CHEM 3472-001 (Fall 2012)
Instrumental Analysis

Term: Fall 2012
Lecture: MW 12:00 – 1:15 pm; SLC 2.304
Laboratory: MW 1:15 – 3:45 pm; BE2.330

Course description:

The goal of this course is to provide you with practical experiences of using modern analytical instrumentation including ultraviolet, visible, fluorescence, atomic and mass spectroscopy, electrochemistry, surface and microanalysis, and chromatography. Emphasis will be placed upon fundamental principles, data acquisition and analysis, and report writing.

Instructor:

Dr. Warren J. Goux
Office: BE3.510
Phone: 972-883-2660
Email:wgoux@utdallas.edu
Office hours: MW 10 am – 11 am
Other information: Use of standard computational programs, such as Excel, will be required. Contact the instructor early in the course if assistance is needed.

Teaching Assistants:

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Prerequisite:

Prerequisite: CHEM 2401 Quantitative Analysis

Required Texts & Materials:

Required: Principle of Instrument Analysis, 6th edition(2007) Skoog, Holler and Crouch
Recommended: Quantitative Chemical Analysis, 6th edition or later, Daniel C. Harris
Lab Book: "Roaring Springs Composition Book", Quad. Rules 5 to 1", Bar Code 71072 77255, available in UTD Bookstore OR any other quad. Ruled notebook(required)

Homework:

Problems are designed to help you understand the fundamental principles of various analytic techniques. Similar problems might appear in the exams. While you are encouraged to work together, you should turn in your homework one week after the work is assigned at or before the class time. 5% per day late penalty will be assessed if work is not turned in at the beginning of class. No work later than 3 days late will be

accepted. **All work must be turned in as a paper copy unless otherwise specified**. **No email submissions will be accepted**.

Exams:

Two 1-hour exams and one final exam will be given throughout the course. The dates of these exams will be confirmed in class and on the WebCT. All three exams must be taken. Your lowest hour exam score will be replaced by your score on the final exam if the final exam score is higher.

Labs:

MW: 1:15 – 3:45 pm; Room: BE2.330
You are expected to record all data in your notebooks.
Your notebooks must be signed at the end of the period by the TA or instructor. You must be present for the FULL lab period in order for the TA to sign your lab book and for you to be able to write up the experiment. There are no make-up labs.
Please visit http://www.utdallas.edu/chemistry/resources/safety.html for detailed safety rules

Reports:

While you collect data with your lab partner, you must complete your own reports including graphs, calculations and answers. You should turn in your reports 10 days after the lab is conducted in a designated box on the second floor of Berkner (see Appendix B for schedule). The TAs will distribute detailed grading policies. **No emailed submissions**. **Grading errors should be brought to the attention of the TA or instructor within one week of you receiving your returned graded report**.

Grading:

Your course grade will be determined as follows:
Three in-class exams (40% total; Hour exams, 10%; Final exam, 20%); Homework (10%); Lab reports (50%)
Please note: Adjustments may be made by the instructor based on class ability.
Lab report grading policy is made by your TA. All discussions regarding grades must take place within one week after your lab is returned to you.

Lectures:

In order for you to conceptionally understand how the instruments work it is important that you attend class and read the assigned material in your text. It is impossible to cover all of the concepts before you begin your experiments. Therefore you may have to read ahead in the text and ask for your instructor's help before beginning an experiments whose concepts have not yet been covered in class.

Integrity:

Plagiarism includes copying material from printed sources including the world wide web. To make it your own you must read and understand the material and report the concepts in your own words. Copying figures from the web is OK as long as it is not covered by copyright and as long as your reference is cited. **Do not give your lab report to anyone, either before or after it is graded.** Should your words appear in another student's report you, along with the student who benefited, will be guilty of collusion. **Those students who either innocently or knowingly participate in collusion or plagiarism will be turned into UTD judicial**.

Appendix A: Course policies

Course Policies

Make-up Exams	**None; points are rolled forward to next exam**
Extra Credit	**None**
Late Work	**Accepted at the sole discretion of the instructor**
Special Assignments	**None; syllabus is complete**
Class Attendance	**Used in determination of whether mercy is justified**
Classroom Citizenship	**Highest level is expected**
Field Trip Policies	**No off campus trips**
Student Conduct and Discipline	The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year. The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391). A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.
Academic Integrity	The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

	Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings. Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective. Should sections of your lab report be found to be copies of your lab partners report or copies of external sources you will be immediately be turned into UTD Judicial.
Email Use	The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.
Withdrawal from Class	The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.
Student Grievance Procedures	Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*. In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting

	the rules and regulations.
Incomplete Grades	As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.
Disability Services	The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m. The contact information for the Office of Disability Services is: The University of Texas at Dallas, SU 22 PO Box 830688 Richardson, Texas 75083-0688 (972) 883-2108 (voice or TTY) Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance. It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.
Religious Holy Days	The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated. The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment. If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed

	assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.
Off-Campus Instruction and Course Activities	Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm. Additional information is available from the office of the school dean.

Appendix B
LECTURE, LABORATORY, AND EXAM SCHEDULE

(The dates, order of presentation and topical coverage are subject to change. The correspondence between the material covered and the chapters in the text is approximate.)

Nominal Date		Lecture Topic	Reference (SH&C)
M	08/27/12	Class Organization, course overview	handout
W	08/29/12	Laboratory Reports, Statistics1	Notes
W	09/05/12	Statistics2	Notes
M	09/10/12	Introduction to spectroscopy	6
W	09/12/12	Components of optical spectrometer	7
M	09/17/12	Introduction to optical atomic spectroscopy	8
W	09/19/12	Atomic Absorption and emission spectroscopy	9
M	09/24/12	Introduction to molecular UV-Vis spectroscopy	13
W	09/26/12	Molecular Absorption and Emission spectroscopy	14-15
M	10/01/12	Infrared Absorption & Raman	16-18
W	10/03/12	Exam Review	
M	10/08/12	First one-hour exam	
W	10/10/12	After-Exam Review	
M	10/15/12	Statistics3, ANOVA	notes

W	10/17/12	Statistics3, linear regression	notes
M	10/22/12	Introduction to chromatography	26
W	10/24/12	GC	27
M	10/29/12	HPLC	28
W	10/31/12	NMR1 , 1D and 1D FT, components of NMR spectrometer	19,notes
M	11/05/12	MRI	19, notes
W	11/07/12	Mass Spectrometry	20
M	11/12/12	Mass Spectrometry	20
W	11/14/12	Review	
M	11/26/12	Second one hour exam	
W	11/28/12	After exam review	
M	12/03/12	Dynamic Light Scattering	34C
W	12/05/12	Surface Characterization	21
M	12/10/12	TEM, SEM	21
W	12/12/12	Review for Final Exam	
M	12/17/12	Final Exam, 11:00 pm – 1:00 pm (comprehensive)	

Lab/Alternate Activity Schedules

Students will work in pairs. 10 lab modules will be available; each module requires one week of lab work (two lab periods).

Laboratory Modules

L1 UV = UV-Vis absorption spectrophotometry
L2 AA = atomic absorption
L3 Fluorescence
L4 PLATES = sampling and use of plate reader (fluorescence based)
L5 Raman = Raman spectrophotometry
L6 GC = gas chromatography
L7 Virtual Mass Spectrometry Laboratory*
L8 HPLC = high pressure liquid chromatography

L9 NMR spectroscopy
L10 Dynamic Light Scattering
*Mass spec simulation has 5 labs to choose from. We will rotate through these labs twice, with new groups doing a new experiment each week.

Lab/Alternate Activity Schedule
(Assignments for Lab schedule will be made approximately one week prior to the start of labs.)

Date		**Activity**	**Report Due**
M	08/27/12		
W	08/29/12		
W	09/05/12		
M	09/10/12	Lab #1	
W	09/12/12	Lab #1	
M	09/17/12	Lab #2	
W	09/19/12	Lab #2	
F	09/21/12		Lab Report #1
M	09/24/12	Lab #3	
W	09/26/12	Lab #3	
F	09/28/12		Lab Report #2
M	10/01/12	Lab #4	
W	10/03/12	Lab #4	
F	10/05/12		Lab Report #3
M	10/08/12	Lab #5	
W	10/10/12	Lab #5	
F	10/12/12		Lab Report #4
M	10/15/12	no lab	

W	10/17/12	no lab	
F	10/19/12		Lab Report #5
M	10/22/12	Lab #6	
W	10/24/12	Lab #6	
M	10/29/12	Lab #7	
W	10/31/12	Lab #7	
F	11/02/12		Lab Report#6
M	11/05/12	Lab #8	
W	11/07/12	Lab #8	
F	11/09/12		Lab Report #7
M	11/12/12	Lab #9	
W	11/14/12	Lab #9	
F	11/16/12		Lab Report #8
M	11/26/12	Lab #10	
W	11/28/12	Lab #10	
F	11/30/12		Lab Report #9
M	12/03/12	no lab	
W	12/05/12	no lab	
F	12/07/12		Lab Report #10
M	12/10/12	no lab	
W	12/12/12	no lab	
F	12/14/12		Lab Report #10