Course Syllabus

CHE 410 and 5410: Instrumental Analysis

Spring 2013

Course Credit: Four Semester Hours

Professor: Dr. Dale Rosado

Office: Hederman 402

E-mail: rosado@mc.edu

Phone: 601-925-3424Webpage: http://www.mc.edu/faculty/rosado

Office Hours: Tues., Thurs. 3:00-5:00

E-mail Communications: I will only reply to e-mails sent from your MC mail account. I will not discuss exam scores before I return them and will not discuss scores via e-mail. The campus e-mail system is not a text messaging system. Do not expect me to return your e-mails within minutes of their arrival in my inbox. I prefer to discuss excused absences and any possible make-up work in person.

My website may contain course material (i.e. Lecture Notes, Homework Assignments, Syllabi, etc.)

Location: Lecture: Hederman 415

Lab: Hederman Science 413/415

Textbook: "Undergraduate Instrumental Analysis", Sixth Edition (Required)

Authors: Robinson, Frame, and Frame

ISBN: 0-8247-5359-3

Prerequisites: CHE 310 and CHE 317

Course Description: This course will expose students to modern instrumental theory, operation of modern instruments, data analysis, and data interpretation currently used in qualitative and quantitative chemical analysis.

Rationale: The purpose of this course is to learn the theory behind the construction of modern instrumentation that is used in qualitative and quantitative chemical analyses and how said theory can be used to optimize instrumental performance. The students will also learn how to make conclusions based on the analysis of raw data.

Objectives: Upon completing this course students will be able to:

- 1. Handle samples from a variety of matrixes so that precise and accurate data can be obtained
- 2. Understand the basic principles and operation of chemical instrumentation
- 3. Interpret the output from chemical instrumentation
- 4. Have a solid understanding of data analysis, data manipulation, and error associated with chemical analysis
- 5. Make solid conclusions based on the results of analyses
- 6. Design analyses for specific problems with a variety of analytes

Suggested Materials:

Material may be supplemented from: "Principles of Instrumental Analysis" Sixth Edition

Authors: Skoog, Holler, and Crouch ISBN: 0-495-01201-7

* This text is not required for CHE 410, but is a suggested purchase for students who plan to pursue a career in the chemical industry.*

A laptop computer with Microsoft Office® may be useful during some lectures and laboratory experiments. Microsoft Word®, Excel®, and Powerpoint® may be will be used for Analysis and/or presentation of data in problem sets and /or for laboratory reports. Let me know in person if you do not own a laptop.

Instruction: The course will consist of a lecture component, discussion of relevant topics, problem solving sessions, and a laboratory component. The general outline of the textbook will be followed, but will be supplemented with current material relevant to the topics of study. Handouts may be given from other text. Students should prepare for class by reading the assigned reading given at the end of the previous class period. Please bring your textbook to class.

Topics Covered:

- 1. Concepts of Instrumental Analysis
- 2. Introduction to Spectroscopy
- 3. Ultra Violet and Visible Spectroscopy
- 4. Infrared Spectroscopy
- 5. Nuclear Magnetic Resonance Spectroscopy
- 6. Mass Spectrometry
- 7. Principles of Chromatography
- 8. Gas Chromatography
- 9. Liquid Chromatography

Covered if Time Permits

- 10. Basic Concepts of Atomic Absorption and Emission Spectroscopy
- 11. X-Ray Spectroscopy
- 12. Electroanalytical Chemistry

Evaluation:

<u>Quizzes:</u> 10 quizzes will be given throughout the semester at the beginning of class on Wednesday that will cover the material from the previous lectures and will count as 10 points each (total 100 points). The question format could be multiple choice, short answer, problem solving, or discussion. Quizzes will not be given on the week of an exam. The questions from quizzes will be similar to problems worked during lecture, problems assigned at the end of each chapter, or topic covered in lab. Missed quizzes will not be made up. <u>Exams</u>: 3 exams will be given during the semester and will count 100 points each. The questions on each exam will be composed of questions derived from problems discussed during lecture, practice problems from the end of each chapter, and textbook examples. The question format could be multiple choice, short answer, problem solving, or discussion. The exams will cover the material from lectures that have been discussed since the last exam. The final exam will be comprehensive and will include all material covered during the semester.

Quizzes: 10 X	10 = 100 points	
Exams: 3 X 1	00 = 300 points	
Lab Problem Sets or Reports: $5 \times 20 = 100$ points		
Final Lab Report:	= 50 points	
Lab Notebook:	= 20 points	
(CHE 5410 Presentation:	= 50 points)	
Final Exam:	= 200 points	
CHE 410 Total Points	= 820 points	
(CHE 5410 Total Points	= 870 points)	

<u>Graduate Student Project</u>: Oral presentations are an integral part of chemical research. Graduate students enrolled in CHE 5410 are required to prepare and present a 20 minute Powerpoint® presentation on an instrumental technique that is commonly used in an area of scientific study that is of interest to the student. The topic of the presentation must meet the approval of the instructor. A discussion of the chosen topic must take place by **Friday February 15, 2013**. Please make an appointment to discuss the topic during my office hours. This presentation will be worth 50 points.

Grading: Grading will be conducting using the total of points earned and will be based on the following scale:

CHE 410	CHE 5410
A: 738 – 820	A: 783 – 870
B: 656 – 737	B: 696 – 782
C: 574 – 655	C: 609 – 695
D: 492 – 573	D: 522 – 608
F: 0 – 491	F: 0 – 521

* To calculate your grade as a percentage divide the sum of your grades by the total points that have been assigned to date and multiply by 100.*

Spring 2011 Exam and Quiz Schedule (Tentative):

First Day of Class: Monday January 14

Exam 1: Monday February 11
Exam 2: Monday March 25
Exam 3: Monday April 29
Review for Final Exam: Wednesday May 1
Final Exam: Saturday May 6, 12-3 pm

Electronic Devices Other than Laptops: Cell phones must be turned off during lecture and labs. See me in the event of an emergency that requires monitoring of a cell phone. Use of the cell phone or other unauthorized devices during exams or quizzes will be construed as cheating. A graphing calculator or a scientific calculator with logarithm and exponential function capabilities may be used.

Course Withdrawal: The last day to drop a class without loss of tuition is January 22, 2013, after which there will be no tuition refund. The last day to drop a class without academic penalty is March 22, 2013. See the Mississippi College Academic Calendar for further information (http://www.mc.edu/resources/publications/schedules.php).

Attendance Policy: Attendance is expected for each class meeting. Absence during a lecture may result in the student missing material that is important for subsequent lectures or labs. The student is responsible for obtaining any lecture notes or assignments from days missed.

Attendance during exams is mandatory. Students who miss an exam will receive a zero for the exam. A make-up exam may be given at the discretion of the professor if circumstances warrant.

Otherwise, the attendance policy set forth in pages 33 - 34 of the <u>2010 – 2011 student handbook</u> (<u>Mississippi College Tomahawk</u>) and Academic Affairs Policy 2.10: Class Attendance in the "Mississippi College Policies and Procedures Manual" will be followed.

Academic Integrity: An honor pledge will be signed and turned in with each exam. Otherwise, the academic honesty policy set forth in pages 35 - 36 the <u>2010 – 2011 student handbook</u> (<u>Mississippi College Tomahawk</u>) and Academic Affairs Policy 2.19: Academic Honesty in the "Mississippi College Policies and Procedures Manual" will be followed.

Special Accommodations: In order for a student to receive disability accommodations under Section 504 of the Americans with Disabilities Act, he or she must schedule an individual meeting with the Director of Student Counseling Services **immediately upon recognition of their disability** (if their disability is known they must come in before the semester begins or make an appointment **immediately** upon receipt of their syllabi for the new semester). The student must bring with them written documentation from a medical physician and/or licensed clinician that verifies their disability. If the student has received prior accommodations, they must bring written documentation of those accommodations (example Individualized Education Plan from the school system). Documentation must be current (**within 3 years**). The student must meet with SCS **face-to face** and also attend two (2) additional follow up meetings (one mid semester before or after midterm examinations and the last one at the end of the semester). Please note that the student may also schedule additional meetings as needed for support through SCS as they work with their professor throughout the semester. Note: Students must come in **each semester** IAP plan and even if student is a continuing student for the spring semester they must come in again to complete their spring semester IAP plan).

Student Counseling Services is located in Alumni Hall Room #4 or they may be contacted via email at <u>christia@mc.edu</u> or <u>rward@mc.edu</u>. You may also reach them by phone at **601-925-7790.**

* The professor reserves the right to modify this syllabus to better meet the needs of this course. This includes the schedule and the grading scale. The grading scale may be lowered but will not be raised.*