

PMCY 3500 Spring 2022
Pharmaceutical Analysis

Instructor: Michael G. Bartlett, Ph.D.
Class: MWF 11:30 – 12:20
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The purpose of this course is to provide you with an understanding of analyzing pharmaceutical substances. This course will focus on the principles and limitations of each major technique, as well as, how to interpret the data. The techniques will be placed in context with the regulations that govern the use of the data generated by each method. Pharmaceutical analysis is critical to all aspects of drug discovery and drug development as these processes are driven by the necessity for reliable high quality measurements.

Method of Evaluation

There will be 4 hourly exams during the semester plus a comprehensive final exam during finals week. Exams 1-4 will each count for 15% of your final grade. The final exam will count for 25% of your grade. These exams may consist of a combination of multiple choice, multiple-multiple choice (keyed questions), short answer, numerical problems and essay questions. Homework assignments given over the course of the semester will count for 10% of your grade and class participation in the form of minute papers will account for the remaining 5% of your grade.

Exam Dates

Exam I	Friday February 4 th , 2022
Exam II	Friday March 4 th , 2022
Exam III	Monday April 4 th , 2022
Exam IV	Monday April 25 th , 2022
Final Exam	Monday May 9 th , 2022

Grading Scale for PMCY 3500

Grade	%
A	92.00-100
A-	89.50-91.99
B+	87.00-89.49
B	82.00-86.99
B-	79.50-81.99
C+	77.00-79.49
C	72.00-76.99
C-	69.50-72.00
D	59.50-69.49
F	0.00-59.49

Regrading Policy

Students who believe that an error has occurred in the grading of an assignment should alert the instructor within two weeks of the date of the assignment. Additional points may be awarded at the discretion of the instructor. No grades will be changed once the two-week period for regrading has passed.

Make-Up Examination Policy

Students may be permitted to take a make-up examination under the following conditions. 1) The student was medically unable to be in school and appropriate proof is provided to the instructor. 2) There is a conflict with another University or College academic function and the student has informed the instructor at least 48 hours prior to the examination. 3) Other personal emergencies will be handled on a case-by-case basis.

Make-up tests will be primarily essay in nature. The examinations may take longer than the time normally allotted for standard assignments. Make-up examinations must occur within a week of the original test date or the student will receive a zero for the assignment.

Calculator Policy

Calculators may be permitted on some exams. During the exams, only basic scientific calculators with simple functions such as addition, subtraction, multiplication, division, logarithms and exponents will be allowed. Examples of acceptable calculators are the Casio 100-300, Sharp 500 and TI-30 series. The instructor must approve other calculators 24 hours before the exam begins. Calculators with graphing and differentiating capabilities are NOT allowed. Use of calculators on cell phones or PDAs is NOT allowed. Use of an unauthorized calculator will result in a zero for the examination and will be considered a violation of the UGA academic honesty policy.

Class Attendance and Absences

Students are expected to attend class regularly. A student who incurs an excessive number of absences may be dismissed from a class at the discretion of the instructor. If the student must miss an exam due to illness or another emergency, the instructor should be informed, either directly or through the Dean's office, of the situation prior to the exam being given. The student will then be given a make-up exam as soon as possible after the student returns to class. An unexcused absence from an exam will result in a zero for that exam at the discretion of the instructor.

Academic Honesty

The University of Georgia Honor Code, Academic Policy and the College of Pharmacy Professionalism Policy provide the framework for all assignments and interactions associated with this course. In addition, all academic work must meet the standards contained in "A Culture of Honesty." Students are responsible for informing themselves about those standards before performing any academic work.

Covid-19 Guidelines Addendum – Spring 2022

Students are expected to follow all COVID-19 related policies, procedures and guidelines stated in the University of Georgia College of Pharmacy COVID-19 Addendum.

- **Face coverings**
 - Following guidance from the University System of Georgia, face coverings are recommended for all individuals while inside campus facilities.
- **How can I obtain the COVID-19 vaccine?**
 - University Health Center is scheduling appointments for students through the UHC Patient Portal (https://patientportal.uhs.uga.edu/login_dualauthentication.aspx). Learn more here – <https://www.uhs.uga.edu/healthtopics/covid-vaccine>.
 - The Georgia Department of Health, pharmacy chains and local providers also offer the COVID-19 vaccine at no cost to you. To find a COVID-19 vaccination location near you, please go to: <https://georgia.gov/covid-vaccine>.
 - In addition, the University System of Georgia has made COVID-19 vaccines available at 15 campuses statewide and you can locate one here: <https://www.usg.edu/vaccination>.
- **What do I do if I have COVID-19 symptoms?**
 - Students showing COVID-19 symptoms should self-isolate and schedule an appointment with the University Health Center by calling 706-542-1162 (Monday-Friday, 8 a.m.-5p.m.). Please DO NOT walk-in. For emergencies and after-hours care, see, <https://www.uhs.uga.edu/info/emergencies>.
 - Please see the applicable “Guidance on COVID-19 Decision Tree” for the College of Pharmacy for additional information on what to do if you experience symptoms.
- **What do I do if I test positive for COVID-19?**
 - If you test positive for COVID-19 at any time, you are **required to report it** through the [DawgCheck Test Reporting Survey](#). We encourage you to stay at home if you become ill or until you have excluded COVID-19 as the cause of your symptoms. UGA adheres to current Georgia Department of Public Health (DPH) quarantine and isolation [guidance](#) and requires that it be followed. Follow the instructions provided to you when you report your positive test result in DawgCheck.
 - Please see the applicable “Guidance on COVID-19 Decision Tree” for the College of Pharmacy for additional information on what to do if you test positive.
- **Guidelines for COVID-19 quarantine period**
(As of 8/1/21; follow DawgCheck or see DPH website for most up-to-date recommendations)

- Students who are fully vaccinated **do not** need to quarantine upon exposure unless they have symptoms of COVID-19 themselves. All others must follow the Georgia Department of Public Health (DPH) recommendations:
 - Students who are not fully vaccinated and have been directly exposed to COVID-19 but are not showing symptoms should self-quarantine for 10 days. Those quarantining for 10 days must have been symptom-free throughout the monitoring period and continue self-monitoring for COVID-19 symptoms for a total of 14 days. You should report the need to quarantine on DawgCheck (<https://dawgcheck.uga.edu/>).
 - Students, faculty and staff who have been in close contact with someone who has COVID-19 are no longer required to quarantine if they have been fully vaccinated against the disease and show no symptoms.
 - Individuals are considered fully vaccinated 2 weeks after their second shot in a 2-dose series (e.g., Pfizer or Moderna vaccines) or 2 weeks after a single-shot vaccine (e.g., Johnson & Johnson's Janssen vaccine).
 - Please see the applicable "Guidance on COVID-19 Decision Tree" for the College of Pharmacy for additional information on what to do if you have close contact, or non-close contact with someone who has been diagnosed with or tested positive for COVID-19.
- **Hand hygiene and respiratory etiquette**
 - Consistent [handwashing](#) with soap and water for at least 20 seconds is recommended. Use an alcohol-based hand sanitizer (at least 60% alcohol) if soap and water are not available. Avoid touching your eyes, nose and mouth with unwashed hands.
 - Everyone should cover coughs and sneezes with a tissue or the inside of their elbow. Used tissues should be thrown in the trash and hands washed immediately with soap and water for at least 20 seconds.
- **Monitoring conditions**
 - Note that the guidance referenced in this addendum is subject to change based on recommendations from the Georgia Department of Public Health, the University System of Georgia or the Governor's Office. For the latest on UGA policy, you can visit coronavirus.uga.edu.
- **Student compliance with COVID-19 guidelines**
 - Students who fail to comply with COVID-19 safety policies and procedures may be subject to disciplinary action under the UGA Student Conduct and College of Pharmacy Professionalism Policy.

- **Well-being, mental health, and student support**
 - *University of Georgia*
 - If you or someone you know needs assistance, you are encouraged to contact Student Care & Outreach in the Division of Student Affairs at 706-542-7774 or visit <https://sco.uga.edu/>. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services.
 - UGA has several resources for a student seeking mental health services (<https://www.uhs.uga.edu/bewelluga/bewelluga>) or crisis support (<https://www.uhs.uga.edu/info/emergencies>).
 - If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA (<https://www.uhs.uga.edu/bewelluga/bewelluga>) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center.
 - Additional resources can be accessed through the UGA App.
 - *College of Pharmacy*
 - The College of Pharmacy Office of Student Affairs provides wellness and academic support resources and services to students. The list of resources is outlined in the [PharmD Student Handbook](#). If you or someone you know may benefit from our services, please contact our [office](#).
- **Additional resources**
 - See CDC website for additional up-to-date information: <https://www.cdc.gov/coronavirus/2019-nCoV/index.html>
 - See UGA website for additional COVID-19 information related to the university: <https://coronavirus.uga.edu/>
 - See the link below for College of Pharmacy COVID-19 information: <https://rx.uga.edu/about/college-of-pharmacy-coronavirus-covid-19-updates-and-resources/>
 - See Student Handbook for additional information on student resources: <https://rx.uga.edu/students/current-pharmd-students/>

General Attendance and Participation Guidance

- See your course syllabus for specific policies related to the items in this section.
- **Didactic course recordings**
 - See your course syllabus for specific policies.
- **No penalties if unable to attend in-person due to COVID-19**
 - Students will not be penalized if they cannot attend in-person sessions because they are ill, symptomatic, or in medical quarantine due to COVID-19. Course instructors will work individually with these students to identify options to make

up mandatory, in-person requirements (e.g., labs, IPPEs, etc.).

- Students who are fully vaccinated **do not** need to quarantine upon exposure unless they have symptoms of COVID-19 themselves.
 - [UGA Student Care and Outreach](#) will coordinate care and support for students who must isolate or quarantine due to exposure or symptoms related to COVID-19.
 - UGA Student Care and Outreach or the [College of Pharmacy Office of Student Affairs](#) will continue to notify faculty should students report a positive COVID-19 test result through DawgCheck.
- **Communication with faculty**
 - Students are required to contact the course coordinator and other appropriate faculty members if there is an issue related to COVID-19 that will impact attendance/participation for a course requirement. Course instructors will work individually with these students to identify options to manage issues that arise.
 - **Course withdrawal**
 - In the event a student is unable to complete course requirements and needs to withdraw, the student should contact Dr. Duc Do in the Office of Student Affairs, who will work with UGA StudentCare and Outreach as needed, to coordinate this process.

General Exam and Assignment Guidance

- See your course syllabus for specific policies related to the items in this section.
- **Missed exams or assignments due to COVID-19**
 - If a student misses an exam or assignment due to COVID-19, the course coordinator and other appropriate faculty member will work with the student to offer a makeup exam or assignment to the extent feasible and reasonable.
 - Students are required to contact the course coordinator and any other appropriate faculty member in advance if there is an issue that will impact taking an exam or completing an assignment.
 - [UGA Student Care and Outreach](#) will coordinate care and support for students who must isolate or quarantine due to exposure or symptoms related to COVID-19.
 - UGA Student Care and Outreach or the [College of Pharmacy Office of Student Affairs](#) will continue to notify faculty should students report a positive COVID-19 test result through DawgCheck.

Texts

Pharmaceutical Analysis, 4th Edition by David G. Watson. Elsevier. ISBN 978-0-7020-6989-5

Course Outline:

Week 1	Quality Control - Accuracy and Precision; Linearity; Method Validation; SOPs; Basic Calculations
Week 2	Physical & Chemical Properties – pKa; H-H; % Ionization; Partition Coefficients; Stereochemistry; Optical Rotation;
Week 3	Physical & Chemical Properties – Stability; Gravimetric; Polymorphs;
Week 4	Titration – Acid/Base; Non-aqueous; Redox; Potentiometric; Karl-Fischer, Exam 1 (covers weeks 1-4)
Week 5	UV/Vis Spectroscopy – Instrumentation; Beer's Law; Diode Array; Interpretation; Difference Spectrophotometry; Derivative Spectra
Week 6	IR Spectroscopy – Instrumentation; Interpretation; Polymorphs; Near-infrared Spectroscopy
Week 7	Molecular Spectroscopy – Instrumentation; Molecules that Fluoresce; Quenching; Raman Spectroscopy; Interpretation;
Week 8	Mass Spectrometry – Instrumentation; Ionization; Interpretation; MS-MS Exam 2 (weeks 5-8)
Week 9	Chromatography – Capacity Factor; Efficiency; Partitioning; Band Broadening; Peak Shape
Week 10	Gas Chromatography – Instrumentation; Column Chemistry; Derivatization; Detectors; Residual Solvent Analysis; GC-MS
Week 11	HPLC – Instrumentation; Column Chemistry; Secondary Equilibrium; Detectors
Week 12	HPLC – Normal Phase, Reversed Phase, Ion-Pair; Ion-exchange; Size-exclusion; Affinity; HILIC, Method Development; Exam 3 (weeks 9-11)
Week 13	Other Separations – Thin Layer Chromatography; Electrophoresis; Capillary Electrophoresis; Sample Preparation
Week 14	NMR – Instrumentation; Proton; Carbon; 2-D; Interpretation
Week 15	Hyphenated Techniques: LC-MS; LC-NMR;
Week 16	Special Topics; Review; Exam 4 (weeks 12-15)
Final Exam	May 9 (12 pm – 3 pm)