



UCSF School of
Pharmacy

2018 and Beyond Curriculum Prospectus





Why Curriculum Change	4
Program Objectives	5
Core EPAs for New Graduates	7
Curriculum Overview	8
Curriculum Blueprint	11
Assessment Strategy	12
Course Objectives	14
Integrated Theme Conditions	27
Course Credit Units	28

Table of Contents



UCSF PharmD graduates are recognized for excellence, and considered as innovators, leaders and ambassadors for the pharmacy profession.

Why Curriculum Change

Change is the norm for the PharmD curriculum at the UCSF School of Pharmacy. Our leadership in pharmacy education requires that our curriculum constantly evolves, and this is evermore urgent today. Rapid advances in science and technology, dramatic changes in the nation's health, how health care is delivered and who delivers it, who will have access to care—all of these forces are driving curriculum change.

These forces are also creating leadership opportunities for our future graduates who will build on their pharmacy expertise with additional advanced training. The curriculum for 2018 and beyond will prepare graduates to be critical thinkers, problems solvers, and collaborators—who will lead the way in today's dynamic health care environment, toward better health for all.





Program Objectives

Domain 1 – Foundational Knowledge

1.1. Learner (Learner): Develop, integrate, and apply knowledge from the foundational sciences (i.e., **pharmaceutical, social / behavioral / administrative, and clinical sciences**) to evaluate the scientific literature, explain drug action, solve therapeutic problems, and advance population health and **patient-centered care**.

Domain 2 – Essentials for Practice and Care

2.1. Patient-centered care (Caregiver): Provide **patient-centered care** as the medication expert (collect and interpret evidence, prioritize, formulate assessments and recommendations, implement, monitor and adjust plans, and document activities).

2.2. Medication use systems management (Manager): Manage patient healthcare needs using human, financial, technological, and physical resources to optimize the safety and efficacy of medication use systems.

2.3. Health and wellness (Promoter): Design prevention, intervention, and educational strategies for individuals and communities to manage chronic disease and improve health and wellness.

2.4. Population-based care (Provider): Describe how **population-based care** influences **patient-centered care** and influences the development of practice guidelines and evidence-based best practices.

Domain 3: Approach to Practice and Care

3.1. Problem Solving (Problem Solver): Identify problems; explore and prioritize potential strategies; and design, implement, and evaluate a viable solution.

3.2. Educator (Educator): Educate all audiences by determining the most effective and enduring ways to impart information and assess understanding.

3.3. Patient Advocacy (Advocate): Assure that patients' best interests are represented.

3.4. Interprofessional collaboration (Collaborator): Actively participate and engage as a healthcare team member by demonstrating mutual respect, understanding, and values to meet patient care needs.

3.5. Cultural sensitivity (Includer): Recognize **social determinants of health** to diminish disparities and inequities in access to quality care.

3.6. Communication (Communicator): Effectively communicate verbally and nonverbally when interacting with an individual, group, or organization.

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Domain 4 – Personal and Professional Development

- 4.1. Self-awareness (Self-aware):** Examine and reflect on personal knowledge, skills, abilities, beliefs, biases, motivation, and emotions that could enhance or limit personal and professional growth.
- 4.2. Leadership (Leader):** Demonstrate responsibility for creating and achieving shared goals, regardless of position.
- 4.3. Innovation and Entrepreneurship (Innovator):** Engage in innovative activities by using creative thinking to envision better ways of accomplishing professional goals.
- 4.4. Professionalism (Professional):** Exhibit behaviors and values that are consistent with the trust given to the profession by patients, other healthcare providers, and society.

Interprofessional Education (IPE) Outcomes

- IPE-1.** Use the knowledge of one's own role and the roles of other health professionals to appropriately assess and address the health care needs of the patients and populations served.
- IPE-2.** Communicate with other health professionals in a responsive and responsible manner that supports a collaborative approach to the maintenance of health and the treatment of disease in individual patients and populations.
- IPE-3.** Work with other health professionals to establish and maintain a climate of mutual respect, dignity, diversity, ethical integrity, and trust.





Core Entrustable Professional Activities (EPAs) for New Pharmacy Graduates

Patient Care Provider Domain

- Collect information to identify a patient's medication-related problems and health-related needs.
- Analyze information to determine the effects of medication therapy, identify medication-related problems, and prioritize health-related needs.
- Establish patient-centered goals and create a care plan for a patient in collaboration with the patient, caregiver(s), and other health professional that is evidence-based and cost-effective.
- Implement a care plan in collaboration with the patient, caregivers, and other health professionals.
- Follow-up and monitor a care plan.

Interprofessional Team Member Domain

- Collaborate as a member of an interprofessional team.

Population Health Promoter Domain

- Identify patients at risk for prevalent diseases in a population.
- Minimize adverse drug events and medication errors.
- Maximize the appropriate use of medications in a population.
- Ensure that patients have been immunized against vaccine-preventable diseases.

Information Master Domain

- Educate patients and professional colleagues regarding the appropriate use of medications.
- Use evidence-based information to advance patient care.

Practice Manager Domain

- Oversee the pharmacy operations for an assigned work shift.
- Fulfill a medication order.

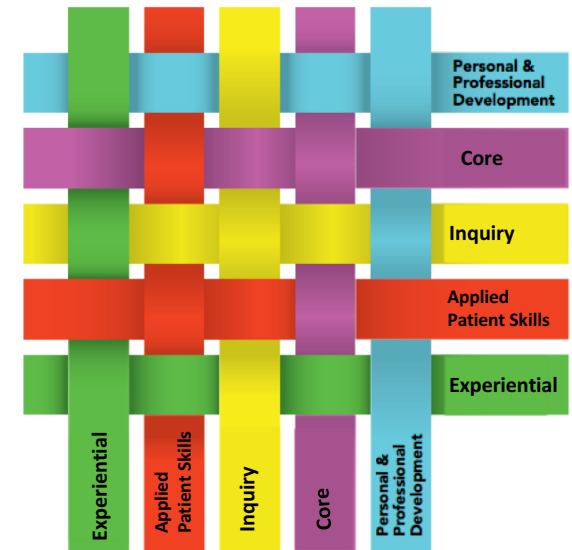
Self-Developer Domain

- Create a written plan for continuous professional development.

Curriculum Overview

Effective with the cohort of students entering in summer 2018 and beyond, the time to completion for the UCSF Doctor of Pharmacy (PharmD) degree program **will shorten from four years to three years**. While actual overall enrollment time (12 quarters) for students will remain unchanged, the degree program transformation includes an entirely new curricular architecture and delivery model. Content originally housed within traditional discipline-specific courses has been integrated for delivery within physiological-systems-based course blocks of varying lengths, called **integrated themes**.

Each integrated theme includes two intertwined threads—a core Science and Therapeutics thread composed of the basic, clinical, and social sciences, and an **Inquiry** thread that exposes students to the latest developments and innovations in science and practice. The capstone for the Inquiry thread will be a **Discovery** (research) project. Students experience each Integrated Theme coupled with two other courses—an **Applied Patient Care Skills** (APCS) lab course and an **Introductory Pharmacy Practice Experience** (IPPE) course—before matriculating into **Advanced Pharmacy Practice Experiences** (APPEs). **Synthesis weeks** are strategically placed after most



Vertical and horizontal integration are embedded within the curriculum.

integrated themes to serve as protected time that promotes improved knowledge organization and connectivity. At the conclusion of the P1 and P2 years, students will complete a **progress exam** to demonstrate competency of knowledge and skills acquired.



Synthesis Weeks



Synthesis weeks are designed to function as protected time during the didactic curriculum in order to promote improved knowledge organization and connectivity through active learning, learning from experience, learner motivation and responsibility, and learner self-awareness/mindfulness. Strategically placed during the P1 and P2 academic years, synthesis weeks naturally fall after most integrated themes. No new/additional content will be taught to students during a synthesis week and intentional reflection by students on their learning and classroom performance will take place to identify ways in which students can improve their personal performance and gain leadership skills.

Applied Patient Care Skills

The Applied Patient Care Skills (APCS) course is a longitudinal series that complements the core, inquiry, and experiential education elements of the curriculum. The purpose of the APCS course is to help students further build upon their knowledge to care for patients as a whole and enhance communication skills with patients and other healthcare providers both orally and in writing. The APCS course is fully case-based and will focus on advancing 3 domains: hands-on skills, communication skills, and critical thinking skills.



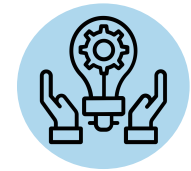


Inquiry Thread



Tremendous advances in molecular and cellular research in recent decades have dramatically increased the pace of scientific discovery, providing new insights into mechanisms of disease and new approaches for treatments and cures. As these advances continue to accelerate, healthcare professionals must be prepared to routinely evaluate new evidence and adapt their practice to a constantly evolving scientific landscape. The Inquiry curriculum is a longitudinal thread designed to help students articulate how different types of scientific inquiry impact identification of clinical problems and their therapeutic solutions, and develop skills to critically read and evaluate new scientific evidence for disease mechanisms and the use of drugs. The Inquiry curriculum will be fully integrated over the 3-year program beginning with introduction to fundamental principles and skills in Foundations and merging with each theme through Inquiry sessions linked to clinical cases, journal clubs, frontiers lectures and scientific debates. As the curriculum proceeds, inquiry sessions will evolve so students are challenged to apply their skills in more advanced ways with each subsequent theme.

Discovery Project



The capstone for the Inquiry curriculum is the Discovery project. Over the course of the Inquiry curriculum, students will learn to identify gaps in knowledge associated with biomedical problems and their treatments and how to design studies to address these gaps through new scientific inquiry. In their P2 year, students will be given the opportunity to join a cohort of students with similar interests to focus on skill building for projects associated with a specific field of interest. Examples may include but are not limited to research related to clinical pharmacology, (e.g., pharmacogenetics), public health, pharmacy education, policy, etc. In many cases, the Discovery project will be completed in the context of a student's clinical site rotations (i.e. APPEs), but some students may elect to spend focused time to develop a more basic or translational research project. Timeline for project development and approval will be during the P2 year of the curriculum while project implementation and completion will occur during P3 year. A primary goal for the Discovery project is that all students will disseminate their findings through oral presentations and/or publication.



Curriculum Blueprint

Practice Experiences

- IPPE: Introductory Pharmacy Practice Experiences
- APPE: Advanced Pharmacy Practice Experiences

Integrated Themes

- Sci+Ther: Science and Therapeutics
- Inquiry, Immersion, Discovery Project, and Presentation

Orientation

- APCS: Applied Patient Care Skills
- Foundations
- Synthesis and Assessment
- Progress Exams
- Licensure Exam Review





Assessment Strategy

Assessments take place throughout a theme and will include multiple choice questions (MCQs), short answer written questions, Objective Structured Clinical Examinations (OSCEs), oral, online simulations and team/individual projects. Assessment modes are appropriate to the different types of learning outcomes (knowledge, skills and attitudes) and assessments are carefully blueprinted to the course material for each theme.

Each theme will contain 1-2 out-of-class formative assessments per week.

These will not be formally scored, however, students will be required to complete all of these assessments and student completion will be monitored.

There will be 2-4 summative assessments per theme.

Questions on a summative assessment will be similar in style and scope to 'in class' discussion problems and designed to assess thinking processes and NOT recall. Each summative assessment will be created with correct model answers and the rubric for grading will be:

- Meets criteria
- Borderline
- Does not meet criteria

All assessments will be tagged to the PharmD program outcomes, as well as other taxonomies for student learning and performance. Tagging will ensure the program can accurately map both the curriculum and assessment of student learning and performance.

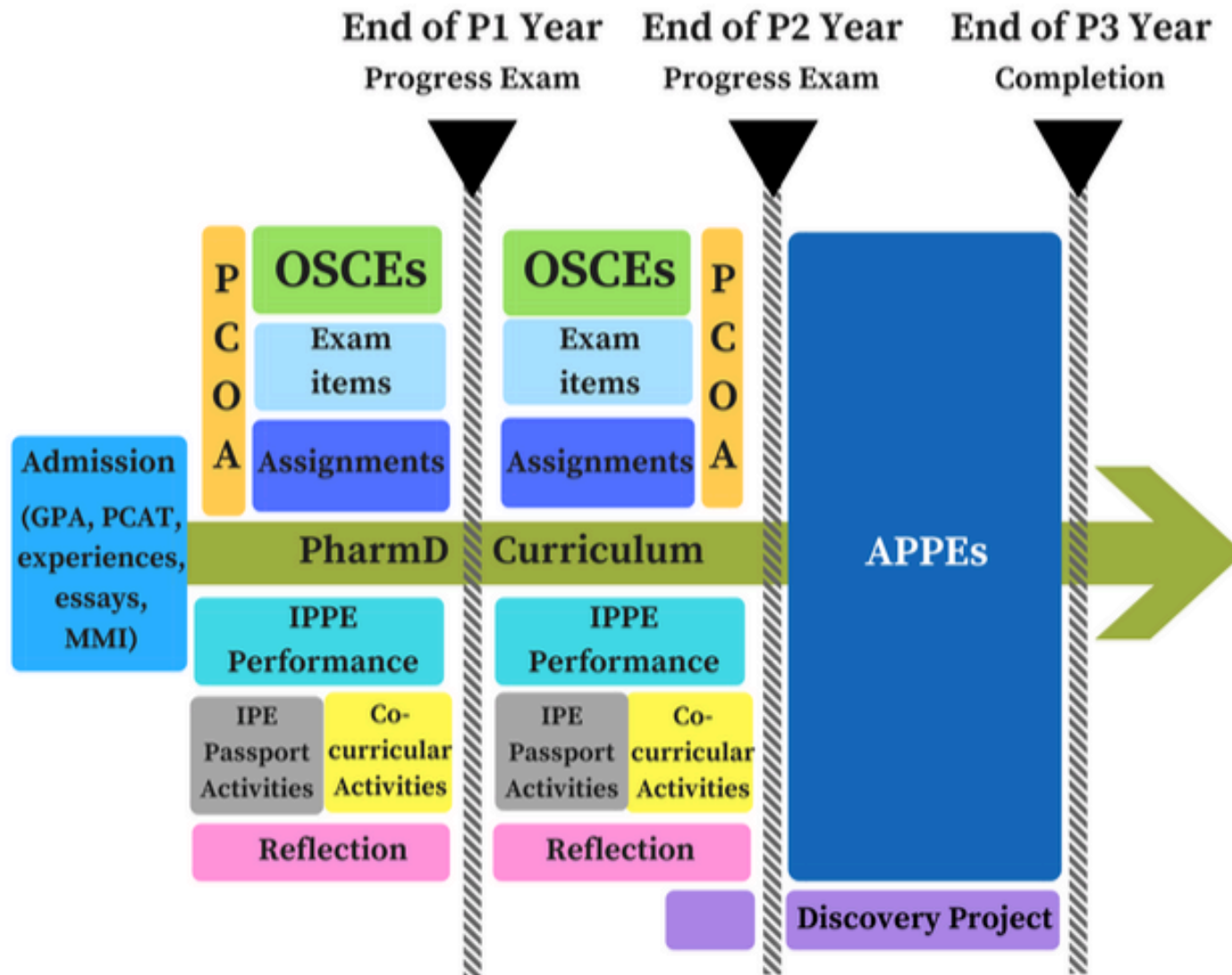
Students who do not get a passing score on summative assessments that occur during a theme will have two opportunities to demonstrate proficiency.

Following the P1 and P2 years, progress exams will assess the complete knowledge/skills/abilities expected of students upon completion of the academic year. Such assessments will provide evaluation of development and sustainability of the student learning process.

Experiential (IPPE/APPE) assessment will employ the use of performance evaluation forms (incorporating new instrumentation that includes EPAs and a corresponding performance rubric) and checklists for student performance-related activities for experiential courses.



PharmD Student Progression



GPA: Grade Point Average, **PCAT:** Pharmacy College Admission Test, **MMI:** Multiple Mini Interview, **PCOA:** Pharmacy Curriculum Outcomes Assessment, **OSCE:** Objective Structured Clinical Examination, **IPPE:** Introductory Pharmacy Practice Experience, **IPE:** Interprofessional Education, **APPE:** Advanced Pharmacy Practice Experience.



Foundations I Course Objectives

Therapeutic Sciences

1. Compare and contrast mechanisms by which humans maintain homeostatic balance in the context of a changing environment and address the relationship between disruption of this balance and disease.
2. Differentiate the roles of the circulatory, gastrointestinal, hepatic and renal systems in drug absorption, distribution, metabolism and elimination.
3. Apply thermodynamic and kinetic principles to describe the interaction of drugs with their cellular targets and their disposition in the body.
4. Quantify relationship between drug absorption, membrane transport, metabolism, pharmacokinetics and the efficacy and toxicity of a given drug.
5. Explain the major mechanisms underlying interindividual variability in drug response.
6. Describe how basic and translational science inform which drug and dose are best to treat disease.

Health Care Systems and Pharmacy Practice

1. Identify and explore some of one's own implicit biases.
2. Define key constructs related to cultural competence.
3. Identify characteristics of leadership and management.
4. Demonstrate skills integral to leadership development including communication, conflict management, self-awareness, and working with teams.
5. Create an individual leadership development plan.
6. Describe pharmacy federal and state laws and regulations and how they pertain to pharmacists' responsibilities.
7. Describe the role of state boards of pharmacy.
8. Explain how health policies contribute to health systems.
9. Develop strategies to create policy change.
10. Apply knowledge of US health care infrastructure and systems to selecting health plans and drug coverage for patients.

Evidence-Based Health Care (EBHC)

1. Search available resources and references to identify key databases and select search terms.
2. List some determinants of health and recognize how individual determinants of health affect population health.
3. Describe the concepts of normal distribution, population, and sample and interpret the statistical and clinical significance of basic statistical tests.
4. Assess measures of disease frequency, person, place and time and interpret the measurement of drug exposure, disease outcome and adverse events.
5. Begin to critically evaluate and communicate drug information and methodological quality of varying study designs.
6. Compare the strength of the evidence of studies of varying designs.

Professional Success

1. Explain the goals, expectations and competencies of the PharmD curriculum for 2018 and beyond.
2. Identify and begin to apply learning strategies essential for success in an integrated, inquiry based curriculum.
3. Describe the tenants of professionalism as they apply to the UCSF PharmD learning community, practice experiences, and professional development.
4. Implement a foundation for self-care and wellness during the PharmD program.



Cardiovascular Theme Course Objectives

1. Describe the anatomical structures, biochemical pathways, and physiologic processes responsible for maintenance of cardiovascular system homeostasis and predict the consequences of dysregulation within the cardiovascular system.
2. Describe the pathophysiological processes of the following cardiovascular conditions: ischemic heart disease, dyslipidemia, heart failure, cardiac arrhythmias (i.e., atrial fibrillation, ventricular tachycardia/fibrillation, and bradycardia).
3. Apply the understanding of biomedical sciences, pharmaceutical sciences, and clinical sciences to identify abnormal clinical findings and laboratory findings and to assess for appropriate drug response.
4. For drugs used for the treatment of 4 cardiovascular conditions (i.e., ischemic heart disease, dyslipidemia, heart failure, and arrhythmias) discussed in the course, describe structure-activity relationship, mechanism of action at a receptor or enzyme level, how mechanism of action modulates relevant biological signaling cascades, and how understanding of protein-structure function helps with drug recognition and optimization in the drug discovery process.
5. Collect and assess relevant patient information and determine the patient's appropriate treatment needs for a cardiovascular condition (i.e. immediate medical care, self-care, and management by pharmacist) based on the patient's symptom presentation, risk factors, laboratory findings, co-morbidities, and preferences.
6. Collect relevant patient information, assess current treatment and, when appropriate, develop and recommend alternative pharmacological treatments for a patient with a cardiovascular condition by applying biomedical sciences, pharmaceutical sciences, clinical sciences, and social/behavioral administrative sciences.
7. Apply pharmacokinetic, pharmacodynamic, and pharmacogenomic knowledge to optimize therapy with a cardiovascular medication such as simvastatin, digoxin, warfarin, and clopidogrel.
8. Identify and recommend appropriate non-pharmacological treatment options including lifestyle changes (e.g, diet/nutrition, exercise, stress reduction etc) for a patient with a cardiovascular condition by considering strength of literature evidence, side effects, patient preference, interactions with concomitant medications, and cost.
9. Describe specific medication use policies to improve the safe use of anticoagulants within the inpatient setting.
10. Describe major disparities in health and healthcare as they exist along axes of gender identity, race, ethnicity, disability, geography, language, nativity, and sexual orientation.
11. Identify the social, administrative, and cultural issues (e.g., socioeconomic status, health insurance) that affect the progression of a cardiovascular disease and provision of care; and apply this knowledge to modify appropriate individual treatment options.
12. Apply relevant federal and state laws that govern the profession of pharmacy within the research and clinical activities of cardiovascular therapeutics.
13. Compare, analyze, interpret, and apply cardiovascular studies to optimize treatment for patient with a cardiovascular condition.





Respiratory Theme Course Objectives

1. Describe the incidence and prevalence of: tobacco usage, colds/flu, rhinitis, asthma, COPD, VTE/PE.
2. Assess the determinants of: tobacco usage, colds/flu, rhinitis, asthma, COPD, VTE/PE.
3. Describe the anatomical structures, biochemical pathways and physiologic processes responsible for maintenance of metabolic homeostasis of blood gases and pH, and explain the mechanisms and predict consequences of dysregulation within the context of: cough, asthma, chronic obstructive pulmonary disease, VTE, PE, and cystic fibrosis.
4. For drugs used for the treatment of major respiratory conditions (i.e., allergy/rhinitis, Asthma/COPD, Cough/Cold/Flu and VTE/PE) and smoking cessation, describe structure-activity relationship, mechanism of action at a receptor or enzyme level, how mechanism of action modulates relevant biological signaling cascades, and how understanding of protein-structure function helps with drug recognition and optimization in the drug discovery process.
5. Apply principles of biochemistry, physiology, and anatomy to interpret abnormal clinical and laboratory findings to assess drug response (i.e., efficacy and toxicity) and refer patient for additional evaluation, as needed.
6. Perform thorough medication reconciliation and counsel on discharge medications for a patient with a respiratory condition in an effective, efficient, clear, and organized manner.
7. Utilize knowledge of biopharmaceutical, biomedical, behavioral and social sciences as well as clinical pharmacology (PK, PD, PG) to assess and recommend appropriate, patient-specific pharmacologic treatment(s) for a respiratory condition, including: self-care, management by pharmacist or immediate medical care.
8. Identify and recommend appropriate non-pharmacological treatment options (including smoking cessation, diet/nutrition, exercise, stress reduction and lifestyle changes) for a patient with a respiratory condition
9. Assess current treatment, recommend alternative treatment, and, when appropriate, propose optimal treatment for a patient with a respiratory disease using knowledge of pathophysiology, pharmaceutical chemistry, pharmacology, behavioral and social sciences, as well as current evidence (i.e. literature review) and justify your choices.
10. Optimize pharmaceutical care of patient with multiple respiratory diseases including consideration of co-morbidities and polypharmacy, even if specific guidelines are not available (e.g., the assessment and management of clinically relevant drug-drug interactions and/or drug-disease interaction).
11. Apply pharmacokinetic, pharmacodynamic and pharmacogenomic knowledge to optimize use and dosing of medications used to treat respiratory disease (e.g., beta agonists, muscarinic antagonists, corticosteroids, theophylline), as well as antithrombotics (e.g., DOAC, LMWH) for VTE/PE.
12. Propose ways to improve a healthcare system (focusing on improvements in team-based respiratory health care; sustainability issues).
13. Describe the drug approval process in the US and the varied roles of pharmacists in drug development.
14. Describe major disparities in health and healthcare as they exist along axes of gender identity, race, ethnicity, disability, geography, language, nativity, and sexual orientation.
15. Identify the social and structural conditions¹ that affect the progression of a respiratory disease and provision of care (e.g., patient's socioeconomic status; health literacy; insurance status); and apply this knowledge to modify appropriate individual treatment options.
16. Compare the strength of the evidence upon which most recent guidelines for respiratory conditions were developed.
17. Apply relevant federal and state laws that govern the profession of pharmacy within the research and clinical activities of respiratory conditions.



Renal Theme Course Objectives

1. Describe the anatomical structures, biochemical pathways, and physiologic processes in the kidney responsible for maintaining water and electrolyte homeostasis, and the regulation of blood pressure.
2. Describe the pathophysiological processes of hypertension and chronic kidney disease.
3. Apply the understanding of biomedical sciences, pharmaceutical sciences, and clinical sciences to identify abnormal clinical findings and laboratory findings and to assess for appropriate drug response.
4. For drugs used in the treatment of hypertension discussed in the course, describe structure-activity relationship, mechanism of action at a receptor or enzyme level, how mechanism of action modulates relevant biological signaling cascades, and how understanding of protein-structure function helps with drug recognition and optimization in drug discovery process.
5. Collect and assess relevant patient information and determine the patient's appropriate treatment needs (i.e. immediate medical care, self-care, and management by pharmacist) based on the patient's symptom presentation, risk factors, laboratory findings, co-morbidities, and preferences.
6. Collect relevant patient information, assess current treatment and, when appropriate, develop and recommend alternative pharmacological treatments for a patient by applying biomedical sciences, pharmaceutical sciences, clinical sciences, and social/behavioral administrative sciences.
7. Apply pharmacokinetic, pharmacodynamic, and pharmacogenomic knowledge to optimize medication therapy.
8. Identify and recommend appropriate non-pharmacological treatment options including lifestyle changes (e.g. diet/nutrition, exercise, stress reduction etc) for a patient by considering strength of literature evidence, side effects, patient preference, interactions with concomitant medications, and cost.
9. Discuss the effects of kidney disease on the pharmacokinetics of a drug.
10. Develop a loading and maintenance dosage regimen for a patient with CKD given patient-specific data and the relationship between the drug's pharmacokinetic parameters and patient renal function.
11. Describe the processes by which drugs are removed by hemodialysis.
12. List the factors that influence drug removal by hemodialysis including the relevant drug characteristics and dialysis conditions.
13. Rate the relative efficiency of peritoneal dialysis, conventional hemodialysis, and high- flux hemodialysis in removing drugs.
14. Describe major disparities in health and healthcare as they exist along axes of gender identity, race, ethnicity, disability, geography, language, nativity, and sexual orientation.
15. Identify the social, administrative, and cultural issues (e.g., socioeconomic status, health insurance) that affect the progression of a renal disease and provision of care; and apply this knowledge to modify appropriate individual treatment options.
16. Apply relevant federal and state laws that govern the profession of pharmacy within the research and clinical activities of renal conditions.
17. Compare, analyze, interpret, and apply scientific studies to optimize treatment for patient.



GI Theme Course Objectives

1. Identify common anatomical structures of the gastrointestinal (GI) tract and describe the biochemical pathways and physiologic processes critical for their ability to contribute to normal GI function and homeostasis.
2. Describe pathophysiological processes for the following GI conditions (e.g. oral health, nausea and vomiting, diarrhea, constipation, ulcer, gastroesophageal reflux disease (GERD), pancreatitis, inflammatory bowel disease, irritable bowel syndrome and liver cirrhosis) and their relationship to commonly presenting signs and symptoms.
3. Explain abnormal clinical and laboratory findings for each gastrointestinal condition, applying your understanding of biomedical sciences, pharmaceutical sciences and clinical sciences and how abnormalities affect drug disposition.
4. Discuss epidemiologic (e.g. geographic, social, economic, and cultural) and other risk factors for each GI condition and ways to decrease disease risk.
5. Given a patient case, gather information on patient's symptoms, risk factors, laboratory findings, and co-morbidities to assess need for therapy (i.e. self-care, pharmacist management or physician referral).
6. For drugs used to treat common GI conditions, compare and contrast mechanism of action, onset and duration of action, clinical efficacy, side effects, monitoring parameters and drug interactions.
7. Discuss how structure-activity relationships and protein-structure function helps with drug recognition and optimization in the drug discovery process.
8. Formulate and recommend a treatment plan with drug and disease specific monitoring parameters and follow up. For any treatment plan, apply clinical sciences, pharmacology and pharmaceutical chemistry principles, clinical sciences, social/behavioral administrative sciences and pharmacoeconomics.
9. Counsel a patient on the intended treatment plan, drugs to avoid, monitoring measures and follow up parameters.
10. Utilize drug information resources and identified key articles to support clinical decision-making and optimize treatment for a patient with a gastrointestinal condition.
11. Describe how current dietary supplement policy influences the efficacy, safety and marketing of supplements to consumers.
12. Apply relevant federal and state laws that govern the profession of pharmacy within the research and clinical activities of GI conditions.

Foundations II Course Objectives

1. List the key elements of a poisoning history and emergency response to poisonings.
2. Identify useful clinical signs and laboratory tests to diagnose a suspected poisoning.
3. Recognize special management considerations for poisoning patients.
4. Describe various methods for enhanced elimination of poisons.
5. Develop strategies to implement policy change.
6. Identify characteristics that reflect leadership and management.
7. Demonstrate key skills integral to leadership development including communication, conflict management, self-awareness, and working with teams.



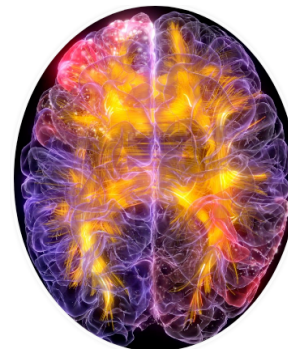
Endocrine Theme Course Objectives

1. Describe the anatomical structures, biochemical pathways, and physiologic processes responsible for maintenance of endocrine system homeostasis and describe the predicted consequences of dysregulation within the endocrine system.
2. Describe the pathophysiological processes that underlie each of the following endocrine conditions and their common presenting signs and symptoms: type 1 diabetes and type 2 diabetes, including diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS); hypothyroidism; hyperthyroidism; adrenal insufficiency, hypercortisolism; growth hormone deficiency; acromegaly; hyperprolactinemia; hypothalamic-pituitary-gonadal axis in reproduction and menopause).
3. Apply the understanding of biomedical sciences, pharmaceutical sciences, and clinical sciences to the interpretation of clinical and laboratory findings (normal and abnormal) and to assess for appropriate drug response.
4. For drugs used for the treatment of the following five endocrine conditions (i.e., type 1 diabetes, type 2 diabetes, hypothyroidism, hyperthyroidism, and adrenal inefficiency), describe the structure-activity relationship, mechanism of action at a receptor or enzyme level, how mechanism of action modulates relevant biological signaling cascades, and how understanding of protein-structure function helps with drug recognition and optimization in the drug discovery process.
5. Collect and assess relevant patient information and determine the patient's treatment needs for an endocrine condition (i.e. immediate medical care, self-care, and management by pharmacist) based on the patient's symptom presentation, risk factors, laboratory findings, co-morbidities, and preferences.
6. Collect relevant patient information, assess current treatment and, when appropriate, develop and recommend alternative pharmacological treatments for a patient with an endocrine condition by applying biomedical sciences, pharmaceutical sciences, clinical sciences, and social/behavioral administrative sciences; and refer patient for additional evaluation if needed..
7. Apply pharmacokinetic, pharmacodynamic, and pharmacogenetic knowledge to optimize therapy with an endocrine medication such as metformin, sulfonylureas, insulins, prednisone, reproductive hormones and levothyroxine.
8. Identify and recommend appropriate non-pharmacological treatment options including lifestyle changes (e.g., diet/nutrition, physical activity, stress reduction etc.) for a patient with an endocrine disorder by considering strength of literature evidence, side effects, patient preference, interactions with concomitant medications, and cost; and refer patient for additional evaluation if needed.
9. Describe specific medication use policies to improve the safe use of insulin and steroids within the inpatient setting.
10. Describe major disparities in health and healthcare, as they exist along axes of gender identity, race, ethnicity, disability, geography, language, nativity, and sexual orientation.
11. Identify the social, administrative, and cultural issues (e.g., socioeconomic status, health insurance) that affect the progression of an endocrine disorder and provision of care; and apply this knowledge to modify appropriate individual treatment options.
12. Apply relevant federal and state laws that govern the profession of pharmacy within the research and clinical activities related to endocrine conditions.
13. Compare, analyze, interpret, and apply endocrine studies to optimize treatment for a patient with an endocrine condition.



Psych/Neuro Theme Course Objectives

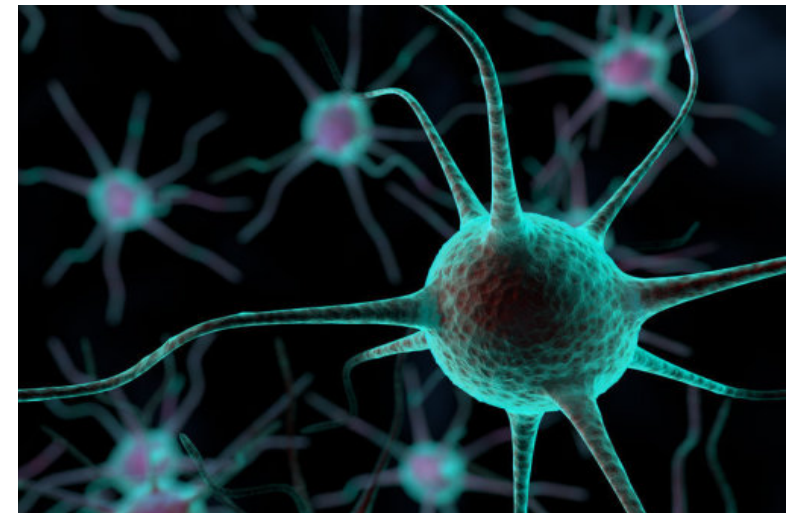
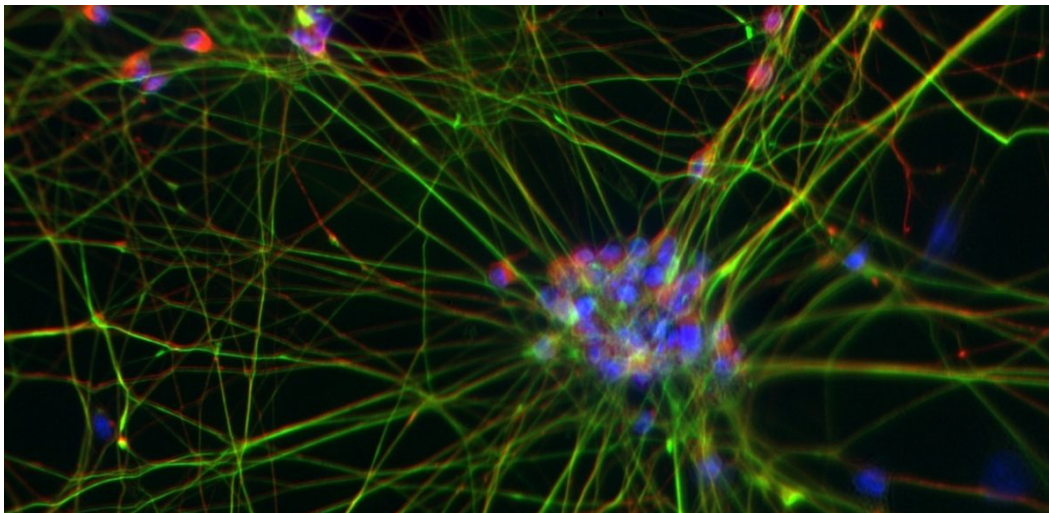
1. Use your understanding of the neuroanatomy and pathophysiology to recognize Transient Ischemic Attacks (TIA) and Cerebrovascular Accidents (CVA, or 'stroke') and to recognize associated signs and symptoms and predict the consequences of hemorrhagic or thromboembolic stroke based upon the location of the cardiovascular event.
2. Recommend, monitor and/or modify therapeutic interventions for the management of CVA by utilizing knowledge of neuroanatomy, neurophysiology, pathophysiology, biochemistry, pharmaceutical chemistry, pharmacology, pharmacokinetics, and current evidence and treatment guidelines.
3. Compare and contrast various seizure types based on the underlying neuroanatomy, neurophysiology, pathophysiology, presentation and prognosis.
4. Demonstrate a comprehensive understanding of the various antiepileptic drugs (AED) and the characteristics which determine their respective roles in controlling seizure disorders, applying principles of pharmaceutical chemistry, pharmacology, pharmacokinetics, recommended monitoring practices, and the impact of specific AED upon the metabolism of other medications.
5. Assess and determine the therapeutic needs for a patient requiring acute pain management in both inpatient and ambulatory care settings by applying principles of neuroanatomy, neurophysiology, pathophysiology, pharmaceutical chemistry, pharmacology, relative potency (e.g., equivalence required for opioid conversions) and the practical considerations inherent to the selection of specific products (e.g., patient-controlled analgesia, transdermal preparations, sustained release oral formulations).
6. Compare and contrast the different headache syndromes applying the principles of neuroanatomy, neurophysiology, pathophysiology, clinical presentation, acute therapeutic interventions, and long-term administration of medications indicated for prophylaxis.
7. Describe the neuroanatomy, neurophysiology, pathophysiology underlying the presentation of mood, anxiety, and sleep disorders, and explain how this relates to clinical presentation, prognosis, and treatment selection.
8. Recommend, monitor and/or modify a therapeutic regimen for the management of mood, anxiety or sleep disorders based upon clinical presentation, medication history, medical comorbidities, pharmacogenomics, patient preference, and current evidence & treatment guidelines.
9. Provide appropriate patient education to individuals afflicted with mood, anxiety or sleep disorders including recommendations for nonprescription products (herbals, supplements) and methods for improving sleep hygiene.
10. Demonstrate a thorough and practical understanding of the pharmaceutical chemistry, pharmacology, toxicology, and therapeutics underlying the use of antipsychotics in the management of schizophrenia, bipolar disorder and the behavioral disturbances associated with Alzheimer's dementia, Parkinson's disease and ICU psychosis.





Psych/Neuro Theme Course Objectives (...continued)

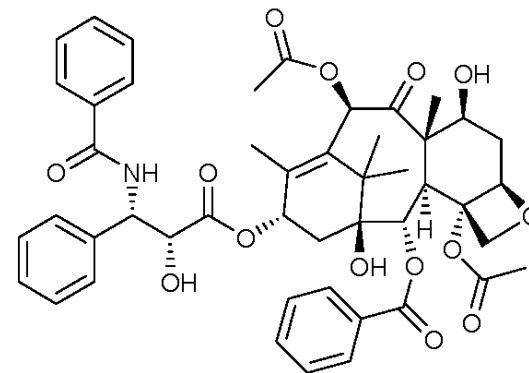
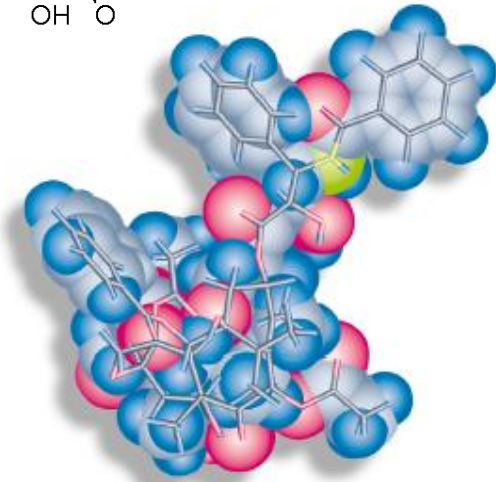
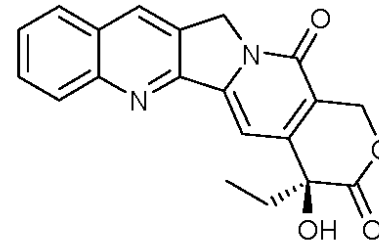
11. Recommend , monitor and/or modify therapeutic interventions for the treatment and prevention of manic and depressive episodes associated with bipolar disorder.
12. Describe the neuroanatomy, neurophysiology, and pathophysiology underlying the manifestation of Attention Deficit Hyperactivity Disorder (ADHD) and recommend a therapeutic intervention applying the principles of pharmaceutical chemistry, pharmacology, and pharmacokinetics of stimulant and non-stimulant medications.
13. Describe the pathophysiology, neurophysiology, neuroanatomy, clinical presentation and anticipated progression of neurodegenerative conditions such as Parkinson's Disease and Alzheimers Dementia, applying the principles of pharmaceutical chemistry, pharmacology, toxicity, and current evidence & treatment guidelines to select a therapeutic intervention.
14. Describe the neuroanatomy, neurophysiology and pathophysiology underlying chronic pain syndromes (including associated stimuli and pain pathways) and explain how these factors influence the clinical manifestation and therapeutic response associated with specific pain subtypes.
15. Assess requirements for therapeutic interventions necessary to manage chronic pain syndromes and recommend a treatment plan applying the principles of pharmaceutical chemistry, pharmacology, and current evidence & treatment guidelines.
16. Compare and contrast the neuroanatomical, neurophysiological, pathophysiological and psychosocial etiology of substance abuse as it pertains to alcohol, opioids, stimulants and other psychotropic compounds, and utilize this information to explain the clinical presentation, prognosis and treatment of related conditions.
17. Recommend a safe and effective treatment plan for someone suffering from Substance Abuse applying the principles of pharmaceutical chemistry, pharmacology, and behavioral and psychosocial considerations.
18. Describe major disparities (and related biases) evident in mental health and mental health care delivery as it exists along axes of age, race, ethnicity, gender identity, and socioeconomic factors.





Oncology Theme Course Objectives

1. Describe the role of a clinical pharmacist in the treatment of a patient requiring chemotherapy or immunotherapy as treatment (malignant and non-malignant disease) and effectively communicate information to the patient along with other members of the healthcare team.
2. Describe the etiology, primary mechanisms for development of malignancy (cellular and molecular biology) and tumorigenesis, metastasis, and angiogenesis in tumor pathology.
3. Classify and describe anti-tumor and immunogenic agents used to treat malignancy or similar immune-mediated nonmalignant diseases.
4. Describe the pharmacologic basis for developing and using multidrug regimens to effectively target and treat malignancy while minimizing toxicity.
5. Describe anti-tumor and immunotherapy drug related toxicity and interventions for prevention of treatment of adverse events.
6. Provide a comprehensive and accurate verification of chemotherapy orders and related supportive care treatment plans.
7. Describe the potential for drug-drug interactions, organ dysfunction, and comorbidities on the efficacy or toxicity of anti-tumor and immunotherapy and effectively communicate information to the patient and other members of the healthcare team.
8. Describe and create effective treatment plans for supportive care related to disease or anti-tumor drug therapy and immunotherapy.
9. Describe the social and economic burden among patients, caregivers and family affected by malignancy or nonmalignant diseases.
10. Describe appropriate precautions by pharmacists and patients with preparing, dispensing or handing anti-tumor agents.





Infectious Disease Theme Course Objectives

1. Describe the role of the human microbiome in health and disease.
2. Explain the pathophysiology and immunology of sepsis and recommend appropriate pharmacotherapy interventions based on a patient's physiologic parameters.
3. Describe the pathophysiology of infections of the respiratory, gastrointestinal, and genitourinary tracts and of the skin, bones, cardiovascular, and central nervous systems.
4. Discuss the techniques used in the clinical microbiology laboratory to identify microorganisms and to classify their susceptibility to antimicrobials.
5. For the key organisms identified in the course, provide their microbiologic classification, describe their usual ecologic niche, discuss noteworthy physiologic characteristics (e.g. virulence), list infectious syndromes they are commonly associated with, and describe their typical antimicrobial susceptibility.
6. Discuss the three primary mechanisms of antimicrobial resistance and identify for which of the key organisms these mechanisms are important, which antimicrobials are affected, and means of developing agents that defeat these resistance mechanism.
7. Describe the major molecular and cellular components of the immune system (including cytokines, antibodies, and several types of myeloid cells and lymphocytes) and discuss their role in preventing and responding to infection.
8. Use the understanding of normal biochemistry, pathophysiology, immunology, and anatomy to describe the connection between clinical findings and lab data to underlying causes of dysregulation within the immune system and microbiome and to assess drug responses.
9. Critically read and interpret the results of studies where an intervention is compared to an active control, and provide a recommendation incorporating risks and benefits of the new intervention.
10. Assess and determine the patient's appropriate therapeutic treatment needs for an infectious syndrome (i.e. symptomatic treatment, referral/recommendation for antimicrobial treatment) by synthesizing knowledge of anatomy, pathology, pathophysiology, microbiology, immunology, pharmacology, behavioral and social sciences, and therapeutic evidence.
11. Apply pharmacokinetic, pharmacodynamic, and pharmacogenomic knowledge to optimizing selection and dosing of antimicrobials.
12. Discuss the fundamentals of diagnostic assessment, incorporating as applicable the concepts of prevalence, sensitivity, specificity, positive predictive value, negative predictive value, and likelihood ratios.
13. Discuss the implications of structural differences between related agents on the antimicrobial activity, pharmacokinetics, and toxicity of antimicrobials.
14. Obtain key information from patients regarding prior adverse drug reactions, classify and explain the reaction according to underlying mechanism, assess reaction characteristics, integrate results of objective tests, incorporate your assessment into pharmacotherapy recommendations, and document your assessment in the medical record.
15. Assess current treatment, recommend alternative treatment, and, when appropriate, prescribe optimal treatment for a patient with an infectious syndrome using knowledge of pathophysiology, microbiology, immunology, pharmaceutical chemistry, pharmacology, behavioral and social sciences, and therapeutic evidence.
16. Optimize pharmaceutical care of patient with multiple infectious conditions including consideration of co-morbidities and polypharmacy, e.g. the assessment and management of clinically relevant drug-drug interactions and drug-disease interactions.
17. Describe and discuss healthcare systems approaches to antimicrobial stewardship and recommend stewardship strategies appropriate to a given system's needs and resources.
18. Describe and discuss the global burden of infectious diseases, especially in vulnerable populations (e.g. children), identify barriers to infection management in resource-limited settings, and discuss the challenges that climate change adds to the burdens of infection and treatment.



IPPE Community Course Objectives

1. Collect a medication history.
2. Evaluate a patient's medication adherence.
3. Assess a patient's signs and symptoms to determine whether the patient can be treated with self-care measures or requires a referral.
4. Measure a patient's vital signs and interpret the results.
5. Make appropriate recommendations for modifying a patient's care plan to meet patient-specific needs.
6. In collaboration with the patient, formulate a care plan that is evidence-based and cost-effective.
7. Educate a patient regarding the appropriate use of a new medication, supplement, or device to administer a medication.
8. Educate a patient regarding appropriate use of a self-monitoring device.
9. Assist a patient with behavior change (e.g., use shared decision making and motivational strategies).
10. Effectively collaborate with other members of the healthcare team in the community practice setting.
11. Perform a screening assessment to identify patients at risk for prevalent diseases in a population.
12. Assist in the identification of underlying system-associated causes of errors.
13. Perform screening for CDC-recommended immunizations.
14. Administer and document CDC-recommended immunizations.
15. Retrieve and analyze scientific literature to answer a drug information question.
16. Assist in monitoring pharmacy inventory.
17. Assist in the preparation for regulatory visits and inspections.
18. Fulfill a medication order.
19. Model professional behaviors in the practice setting.

IPPE Health System Course Objectives

1. Obtain an accurate medication history.
2. Evaluate a patient's medication adherence.
3. Make appropriate recommendations for developing or modifying a patient's care plan to meet patient-specific needs.
4. Utilize appropriate evidence-based resources in the development or modification of a patient's care plan or population-based services.
5. Document patient specific findings in the patient medical record.
6. Educate a patient regarding the appropriate use of a new medication, supplement, or device to administer a medication.
7. Effectively collaborate with other members of the healthcare team in the health system practice setting.
8. Assist in the identification of underlying system-associated causes of errors.
9. Assist in conducting a medication use evaluation or quality improvement project.
10. Perform screening for CDC-recommended immunizations.
11. Retrieve and analyze scientific literature to answer a drug information question.
12. Describe the processes utilized in maintaining and monitoring the pharmacy inventory.
13. Assist in preparing for regulatory visits and inspections.
14. Articulate the pharmacist's role in medication safety and quality improvement activities.
15. Fulfill a medication order.
16. Describe the preparation of medications that require basic sterile compounding or basic non-sterile compounding prior to patient use.
17. Model professional behaviors in the practice setting.





APCS Foundations I Course Objectives

1. Screen patients for appropriate vaccinations per CDC recommendations.
2. Prepare, administer, and appropriately document immunizations provided to patients.
3. Explain the pharmacy workflow in a community pharmacy setting.
4. Propose a search strategy for determining an answer to a legal question.
5. Conduct a basic medication history with a peer or standardized patient that includes the name of the medication, dose, route, frequency, and indication in an organized manner.

APCS CV Course Objectives

1. Perform an inpatient medication reconciliation during hospital admission.
2. Provide hospital discharge medication education to a patient.
3. Triage and formulate a plan for a patient presenting with possible adverse effects from a medication.
4. Perform a vital signs assessment.
5. Counsel a patient who is starting on a new anticoagulant medication (DOAC, warfarin, lovenox).
6. Construct a comprehensive SOAP note for a patient with low to medium level of difficulty.

APCS Respiratory Course Objectives

1. Using motivational interviewing techniques, counsel a patient who is interested in quitting smoking.
2. Demonstrate how to use a patient-specific inhaler by performing a full counseling session.
3. Construct a comprehensive assessment and plan for a patient with venous thromboembolism.
4. Explain the physical exam findings for a complete lung exam for someone with asthma and COPD.

APCS Renal/GI Course Objectives

1. Recommend appropriate renal dose adjustments for patients with chronic kidney disease stage III to V.
2. Provide patient education regarding therapeutic lifestyle changes for patients with chronic kidney disease or end stage renal disease on/not on dialysis.
3. Provide patient education regarding specific medications that chronic kidney/liver disease patients are taking.
4. In an obese patient who has undergone gastric bypass surgery, provide patient education regarding nutritional and lifestyle changes.
5. Triage a patient presenting to the community pharmacy with GI upset.
6. Develop a total parenteral nutrition (TPN)/peripheral parenteral nutrition (PPN) plan for a patient requiring TPN/PPN.



APCS Endocrinology Course Objectives

1. Demonstrate how to inject insulin (pen vs. syringe and vial) to a patient who is newly diagnosed with diabetes (clinic and hospital discharge setting).
2. Counsel a patient with diabetes on proper use of a glucometer to monitor blood glucose.
3. Formulate a contraception plan for a patient with multiple comorbidities (3+).
4. Recommend an appropriate dose and monitoring plan for a patient with hypothyroidism.
5. Obtain a medication history from a complicated patient (3+ disease states) and update the patient's electronic medical record.

APCS Psych/Neuro Course Objectives

1. Recommend naloxone for the appropriate patient population.
2. Counsel a patient on appropriate use of naloxone during an opioid overdose situation.
3. Formulate a plan for a patient who is experiencing side effects from a psychiatric or neurologic medication.
4. Explain findings from a neurologic exam.
5. Provided a patient who is switching between opioids, calculate the dosing of the new opioid regimen, taking into account cross-tolerance if necessary.
6. Work up a patient thoroughly using the electronic medical record.
7. Formulate a complete patient presentation to present to a preceptor.

APCS Oncology/ID Course Objectives

1. Given a patient with a reported allergy to an antimicrobial, recommend an appropriate antimicrobial using information provided in the electronic medical record and/or obtained from the patient/family member/caregiver.
2. Conduct a pre-travel consultation to identify necessary vaccinations or chemoprophylaxis for an individual traveling to endemic regions.
3. Given drug information resources pertaining to antiretroviral drug interactions, review a patient's current and/or proposed medications and provide a care plan for managing the interaction, including patient counseling as indicated.
4. Identify opportunities for antimicrobial stewardship by evaluating a patient's EMR and effectively communicating the recommendation to another healthcare provider.
5. Given an antimicrobial susceptibility report, recommend and appropriate antimicrobial to treat a patient's infection(s) and explain your reasoning.
6. Provided a chemotherapy order, check and certify the regimen using verification resources.
7. Formulate a plan to communicate to a provider for a patient on chemotherapy with multiple drug interactions.
8. Develop an appropriate plan for prevention of chemotherapy-induced nausea and vomiting.



Integrated Theme Conditions

YEAR 1	Cardiovascular	Dyslipidemia, acute coronary syndromes, chronic heart failure, atrial fibrillation
	Respiratory	Allergic rhinitis/cough, asthma, COPD, venous thromboembolism, smoking cessation
	Renal	Hypertension, chronic kidney disease
	GI	Constipation, diarrhea, simple nausea/vomiting, essential nutrients, obesity, enteral/parenteral nutrition, gastroesophageal reflux disease, peptic ulcer disease, pancreatitis, inflammatory bowel disease, cirrhosis
YEAR 2	Endocrine	Diabetes types 1/2, hyperthyroidism, hypothyroidism, adrenal insufficiency
	Psych/Neuro	Stroke (ischemic, hemorrhagic, and transient ischemic attack), epilepsy, nociceptive pain (acute/chronic), headache, insomnia, anxiety disorders, major depressive disorder, schizophrenia, Alzheimer's disease, Parkinson's disease, delirium/agitation in ICU, attention-deficit/hyperactivity disorder, alcohol/opioid/substance use disorder
	Oncology	Breast cancer, lung cancer, leukemia, multiple myeloma, immunodeficiency, inborn errors of metabolism
	ID	Antimicrobial regimen selection, antimicrobial stewardship, respiratory tract infections, urinary tract infections, skin and soft tissue infections, fungal infections, CNS infections, GI infections, sepsis and septic shock, HIV infection, viral hepatitis, viral infections, tuberculosis



Course Credit Units

First Year: Core: 55 units; Electives: 0 - 5

Summer			Fall			Winter			Spring		
Course #	Name	Units	Course #	Name	Units	Course #	Name	Units	Course #	Name	Units
	Foundations I	10		Cardiovascular Theme	8		Respiratory	6.5		Renal Theme	4.5
	APCS- Foundation	2		APCS- CV	2		APCS- Respiratory	1		GI Theme	5
	IPPE- Community A	3		IPPE- Community A	3		IPPE- Community B	3		IPPE- Community B	3
							Inquiry Immersion	2		APCS- GI/Renal	2
Units		15	Units		13	Units		12.5	Units		14.5
Electives		0	Electives		0-1	Electives		0 - 2	Electives		0 - 2

Second Year: Core: 55 units; Electives: 3 - 6

Summer			Fall			Winter			Spring		
Course #	Name	Units	Course #	Name	Units	Course #	Name	Units	Course #	Name	Units
	Foundations II	2.5		Psych/Neuro	10		Oncology	4		Inquiry Immersion	3
	Endocrinology	6.5		APCS- Psych/Neuro	2		ID	5		APPE 1	7
	IPPE- Institution	3		IPPE- Institution	3		IPPE- Institution	3		IPPE- Institution	3
	APCS- Endocrinology	1					APCS- Oncology/ID	2			
Units		13	Units		15	Units		14	Units		13
Electives		1 - 2	Electives		1 - 2	Electives		1 - 2	Electives		0

Third Year: Core: 49; Electives as needed

Summer			Fall			Winter			Spring		
Course #	Name	Units	Course #	Name	Units	Course #	Name	Units	Course #	Name	Units
	APPE 2	7		APPE 4	7		APPE 6	7		APPE 8	7
	APPE 3	7		APPE 5	7		APPE 7	7			
Units		14	Units		14	Units		14	Units		7
Electives		0	Electives		0	Electives		0	Electives		0



University of California
San Francisco

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