

# Phar 6728 Pharmaceutical Calculations

## Course Syllabus – Fall 2019

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### Meeting Time, Place, Credits

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Meets Thursdays 1:25-2:15pm in Moos 1-451 or LSci 163

Target audience: PD1 students

0.7 credits

### Course Instructional Team

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#### Course Team:

Anthony Olson, PharmD, MEd

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Preferred method of contact: Email

Office Hours: By appointment

*Teaching Assistants:* See course website for roster and contact information

### Course Materials

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#### Required eReserve Texts

- Ansel, Howard C. *Pharmaceutical Calculations*. 15th ed. Lippincott Williams & Wilkins 2017. E-text or print (instructors strongly encourage print text as source of reference throughout career).
- Elder, DL. *A Practical Guide to Contemporary Pharmacy Practice and Compounding* 4th ed. (already required for Pharmaceutical Care Skills Lab).

#### Required Technology

- Non-graphing calculator. Graphing calculators and smartphones are not allowed during exams.
- Access to a tablet or laptop is encouraged. Content may be accessed using PCLC computers, as well.
  - The University of Minnesota computer requirements are listed here: <https://it.umn.edu/academic-technology-tools>

### Course Website

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This syllabus, as well as all of the details of the course, including schedule, recorded lectures, and activities can be found on the course website (<http://canvas.umn.edu>). Course announcements will also be posted on this course site as necessary. Students are required to check the course site *at least* once a week.

### Course Prerequisites

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- Students must be enrolled in the Pharm.D. program
- Students should be committed to becoming a competent generalist practitioner who assumes responsibility, and is willing to be held accountable for their patients' medication outcomes.
- Students must have successfully completed Becoming a Pharmacist
- Students will need to be comfortable with both algebra and general chemistry concepts.

## Overview of the course

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### **Course content:**

Accurately performing pharmaceutical calculations is a critical component of patient care in every pharmacy practice environment. Calculations contribute just as much to good patient outcomes as the newest methods and guidelines for diagnosis, treatment, and prevention.

The challenge of pharmacy calculations lies not in the cutting edge of science or their mathematical complexity, but in the need for consistent accuracy to prevent patient harm and possible fatality. To obtain this level of accuracy, an understanding of methods and deliberate, undivided attention to detail is required. Students must understand and master the basic concepts of pharmaceutical calculations with organization, consistency and accuracy in order to provide optimal care to their future patients every day. *Students must demonstrate these skills via detailed documentation on homework and exams, including showing and labeling all steps in their work.*

### **Course format:**

Pharmaceutical Calculations is taught using online lectures, which present all of the new content, with weekly face-to-face classes that are optional except for the first day of class and scheduled exams (including practice exams). Lectures are available on the course website and provide the information necessary to excel at basic pharmaceutical calculations. Lectures are released per the schedule below and **will not** be released early, as regular practice is required for success in pharmaceutical calculations.

The weekly classes are not ITV and provide an opportunity to ask questions about concepts presented in lectures, assigned homework problems, and exam materials. Exam review materials are posted online prior to exams, and students are welcome to bring questions to class. Post-exam reviews will occur the recitation after an exam. It is expected that the weekly online lecture is viewed **prior to** each class, and weekly homework assignments are due by the end of class on **Thursdays at 2:15pm**. Course exams will consist of open-ended questions that may combine concepts and will be taken during the scheduled class time.

If you have a personal concern hindering your progress, or if you experience difficulties, it is critical that you initiate contact with the course director as soon as possible. We will work together to find a solution. Difficulties arise when contact is not initiated in a timely manner.

## Course Goals & Objectives

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### INTEGRATION OF LEARNING OBJECTIVES AND ASSESSMENTS

Utilize the ability to organize and document pharmaceutical calculations in a clear and accurate manner to solve patient care problems in Drug Delivery, Pharmacotherapy, Pharmaceutical Care Skills Lab courses, IPPEs, APPEs and into pharmacy practice.

### COURSE LEARNING GOALS

- A. Describe the role pharmaceutical calculations have in the provision of pharmaceutical care
- B. Demonstrate the ability to organize a calculation's set up in a clear and appropriately documented fashion
- C. Demonstrate the ability to complete pharmaceutical calculations accurately in the topic areas covered in this course
- D. Define commonly used medical abbreviations and conversions

## Course Requirements

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### Exams

**Note: Only non-graphing calculators are allowed for exams**

Students will take:

- The initial knowledge assessment is due on the first day of class (to assess content depth needed for the subject matter, to allow students to experience test format without an impact on their grades, to allow students to see where they need to work the hardest, and to provide a final exam study guide).
- The Midterm I Practice exam in Week 8.
- 2 in-class, closed-book, 10-point midterm exams (cumulative)
- 1 in-class, closed-book, 10-point final exam (cumulative)

In order to pass this course, students must:

- **Show all steps of work with proper labeling to earn credit on all problems.**
- Complete the Initial Knowledge Assessment due on the first day of class
- Complete the Midterm I Practice Exam administered in class on Week 8
- Complete all the homework
  - The purpose of the homework is to provide consistent use of the course material and to help students retain the methods and habits they develop in the course. Homework is graded satisfactory or unsatisfactory, on whether it was completed in a timely manner and with intention and attention to detail. TAs should be noting the place where the students go wrong in their problem solving. Students will have access to homework keys so that it can be determined where things go astray in problem solving and errors may be corrected in future problems. Regular homework, as with all practice, helps develop expertise and retention.
- Prove competency of the material twice, once by earning 15 out of 20 points on the two 10-point midterm exams.
- Demonstrate competency and mastery of the course material a second time by earning 8 out of 10 points on the final exam (similar to passing a federal or state board exam, like the NAPLEX).

Students who cannot demonstrate their competency of the material in these ways will fail the course. Students obtaining either a total score less than 15 on the two midterms OR a score less than 8 on the final exam have the opportunity to earn a final course grade of C if they obtain a score at or above 8 on a make-up final exam offered during finals week.

Each problem on the two midterms and one final is graded individually and **no partial credit** will be earned.

## Grading Information

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Homework assignments are due each week according to the schedule. Homework that is incomplete will not receive credit for the homework assignment. All homework assignments must be completed on time to earn an A in the course.

Students **must show all steps of work with proper labeling to earn credit** (pass/fail). Each problem on the two midterms and one final is graded individually and no partial credit will be earned. The impact of the homework, midterms, and final exam on the final course grade is shown below.

Initial Knowledge Assessment & Midterm I Practice Exam	Homework	Total Score on Midterm Exams	Score on Final Exam	Final Course Grade
Completed <b>AND</b>	ALL assignments turned in <b>AND</b>	$\geq 18/20$ <b>AND</b>	$\geq 9/10$	A
Completed <b>AND</b>	At least 7 of 8 assignments are turned in <b>AND</b>	$\geq 16/20$ <b>AND</b>	$\geq 8/10$	B
Completed <b>AND</b>	At least 6 of 8 assignments are turned in <b>AND</b>	$\geq 15/20$ <b>AND</b>	$\geq 8/10$	C+
Not completed <b>OR</b>	Fewer than 6 assignments are turned in <b>OR</b>	$< 15/20$ <b>OR</b>	$< 8/10$	F*

\*Students obtaining either a score less than 15 on the two midterms OR a score less than 8 on the final exam can earn a final course grade of C if they obtain a score at or above 8 on a make-up exam offered during the final week of class. (Exam will have 10 questions.) Students earning both a score on the midterms of less than 15 AND a score on the final exam less than 8 earn an F and must retake the course. They do not have an opportunity to earn a C based on make-up exam performance.

### Statement on Penalties for Late Work

Unless approved by the course director ahead of time, late work will not be accepted.

### Regrade Requests

Regrade requests must be discussed *with the responsible TA within 48 hours* of receiving graded material. Should further questions arise, requests must be submitted in writing via email to course director within 1 week of receiving graded material. Requests received after this deadline will not be honored.

## Course Policies

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This course adheres to the [University of Minnesota College of Pharmacy Central Syllabus](#). This page includes all required UMN and CoP policies, e.g., Academic Freedom; Copyright; Course Evaluations; Disability Accommodations; FERPA, etc.

### Excused Absences and Make-Up Policy:

Only University recognized reasons will be accepted for excused absences from the scheduled homework due dates and exams (see Centralized Syllabus above). With excused absences, the student needs to inform the Course Director as soon as possible for arrangements to be made. Unless there are extenuating circumstances, students must contact the course director (by e-mail, phone, or in person) at least 24 hours in advance of the scheduled exam in order to be considered for a make-up exam.

### Detailed Course Outline & Schedule\*

Readings are in the Ansel text, unless otherwise noted. Homework problems are the 'Practice Problems' at the end of the listed chapter, unless otherwise noted.

Class	Agenda/Topics	Objectives	Assignments & Readings Due
<i>Weeks 1-3: No class during Becoming a Pharmacist</i>			
<b>Week 4</b> 9/12	Lecture on Course Introduction observed before class	Determine prior knowledge, expose students to exam format, and provide final exam study materials	Bring a non-graphing calculator.  Prior to class, complete the <b>initial knowledge assessment</b> individually and bring to class. In class, we will work through the problems and labeling expectations. At the end of class, students will submit their exams for feedback from TAs.
<b>Week 5</b> 9/19	Lecture on Concentrations, Ratio Strengths and Specific Gravity observed before class	Explain medication errors caused by common abbreviations.  Calculate concentration, ratio strength, and density/specific gravity  Utilize dimensional analysis and proportions to solve conversion and concentration (v/v, w/w, w/v) problems	Read Elder (lab) text Ch. 1 and Appendix A. <b>These abbreviations will be common knowledge on exams.</b>  HW 1: Ch. 1, Dimensional Analysis Practice Problems # 3, 4, 14 Ch. 1, Dimensional Analysis Practice Problems, # 15, 17, 21 (Use <b>both</b> proportion and dimensional analysis.) Ch. 5, # 1, 3, 19, 23 Ch. 6, # 1, 2, 12, 32, 46  Optional Reading: Ch. 1, Ch. 5, Ch. 6
<b>Week 6</b> 9/26	Lecture on Interpreting Prescriptions and Dosing Calculations observed before class	Calculate doses, including using mg/kg and BSA methods	HW 2: Ch. 4, # 3, 4, 5, 14, 17, 18 Ch. 7, # 10, 12, 13 Ch. 8, # 8, 9, 12, 23, 32, 35, 37, 40, 44  Optional Reading: Ch. 4, Ch. 8, Elder (lab) text Ch. 9
<b>Week 7</b> 10/3	Lecture on IV and Constituted Solutions observed before class	Calculate and define powder volumes, concentrations, and rates	HW 3: Ch. 17, # 2, 3, 12, 14 Ch. 13, #13, 24, 25 Additional IV problems from course website  Optional Reading: Ch. 13, Ch. 17

Class	Agenda/Topics	Objectives	Assignments & Readings Due
<b>Week 8</b> 10/10	Lecture on Milliequivalents observed before class  Midterm I Practice Exam	Calculate and define milliequivalents  Simulate midterm exam and provide study materials and feedback	HW 4: Ch. 12, # 1, 2, 5, 21, 24, 27, 29  Optional Reading: Ch. 12  <b>Midterm I Practice Exam</b>
<b>Week 9</b> 10/17 Fall break	Lecture on Isotonicity observed before class on 10/24	Calculate and define tonicity for parenteral and ophthalmic therapies	HW 5 (due 10/24): Ch. 11, # 6, 10, 16, 26 Additional problems from course website  Optional Reading: Ch. 11
<b>Week 10</b> 10/24	<b>Midterm Exam I on Weeks 5 through 8</b>		
<b>Week 11</b> 10/31	Lecture on Alligation observed before class	Review concentrations, calculate a combination of concentrations (alligation)	HW 6: Ch. 6, # 10, 33, 39, 49, 54, 55, 58 Ch. 15, # 28, 52  Optional Reading: Ch. 1, Ch. 15
<b>Week 12</b> 11/7	Lecture on Thermometry & Alcohol Calculations observed before class	Convert between degrees centigrade and Fahrenheit  Perform Alcohol USP calculations and labeling	HW 7: Appendix A, # 5, 7, 8, 10 Additional problems from course website  Optional Reading: Appendix A (p. 405-9), Elder (lab) text Ch. 8
<b>Week 13</b> 11/14	<b>Midterm Exam II on all material through Week 12</b>		
<b>Week 14</b> 11/21	Lecture on Concentrated Acids, Formaldehyde observed before class  Lecture on Aliquots observed before class	Describe USP defined concentrated acids and their potential for medication errors  Define aliquots and describe their utility. (This will be useful in Phar 6740 next year!!)	HW 8: Ch. 3, # 7, 8 Additional problems from course website  Optional Reading: Ch. 3, Elder (lab) text Ch. 8 and Ch. 10
<b>Week 15</b> 11/28	No Class - Thanksgiving		
<b>Week 16</b> 12/5	Review for Final Exam		
<b>Week 17</b> 12/12	<b>Final Exam (cumulative)</b>		
<b>Finals Week</b>	<b>Make-up Final Exam if needed (cumulative)</b>		

\* Subject to change at course instructor's discretion.

\*\***Must attend in person**