

# Chemistry 541

## Advanced analytical chemistry

Fall 2009  
Western Illinois University

**Lectures:** 5:00-6:15 am, Room: Currens 315

**Instructor:** Dr. Tarab Ahmad

**Office:** Currens 324A, Phone: 298-1656, E-mail: [TJ-Ahmad@wiu.edu](mailto:TJ-Ahmad@wiu.edu)

**Office hours:** MW 11:00-12:00, T 2:00-3:00 pm by appointment

**Prerequisite:** Approval

**Text:** Chromatography Concepts and Contrasts, second edition by James M. Miller, John Wiley & Sons, Inc.

### Suggested References and reading material:

- 1) Unified Separation Science by J. Calvin Giddings, 1991, John Wiley & Sons, Inc.
- 2) Dynamics of Chromatography \_By J. Calvin Giddings
- 3) Principles of Instrumental Analysis, Fifth edition by Skoog, Holler & Nieman, Saunders College Publishers.
- 4) The essence of Chromatography, Colin Poole, Elsevier, 2003
- 5) Journal of chromatography library, volume 69 A, Chromatography, 6<sup>th</sup> edition edited by E.Heffman, 2004.
- 6) Assigned articles, and chapters from different sources that will be announced weekly.
- 7) J.Chromatography A, Elsevier (e-journals/wiu)
- 8) Analytical abstracts (e-journals/wiu)
- 9) [Analytical chemistry](#), ACS (e-journals/wiu)
- 10) JACS, (e-journals/wiu)
- 11) J. liquid chromatography & related techniques (e-journals/wiu)
- 12) J. Separation science (e-journals/wiu)
- 13) [Analytical and bioanalytical chemistry](#)
- 14) [International Journal of Analytical Chemistry](#) (e-journals/wiu)
- 15) [International journal of environmental analytical chemistry](#)
- 16) [Analytical chemistry news & features](#)
- 17) [Journal of analytical chemistry](#)
- 18) [Trends in analytical chemistry](#)
- 19) [Critical Reviews in Analytical Chemistry](#)

The assigned sections of the textbook and other reading material will be posted on the westernonline before the lecture time. You are responsible about the material given for each lecture either by reading from the text or by using the electronic resources that are available. It is recommended that you read the suggested reading material before you come to the lecture.

**Course description & Course out line:** Topics selected aim to familiarize graduate students with the theory and practice of the state of the art of analytical chromatographic separations and their detection methods.

Introduction to Chromatography  
 Band Broadening and Kinetics  
 Physical Forces and Interactions  
 Optimization and the Achievement of Separation  
 Comparison Between Chromatographic Modes  
 Gas Chromatography  
 Liquid Chromatography in Columns  
 Quantitation: Detectors and Methods  
 Chromatography with Mass Spectral Detection (GC/MS and LC/MS)  
 Liquid Chromatography on Plane Surfaces  
 Qualitative Analysis  
 Capillary Electrophoresis and Capillary Electrochromatography  
 Sample Preparation  
 Special Application  
 Selection of a Method

**Lecture and Exam Schedule (Subject to change)**

| <b>Date</b>  | <b>Activity</b>             |
|--|-----------------------------|
| Week 1&2 8/24, 8/26, 8/31, 9/2,<br>Note: Chapter1 is your responsibility | Chapter 2                   |
| 9/7  | <i>Labor Day no classes</i> |
| 9/9  | Homework I due              |
| 9/9, 9/14  | Chapter 3                   |
| 9/16, 9/21   | Chapter 4                   |
| 9/23   | Homework II due             |
| 9/23, 9/28   | Term paper Approval         |
| 9/30, 10/5   | Chapter 6                   |
| 10/7 10/12   | Chapter 7                   |
| Exam I: 10/14  |                             |
| 10/19, 10/21, 10/26,   | Chapter 8                   |
| Homework III due   |                             |
| 10/28, 11/18   | Chapter 9                   |
| 11/2, 11/4,  | Chapter 10                  |
| Homework IV due  |                             |
| 11/9, 11/11,   | Chapter 11                  |
| Exam II : 11/16  |                             |
| 11/18  | Chapter 12                  |
| 11/30  | Chapter 13                  |
| 11/ 23-11/28 Thanks Giving Break   |                             |
| 12/2   | Research paper due          |
| 12/7, 12/9   | Student presentations       |
| 12/14  | Chapter 14                  |
| Final Exam   |                             |

### Grading:

Two exams 20% each

Research paper and class presentation 20%

Homework and homework presentation on the board 20%

Final exam 20%

### Grading Scale

90 % and above A

80-89% B

70-79% C

60-69% D

59% and below F

### Homework

The homework assignment will be posted on the westernonline two weeks before the due date. No late homework will be accepted after the due date. There will be student presentation for the homework. Each student is expected to solve problems on the board. There will be four homework assignments on the following Wednesdays (9/ 5, 9/19, 10/17, 10/31).

### Research Paper and Class Presentation

Each student will complete 10-15 page research papers and class presentation on an advanced topic in separation science. The topic of your paper should be selected no later than September 24<sup>th</sup> and should be approved by the Instructor. The paper will be due on November 21<sup>st</sup>. by noon. Electronic copy along with the hard copy should be submitted at the same time on the due date. During the last week of the classes, each student will give an oral presentation on his (her) paper.

### Attendance

The students are expected to attend all the classes regularly and punctually. The students are responsible for all the material given whether the student is present or not. No make up exams will be given. An excused missed test will have the final exam grade as a substitute score.

**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 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 at the beginning of the course. Any student requiring accommodations should contact the Office of Special Student 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/](http://www.wiu.edu/rmep/) (Click “Resources” on the right side of the page).

The following action is prohibited under the Student Conduct Code:

**Disorderly Conduct:** 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>)