King Fahd University of Petroleum and Minerals
Chemistry Department

First Semester (111) **CHEM 540** **Year (2011/2012)**

Advanced Analytical Chemistry

Course Syllabus

Instructor: Dr. Abdel - Nasser Kawde

Lecture: **U T**: 17:00 - 18:15, Room 4-106.

Office #: 4-109.

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Office Hours: Sunday: 13:10 – 14:00 PM

Tuesday: 10:00 – 11:50 AM

Chem 540 Advanced Analytical Chemistry (3-0-3)

Advanced instrumental analysis: electroanalytical methods including potentiometry, voltammetry and coulometry, spectroscopic techniques: AA, FE, ICP, molecular spectroscopy: fluroscence and phosophrescence. Chromatography: principles of GC, HPLC. Mass spectrometry

Textbook: Besides enormous review articles and related peer-reviewed published papers, the following text books would be used:

1- Principles of Instrumental Analysis, D.A. Skoog, F. J. Holler and S. R. Crouch, 6th Edition, Thomson Brooks/Cole, **2007**.
ISBN-13: 978-0-495-01201-6

2. Quantitative Chemical Analysis, D. C. Harris, 7th Edition, W.H. Freeman and Company **2007**.
ISBN-13: 978-0-7167-7041-1

3- Analytical Electrochemistry, J. Wang, 3rd Edition, Wiley-VCH, Inc. **2006**.
ISBN-13: 978-0471678793

4- Electrochemical Sensors, Biosensors and their Biomedical Applications by Xueji Zhang, Huangxian Ju, Joseph Wang Publisher: Academic Press is an imprint of Elsevier, **2008**
ISBN: 978-0-12-373738-0

5. Optical Biosensors : Today and Tomorrow. Ligler, Frances S.; Taitt, Chris Rowe; Editors. Neth. **(May 19, 2008)**, 688 pp Publisher: (Elsevier B. V., Amsterdam, Neth.)
ISBN: 978-0-444-53125-4

Examinations:

- Two majors and final written exams.
- A five-page mini-proposal on an advanced analytical technique, along with a short presentation.

Dates for Major Exams

1. First Major	Tues. Oct. 18, 2011.
2. Second Major	Tues. Dec. 06, 2011.
3. Final Exam (Comprehensive)	To be announced by the Registrar

General Information

1. The major exams will be carried out within the class time
2. The final letter grade will be assessed on the following activities:

Class activities (Homework, attendance & Quizzes):	10
First and Second major exams:	40
Proposal & Presentation	20
Final exam:	30

Syllabus & Course Content:

The course will cover the following subtitles:

- Advanced Analytical Chemistry, General Introduction **(One Week)**
- Electroanalytical Techniques: **(Four Weeks)**
- Spectroscopic Techniques: **(Four weeks)**
- Chromatographic Techniques: **(Four weeks)**

One week (more or less, based on the number of registered students) will be designated for Students Presentations.

Course Objectives:

The course introduces the graduate students to the principles and applications of advanced analytical techniques. The main objective of the course is to familiarize students with the cutting-edge technologies on both commercial available and under-development analytical techniques used in various analytical instruments through learning their concepts, operation, design, problems, optimization, and linking the outcome of these instruments with meaningful information.

Learning Outcomes:

Upon completion of the course, students should acquire the following capabilities:

- Understanding the advantages, disadvantages, and limitations of different analytical instruments.
- Determine and compare the most important analytical features of each analytical technique including sensitivity, precision, and accuracy.
- Learning the basic measurement principles necessary for the calibration, standardization, and validation of different analytical methods.
- Make proper analysis of the data generated from these analytical instruments and their relationship to the analytical problems.
- Being capable of making the right decision and choice of the suitable analytical method for the selected analytical problem.

LECTURE SCHEDULE, First Semester 2011-1

Week	Lecture	Day	Date	Notes
1	1 2	U T	11.09 13.09	 (Last Day of Adding a Course)
2	3 4	U T	18.09 **20.09**	 **Quiz I**
	Sept. 21st Last Day for Dropping Course(s) Without Permanent Record.			
3	5 6	U T	25.09 27.09	
4	7 8	U T	02.10 **04.10**	 **Quiz II**
5	9 10	U T	09.10 11.10	
6	11 12	U T	16.10 **18.10**	 **Major Exam I**
	Oct. 19th Last Day for Dropping Course(s) with Grade of 'W' Through Internet.			
7	13 14	U T	23.10 25.10	
8	15	U	**30.10**	**Quiz III**
1-11 November (5-15 Dhul-Alhejah) ID Al-Adha Vacation				
9	16 17	U T	13.11 15.11	
10	18 19	U T	20.11 **22.11**	 **Quiz IV**
	Nov. 23rd Last Day for Withdrawal from all Courses with Grade of 'W' Through Univ. Reg.			
11	20 21	U T	27.11 29.11	
12	22 23	U T	04.12 **06.12**	 **Major Exam II**
13	24 25	U T	11.12 13.12	
14	26 27	U T	18.12 **20.12**	 **Quiz V**
15	28 29 30	U T U	25.12 27.12 01.01	**Students Presentations**