Chemistry 411/711: Chemical Thermodynamics — Course Syllabus

Fall 2025, Mon & Wed 5:00 – 6:15, E-427

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Office Hours TBD

Textbook *Chemical Thermodynamics*, Peter A. Rock, ISBN: 978-1891389320

Prerequisites Chemistry 410B or equivalent

Catalog Description Chemical Thermodynamics and an Introduction to Statictical Thermodynamics

Course Structure The lectures will roughly follow the text, with additional examples drawn from the chemical literature and perhaps from research in SDSU's Chem&Biochem Department. Some lectures will be devoted to tutorials in the use of computer software; these lectures will be held in the departmental computer lab, GMCS-245 (Note: you do *not* need to purchase any software since it will be available on the departmental computers).

Grading

Quiz	6% (covers Chap 3; Wednesday Sept 3)
Exam I	22% (covers Chaps 3-6; *tentatively* Sept 24)
Exam II	22% (covers Chaps 7-9; *tentatively* Oct 20)
Exam III	22% (covers 10-12; *tentatively* Nov 17)
Final Exam	28% (covers Chaps 13-14 and cumulative; Friday Dec 12, 3:30 – 5:30)

- No makeup quiz or exams will be given.
- The grading scale is:

A–,A	80-100%
B–,B,B+	65-80%
C–,C, C+	50%-65%
F,D–,D,D+	<50%

- The exams will consist of an in-class part and sometimes a take-home part for which Excel or Gaussian can be used to solve the problem(s)
- Dedicated calculators may be used during the in-class exams; cell phones and other electronic gadgets (e.g., ipads) must be turned off before the start of exams.

Topics We will cover topics from all or parts of the following chapters in the text:

Chap 1 The Purpose and Scope of Thermodynamics
Chap 2 Temperature
Chap 3 Energy and the First Law of Thermodynamics
Chap 4 Entropy and the Second Law of Thermodynamics
Chap 5 Thermodynamic Functions
Chap 6 The Third Law of Thermodynamics and Absolute Entropies
Chap 7 Thermodynamics of Chemical Reactions
Chap 8 The Chemical Potential and the Phase Rule
Chap 9 Phase Equilibria: The Activity Function
Chap 10 Equilibrium Constants
Chap 11 Activities of Solute Phase Species
Chap 12 Thermodynamics of Ions in Solution
Chap 13 Phase Equlibria Involving Solutions
Chap 14 Statistical Thermodynamics

Student Learning Outcomes

Upon completing Chem 411/711, students will be able to:

1. Understand and articulate the basic principles of Chemical Thermodynamics
2. Calculate thermodynamic properties of chemical samples and chemical reactions
3. Perform thermodynamic calculations and simulations using Excel and Gaussian
4. Understand and articulate the basic principles of Statistical Thermodynamics
5. Describe the fundamental thermodynamic properties of molecular system in terms of the energy levels of the molecules
6. Evaluate the literature regarding thermodynamic measurements of complex reaction systems

Canvas

Canvas will be used to post announcements and course documents (e.g., lecture notes, problems, solution keys to exams, problems, and the quiz).

Problem Sets

There will be a set of suggested problems from the text for each chapter; additional problems may be added and will be available on Canvas. The problems will ***not*** be graded; you do not need to hand them in. You can download them from the Canvas website for the class. **As in any technical class, doing the problem sets is of the utmost importance to learning the material and doing well on exams**.

Add/Drop Procedure

The add/drop deadline is Sept. 8, 2025 at 11:59 PM. For details, see https://registrar.sdsu.edu/students/registration#start

Students with Disabilities

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Academic Honesty

Cheating amounts to lying because you are saying that you did the work as instructed whereas, in fact, you did not. Cheating will not be tolerated and will result in grade reduction. It will also be documented according to university rules (see https://sacd.sdsu.edu/student-rights/academic-dishonesty).

Chemistry 411/711 **Tentative Schedule** Fall 2025

Week	Date		Chapter	Suggested Problems in Rock
1	Aug 25		3	Ch 3: 1-7,13,15,17,21,26,32
	Aug 27		3	
2	Sept 1		No class: Labor Day	
	Sept 3	(Quiz I: ch 3)	4	Ch 4: 1,2,3,6,24,26,27
3	Sept 8		4	
	Sept 10		5	Ch 5: 1,2,3,4, 8b,c,f,h,11,18,
4	Sept 15		5	22,28,35,41,43,45
	Sept 17		6	Ch 6: 1,2,4-6,10,19,35
5	Sept 22		7	Ch 7: 1,2,4-8,11,12,22,23
	Sept 24		Exam I: Ch 3 – 6	
6	Sept 29		7	
	Oct 1		7	
7	Oct 6		8	Ch 8: 1,3,15,22,23,29,33,46
	Oct 8		8	
8	Oct 13		9	Ch 9: 1,2,5,6,11,14,22,23,
	Oct 15		9	36,42,45a
9	Oct 20		Exam II: Ch 7 –9	
	Oct 22		10	Ch 10: 1,2,4,6-8,11-13,
10	Oct 27		10	14,16,18,22,23,28
	Oct 29		Gaussian workshop, GMCS-245	
11	Nov 3		11	Ch 11: 1,2,7,14,17,18,29
	Nov 5		11	
			Note: We will skip various sections of Ch 12 or Ch 13	
12	Nov 10		12	Ch 12: 4,6,11,12, 13,18,22,23
	Nov 12		12	
13	Nov 17		Exam III: Ch 10 – 12	
	Nov 19		13	Ch 13: 1,4,5,7,8,11,15,23,
14	Nov 24		13	31,40,48
	Nov 26		No class – Thanksgiving	
15	Dec 1		14	Ch 14: 3,4,14,18,20,23,37
	Dec 3		14	
16	Dec 8		14	
	Dec 10		Review	
	Fri Dec 12		Final exam, 3:30 – 5:30	
			Cumulative but emphasizes Chapterss 13 and 14	