important Note: Any situation, condition, or circumstance not covered in the syllabus is subject to the decisions of the instructor, only.