# N5334 Advanced Pharmacology Course & Syllabus Design

## Start Date: 06-30-2014

## Course Goal Statement:

The student will gain a functional knowledge of clinical pharmacological therapeutics for advanced nursing practice

## Course-Level Learning Objectives

1. Prescribe drugs based on knowledge of drug pharmacokinetics and pharmacodynamics as it relates to relevant individual patient characteristics (e.g. age, culture, & gender)
2. Prescribe drugs based on efficacy, safety, cost, expected outcomes, and other health conditions
3. Apply appropriate monitoring parameters in assessing the impact and efficacy of drug treatment
4. Minimize drugs reactions/interactions with special attention on vulnerable populations such as infants, children, pregnant & lactating women and older adults
5. Counsel the patient/family concerning drug regimens, side effects, interactions with other prescription/non-prescription drugs, herbal preparations, and food supplements
6. Write prescriptions that fulfill the legal requirements for advanced practice nursing prescriptive authority in the student’s prospective State.

## Unit/Module/Lesson Learning Objectives

Week 1:

Topic: Pharmacological Principles/Drugs Across the Life Span

Topic: Drugs Influencing the Autonomic Nervous System

Objectives:

* Discuss principles of pharmacodynamics, pharmacokinetics, pharmacology, adverse effects, therapeutic index, effectiveness, safety, selectivity of drugs
* Discuss the 6 rights of drug administration
* Become familiar with generic and trade drug names
* Discuss the 4 processes of pharmacokinetics
* Identify drug interactions, antagonistic effects, interference, and displacement
* Evaluate adverse reactions in pediatric, pregnant/breast feeding, and geriatric populations
* Review mechanisms of actions of the autonomic nervous system in regards to regulation of cholinergic and adrenergic receptors on muscle and target organs, dopamine, norepinephrine, epinephrine, acetylcholine, alpha and beta receptors.
* Discuss muscarinic agonists, antagonists, cholinesterase inhibitors, neuromuscular blocking agents, nicotinic receptors and adverse effects on body systems
* Discuss clinical consequences of centrally acting agonists on target issue receptors, therapeutic uses, adverse reaction, drug interactions, especially MAO inhibitors.

Week 2:

Topic: Cardiovascular Drugs: (inotropic drugs, anti-anginal drugs, and

antihypertensive drugs, diuretics)

Topic: Cardiovascular Drugs: (anti-lipid drugs, anticoagulants, anti-platelets,

and drugs for deficiency anemia)

Objectives:

* Review basic physiology of renal, cardiac hemodynamics, blood pressure regulation via renal andautonimic nervous system, heart failure, clotting cascade, hypertension, and hyperlipidemia.
* Discuss classifications of diuretics, mechanisms of action, therapuetic uses and adverse effects.
* Discuss mechanisms of action, pharmacokinetics, therapeurtic actions, adverse effects of ACE inhibitors, calcium channel blockers, angiotensin II receptor blockers, aldosterone antagonists, vasodilators, beta blockers
* Identify anti-hypertensive agents that are efficacious for specific populations (pediatric, pregnancy, African-American)
* Identify medical treatment of congestive heart failure and the role of digoxin.
* Discuss the pharmacokinetics, therapeutic uses, adverse effects and drug interactions of drugs to treat hyperlipidemia, angina, anti-coagulation.
* Identify the differences in anti-coagulation therapies, mechanisms of action, adverse effects, monitoring treatment, treatment options for overdose.
* Review P2YAdenosine Diphosphate, therapeutic uses, rare potential fatal adverse reactions.
* Review uses of folic acid, vitamin B 12, iron replacement, indications, adverse effects, especially in specific populations (pediatrics, pregnancy, geriatrics)

Week 3:

Topic: Psychopharmacology

Topic: Eye, skin, ear medications

Objectives:

* Identify the properties of antipsychotic, antidepressant, anxiolytic, mood stabilizing, and stimulant medications for psychiatric disorders
* Describe the action, therapeutic indications, side effects and adverse reactions of the agents used to treat psychological conditions noted.
* Discuss dose adjustments for the noted psychological conditions and indications for increasing or decreasing dosages
* Discuss adjunct therapies for mood stabilization
* Discuss CYP450 enzymes in medication decision making
* Review glaucoma, allergic conjunctivitis, macular degeneration and the medications used for treatment & adverse effects
* Review pathophysiology of acne, psoriasis, atopic dermatitis, warts, seborrhea, actinic keraosis, impetigo and the medications used for treatment & adverse effects.
* Discuss medications used for treatment of acute otitis media, recurrent otitis media, otitis externa; drug choice considerations in recurrent otitis media, side effects & adverse reactions.

Week 4:

Topic: Endocrine Drugs to treat Diabetes and Thyroid conditions

Topic: CNS Drugs to treat: Parkinson’s Disease, Alzheimer’s Disease and Seizure Disorders

Objectives:

* Review physiology and pathophysiology of glucose regulation, diabetes mellitus (Type 1 & 2), thyroid regulation & hypo/hyperthyroidism, thyroid function tests, testing used for diabetes diagnosis.
* Discuss mechanism of action, pharmacokinetics, indications for use, side effects, adverse reactions, drug interactions for insulin types, oral diabetic agents and thyroid agents.
* Review diabetic ketoacidosis and hyperglycemic hyperosmotic nonketotic syndome and general drug treatment.
* Review treatment of insulin overdose, Graves disease using Beta Blockade.
* Review physiology of central nervous system transmitters, blood-brain barrier, effects of prolonged drug exposure in CNS.
* Review pathophysiology of Parkinson's, Alzheimer's, Multiple Sclerosis, epilepsy, and muscle spasm/spasticity.
* Discuss mechanism of actions, pharmacokinetics, therapeutic use, adverse effects of drugs used in the treatment of epilepsy, muscle spasm/spasticity, MS, Parkinson's, Alzheimer's
* Review the role of vitamin K in the pregnant woman with epilepsy and the specific medications indicating the use of Vitamin K.
* Discuss the benefits and risks of drug treatment for neuropsychiatric symptoms in Alzheimer's Disease.

Week 5:

Topic: Pain Management

Topic: Musculoskeletal/Bone and joint

Objectives:

* Review pain physiology, pain theory, categories of pain (nociceptive vs neuropathic), pain assessment, inflammatory process (arachidonic acid metabolism, mu, kappa & sigma receptors)
* Review pharmacologic and non-pharmacologic treatment of pain, , analgesic selection and pain treatment in special populations (elderly, pediatrics ,pregnancy)
* Discuss pharmacokinetics and pharmacodynamics of opioids, non-opioids, mixed opioid agaonists & antagonists, non-steroidal anti-inflammatories, aspirin, Cox 1&2 inhibitors (selective/nonselective)
* Discuss differences between acetaminophen and NSAIDS, aspirin
* Discuss adverse effects of opioids, acetaminophen, NSAIDS, aspirin and what actions can be used to decrease these adverse effects
* Review treatment of overdose of opioids, acetaminophen
* Identify the role of the NP and prescribing Scheduled drugs (in Texas, law of scheduled drugs III-V).
* Differentiate between cluster, migraine, tension headaches and appropriate drug treatment differences.
* Discuss abortive vs. prophylactic migraine drug treatment and adjunct therapies commonly used.
* Review pathophysiology of gout and rheumatoid arthritis.
* Discuss pharmacokinetics, side effects and adverse effects of drugs used for gout, rheumatoid arthritis and bone mineralization

Week 6:

Topic: Anti-infectives, anti-fungals, anti-virals, non-HIV infections

Objectives:

* Review classification of antimicrobial drugs by susceptible organisms.
* Review classification of antimicrobial drugs by mechanism of actions upon cell wall, membranes, protein synthesis, and replication.
* Be familiar with antimicrobials and microbe resistance and measures to reduce resistance.
* Describe selections of antimicrobial therapy depending upon microbe, susceptibility, host factors, dosage and treatment duration.
* Discuss mechanism of actions, indications, resistance and side effects of penicillinis, cephalosporins, carbapenems, vancomycin, tetracyclines, macrolides, aminoglycosides, sulfonamides, trimethoprim, fluroquinolones, metronidazole, daptomycin.
* Be familiar with drug therapy for urinary infections, pyelonephritis and prostatic infections.
* Discuss mechanism of actions, indications and side effects of anti-fungals amphoteracin and the azoles.
* Review treatment of superficial fungal infection, treatment and adverse effects of topical azole therapies.
* Discuss mechanism of actions, indications, side effects of non-HIV viral infections, such as herpes simplex virus, varicella-zoster virus, cytomegalovirus, hepatitis C & B, RSV and influenza

Week 7:

Topic: Respiratory Pharmacology, antihistamines, gluccocorticoids, tuberculosis (TB)

Objectives:

* Review main effects of histamine, differentiate between H1 and H2 and the effects on receptors of airway smooth muscle, vascular muscle tone, GI tone, heart rate, CNS.
* Discuss potential drug interactions and inhibition of the P450 system with oral antihistamines
* Discuss use of antihistamines and decongestants in adults & children with allergic rhinitis and upper respiratory infections and precautions of use for each population.
* Discuss topical drugs used for allergic conjunctivitis, their safety and effectiveness.
* Discuss mechanism of action, side effects, adverse effects and contraindications of nasal steroids, decongestants, anti-tussives (both non-narcotic and narcotic anti-tussives).
* Discuss the mechanisms of action, indications, side effects, adverse reactions, contraindications of gluccocorticoids, mast cell stabilizers, leukotriene inhibitors, beta 2 adrenergic agonists (short term and long term), methylxanthines, muscarinic antagonists in the treatment of asthma.
* Discuss asthma drug considerations for asthma treatment in the pediatric, elderly and pregnant/lactating patient.

Week 8:

Topic: Reproduction/Contraception/GU/ STI’s

Topic: HIV infections

Objectives:

* Review physiology & pathophysiology of male and female hormonal mechanisms of action upon target organs.
* Review estrogen & progestin therapy and its effects on bone, cholesterol, heart, ovary, breast and endometrial tissue.
* Discuss the role of SSRI’s in psychological conditions associated with pre-menstrual syndromes.
* Discuss the role, benefits & risks of hormone replacement therapy in menopausal women, keeping in mind the WHO and HERS studies.
* Be able to select a birth control method for women considering the effectiveness and safety profiles of oral contraceptives and alternatives for oral contraceptives
* Describe the mechanism of actions, safety and adverse effects of oral, “emergency”, inject able, and sub-dermal contraception agents.
* Discuss the role of oral contraception for endometriosis and polycystic ovary syndrome.
* Review effects of testosterone replacement on male and female sexuality disorders.
* Discuss androgen replacement uses and adverse effects in males, pregnancy and prostate cancer.
* Be familiar with anabolic steroid abuse in the athlete population, its effects for performance enhancement and side effects.
* Discuss the drugs used for erectile dysfunction and benign prostatic hypertrophy, indications for use, mechanisms of actions and side effects.
* Review transmission of HIV, replication and drug resistance. Note the 5 types of anti-viral drugs used for HIV, their actins and adverse effects.
* Be familiar with opportunistic infections and treatment of PCP, mycobacterium tuberculosis.
* Discuss treatment of STI’s (sexually transmitted infections) for Chlamydia, gonorrhea, pelvic inflammatory disease, non-gonococcal urethritis, epididymitis, syphilis, bacterial vaginosis, herpes simplex, chancroid, trichomonas, proctitis and venereal warts

Week 9:

Topic: Drugs Influencing the GI Tract (GERD, PUD, laxatives & anti-diarrheal drugs, & antiemetic drugs), vitamins, anti-obesity

Objectives:

* Review physiology & pathophysiology of digestive system, GI protection, parietal cell, gastrointestinal reflux disease (GERD), irritable bowel syndrome (IBS)and inflammatory bowel disease IBD)
* Discuss mechanism of action of proton pump inhibitors (PPI) and H2 antagonists, side effects, drug interactions, adverse reactions.
* Discuss why PPI's are preferred over H2 antagonists, indications for both short and long term use.
* Compare and contrast H2 antagonists, actions, side effects, drug interactions.
* Discuss drugs used in IBS, IBD, mechanisms of actions, side effects, adverse effects.
* Discuss indications for use, pharmacokinetics and side effects of prokinetic drugs.
* Be familiar with indications for antacids, cytoprotective drugs, laxatives and drug interactions associated with antacids
* Identify drugs used for the treatment and prevention of ulcers associated with NSAID use.
* Identify the antacids which may compromise patients with renal impairment, congestive heart failure, hypertension and chronic constipation.
* Discuss role of anticholinergics, dopamine antagonists, prokinetics, and seratonin antaonists in prevention and treatment of motion sickness & nausea.
* Identify drugs used in pregnancy and children to prevent or control nausea.
* Discuss weight loss preparations such as Qsymia, Belviq, Orlistat, side effects, drug interactions, contraindications.
* Review role of vitamins in nutrition, especially B12 and D replacement indications.

## Course Outline

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| **Date** | **Topic** | **Required Readings** | **Weekly Assignments** |
| Week 1 | Topic: Pharmacological Principles/Drugs Across the Life Span  Topic: Drugs Influencing the Autonomic Nervous System | Lehne: Chapters 1-19  ~181 pgs | Quiz (chapters 1-19)  Discussion Board  Academic dishonesty quiz (sign document) |
| Week 2 | Topic: Cardiovascular Drugs: (inotropic drugs, anti-anginal drugs, and  antihypertensive drugs, diuretics)  Topic: Cardiovascular Drugs: (anti-lipid drugs, anticoagulants, anti-platelets,  and drugs for deficiency anemia) | Lehne: Chapters 41, 42, 43-48; 50-52, 55  ~184 pgs | Quiz (Chapters 41, 42, 43-48, 50-52, 55)  Discussion Board  Case Study: Hyperlipidemia |
| Week 3 | Topic: Psychopharmacology  Topic: Eye, skin, ear medications | Lehne: Chapters 31-36  Lehne Chapter 104-106  ~133 pgs | Quiz (chapter 31-36, 104-106)  Discussion Board  Prescribing Module: Following the prescribing practices in your state, write one basic prescription for an oral medication for any patient condition from content covered from weeks 2-5. Do not write for controlled substances. |
| Week 4 | Topic: Endocrine Drugs to treat Diabetes and Thyroid conditions  Topic: CNS Drugs to treat: Parkinson’s Disease, Alzheimer’s Disease and Seizure Disorders | Lehne: Chapter 57, 58  Lehne Chapters 20-25  ~123 pgs | Test I (weeks 1-3)  Discussion Board |
| Week 5 | Topic: Pain Management  Topic: Musculoskeletal/Bone and joint | Lehne: Chapters 28-30, 71  Lehne Chapter 73-75  ~117 pgs | Quiz (Chapters 20-25, 28-30, 71, 73-75)  Discussion Board  Case Study: Parkinson’s |
| Week 6 | Topic: Anti-infectives, anti-fungals, anti-virals, non-HIV infections | Lehne 83-89, 91-93  ~111pgs | Quiz (Chapters 83-89, 91-93)  Discussion Board  Case Study: Allergic Rhinitis |
| Week 7 | Topic: Respiratory Pharmacology, antihistamines, gluccocorticoids  TB | Lehne Chapters 70, 72, 76, 77  Chapter 90: TB 1116-1126 only  ~55 pgs | Test II (weeks 4-6)  Discussion Board |
| Week 8 | Topic:Reproduction/Contraception/GU/ STI  Topic: HIV infections | Lehne Chapter 61-63, 65-66, 94, 95  ~132 pgs | Quiz (Chapter 61-63, 65-66, 94, 95)  Discussion Board  Case Study: Polycystic ovarian syndrome |
| Week 9 | Topic: Drugs Influencing the GI Tract (GERD, PUD, laxatives & anti-diarrheal drugs, & antiemetic drugs), vitamins, anti-obesity | Lehne: Chapters 78,79; Chapter 80,  Chapter 81, 82  ~59 pgs | Quiz (Chapters 78-82)  Discussion Board  Prescribing Module: Following the prescribing practices in your state, write one basic prescription for an oral medication for any patient condition from content covered from weeks 6-9. Do not write for controlled substances. |
| Week 10 | Final Examination |  | Final Exam (weeks 7-9) |

**Required Textbooks:**

Lehne, R.A. (2013). *Pharmacology for Nursing Care*. 8th Edition. Philadelphia, PA: W.B. Saunders Company. Hard copy required.

**Supplemental Materials:**

1. The Prescribers Letter: available through UTA library. How to access:

Go to the library’s home page (www.uta.edu/library)

In the orange box, enter "Prescriber's Letter" and click Search

When the library catalog opens, click on the title of interest and the link will display

Click on "Link to Site" link

Enter your MavID

username & password

Bookmark the link,

http://eresource.uta.edu/cgi-bin/db-prescribersLetter.cgi

to skip the first 3 steps.

UT Arlington’s subscription to The Prescriber's Letter site will open

2.     Brenner, G., Stevens C. (2013). Pharmacology (4th ed.). Elsevier/Saunders.

3.       Kester, M., Dowhower, K., Vrana, K. (2012). Elsevier’s Integrated Pharmacology. (2nd ed.). Saunders/Elsevier .

4.     Wrecker, L., Crespo, L., Dunaway, G., Faingold, C., Watts, S. (2010) Brody's Human Pharmacology. (5th ed.). Mosby/Elsevier.

5.     Olson, J. M. (2011). Clinical Pharmacology Made Ridiculously Simple. 4th ed. Miami, FL. Medmaster

**Case Studies**

Case Studies will focus on pharmacokinetics, pharmacodynamics, proper drug selection for the case study, side effects and adverse reactions. Please consider drug selection and its relationship with any co-morbid condition(s).

Case studies will be intended for student content application. Instructor feedback will be given.

**Discussion Board**

Discussion board topics will pertain to best practices, peer reviewed journals, and the most current protocols. Some sources may require the student to initiate a free account in order to access the materials (i.e. Medscape). Some sources offer CE credit and the student may elect to complete/submit the CE for personal/professional purposes. The course instructor will not provide answers for any CE-related content or tests through these independent sources.

Discussion board questions consist of 2 parts. The student will answer question #1 as the original post and respond to another student's post by answering question #2.

Postings need to be well-thought out and contain current (within 5 years) professional resources. Please provide your reference at the end of each question in APA format.

Discussion board will be graded according to a UTA-approved rubric.

**Tests and Quizzes**

There will be 3 tests and weekly quizzes offered during the semester. These tests and quizzes will cover designated reading assignments. Discussion board content and case study materials may also be used for testing materials. Quizzes and tests will consist of questions with multiple choice answers. The testing schedule is designed to keep students on schedule due to the vast amounts of reading and materials covered in the course.

**Prescribing Modules:**

Students will write a basic prescription twice in this course. The prescription will be for a medication based on a condition covered during the course. The prescription must include:

Current date

Patient name (fiction)

Patient address (fiction)

Patient phone

Date of birth (fiction)

Age

Weight in kg (pediatrics)

Patient drug allergies

Name of prescriber (you)

Address of prescriber

Phone of prescriber

Name of drug

Dose of drug

How drug is supplied

Route

Frequency (daily, twice a day, etc)

Duration

Quantity (number and in script)

Refills (number and script)

Indication (why taking)

Special instructions (if any)

Provider signature.

Resources are provided below to assist with this assignment. Students are expected to be familiar with their state's prescribing guidelines, NP limitations with dangerous and controlled substances and the drug “schedules” as delineated by the Drug Enforcement Agency (DEA).

Below is a link to state-specific prescribing laws (July 2013):

<http://www.medscape.com/viewarticle/440315>

Link to Scheduled Drugs Classification and DEA website:

<http://www.justice.gov/dea/druginfo/ds.shtml>

The following is a British site but is an excellent example of how to write a prescription. She refers to the BNF (British National Formulary) which is the national formulary in the United Kingdom. The BNF is not pertinent to the United States, however, students should be aware that several agencies use selected formularies for cost-saving measures (Veteran’s Administration, Medicare, Medicaid, Kaiser, etc). You will be expected to know these formularies in the professional realm.

<http://www.youtube.com/watch?v=rsV55iN8RQQ>

The following video hosts a medical student writing a prescription using a white board then actual prescription pad. He provides a link at the end for additional resources.

<http://www.youtube.com/watch?v=Mhqe12Aj1dE>

**Multi-Media Resources:**

Due to the nature of ever-evolving pharmacology and the vast amount of pharmacological content, not every aspect of pharmacology can ever truly be addressed, especially in a 10 week course. While every attempt is made to offer up to date information in a variety of learning modes, students should also begin the professional practice of self-learning and keeping abreast of new advances in drug therapies.

Based on this premise, the course instructor will offer weekly mini-lectures aimed at the basic and essential concepts and content. Students are expected to focus on these concepts, objectives and readings for the basis of this course. The use of other media resources will provide more timely and current content for application of content.

The course will also offer public pharmacology resource media to reinforce content concepts in the form of videos, webcasts, and online modules. These resources may be (but not limited to) You Tube, pharmacology sites, medical sites, medical schools, the Centers for Disease Control (CDC), pharmacology instructional sites and the Lehne text (available to students under "Student Resources"). Resources may range from very simple to very complex. The student may elect to view these offerings as an adjunct to learning, depending on their learning style and needs. Students may also choose to search for other resources that may aide with their individual learning styles and needs, mindful of the objectives and content required for course outcomes.

Additional Video/Resource lecture sites:

KISSPHARM has a few free videos. Students may elect to subscribe if they enjoy the site. There is a fee and this is per student’s funds. It is not a required site.

[www.kisspharmacology.com](http://www.kisspharmacology.com)

Free pharmacology videos. Levels of instruction vary from professional to layman.

[www.pharmacologytube.blogspot.com](http://www.pharmacologytube.blogspot.com)

Professor Fink Pharmacology Lectures: Multiple topics can be viewed.

<http://www.youtube.com/watch?v=7Ta6m2PkGsI>

University of Hawaii Pharmacology Lectures: Multiple topics can be viewed.

<http://www.youtube.com/watch?v=8jy4HrRhXqA>

University of California San Francisco Pharmacology Lectures:

<http://www.youtube.com/watch?v=D-dWODP5ddw>

Massachusetts Institute of Technology (MIT) Pharmacology Lecture Series

<http://ocw.mit.edu/courses/health-sciences-and-technology/hst-151-principles-of-pharmacology-spring-2005/index.htm>

Several additional options:

<https://video.search.yahoo.com/search/video;_ylt=A0LEV0anKXBTpyMAPilXNyoA;_ylu=X3oDMTB0Nml0YmltBHNlYwNzYwRjb2xvA2JmMQR2dGlkA1ZJUDA1MF8x?p=pharmacology+lectures>

UC Davis Continuing Medical Education Series: War on Pain

<http://www.ucdmc.ucdavis.edu/cme/distance_education/webevents/2011-pain-cecity/2011pain-view-modules.html>

Dr. Najeeb Pharmacology Lecture Series: May require

<http://www.youtube.com/results?search_query=dr+najeeb+pharmacology+lectures>+