Course Syllabus

CHEMISTRY 5200 - Physical Chemistry

Dr. Paul Marshall

Fall 2020

Text:

- Physical Chemistry by Peter Atkins and Julio de Paula, 10th Edition. Chapter Outline, past exams and Homework available online at http://www.chem.unt.edu/~marshall/c5200cha.htm. (Links to an external site.)
- Student's Solutions Manual to accompany Physical Chemistry, 10th Edition (optional)

Lectures:

Tuesdays and Thursdays at 9:30 am - 10:50 am, in room 352 of the Chemistry Building.

My Office Hours:

Mondays 11 am - 2 pm, via Zoom. We can schedule times outside that period if needed.

My e-mail is marshall@unt.edu. Expect a response within 1 business day. My phone is (940) 565-2294.

Additional Information

The information on this page is available online via Canvas. Any syllabus updates will appear there. It is also available through my web site at http://www.chem.unt.edu/~marshall/c5200.htm. (Links to an external site.)

Covid-19

Various accommodations have been made for all our health and safety during the pandemic. The most important goal is safety, and this is more important than class grades.

Welcome to UNT!

As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of the students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. UNT's full Non-Discrimination Policy can be found in the UNT Policies section of the syllabus.

Course Objectives
This course provides students with a fundamental understanding of the principles underlying the behavior of chemical systems. The core of this course is the detailed discussion of thermodynamics (both fundamentals and chemical applications), how thermodynamic behavior arises from microscopic behavior (kinetic theory and statistical mechanics), physical and chemical equilibria, and chemical kinetics.

**Learning Outcomes**

Upon successful completion of this course, students will be able to

- Apply knowledge of the three laws of thermodynamics to solve problems involving basic thermodynamic processes of ideal and real gases.
- Evaluate various chemical equilibrium systems - phase transitions, chemical reactions, solutions - based on the application of thermodynamical principles.
- Analyze kinetic data to determine rates and mechanisms of chemical reactions. Evaluate proposed reaction mechanisms based on experimental data.
- Demonstrate knowledge of mathematical techniques by solving problems related to thermodynamics and kinetics.

**Technology requirements**

You will need to use Canvas to download course handouts and exams, and to submit your exam answers. If you have difficulties please contact me and we will try to work around any problems.

Basic scientific calculators for ~$12 that can evaluate ln(x), exp(x), sin(x) and cos(x) are recommended.

For my office hours, the last week of class and possibly earlier if the general situation requires it, and in case you need to quarantine, or I do, remote learning via Zoom will be used, so you need to have a working computer with web camera, microphone and sound. A smart phone or tablet will be sufficient if it has those functions. Applications for scanning your exam solutions into pdf format are freely available for phone and tablet and one will be needed for your exams and quizzes.

Part of working in the online environment involves dealing with the inconveniences and frustration that can arise when technology breaks down or does not perform as expected. You can contact the Student Help Desk for help with Canvas or other technology issues.

**UIT Help Desk:** [UIT Student Help Desk site (Links to an external site.)](http://www.unt.edu/helpdesk/index.htm)

**Email:** helpdesk@unt.edu

**Phone:** 940-565-2324

**In Person:** Sage Hall, Room 130

**Walk-In Availability:** 8am-9pm
Telephone Availability:

- Sunday: noon-midnight
- Monday-Thursday: 8am-midnight
- Friday: 8am-8pm
- Saturday: 9am-5pm

Laptop Checkout: 8am-7pm

For additional support, visit Canvas Technical Help (Links to an external site.) (https://community.canvaslms.com/docs/DOC-10554-4212710328)

Legal Notices:

My lectures are protected by state common law and federal copyright law. They are my own original expression. Whereas you are authorized to take notes in class thereby creating a derivative work from my lecture, the authorization extends only to making one set of notes for your own personal use and no other use. You are not authorized to record my lectures, to provide your notes to anyone else or to make any commercial use of them without express prior permission from me in writing.

Class recordings

This course employs lecture capture technology to record class sessions. Students may occasionally appear on video. The lecture recordings will be available to you for study purposes and may also be reused in future course offerings. If it is a problem that your image might appear, contact me to arrange accommodation.

Synchronous (live) sessions in this course will be recorded for students enrolled in this class section to refer to throughout the semester. Class recordings are the intellectual property of the university or instructor and are reserved for use only by students in this class and only for educational purposes. Students may not post or otherwise share the recordings outside the class, or outside the Canvas Learning Management System, in any form. Failing to follow this restriction is a violation of the UNT Code of Student Conduct and could lead to disciplinary action.

Pre-requisites:

CHEM 3520 (undergraduate Physical Chemistry) or department permission. Two semesters of calculus are expected.

Exams:

There will be two 40-minute quizzes (50 points each), an 80-minute midterm exam (100 points) and a 2-hour comprehensive final exam (150 points), all to be carried out as take-home exams. They will be posted on Canvas with a 24 h deadline and you will write out solutions by hand (typing is also acceptable but not required), scan them with
a phone or tablet, and upload your answers in pdf format to Canvas. If you have technical difficulties let me know as soon as possible, and also take advantage of UNT’s technical support described above. For these open-book exams you are welcome to consult your notes, other text books and on-line resources, but you may not confer by any means with anyone else, including classmates.

*Exams will be posted as noted in the following table. Your answers are due back to me 24 hours later.*

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz, Thursday September 24</td>
<td>50 points</td>
</tr>
<tr>
<td>Midterm, Thursday October 15</td>
<td>100 points</td>
</tr>
<tr>
<td>Quiz, Thursday November 5</td>
<td>50 points</td>
</tr>
<tr>
<td>Final Exam, Thursday December 10</td>
<td>150 points</td>
</tr>
<tr>
<td>(8 am)</td>
<td></td>
</tr>
</tbody>
</table>

Your grade will be based strictly on your examination performance. There will be no make-up exams. I will however drop your lowest 50 points, meaning I drop a quiz if that is lowest, scale the midterm to a max of 50 if that is the lowest, or scale the final to a max of 100 if that is the lowest, when I calculate your semester average, based on your best 300 points.

The University is committed to providing a reliable online course system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will extend the time windows and provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324 and obtain a ticket number. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

**Attendance and Grading Policy:**

Class attendance (in-person or remotely via Zoom) is not formally required but highly recommended - if you miss many classes you may not do well in the exams. If you have to stay at home, this is not a problem: let me know (this is very important) and remote attendance via Zoom is available. If you miss the deadline for an exam you score zero for that exam, again unless we have arranged an official accommodation. So
you can see that it is important for us to keep communicating. Any queries about grading need to be made within a week of when exams are returned to the class.

Because of Covid-19, for every class I am required to take attendance, and you must follow the assigned seating chart which maintains social distance. As well as wearing a mask, you must follow the cleaning procedure around your seat and work surface at the start of every class. Also, missing two classes in a row will trigger follow-up by UNT so, again, let me know if you need to miss classes. There is no academic penalty.

If your semester average is at least 90% your final grade will be A.
If your semester average is 80-89% your final grade will be B.
If your semester average is 70-79% your final grade will be C.
If your semester average is 60-69% your final grade will be D.
If your semester average is below 60% your final grade will be F.

I reserve the right to give a higher grade than allowed by the above scheme.

Homework problems will not be collected nor graded. However, working the problems is strongly encouraged. This is how you will gain skill at quantitative problems. It is important that you keep up with the homework. Leaving it until the day or two before an exam is not a strategy for success. Expect to spend at least several hours on homework each week.

UNIVERSITY STATEMENT ABOUT COVID-19 IMPACT ON ATTENDANCE

While attendance is expected as outlined above, it is important for all of us to be mindful of the health and safety of everyone in our community, especially given concerns about COVID-19. Please contact me if you are unable to attend class because you are ill, or unable to attend class due to a related issue regarding COVID-19. It is important that you communicate with me prior to being absent so I may make a decision about accommodating your request to be excused from class.

If you are experiencing any symptoms of COVID-19 (Links to an external site.) (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Hotline at 844-366-5892 or COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure. **While attendance is an important part of succeeding in this class, your own health, and those of others in the community, is more important.**

Class Materials for Remote Instruction

The UNT fall schedule requires this course to have fully remote instruction beginning November 28th. Additional remote instruction may be necessary if community health conditions change or you need to self-isolate or quarantine due to COVID-19. Students will need access to a webcam and microphone to participate in fully remote portions of
the class. Additional required classroom materials for remote learning have been discussed above. Information on how to be successful in a remote learning environment can be found at https://online.unt.edu/learn.

UNIVERSITY STATEMENT ON FACE COVERING

Face coverings are required in all UNT facilities. Students are expected to wear face coverings during this class. If you are unable to wear a face covering due to a disability, please contact the Office of Disability Access to request an accommodation. UNT face covering requirements are subject to change due to community health guidelines. Any changes will be communicated via the instructor.

UNT keeps a supply of disposable masks for students or guests who may forget their regular face covering. These masks are intended to be a backup option to ensure all members of the UNT community follow the face covering requirement.

UNT students in need of a mask can stop by the following locations on the Main Campus:

Art Building 101 - College of Visual Arts and Design
Business Leadership Building 290 - G. Brint Ryan College of Business
Chilton Hall 289 - College of Health and Public Service
Chilton Hall 331 - College of Merchandising, Hospitality and Tourism
ESSC 354 - Toulouse Graduate School
General Academic Building 220 - College of Liberal Arts and Social Sciences
Hickory Hall 283/254 - College of Science Advising
Hurley 207 - VP Student Affairs office
Marquis Hall 105 - International Affairs
Music Building 247 - Ricco Dean's Suite College of Music
Matthews Hall 105 - College of Education Student Advising
PEB - Room 209 - College of Education
Sage 320 - TAMS & Honors College
Sycamore 206 - Mayborn School of Journalism
Union 205 - Union Information Desk
Welch Complex - CHE Main Office - College of Education
Willis 223 - Libraries
OTHER COMMENTS:

You can learn a little more about me and my research at my website [www.chem.unt.edu/~marshall](http://www.chem.unt.edu/~marshall) (Links to an external site.), and we can arrange lab tours as well.

There are many equations in this course, but the emphasis is strongly NOT on memorizing a bunch of formulae. I hope students will grasp the scientific principles which, together with a few key equations, will let you solve all kinds of problems. In particular, new problems which you haven't seen before, just like in real life. If you can do this, you truly understand the material, and that is my goal for everyone.

A second goal is for you to see how the general principles we develop help us to understand all kinds of phenomena, some well outside chemistry.

Working the homework is really crucial. It is how you put into practice the principles from the classes, plus it is training for the exams. You can check yourself, or perhaps solve a difficulty, by referring to the Solutions Manual. If there is anything that doesn't make sense after that, please raise it at office hours with me.

The classes more or less track along with the arrangement in the textbook. However, please note that in some chapters I have reordered the material into what I think is a clearer way, and often I have skipped some of the less critical discussion. The syllabus is different from previous years so don't worry if what you are learning now doesn't match with some of the old exams I put on the web. I promise the semester exams will not include anything you do not see in the classroom; anything we cover in class I consider to be fair game!

There are many resources available to help you, including: me, study groups you set up, the Chemistry Resource Center, other books and the internet.

**Succeed at UNT** UNT endeavors to offer you a high-quality education and to provide a supportive environment to help you learn and grow. And, as a faculty member, I am committed to helping you be successful as a student. Here’s how to succeed at UNT: Show up. Find Support. Get advised. Be prepared. Get involved. Stay focused. To learn more about campus resources and information on how you can achieve success, go to [success.unt.edu](http://success.unt.edu)

**Dates:**

The first class will be on Tuesday, August 25, 2020 and the last formal class will be on Tuesday, December 3, 2019. There will be recitations on Tuesday, October 22 and Thursday, December 5.

There is no class on Thanksgiving, Thursday, November 26, 2020. After this date, the rest of the semester (December 1 and 3, 2020) will be delivered only by remote via Zoom. The final exam on December 10, 2020 will be take-home.

Monday, November 2, 2020 is the last day to drop this course.
ACADEMIC INTEGRITY POLICY

Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. Dishonesty on an assignment may lead to a score of zero for that assignment.

ADA POLICY

UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the ODA website (Links to an external site.) (https://disability.unt.edu/ (Links to an external site.)).

PROHIBITION OF DISCRIMINATION, HARASSMENT, AND RETALIATION (POLICY 16.004)

The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

ACCESS TO INFORMATION - EAGLE CONNECT

Students’ access point for business and academic services at UNT is located at: my.unt.edu (Links to an external site.). All official communication from the University
will be delivered to a student's Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail [Eagle Connect (Links to an external site.)](https://it.unt.edu/eagleconnect (Links to an external site.)).

**EMERGENCY NOTIFICATION AND PROCEDURES**

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials. Some helpful emergency preparedness actions include: 1) know the evacuation routes and severe weather shelter areas in the buildings where your classes are held, 2) determine how you will contact family and friends if phones are temporarily unavailable, and 3) identify where you will go if you need to evacuate the Denton area suddenly.

**RETENTION OF STUDENT RECORDS**

Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Canvas online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student's records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy. See UNT Policy 10.10, Records Management and Retention for additional information.

**STUDENT EVALUATION OF INSTRUCTION**

Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course. Evaluation dates are November 16 to December 3, 2020.

**SEXUAL ASSAULT PREVENTION**
UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565-2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.

IMPORTANT NOTICE FOR F-1 STUDENTS TAKING DISTANCE EDUCATION COURSES

Federal Regulation

To read detailed Immigration and Customs Enforcement regulations for F-1 students taking online courses, please go to the Electronic Code of Federal Regulations website (Links to an external site.) (http://www.ecfr.gov/). The specific portion concerning distance education courses is located at Title 8 CFR 214.2 Paragraph (f)(6)(i)(G).

The paragraph reads:

(G) For F-1 students enrolled in classes for credit or classroom hours, no more than the equivalent of one class or three credits per session, term, semester, trimester, or quarter may be counted toward the full course of study requirement if the class is taken on-line or through distance education and does not require the student's physical attendance for classes, examination or other purposes integral to completion of the class. An on-line or distance education course is a course that is offered principally through the use of television, audio, or computer transmission including open broadcast, closed circuit, cable, microwave, or satellite, audio conferencing, or computer conferencing. If the F-1 student's course of study is in a language study program, no on-line or distance education classes may be considered to count toward a student's full course of study requirement.

University of North Texas Compliance

To comply with immigration regulations, an F-1 visa holder within the United States may need to engage in an on-campus experiential component for this course. This component (which must be approved in advance by the instructor) can include activities such as taking an on-campus exam, participating in an on-campus lecture or lab activity, or other on-campus experience integral to the completion of this course.
If such an on-campus activity is required, it is the student's responsibility to do the following:

(1) Submit a written request to the instructor for an on-campus experiential component within one week of the start of the course.

(2) Ensure that the activity on campus takes place and the instructor documents it in writing with a notice sent to the International Student and Scholar Services Office. ISSS has a form available that you may use for this purpose.

Because the decision may have serious immigration consequences, if an F-1 student is unsure about his or her need to participate in an on-campus experiential component for this course, s/he should contact the UNT International Student and Scholar Services Office (telephone 940-565-2195 or email internationaladvising@unt.edu) to get clarification before the one-week deadline.

STUDENT VERIFICATION

UNT takes measures to protect the integrity of educational credentials awarded to students enrolled in distance education courses by verifying student identity, protecting student privacy, and notifying students of any special meeting times/locations or additional charges associated with student identity verification in distance education courses.

See UNT Policy 07-002 Student Identity Verification, Privacy, and Notification and Distance Education Courses (Links to an external site.) (https://policy.unt.edu/policy/07-002).

ACADEMIC SUPPORT & STUDENT SERVICES

Student Support Services

Mental Health

UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

Student Health and Wellness Center (Links to an external site.) (https://studentaffairs.unt.edu/student-health-and-wellness-center)
Counseling and Testing Services (Links to an external site.) (https://studentaffairs.unt.edu/counseling-and-testing-services)
UNT Care Team (Links to an external site.) (https://studentaffairs.unt.edu/care)
UNT Psychiatric Services (Links to an external site.) (https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry)
Individual Counseling (Links to an external site.) (https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling)

Additional Student Support Services

Registrar (https://registrar.unt.edu/registration)

Financial Aid (Links to an external site.) (https://financialaid.unt.edu/)
Student Legal Services (Links to an external site.) (https://studentaffairs.unt.edu/student-legal-services)
Career Center (Links to an external site.) (https://studentaffairs.unt.edu/career-center)
Multicultural Center (Links to an external site.) (https://edo.unt.edu/multicultural-center)
Counseling and Testing Services (Links to an external site.) (https://studentaffairs.unt.edu/counseling-and-testing-services)
Pride Alliance (Links to an external site.) (https://edo.unt.edu/pridealliance)
UNT Food Pantry (Links to an external site.) (https://deanofstudents.unt.edu/resources/food-pantry)

Academic Support Services

Academic Resource Center (Links to an external site.) (https://clear.unt.edu/canvas/student-resources)
Academic Success Center (Links to an external site.) (https://success.unt.edu/asc)
UNT Libraries (Links to an external site.) (https://library.unt.edu/)
Writing Lab (Links to an external site.) (http://writingcenter.unt.edu/ (Links to an external site.))

Listed below are the chapter outlines and homework assignments for this course. Some past exams (Links to an external site.) are available online.

Chapter 1 - The Properties of Gases

Sections A-C

Homework Assignments

Exercises A1-13; B1-7; C1-9 (do part "a" of each assigned exercise in every chapter)
Problems A9; B3; C9, 19 (use the Living Graphs at the text's web site)

Chapter 2 - The First Law

Sections A-E

Homework Assignments
Chapter 3 - The Second Law
Sections A-D
Homework Assignments
Exercises A1-3, 5-12; B2; C1-5; D1-4
Problems A5, 7, 9, 11; B1; C1; D1, 5

Chapter 4 - Physical Transformations of Pure Substances
Section B
Homework Assignments
Exercises B6-8
Problems B3

Chapter 5 - Simple Mixtures
Sections A, E
Homework Assignments
Exercises A4, 6; E-
Problems A-; E-

Chapter 6 - Chemical Equilibrium
Sections A-C
Homework Assignments
Exercises A1-6, 8(i), 9, 10; B1, 2, 4, 5, 7; C-
Problems A3; B1; C-

Chapter 20 - The Rates of Chemical Reactions
Sections A-H
Homework Assignments
Exercises A1-5; B1, 2, 4; C-; D1,2; E1,2; F1; G1,2; H1-3
Problems -

Chapter 21 - Reaction Dynamics
Sections A, C

Homework Assignments
Exercises A1-5; C3, 5
Problems -

Past Exams and Solutions from CHEM 5200
1999 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/exam4-1999.pdf (Links to an external site.)
2000 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/exam4-2000.pdf (Links to an external site.)
an external site.)
2003 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/exam4-2003.pdf (Links to an external site.)
2004 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/exam4-2004.pdf (Links to an external site.)
2019 Quiz 1 - http://www.chem.unt.edu/~marshall/teaching/5200_quiz_1_fall_2019.pdf (Links to an external site.)
2019 Quiz 2 - http://www.chem.unt.edu/~marshall/teaching/5200_quiz_2_fall_2019.pdf (Links to an external site.)
Past Exams and Solutions from CHEM 3510, a related course for undergraduates

I did not teach this course 1998 - 2011

2012 Exam 1 - http://www.chem.unt.edu/~marshall/teaching/3510exam1-2012.pdf (Links to an external site.)
2012 Exam 3 - http://www.chem.unt.edu/~marshall/teaching/3510exam3-2012.pdf (Links to an external site.)
2012 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/3510exam4-2012.pdf (Links to an external site.)
2013 Exam 1 - http://www.chem.unt.edu/~marshall/teaching/3510exam1-2013.pdf (Links to an external site.)
2013 Exam 2 - http://www.chem.unt.edu/~marshall/teaching/3510exam2-2013.pdf (Links to an external site.)
2013 Exam 3 - http://www.chem.unt.edu/~marshall/teaching/3510exam3-2013.pdf (Links to an external site.)
2013 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/3510exam4-2013.pdf (Links to an external site.)

I did not teach this course in 2014

2015 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/3510exam4-2015.pdf (Links to an external site.)

I did not teach this course in 2016

2017 Exam 4 - http://www.chem.unt.edu/~marshall/teaching/3510exam4-2017.pdf (Links to an external site.)
2018 Exam 3 - http://www.chem.unt.edu/~marshall/teaching/3510exam3-2018.pdf (Links to an external site.)