PHA5243 Principles of Pharmacy Informatics
Spring 2023
2 Credit Hours – [A-E Grading]

This course is designed to introduce the theory and concepts of pharmacy informatics and health informatics. Pharmacy informatics focuses on medication-related data and knowledge within the continuum of the healthcare system (HIMSS.) It offers a platform for students who are interested in pharmacy informatics careers. Students will develop the knowledge to discuss the nature of health informatics as an important discipline; and recognize different methods used to analyze fundamentals of workflow process analysis, system redesign, usability, and human factors.

Teaching Partnership Leaders
Khoa A Nguyen, PharmD.
* Email: khoanguyen@cop.ufl.edu
* Office: DG 21
* Phone: 352-273-9418
Office Hours: See Canvas for posted office hours.

See Appendix A. for Course Directory of Faculty and Staff Contact Information.

Entrustable Professional Activities
This course will prepare you to perform the following activities which the public entrusts a Pharmacist to perform:
1. Practice manager domain
   Implement health information technology to improve pharmacy operations.
   Assist in the evaluation of pharmacy practice and workflow.
2. Information master domain
   Retrieve and analyze scientific literature (especially in the area of informatics) to make a recommendation.
   Analyze clinical guidelines to develop meaningful clinical decision support tools.
3. Population health promoter domain
   Minimize adverse drug events and medication errors through health information technology.
   Maximize the appropriate use of medications in a population with clinical decision support and order set.
4. Interprofessional team member domain
   Collaborate as a member of an interprofessional team to evaluate and develop health information technology.

Course-Level Objectives
Upon completion of this course, the student will be able to:

1. Recognize the importance of health informatics and pharmacy informatics in improving the quality and safety of patient care.
2. Recognize the importance of data standards in healthcare systems. Describe some common data standards currently used in pharmacy area.

3. Apply fundamentals concepts of human-computer interaction and human factors in workflow process analysis and system redesign.
4. Analyze human errors and apply usability evaluation methods to design Electronics Health Records (EHRs).
5. Explain the difference between Electronic Health Records (EHRs) and Personal Health Records (PHRs)
6. Recognize the use and potential of artificial intelligence and machine learning methods in pharmacy practice
7. Describe the emerging of telehealth and telemedicine and how they can be used to support clinical service.

Course Pre-requisites
Successful completion of Doctor of Pharmacy coursework through block 11

Course Co-requisites
None

Course Outline
See Appendix for course breakdown. Please routinely check your campus calendar and the Canvas course site for any messages about changes in the schedule including meeting dates/times, deadlines, and room changes.

Required Textbooks/Readings
1. Students will learn through pre-recorded lectures and articles provided through the Canvas course site

Use UF VPN to access UF Libraries Resources when off-campus.
The UF HSC library staff can assist you with questions or issues related to accessing online library materials. For assistance contact your College of Pharmacy librarian or visit the HSC Library Website at this URL:http://www.library.health.ufl.edu/

Suggested Textbooks/Readings
Suggested readings will be posted on Canvas.
Suggested book: Berner ES, Clinical Decision Support Systems: Theory and Practice, 3rd Edition. Springer. ISBN-13: 978- 3319319117

Other Required Learning Resources
None

Materials & Supplies Fees
None

Student Evaluation & Grading

Table 1.1 Evaluation and Grading Above

Requirements	Percentage of Final Grade
Quizzes – (10 total, each 5%)	50%
Assignments – (2 total, each 5%)	10%
Final Project Written Submission	20%
Final Project Presentation	20%
Total	100%

Table 1.2 grading scale

Percentage	Letter Grade
92.50-100%	A
89.50-92.49%	A-
86.50-89.49%	B+
82.50-86.49%	B
79.50-82.49%	B-
76.50-79.49%	C+
72.50-76.49%	C
69.50-72.49%	C-
66.50-69.49%	D+
62.50-66.49%	D
59.50-62.49%	D-
< 59.50%	E

Rounding of grades:

Final grades in Canvas will be rounded to the 2nd decimal place. If the decimal is X.495 or higher, Canvas will round the grade to X.50. The above scale depicts this policy and grades are determined accordingly. Grade assignment is made using this policy and NO EXCEPTIONS will be made in situations where a student's grade is "close."

Educational Technology Use

The following technology below will be used during the course and the student must have the appropriate technology and software.

1. ExamSoft™ Testing Platform
2. Canvas™ Learning Management System

For technical support, navigate to Educational Technology and IT Support Contact Information at this URL: http://curriculum.pharmacy.ufl.edu/current-students/technical-help/

Pharm.D. Course Policies

The Policies in the following link apply to this course. Review the General Pharm.D. Course Policies carefully, at this URL: http://curriculum.pharmacy.ufl.edu/current-students/course-policies/

Makeup Assignments

Makeup assignments may be required for excused absences from all Active Learning Sessions. Students will be required to complete the makeup assignment within one week of the missed session.

Late Assignments

For the final project, 10 points will be deducted for each day from the deadline. Late final projects also are accepted without penalty with appropriate excuses. Refer to Pharm.D. Course policies for requesting Excused absences. No late assignments accepted for quizzes.

Respect for Diversity

The University of Florida College of Pharmacy strives to stimulate a culture that promotes diversity and inclusion within an exceptional community of students, faculty, and staff. It is our intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit.

We intend to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let us know ways to improve the course's effectiveness for you personally or for other students or student groups.

If any of our class meetings conflict with any of your religious events, an excused absence will be provided when requested using the standard UF COP process as detailed in the [UF COP Course policies](#).

If you feel that you have experienced or witnessed any bias/treatment that falls short of these expectations, you may submit a report through the UF [COP *Student Mistreatment Report*](#).

Course Evaluation Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Appendix A. Course Directory

Teaching Partnership Leader/Course Director(s):

Khoa A Nguyen, PharmD.
- Email: khoanguyen@cop.ufl.edu
- Office: DG 21
- Phone: 352-273-9418

Office Hours: Please see the Canvas course site for posted office hours

Questions to Ask:
- Concerns about performance
- Guidance when there are performance problems (failing grades)
- General questions about content

Other Teaching Partnership Faculty Members:

Wei (Jenny) Lo Ciganic, PhD.
- Email: wlociganic@cop.ufl.edu
- Office: HPNP3338
- Phone:352-273-6255

Ben Staley, PharmD.
- Email: staleb@shands.ufl.edu
- Office: NA
- Phone: 352-733-3150

Instructional Designer:

Chris Egan, M.Ed., NRP
- Email: cegan@ufl.edu
- Phone: 352-294-5636

Academic Coordinator Gainesville Campus:

Ashleigh Williams
- Email: acwilliams@ufl.edu
- Office: HPNP 4309
- Phone: 352-273-9951

Absence/Tardy Email: (Visit the course policy site for further instructions)

Educational Coordinators

Katie Orben
- Email: korben06@ufl.edu
- Office: Jacksonville Campus
- Phone: 904-244-9590

Andrea Arredondo
- Email: aarredondo1@cop.ufl.edu
- Office: Orlando Campus

Questions to Ask:
- Issues related to course policies (absences, make up exams, missed attendance)
- Absence/tardy requests (Only the Academic Coordinator handles absence requests)
- Questions about dates, deadlines, meeting place
- Availability of handouts and other course materials
- Assignment directions
- Questions about grade entries in gradebook (missing grades, incorrect grade)
- Assistance with ExamSoft® (Distance campus students may contact the Educational
- Coordinator for use of Examplify and assistance during exams. The Academic Coordinator is the contact person for issues related to grading and posting of ExamSoft grades.

Appendix B: Course Outline:

Date / Time	Mod #	Activity	Activity Title	Contact Time (hr)	Responsible
	1	Module	Module 1: Medical Informatics and Pharmacy Informatics		
04/26/23	1.1	Lecture Video	Medical Informatics and Pharmacy Informatics	0.5	Khoa Nguyen
04/26/23		Optional/Supplemental	Wyatt, J C, and J L Y Liu. "Basic concepts in medical informatics." Journal of epidemiology and community health vol. 56,11 (2002): 808-12. doi:10.1136/jech.56.11.808		
04/26/23		Optional/Supplemental	Cortes, Daniel et al. "Pharmacy Informatics: Where Medication Use and Technology Meet." The Canadian journal of hospital pharmacy vol. 72,4 (2019): 320-326.		
04/26/23		Optional/Supplemental	Haux, Reinhold. "Medical informatics: past, present, future." International journal of medical informatics vol. 79,9 (2010): 599-610. doi:10.1016/j.ijmedinf.2010.06.003		
4/27/23 at 2pm		Quiz (Online)	Quiz #1	0.5	
	2	Module	Module 2: Electronic Health Record		
04/27/23	2.1	Lecture Video	Electronic Health Record	1	Ben Staley
04/27/23		Optional/Supplemental	Evans, R S. "Electronic Health Records: Then, Now, and in the Future." Yearbook of medical informatics vol. Suppl 1,Suppl 1 S48-61. 20 May. 2016, doi:10.15265/IYS-2016-s006		
04/27/23		Optional/Supplemental	Kohli, Rajiv, and Sharon Swee-Lin Tan. "Electronic Health Records: How Can IS Researchers Contribute to Transforming Healthcare?" MIS Quarterly, vol. 40, no. 3, 2016, pp. 553–74. JSTOR, https://www.jstor.org/stable/26629027. Accessed 17 Nov. 2022.		
4/27/23 at 2pm		Quiz (Online)	Quiz #2	0.5	
	3	Module	Module 3: Data Standards		
04/27/23	3.1	Lecture Video	Data Standards and Interoperability in Healthcare	0.75	Ben Staley
04/27/23		Optional/Supplemental	Schulz, Stefan, et al. "Standards in Healthcare Data." Fundamentals of Clinical Data Science, edited by Pieter Kubben et. al., Springer, 22 December 2018.pp. 19–36. doi:10.1007/978-3-319-99713-1_3		
04/27/23		Optional/Supplemental	Richesson, Rachel L et al. "Achieving standardized medication data in clinical research studies: two approaches and applications for implementing RxNorm." Journal of medical systems vol. 34,4 (2010): 651-7. doi:10.1007/s10916-009-9278-5		

Date / Time	Mod #	Activity	Activity Title	Contact Time (hr)	Responsible
4/27/23 at 2pm		Quiz (Online)	Quiz #3	0.5	
04/27/23 at 2:00 - 3:50pm		Active Learning Session	Active Learning Session #1 (MDL, 333, & Dubow)	2	Khoa Nguyen
	4	Module	Module 4: Clinical Decision Support		
05/01/23	4.1	Lecture Video	Clinical Decision Support	0.8	Khoa Nguyen
05/01/23		Optional/Supplemental	Wake, Dyson T et al. "Pharmacogenomic Clinical Decision Support: A Review, How-to Guide, and Future Vision." Clinical pharmacology and therapeutics vol. 112,1 (2022): 44-57. doi:10.1002/cpt.2387		
05/01/23		Optional/Supplemental	Blagec, Kathrin et al. "Implementing pharmacogenomics decision support across seven European countries: The Ubiquitous Pharmacogenomics (U-PGx) project." Journal of the American Medical Informatics Association : JAMIA vol. 25,7 (2018): 893-898. doi:10.1093/jamia/ocy005		
05/01/23		Optional/Supplemental	Nguyen, Khoa, and Kristin Wiisanen. "Patient-facing clinical decision support for pharmacogenomic precision medicine." Clinical Decision Support for Pharmacogenomic Precision Medicine (2022): 203-225.		
5/1/23 at 12pm		Quiz (Online)	Quiz #4		
	5	Module	Module 5: Automated Dispensing Systems		
05/01/23	5.1	Lecture Video	Automated Dispensing Systems (ADS)	0.75	Bradley Hall
05/01/23		Optional/Supplemental	Fitzpatrick, Raymond, et al. "Evaluation of an automated dispensing system in a hospital pharmacy dispensary." The Pharmaceutical Journal, 16 June 2009. The Pharmaceutical Journal, pharmaceutical-journal.com/article/research/evaluation-of-an-automated-dispensing-system-in-a-hospital-pharmacy-dispensary#main-content.		
05/01/23		Optional/Supplemental	Zheng, Wu Yi et al. "The impact of introducing automated dispensing cabinets, barcode medication administration, and closed-loop electronic medication management systems on work processes and safety of controlled medications in hospitals: A systematic review." Research in social & administrative pharmacy : RSAP vol. 17,5 (2021): 832-841. doi:10.1016/j.sapharm.2020.08.001		
		Quiz (Online)	Quiz #5		
		Active Learning Session	Active Learning Session # - Final Project Introduction (MDL, 333, & Dubow)	2	Khoa Nguyen
	6	Module	Module 6: Analytic and Reporting System		

Date / Time	Mod #	Activity	Activity Title	Contact Time (hr)	Responsible
05/04/23	6.1	Lecture Video	Analytics	1	Jay Dorris
05/04/23		Optional/Supplemental	Sheridan, Nick. "Best Practices in Healthcare Reporting: What Every Healthcare Organization Should Know." Medical Advantage, TDC Group, 26 Jan. 2022, https://www.medicaladvantage.com/blog/healthcare-reporting-best-practices/		
05/04/23		Optional/Supplemental	Gliklich RE, Dreyer NA, Leavy MB, editors. Registries for Evaluating Patient Outcomes: A User's Guide [Internet]. 3rd edition. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 Apr. 13, Analysis, Interpretation, and Reporting of Registry Data To Evaluate Outcomes. Available from: https://www.ncbi.nlm.nih.gov/books/NBK208602/		
5/4/23 at 12pm		Quiz (Online)	Quiz #6		
	7	Module	Module 7: Human Factors and Human Computer Interaction		
05/04/23	7.1	Lecture Video	Human Factors and Human Computer Interaction	0.5	Khoa Nguyen
05/04/23		Optional/Supplemental	Holden, Richard J., et al. "Human factors engineering and human-computer interaction: supporting user performance and experience." Clinical informatics study guide (2022): 119-132.		
05/04/23		Optional/Supplemental	Grundgeiger, Tobias et al. "Why and How to Approach User Experience in Safety-Critical Domains: The Example of Health Care." Human factors vol. 63,5 (2021): 821-832. doi:10.1177/0018720819887575		
5/4/23 at 12pm		Quiz (Online)	Quiz #7	0.5	
	8	Module	Module 8: Usability Evaluation Methods		
05/04/23	8.1	Lecture Video	An Introduction to Usability Evaluation	0.66	Khoa Nguyen
05/04/23		Optional/Supplemental	Elchynski, Amanda L et al. "Utilizing a Human-Computer Interaction Approach to Evaluate the Design of Current Pharmacogenomics Clinical Decision Support." Journal of personalized medicine vol. 11,11 1227. 18 Nov. 2021, doi:10.3390/jpm11111227		
05/04/23		Optional/Supplemental	Nguyen, Khoa A et al. "Utilizing a user-centered approach to develop and assess pharmacogenomic clinical decision support for thiopurine methyltransferase." BMC medical informatics and decision making vol. 19,1 194. 17 Oct. 2019, doi:10.1186/s12911-019-0919-4		
5/4/23 at 12pm		Quiz (Online)	Quiz #8	0.5	

Date / Time	Mod #	Activity	Activity Title	Contact Time (hr)	Responsible
05/04/23 at 12:00 - 1:50pm		Active Learning Session	Active Learning Session #3 - Final Project Discussion (MDL, 333, & Dubow)	2	Khoa Nguyen
	9	Module	Module 9: Artificial Intelligence and Machine Learning		
05/05/23	9.1	Lecture Video	Artificial Intelligence and Machine Learning in Pharmacy Practice	1	Jenny Lo-Ciganic
05/05/23		Optional/Supplemental	Secinaro, Silvana et al. "The role of artificial intelligence in healthcare: a structured literature review." BMC medical informatics and decision making vol. 21,1 125. 10 Apr. 2021, doi:10.1186/s12911-021-01488-9		
05/05/23		Optional/Supplemental	Trenfield, Sarah J et al. "Advancing pharmacy and healthcare with virtual digital technologies." Advanced drug delivery reviews vol. 182 (2022): 114098. doi:10.1016/j.addr.2021.114098		
5/8/23 at 12pm		Quiz (Online)	Quiz #9	0.5	
	10	Module	Module 10: Telehealth, Telemedicine, and Health Information Exchange		
05/05/23	10.1	Lecture Video	Telehealth and Telemedicine	0.6	Khoa Nguyen
05/05/23		Optional/Supplemental	Qian, Alexander S et al. "Disparities in telemedicine during COVID-19." Cancer medicine vol. 11,4 (2022): 1192-1201. doi:10.1002/cam4.4518		
05/05/23		Optional/Supplemental	Bitar, Hind, and Sarah Alismail. "The role of eHealth, telehealth, and telemedicine for chronic disease patients during COVID-19 pandemic: A rapid systematic review." Digital health vol. 7 20552076211009396. 19 Apr. 2021, doi:10.1177/20552076211009396		
5/8/23 at 12pm		Quiz (Online)	Quiz #10	0.5	
05/08/23 at 8:00 - 9:50am		Active Learning Session	Active Learning Session #4 - Final Project Presentation (MDL, 333, & Dubow)	2	Khoa Nguyen
05/08/23		Assignment (Graded)	Final Project - Presentation		
05/11/23 11:59pm		Assignment (Graded)	Final Project - Submission	10	
			TOTAL CONTACT HOURS =	29.06	

Appendix C: Final project rubric

100 possible points	Exemplary (10 points)	Accomplished (8 points)	Needs Improvement (5 points)
Specific Aims/Objectives (x3) ---/30 points	• Clearly and concisely describe the objective(s) or aim(s) of the proposal	• Vaguely describe the proposal's objective(s) or aim(s). • Used more than three sentences to describe the objective(s)	• Objectives or aims are not described in the proposal
Background (x3) --/30 points	• The proposal thoroughly summarized background information from the literature. • The **systematic review** clearly described the most relevant studies on the topic of interest. • The proposal states the gap that needs to be addressed and how the proposal's objective(s) can help fill the gap.	• Background section lack information on current literate. • The systematic review is not up to date. • The proposal does not clearly state the gap in the literature or how this proposal can benefit healthcare.	• Illogical background information. • Does not describe the systematic review • Does not describe a gap in the literature
Methods (x3) ---/30 points	• Scientifically and logically described how the proposal can be conducted in detail. • Students are **not expected to use common frameworks or validated techniques from the ground literature**. However, proposed methods should be measurable and logically address the objective(s.) • All elements of the methods section are presented	• Most elements of the methods are presented. • Most of the information is relevant and organized correctly.	• The paper does not provide a scientifically sound and reasonable method to address the objective(s) of the project.
References (x1) ---/10 points	• Articles are clearly cited throughout the proposal. • Demonstrate a thorough review of the literature (relevant number of references). • References are listed at the end in a consistent format. • Students can choose one citation format of their own but must stay consistent with that format.	• Provided references but not thoroughly. • Inconsistent format for citation • The information cited is outdated.	• Do not provide adequate references and citations of the literature. • Does not meet the format requirement

Appendix D. Final presentation rubric

100 points total	Exemplary (10 points)	Accomplished (8 points)	Needs Improvement (3 points)
Organization (x2.5) Pts: ---/25	Information presented in a logical, interesting sequence is accurate and comprehensive	Information in a logical sequence, is accurate and comprehensive, though minor errors may be present	Cannot understand presentation; content is not accurate and not comprehensive
Presenter Knowledge (x2.5) Pts: ---/25	Demonstrates full knowledge by answering all questions with explanations and elaborations	At ease with expected answers to questions but does not elaborate	Does not have a grasp of the information Cannot answer questions about subject
Visual Aid (x2.5) Pts: ---/25	Sufficient but not overwhelming detail. Adds to presentation meaningfully.	Relate to text and presentation, lacks sufficient detail or overwhelming amount of detail.	Visual aid distracts from presentation,
Professional Presentation (x2.5) Pts: ---/25	Maintains eye contact and pronounces/spells all terms precisely. Speech is clear with appropriate volume. Meets time requirements.	Maintains eye contact most of the time and pronounces/spells most words correctly. Speech is clear, but volume is too quiet/loud at times. Meets time requirements.	Reads with no eye contact and incorrectly pronounces/spells terms. Speech is unclear and volume is not appropriate most of the time. Does not meet time requirements.