Advanced Instrumental Analysis CHEM-5317
Department of Physical and Environmental Sciences
Fall 2019

A. COURSE INFORMATION
   Course number/section: CHEM-5317.001
   Class meeting time: MWF 12:00-12:50PM
   Class location: CS-103
   Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION
   Instructor: Dr. Hussain Abdulla
   Office location: CS-211
   Office hours: M W F 10:00 am- 12:00 pm and by appointment
   Telephone: 361-825-6050
   e-mail: Hussain.abdulla@tamucc.edu
   Appointments: Appointment should be arranged a head of time via e-mail.

C. COURSE DESCRIPTION
   Catalog Course Description
   The course is taught at a graduate level with focusing on the study of instrumental methods of
   analysis. The course aims to present foundational theoretical concepts of different
   spectroscopy and chromatography techniques. This includes different types of mass
   spectrometer analyzers, nuclear magnetic resonance spectroscopy and inductively coupled
   plasma. The course will also explore the advantages and challenges of coupling
   chromatography with different spectroscopy techniques.

D. PREREQUISITES AND COREQUISITES
   Prerequisites
   CHEM 3418, or permission of instructor.

   Corequisites
   None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
   Required Textbook(s)
   Assigned readings of journal articles and book chapters.
Optional Textbook(s) or Other References


Supplies

Calculator

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1) Identify the main type of ion sources and their advantage and disadvantages
2) Describe different types of mass analyzers
3) Explain tandem mass spectrometry.
4) Explain the basic principle of solid state and liquid state nuclear magnetic resonance spectroscopy and inductively coupled plasma.
5) Describe the foundational theoretical concepts inductively coupled plasma.
6) Identify the challenges and advantages of coupling different spectrometry with chromatography techniques.

G. INSTRUCTIONAL METHODS AND ACTIVITIES
The course is given by face-to-face lectures augmented with PowerPoint slides. Coursework involves the analysis of research articles; writing a scientific review paper, class participation. Attendance will be taken. There will be one mid-term exam, a final exam and in class presentation.

**MAJOR COURSE REQUIREMENTS AND GRADING**

There will also be one mid-term in-class exam, presentation and a final exam. The in-class exam is will cover the material that has been covered in class up to the date of the examination and the final is comprehensive.

**Scientific review paper:**
Each student is responsible for submitting and presenting a 10 page long ACS style review research paper on one type of spectroscopy techniques. An abstract (Title and 1 paragraph summary) of the presentation will be required approximately half-way through the semester. A 25-minute PowerPoint presentation will be required of all students, on their review paper by the end of the semester. If you have a question regarding your presentation consult with your instructor.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Scientific paper</td>
<td>35%</td>
</tr>
<tr>
<td>Presentation</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
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Final letter grading for the course will be as follows: A: 90% +, B: 80%+, C: 70% +, D: 60%+, F < 60%.

**H. COURSE CONTENT/SCHEDULE**

The schedule below is a preliminary outline of the semester. It is your responsibility to keep up with changes to this schedule. The reading and problems assignments should be completed before the due dates. Failure to stay current on reading and problem assignments will greatly affect your ability to keep up during lecture and will affect your grade in this course.
<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week of Aug 25th</td>
<td>Introduction to mass spectrometry</td>
<td></td>
</tr>
<tr>
<td>Week of Sep. 1st</td>
<td>Ion sources of mass spectrometry</td>
<td></td>
</tr>
<tr>
<td>Week of Sep. 8th</td>
<td>Types of mass analyzers</td>
<td></td>
</tr>
<tr>
<td>Week of Sep. 15th</td>
<td>Types of mass analyzers (continue)</td>
<td></td>
</tr>
<tr>
<td>Week of Sep. 22nd</td>
<td>Types of mass analyzers (continue)</td>
<td></td>
</tr>
<tr>
<td>Week of Sep. 29th</td>
<td>Tandem mass spectrometry</td>
<td></td>
</tr>
<tr>
<td>Week of Oct. 6th</td>
<td>Tandem mass spectrometry (continue)</td>
<td></td>
</tr>
<tr>
<td>Week of Oct. 13th</td>
<td>Introduction to nuclear magnetic resonance</td>
<td>Midterm Exam</td>
</tr>
<tr>
<td>Week of Oct. 20th</td>
<td>1D and 2D nuclear magnetic resonance</td>
<td></td>
</tr>
<tr>
<td>Week of Oct. 27th</td>
<td>1D and 2D nuclear magnetic resonance (continue)</td>
<td></td>
</tr>
<tr>
<td>Week of Nov. 3rd</td>
<td>Coupling chromatography with spectroscopy techniques</td>
<td></td>
</tr>
<tr>
<td>Week of Nov.10th</td>
<td>Coupling chromatography with spectroscopy techniques (continue)</td>
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</tr>
<tr>
<td>Week of Nov.17th</td>
<td>Student Presentations</td>
<td>Review Paper due</td>
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<tr>
<td>Week of Nov.24th</td>
<td>Student Presentations</td>
<td>Thanksgiving Holiday</td>
</tr>
<tr>
<td>Week Dec. 1st</td>
<td></td>
<td>Final Exam</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

1. **COURSE POLICIES**

   **Attendance/Tardiness**
   I expect students to attend every class meeting. Failure to attend class may affect your performance on scheduled examinations. Lecture notes will only be provided during
lecture and will not be repeated in the event that a student fails to attend at the scheduled meeting time. Changes to the course content and schedule will be announced during lectures.

**Late Work and Make-up Exams**
There will be a 10% reduction, per day, in credit for overdue assignments. Students with a university approved scheduled absence (athletics, military duty, etc.) MUST contact the instructor in advance of the scheduled absence. Exams may be taken early in those specific cases. Students who do not arrange to take exams ahead of time will not be eligible for this special consideration. A written excuse from the university department involved or the Office of the Dean of Students is required. Exam taken outside class will not be multiple choice and it will not include any bonus points. Bring your university picture ID to all lecture exams.

**Extra Credit**
The addition of extra credit to examinations or for individuals will remain at the sole discretion of the professor.

**Cell Phone Use**
Before you enter the lecture hall turn OFF your cell phone! Beepers must also be turned off or put on silent mode. Electronic interruptions will NOT be tolerated!

**Laptop Use**
Laptops and tablets are allowed in the classroom for course related activities only.

**Food in Class**
No food is allowed in the classroom, unless related to academic activities, medically necessary, or nutritionally sound with teacher permission. But beverages in spill proof containers are permitted.

**Missed Exam**
If an exam date is missed and the student cannot fulfill the above requisites for excuse, an exam grade of 0 will be recorded. Providing a student with an opportunity to make up an unexcused missed examination will remain at the sole discretion of the Professor. NO STUDENT WILL BE ADMITTED TO THE EXAMINATION AFTER THE FIRST EXAM-TAKER HAS LEFT!

**Participation**
Participation in class discussions is required and will count for a significant portion of final grade.

**Others**
Any use of an electronic device (PDA, Cell Phone, MP3 player, Computer etc…) during an exam is strictly prohibited. Any use of such a device will be considered an attempt to cheat on the exam and will result in a grade of zero on the exam. In addition, more severe
actions may also be considered.

J. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**K. OTHER INFORMATION**

- **Academic Advising**
The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.