

# THE DANIEL K. INOUE COLLEGE OF PHARMACY SCRIPTS

## Creating a Curriculum to Prepare Pharmacists for Practice in an Evolving Health Care Environment

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### Abbreviations

CTT = curriculum transformation team  
DKICP = Daniel K. Inouye College of Pharmacy  
SLO = Student Learning Outcomes

### Background

The inaugural class enrolled at the University of Hawai‘i (UH) at Hilo, The Daniel K. Inouye College of Pharmacy (DKICP) in 2007. The framework of the curriculum has been altered periodically yet remains largely intact. The Accreditation Council for Pharmacy Education provides accreditation standards for pharmacy colleges/schools that are updated intermittently to reflect the changing role of the pharmacist and the health care field. The current standards were implemented in 2016 with the next revision scheduled for implementation in 2025. The DKICP undertook a curricular revision to design a contemporary curriculum congruent with anticipated changes in the 2025 standards. Along with the contemporary curriculum, a continuous quality improvement process has been incorporated allowing for curriculum revision agility as the health care environment evolves. This curricular revision brings DKICP’s curriculum into better alignment with other colleges of pharmacy who have undergone recent curricular revisions.

### How We Did It

In Fall 2020, DKICP established the Curriculum Transformation Team (CTT). The team gathered and analyzed internal and external data and reviewed other programs with recently revised curricula. The first phase of the curriculum transformation was the creation of the draft student learning outcomes (SLOs) by the CTT. The goal of the SLOs was to describe knowledge, skills, and abilities a graduate of the DKICP would attain and was a

critical piece to guide the development of the curriculum. The CTT reviewed SLOs from several other colleges and discussed key attributes necessary for pharmacists. The SLOs were presented to the faculty in February 2021 where input was given, and revisions were made.

The pharmacy practice and pharmaceutical sciences departments initially provided 5 curricular improvement suggestions. The CTT also requested that the college’s curriculum committee map the current curriculum to the new proposed SLOs and national pharmacy standards. After reviewing this information and analyzing other programs’ successful curricula revisions, the CTT created a draft curriculum framework. The first curriculum retreat in June 2021, focused on the importance of curricular revision, the revised SLOs, and a data analysis summary. An activity discussing strengths, challenges, and ideas for the framework draft was conducted. To gather input from additional college stakeholders, retreat guests included preceptors, alumni, and a UH Mānoa John A. Burns School of Medicine faculty member.

After the first retreat, 5 different color-coded workgroups were established in July 2021 by the CTT (**Figure 1**). The CTT provided expectations and charges to each group. Workgroups included faculty, staff, preceptors, alumni, and fourth-year students. Once the workgroups developed recommendations for the assigned courses, a survey was sent to capture feedback on recommendations from all workgroups. Throughout the process all participants had access to workgroup documents and course syllabi and were able to provide feedback to the workgroups.

The second retreat, held in September 2021, began with an overview of the “why” process, project timeline, and brainstorming activities to capture input and ideas. Discussions included maximizing limited curricular space to meet students’ needs, framework revisions, and credit hour allocation. The workgroups

Contemporary Curriculum Workgroups:	
BLUE GROUP	Courses focusing on pharmaceutical science/pharmacotherapy/critical thinking
PURPLE GROUP	Courses focusing on comprehensive cases/skills/calculations/drug information
GREEN GROUP	Courses focusing on social administrative behavioral sciences
PINK GROUP	Experiential education
YELLOW GROUP	Prerequisites

Figure 1. Workgroup Descriptions

reported their progress on the assigned charges. Retreat guests included preceptors, alumni, and a medicinal chemistry faculty member from another college of pharmacy.

After the second retreat, the CTT took the input and distributed a revised curriculum framework to the workgroups. Additional preceptors were added to enable further input from our stakeholders and community. As initial workgroup charges were completed, members were reassigned to other workgroups.

The third retreat, held in November 2021, focused on external stakeholders' opinions on essential curriculum components to prepare graduates for current and future career success. During the activity, participants reviewed infectious disease pharmacotherapy syllabi from other schools as an example to discuss their strengths, weaknesses, and opportunities. Workgroups presented their work to-date followed by discussion to inform retreat participants of project progression. Guests included pharmacy managers, DKICP alumni, and a medicinal chemistry faculty member from another college of pharmacy. Afterward, additional charges and syllabi templates were sent to the workgroups. These templates helped faculty begin creating draft syllabi including course descriptions, credit hours, type of contact hours, and grade format. As the implementation of the contemporary curriculum was scheduled for the Fall 2023 semester, the curriculum framework and draft syllabi the submissions deadline from the university registrar's office was October 1, 2022.

At the fourth retreat in January 2022, preceptors, alumni, and pharmacy managers discussed responses for the question, "What must be in courses to create successful graduates now and in the future?" Guests included the same medicinal chemistry faculty member from the previous retreat and a former pharmacy practice faculty from another school. Each workgroup reviewed syllabi from the other groups and indicated strengths, areas to strengthen, and how to improve it. Progress and trends were also discussed.

The fifth and final retreat in February 2022 included the same 2 guest faculty who provided input into curricular transformation trends and their experience with curricular revisions. Participants gave input on syllabi and brainstormed electives for this revised curriculum.

## Results

The draft curriculum package which included the SLOs and the contemporary curriculum framework were presented at the college meeting on March 24, 2022. Time was allotted for discussion. An anonymous vote to approve the curriculum occurred on April 28, 2022 via an electronic platform to maximize participation and passed by a majority vote. The revised curriculum is set to be implemented in Fall 2023 (**Figure 2**).

The SLOs approved by the faculty are listed in **Table 1**. The SLOs incorporated forethought to best prepare students to not only be skilled pharmacists but to be resilient and lead in the ever-changing world of pharmacy. Incorporating SLOs that encompass leadership and innovation skills makes the SLOs pertinent today and for the future and encourages periodic curricular adjustments that would continue to produce high-functioning pharmacists.

Another important component of the SLOs was creating a unique identity to separate DKICP from other programs. The UH System strives to be the world's top-tier Indigenous serving institute. The UH System recognizes their responsibility to the Indigenous people of Hawai'i. To support this goal, UH created the Hawai'i Papa O Ke Ao (HPOKA) plan which outlines the goals and objectives to meet the higher education needs of our Indigenous people.<sup>1</sup> The main thematic goals are leadership development, community engagement, and Hawaiian culture and language parity. Incorporating pertinent Hawaiian values into the SLOs was a first step in recognizing and working towards the goals of HPOKA at the DKICP. In addition, it provided an opportunity for DKICP to develop a unique identity, and for students to have unique cultural experiences that are not offered at other programs. The first SLO is the Hawaiian value *pono*, which has many different meanings depending on the context in which it is used. In the SLO, *pono* refers to high moral qualities, excellence or doing things the proper way.<sup>2</sup> *Pono* is a key Hawaiian cultural value and is an important quality for a pharmacist to have, as it is part of the original and updated DKICP Oath of a Pharmacist.<sup>3</sup>

The SLOs were also mapped to different national organization standards for accreditation requirements, objectives for the national licensing exam, and activities that a pharmacist

P1 FALL SEMESTER 2023				P1 SPRING SEMESTER 2024								
Cornerstone of Pharmacy & Science - 1st 2weeks	Cornerstone of Pharmacy & Science			2								
	Pharmacology/Medicinal Chemistry I			3								
	Pharmaceutical Formulations I			2								
	Foundational Pharmaceutical Biochemistry - 7 weeks			2								
	Foundational Pharmaceutical Immunology - 7 weeks			2								
	Therapeutic Problem Solving (TPS) I - Wellness/ OTC - 7 weeks			TPS II - Wellness/ OTC - 8 weeks		TPS III- FLUIDS - 8 weeks		4				
	Drug Information - 7 weeks			Evidence-Based Science and Practice I				2				
	Foundational Calculations 7 weeks			Foundational Individualized Pharmacotherapy - 8 weeks		Topics in Healthcare I - 8 weeks		2				
	Principles of Pharmacy Readiness I			Principles of Pharmacy Readiness II				1				
	IPPE I			IPPE I cont. (1 credit awarded for Spring semester only)				1				
Total credits				17				Total credits				18
<b>P1 SUMMER 2024</b>												
IPPE II COMMUNITY X 4 WEEKS (160 hours)								1				

  

P2 FALL SEMESTER 2024				P2 SPRING SEMESTER 2025								
TPS IV - Endocrine - 5 weeks	TPS V- Cardio I - 5 weeks	TPS VI - Cardio II - 5 weeks	6	TPS VII - Infectious Diseases	TPS VIII - Pulm/ Gout/ Arthr	TPS IX - GI/GU/ Nutrition	6					
Comprehensive Clinical Care II			2	Comprehensive Clinical Care III			2					
Essential Pharmacist Skills II			2	Essential Pharmacist Skills III			2					
Evidence Based Science and Practice II			2	Topics in Healthcare II			3					
Principles of Pharmacy Readiness III			1	Principles of Pharmacy Readiness IV			1					
IPPE III				IPPE III cont. (1 credit awarded for Spring semester only)			1					
Elective I			1	Elective III			1					
Elective II			1	Elective IV			1					
Total credits				15				Total credits				17
<b>P2 SUMMER 2025</b>												
IPPE IV HOSPITAL X 3 WEEKS (120 hours)								1				

  

P3 FALL SEMESTER 2025				P3 SPRING SEMESTER 2026								
TPS X - Onc/Heme	TPS XI - Psychiatric/ Neuro	TPS XII Pain/Derm/ Ophth	6	TPS XIII - Special Populations	TPS XIV - Womens/Mens Health	TPS XV - Advanced Dx	6					
Comprehensive Clinical Care IV			2	Comprehensive Clinical Care V			2					
Essential Pharmacist Skills IV			2	Essential Pharmacist Skills V			2					
Pharmacy Informatics and Technology			2	Topics in Healthcare III			3					
Principles of Pharmacy Readiness V			1	Principles of Pharmacy Readiness VI			1					
IPPE V				IPPE V cont. (1 credit awarded for Spring semester only)			1					
Elective V			1	Elective VII			1					
Elective VI			1	Elective VIII			1					
Total credits				15				Total credits				17

  

P4 APPE Year 2026-2027		
Ambulatory Care	6	
Community	6	
Hospital	6	
Acute Medicine	6	
Elective I – Clinical Patient Care	6	
Elective II – General I	6	
Elective III – General II	6	
Board Exam Review	1	
	43	
Total credit hours in the DKICP Doctor of Pharmacy curriculum		144
Total IPPE contact hours		340
Total APPE contact hours		1680

Figure 2. Contemporary Curriculum Framework

Table 1. Student Learning Objectives
<b>1. Pono (Hawaiian word meaning excellence, moral qualities, correct): Live and practice professional conduct in the proper way</b>
1.1 Ensure optimal health outcomes for people of all cultures, races/ethnicity, genders, lifestyle habits and socioeconomic levels
1.2 Demonstrate personal and professional attributes of an ethical, reflective, and responsible pharmacist
<b>2. Demonstrate and apply the foundational knowledge and skills of contemporary pharmacy practice</b>
2.1 Demonstrate expertise in medication use and delivery, population health, and practice
2.2 Access, evaluate, and apply relevant scientific and patient centered knowledge and information to support evidence-based healthcare
2.3 Utilize electronic and other technology-based systems and evaluate its impact on patient safety, efficiency, privacy, and patient and health care services
2.4 Think critically, prioritize effectively, identify and implement solutions
2.5 Demonstrate strong decision-making skills and the ability to justify those decisions
2.6 Deliver quality health care through health promotion and disease prevention
2.7 Utilize an integrative health approach to treating the whole patient with a wide range of preventive and treatment modalities
<b>3. Collaborate with other healthcare professionals to provide optimal patient care</b>
3.1 Demonstrate mutual respect, understanding and the value of working as a team in the delivery of patient-centered care
3.2 Learn with and from other healthcare professionals
3.3 Educate others on the role of the pharmacist in improving health outcomes
<b>4. Communicate and educate effectively with individuals and groups</b>
4.1 Educate, advocate, and collaborate utilizing effective and professional communication
4.2 Read/interpret and listen using effective communication to identify and manage problems and foster collaborative care
<b>5. Lead, innovate and create through professional development</b>
5.1 Drive and manage discovery, innovation, and entrepreneurship to improve patient care and advance the pharmacy profession

performs, to ensure the graduates would meet the qualifications to practice pharmacy.<sup>4-6</sup>

The revised curriculum allows for threading of topics, such as communication and calculations, throughout the curriculum contributing to cumulative application, scaffolding, and relational learning. The first year (P1) Fall semester includes foundational science courses such as biochemistry and immunology delivered using a “block” format. This allows the course to still have the same number of content hours, but more concentrated in a shorter time frame.

A course called Principles of Pharmacy Readiness occurs every semester for 3 years and includes introducing the practice of pharmacy, clinical reasoning, interprofessional education skills and activities, communication, professional development, leadership, and other developmental activities.

The Therapeutic Problem Solving (TPS) course series begins in the P1 Fall semester and ends in the third year (P3) Spring semester. Each 2-credit TPS block focuses on the pharmacotherapy related to disorders of a specific organ system, applying pathophysiology, pharmacology, and medicinal chemistry concepts. This holistic approach fosters the development of a comprehensive clinical understanding to prevent and manage these diseases. Students will develop their ability to apply evidence-based medicine to provide medication-related,

patient-centered, and population-based care. Finally, concepts such as pharmacokinetics, pharmacogenomics, toxicology, immunology, and diversity, equity, and inclusion (DEI) will be threaded as appropriate so students can build upon their previously learned knowledge.

Application of knowledge is the focus of the Comprehensive Clinical Care (CCC) courses, which run alongside the TPS courses. The courses run from P1 Spring through P3 Spring and focuses on students applying their knowledge and critical thinking skills to patient case scenarios to mimic real life situations. Patient cases in CCC become more complex as students progress through the program. Application, repetition, threading, and scaffolding of key components such as pharmacy law, calculations, communication, and DEI will be intentionally included.

Essential Pharmacist Skills is another course series that will run from P1 Spring through P3 Spring. This is a lab style course that includes topics skills such as pharmacy compounding, immunization technique, mock pharmacy simulation, medication counseling, intravenous drug compatibility, and point of care testing.

Topics in Health Care is a 3-course series that will occur each Spring semester from P1-P3 year. Topics include US health care systems, law, insurance overview, medication safety, phar-

macroeconomics, ethics, DEI, management, and introduction to technology. This course series is important to help students gain an understanding of the environment they practice in and factors that contribute to medication access issues.

A Pharmacy Informatics and Technology course will be part of the P3 year covering technological topics such as clinical decision support, computerized provider order entry, e-prescribing, telepharmacy, bedside barcoding, automated dispensing cabinets, inventory management systems, smart pumps, and robotic automation. This course exposes student pharmacists to how technology supports a pharmacist and helps to improve health care delivery.

Throughout the P1-P3 years, students will engage in longitudinal Introductory Pharmacy Practice Experiences (IPPEs). Students will complete these rotations at clinics, hospitals, and pharmacies throughout the Fall and Spring semesters in East Hawai'i Island, as well as during summers throughout the state. The contemporary curriculum increases the IPPE hours in the curriculum, which will provide students with more real-life experience to complement the didactic courses.

The final fourth year consists of Advanced Pharmacy Practice Experiences (APPEs) and a 1 credit Board Exam preparatory course which ensures students are prepared for the North American Pharmacist Licensure Examination (NAPLEX) and the Multistate Pharmacy Jurisprudence Examination (MPJE). Students will complete 7 APPE rotations as compared to 6 in the current curriculum, providing an extra required clinical elective, increasing opportunities to apply and strengthen their skills in real life settings.

The total credit hours in the revised framework of the contemporary curriculum is 144 hours as compared to 137.

## Implication

The pharmacy landscape has dramatically changed in the past 10 years and pharmacists have moved from working behind the scenes to practicing at the top of their license. Pharmacists routinely provide direct patient care improving patient outcomes. Guided by our SLOs, our contemporary curriculum ensures graduates are practice ready now and in the future. While we do have predictions of what the future of pharmacy may hold based on trajectories and trends, there will also be changes that we cannot predict or teach in the curriculum. One example was how pharmacists adapted during the COVID-19 pandemic. In our curricular redesign, we ensured that we instill a continuous improvement mindset in our graduates, so they continue developing beyond the classroom. It is imperative future pharmacists meet changing patient care needs while simultaneously leading innovation.

## Future Directions

The new contemporary curriculum will take effect in August 2023 with the incoming professional year-1 class. Student, faculty, and community partners will provide valuable feedback informing sustainment and improvement initiatives. The curricular transformation process is iterative, and we anticipate continuous refinement. Potential areas for expansion include the development of electives in specialty areas such as critical care, advanced genomics, and geriatrics. The first class that will graduate with the contemporary curriculum will be in May 2027.

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