

Phar 6161
Principles of Drug Delivery I
3 Credits, Fall 2007

Course Director:	Cheryl L. Zimmerman, Ph.D. Office: WDH 9-149B, (612) 624-4611, (612) 624-5151 e-mail: zimme005@umn.edu Office hours: by appointment
UMTC Course Faculty:	Ronald A. Siegel, D.Sc. Office: WDH 9-127E, (612) 624-6164 e-mail: siege017@umn.edu Office hours: by appointment Raj Suryanarayanan (Sury), Ph.D. Office: WDH 9-157, (612) 624-9626 e-mail: surya001@umn.edu Office hours: by appointment
UMD Course Faculty	Gregory Rutkowski, Ph.D. Office: (218) 726-7828, FAX (218) 726-6907 e-mail: grutkows@umn.edu Office hours: Thursdays 12:30-1:30 in 162 Life Science Cube A
UMTC Teaching Assistants	Amrinder Rai, M.Pharm. Office: WDH 9-104, 612-624-8947 email: raixx008@umn.edu Office hours: Thursdays, 11:15-12:05 (in 9-104 WDH) Jing Wang, M.S. Office: WDH 9-125, 612-624-7968 email: wangx976@umn.edu Office hours: Thursdays, 11:15-12:05 (in 9-104 WDH)
UMD Teaching Assistant	Matthew Pruitt, Pharm.D.II e-mail: pruit020@d.umn.edu Office hours: to be announced
Lectures/Workshops/ Quizzes	MWF, 9:05-9:55 a.m.; Twin Cities, 1-450 MoosT; Duluth, LSci 165
Tutorial (optional)	Wednesdays, 4:35-5:25 p.m., Twin Cities 1-450 MoosT*, LSci 163 * on November 28, Twin Cities will meet in 2-690
Midterm Exams	Twin Cities, 2-690 and 1-450G MoosT; Duluth LSci 160 and 165 October 15, 4:40-6:30 pm, December 3, 3:30- 5:30 pm

Learning Objectives: After successfully completing this course, the student will be able to:

1. **Explain** the physicochemical principles underlying the preparation, properties, function and performance of the various common types of solid and solution dosage forms.
2. **Choose** the most appropriate type of dosage form for optimal drug delivery and pharmaceutical care.
3. **Perform** the various types of calculations related to the preparation of the common types of solid and solution dosage forms.

Textbooks (required)
please note, these textbooks will also be required for Phar 6162, in Spring semester

Course notes, written by each instructor.

Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th edition, Sinko, PJ, editor, Lippincott Williams & Wilkins, Philadelphia PA (2006) (ISBN 0-7817-5027-X)

Allen LV, Popovich NG, Ansel HC, *Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems*, 8th edition, Lippincott, Williams & Wilkins, Philadelphia, PA (2004) (ISBN 0-7817-4612-4). **(this book is on reserve in Pharmaceutical Care Learning Centers at both UMTC and UMD)**

Course Structure: The course will be made up of lectures, in-class workshops and quizzes. In most weeks, lecture will be on Monday, an in-class workshop on Wednesday, and a short review and quiz on Fridays.

There will also be Breeze presentations posted on the WebCT site for this course.

There will be a weekly optional tutorial session on Wednesday afternoons. Although attendance at the tutorials is optional, you are strongly encouraged to attend.

Prerequisites: Calculus (both differential and integral calculus) is a prerequisite for this course. Knowledge of the metric system for weight, volume, and length is also prerequisite. College of Pharmacy Student or permission of the Course Director.

Concurrent registration in Phar 6171.

Course Requirements: Attend all class meetings, view all Breeze presentations; complete reading and homework assignments; successfully complete quizzes, mid-terms and final examinations.

The University of Minnesota policy is that a 3-credit course requires two hours of work outside of class for each hour spent in class. Therefore, students should expect to spend, typically, 6 hours per week on homework for this course.

Exams and Quizzes: The maximum number of points awarded in the course will be 400. Two midterm exams will each be worth 100 points (for a total of 200 points). There will be 11 quizzes worth 10 points each scheduled throughout the semester. You will be allowed to drop the lowest quiz grade, so you have a maximum of 100 possible points from quizzes.

A *comprehensive* two-hour final exam will be given during the Final Exams Week. This is a required exam worth 100 points.

Homework problems, both from the book and posted on WebCT as well as assigned readings, are expected to be completed.

Grading Policy: A total of 400 points can be obtained on exams and quizzes, as indicated above. A percentage will be calculated and grades will be assigned as follows:

(A) 93-100; (A-) 90-92; (B+) 87-89; (B) 83-86; (B-) 80-82; (C+) 77-79; (C) 73-76; (C-) 70-72; (D) 60-69; (F) <60.

Honor Code: Each student is bound by the following specific provisions of the Honor Code: Academic misconduct is any unauthorized act which may give a student an unfair advantage over other students, including but not limited to: falsification, plagiarism, misuse of test materials, receiving unauthorized assistance and giving unauthorized assistance. Unless otherwise explicitly stated, you are required to do your own work on all exams, quizzes, tests and other assignments.

Classroom Etiquette: Specifically:

1. We expect you to be respectful to the professors, teaching assistants, and your fellow students.
2. We expect that you will not be disruptive during class time, which is annoying and impolite to your fellow students and to the instructors. Disruptive behavior includes the following:
 - Arriving late for class
 - Reading your newspaper, doing crossword puzzles (or Sudoku!), studying for exams, sending and receiving IM's, etc.
 - Habitually leaving class early.
 - Conducting side conversations while the instructor is lecturing.
 - Having your cell phone ring (it is also rude when the cell phone belongs to the instructor!).
 - Snoring
3. Student announcements can be made before class officially starts, after it officially ends, or during class breaks.

Make-up Policy: There will be no make-up exams given for the mid-term and final exams except under the following circumstances:

- illness, verified by a note from a doctor
- a family emergency, verified by a note from the professional person in attendance
- a University-sponsored event, verified by a note from the leader of the sponsoring organization.

The course director must be notified IN ADVANCE of the originally scheduled time of the examination.

There will be no make-up quizzes given under any circumstances, because you are allowed to drop a quiz.

Disability Policy: Any student with a documented disability (e.g. physical learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the Course Director (612-624-4611) and Disability Services (612-626-1333 at UMTC or 218-726-8217 at UMD) at the beginning of the semester. All discussions will remain confidential.

Course Evaluation: Available on-line in the last week of the semester.

Phar 6161, Drug Delivery 1								
Fall 2007, 3 credits								
M - W - F 9:05 - 9:55 a.m.								
Room assignments; Twin Cities, 1-450 MoosT: Duluth, LSci 165								
Mid-Term exams TC: Moos T 2-690, Moos T 1-450G, Duluth: LSci 160 and 165								
Day	Date	Topic	Assigned Readings from texts		WebCT		Instructor	
			Martin's*	Ansel**	Breeze presentations	Practice Problems		
Wed	5-Sep	Course Introduction		pp. 7-11, 92-96			Zimmerman	
Fri	7-Sep	Introduction to dosage forms		pp. 125-141, 155-159		Math/calculus review	Zimmerman	
Mon	10-Sep	Math and calculus review	pp. 1-12	pp. 685-687			Zimmerman	
Wed	12-Sep	Workshop #1 (math and calculus)					Zimmerman	
Fri	14-Sep	Math review and quiz 1					Zimmerman	
Mon	17-Sep	States of Matter (gases)	pp. 21-31		Intermolecular Forces	States of Matter 1	Siegel	
Wed	19-Sep	Workshop #2 (gases)			(Siegel)		Siegel	
Fri	21-Sep	Gases review and quiz 2					Siegel	
Mon	24-Sep	States of Matter (liquid state)	pp.31-34		Basic Thermodynamics	States of Matter 2	Sury	
Wed	26-Sep	Workshop #3 (liquids)			(Siegel)		Sury	
Fri	28-Sep	liquids review and quiz 3					Sury	
Mon	1-Oct	States of Matter (solids)	pp. 34-43	pp. 204-212, 214-219, 222-226	Solid Dosage Forms	Solids	Sury	
Wed	3-Oct	Workshop # 4 (solids)		pp. 227-239, 246-247, 256-259	(Zimmerman)		Sury	
Fri	5-Oct	solids review and quiz 4					Sury	
Mon	8-Oct	Phase Equilibria	pp. 47-58			Phase Equilibria	Siegel	
Wed	10-Oct	Workshop #5 (Phase Equilibria)					Siegel	
Fri	12-Oct	Phase Equilibria review and quiz 5					Siegel	
Mon	15-Oct	Review at 9:05-9:55 a.m.					Siegel/CZ/Sury	
	15-Oct	Exam#1 from 4:30-6:30 pm						
Wed	17-Oct	Solutions	pp. 119-128	96-100	Solution dosage forms	Solutions	Siegel	
Fri	19-Oct	No Class - Fall Break			(Zimmerman)			
Mon	22-Oct	Colligative Properties	pp. 128-141	Chapter 13	Solution calculations	Solution Dosage	Siegel	
Wed	24-Oct	Workshop #6 (solutions)			(Zimmerman)	Forms	Siegel	
Fri	26-Oct	Solutions review and quiz 6					Siegel	
Mon	29-Oct	Ionic Equilibria 1	Chapter 6	p. 112, 689-691		Ionic Equilibria	Rutkowski	
Wed	31-Oct	Workshop #7 (Ionic Equilibria 1)					Rutkowski	
Fri	2-Nov	Review Ionic Equilibria 1 and quiz 7					Rutkowski	
Mon	5-Nov	Ionic Equilibria 2	Chapter 7				Sury	
Wed	7-Nov	Workshop #8 (Ionic Equilibria 2)					Sury	
Fri	9-Nov	Review Ionic Equilibria 2 and quiz 8					Sury	
Mon	12-Nov	Buffers	Chapter 9			Buffers	Rutkowski	
Wed	14-Nov	Workshop #9 (Buffers)					Rutkowski	
Fri	16-Nov	Review Buffers and quiz 9					Rutkowski	
Mon	19-Nov	Solubility	pp. 231-234, 241-251	336-342		Solubility	Sury	
Wed	21-Nov	Workshop #10 (solubility 1)					Sury	
Fri	23-Nov	Thanksgiving Holiday						
Mon	26-Nov	Effect of pH on Solubility	pp. 251-258	100-106			Sury	
Wed	28-Nov	Workshop #11(Effect of pH on solubility)					Sury	
Fri	30-Nov	Solubility review and quiz 10					Sury	
Mon	3-Dec	Review at 9:05-9:55 a.m.					all	
	3-Dec	Exam #2 from 3:30 - 5:30 p.m.						
Wed	5-Dec	Dissolution 1	pp. 337-344			Dissolution	Sury	
Fri	7-Dec	Workshop #12 (Dissolution1)					Sury	
Mon	10-Dec	Dissolution 2	pp. 351-354				Sury	
Wed	12-Dec	Workshop #13 (Dissolution 2)					Sury	
Fri	14-Dec	Dissolution review and quiz 11					Sury	
	Dec 15-20	Final Exam						
			<i>*Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th edition</i>					
			<i>**Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 8th edition (on reserve in Pharmaceutical Care Learning Centers at UMTC and UMD)</i>					