Auditory Pharmacology

AUD 7205, SPRING 2018

Syllabus updated 10 January 2018

Course Information

Time: Wednesday, 4 pm - 6 pm
Location: Callier Dallas, Room B108
Course Credits: 2

Professor Contact Information

Instructor: Colleen Le Prell, Ph.D.
Telephone: 214.905.3018
Email: colleen.leprell@utdallas.edu
Office Hours: Monday 10-12;
Tuesday 3-5;
and by appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions

AUD 6305 Anatomy and Physiology of the Auditory System

Course Description

This course covers the effects of drugs on the inner ear, including both ototoxic insult and otoprotective benefit. Key content areas include: 1) assessment of medication history: requirements and rationale, 2) how drugs affect the inner ear/review of drugs that affect the inner ear, 3) regulation of new drug development/new drug testing, and 4) emerging data that may lead to new drug options in future years.

Upon successful completion of this course, students will be able to:

1) Review medication history and identify ototoxic drugs and chemicals
2) Describe common otologic medications
3) Summarize steps within the drug development process
4) List ototoxic drugs and describe their mechanism of action
5) Describe processes by which different otoprotective drugs preserve hearing
6) Summarize the current status of research and evidence for otoprotective drugs
7) Discuss key elements in preclinical and clinical trial design

ASHA Competencies Addressed in this Course:

Standard IV-A Foundations of Practice

The applicant must have knowledge of:
A3. Normal aspects of auditory physiology and behavior over the life span
A8. Effects of pharmacologic and teratogenic agents on the auditory and vestibular systems
A10. Pathologies related to hearing and balance and their medical diagnosis and treatment
A18. Principles and practices of research, including experimental design, statistical methods, and application to clinical populations
A19. Legal and ethical practices (e.g., standards for professional conduct, patient rights, credentialing, and legislative and regulatory mandates)

Standard IV-B: Prevention and Identification

The applicant must have the knowledge and skills necessary to:
B1. Implement activities that prevent and identify dysfunction in hearing and communication, balance, and other auditory-related systems
B3. Screen individuals for hearing impairment and disability/handicap using clinically appropriate, culturally sensitive, and age- and site-specific screening measures

Standard IV-C: Assessment

The applicant must have knowledge and skills in:

C2. Assessing individuals with suspected disorders of hearing, communication, balance, and related systems
C3. Evaluating information from appropriate sources and obtaining a case history to facilitate assessment planning
C5. Conducting and interpreting behavioral and/or electrophysiologic methods to assess hearing thresholds and auditory neural function
C7. Conducting and interpreting otoacoustic emissions and acoustic immitance (reflexes)
C9. Evaluating functional use of hearing
C10. Preparing a report, including interpreting data, summarizing findings, generating recommendations, and developing an audiologic treatment/management plan
C11. Referring to other professions, agencies, and/or consumer organizations

Standard IV-F: Education/Research/Administration

The applicant must have knowledge and skills in:

F2. Applying research findings in the provision of patient care (evidence-based practice)
F3. Critically evaluating and appropriately implementing new techniques and technologies supported by research-based evidence

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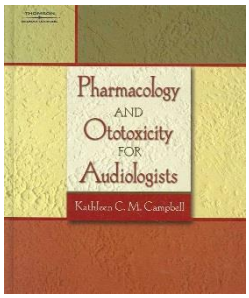
Required Textbook



- POA: Pharmacology and Ototoxicity for Audiologists (2007). Kathleen Campbell, Thomson Delmar Publishing. ISBN (Americas): 1-4180-1130-4.

This book is out of print. New and used copies are available on Amazon.com, Barnesandnoble.com, and other on-line book sellers. The book is also available for rental through Amazon.com. In addition, the Course Instructor has copies of this textbook which are available to be signed out to students for the semester in which the course is taken. ***Textbooks borrowed from the course instructor are required to be returned at the time of the third (final) examination. Textbooks are UTD property.***

Chapters from These Textbooks Available Electronically Through UTD Library

- NIHLSA: Noise-Induced Hearing Loss: Scientific Advances (2012). Le Prell, C.G.; Henderson, D.; Fay, R.R.; Popper, A.N. (Eds.) Springer; ISBN 978-1-4419-9522-3.
- FRENTP: Oxidative Stress in Applied Basic Research and Clinical Practice: Free Radicals in ENT Pathology (2016). Miller JM, Le Prell CG, Rybak LP. (Eds). New York: Springer. ISBN 978-3-319-13472-7
- TRANHS: Translational Research in Audiology, Neurotology, and the Hearing Sciences (2016). Le Prell, C.G.; Lobarinas, E.; Popper, A.N.; Fay, R.R. (Eds.) Springer; ISBN 978-3-319-408460-0.

The University of Texas library system has an electronic subscription which provides UTD students with free access to this book. All chapters are available electronically.

Date	Topic	Assigned Reading
Wed 1/10	**Introduction - 1**	• POA - Ch 1: An Introduction to Pharmacology • POA - Ch 2: Pharmacodynamics and Pharmacokinetics • POA - Ch 3: Pharmacotherapeutics and Patient Factors • POA - Ch 4: Role of Food and Drug Administration in Drug Development
Wed 1/17	**Introduction - 2**	• POA - Ch 5: Common Classes of Drugs Used in Otolaryngologic Practice • POA - Ch 6: Nutraceuticals and Herbal Supplements • POA - Ch 7: Mechanisms of Toxicity • POA - Ch 8: Biochemical Bases of Hearing • POA - Ch 21: From Pharmacology to Function: Using drugs as tools to dissect cochlea
Wed 1/24	**Cisplatin-Induced Ototoxicity and Monitoring**	• POA - Ch 10: Cancer and Ototoxicity of Chemotherapeutics • FRENTP – Ch 11. Laurell and Pierre. Hearing loss after cisplatin: oxidative stress pathways and potential for protection. • TRANHS – Ch 6. Campbell and Fox. Cisplatin-induced hearing loss.
Wed 1/31	**Aminoglycoside-Induced Ototoxicity and Monitoring**	• POA - Ch 11: Aminoglycoside Antibiotics • FRENTP – Ch 10. Rybak and Brenner. Aminoglycoside-induced oxidative stress: Pathways and protection. • FRENTP – Ch 12. Anderson and Campbell. Assessment of interventions to prevent drug-induced hearing loss.
Wed 2/7	**Exam 1**	
Wed 2/14	**Other Ototoxic Drugs and Chemicals** (No class meeting, view Audiology online videos and complete discussion board)	• Video: Michael Myers, Ototoxicity: When Good Drugs Go Bad (https://www.audiologyonline.com/audiology-ceus/course/ototoxicity-when-good-medicines-go-25957) • POA - Ch 12: Renal Function and Ototoxicity of Loop Diuretics • POA - Ch 13: Other Ototoxins: Aspirin and other NSAIDS, Quinine and Macrolides • Adverse Drug Reactions and Audiology Practice, by Robert DiSogra;
Wed 2/21	**Ototoxic Chemical Injury**	• POA - Ch 14: Industrial Chemicals and Solvents Affecting the Auditory System • FRENTP - Ch 5. Park. Role of Free Radicals in Hearing Loss due to Heavy Metals. • NIHLSA – Ch 12. Johnson, Morata. Effects of Exposure to Chemicals on NIHL.
Wed 2/28	**Vestibulo-toxicity**	• POA - Ch 17: Vestibular Ototoxicity • POA - Ch 18: Audiologic Findings in Vestibular Ototoxicity
Wed 3/7	**Steroids and Sudden Hearing Loss; Steroids and CI surgery**	• TRANHS – Ch 4. Montgomery, Bauer, Lobarinas. Sudden Sensorineural Hearing Loss. • FRENTP Ch 21. Low, Kahmke, Tucci. The role of oxidative stress in idiopathic sudden hearing loss and Meniere's disease.
Wed 3/14	***No Class***	***UTD Spring Break***

Wed 3/21	**Exam 2**	
Wed 3/28	**Noise-Induced Hearing Loss: Pharmaceutical Prevention**	• NIHLSA Ch 13. Le Prell and Bao. Prevention NIHL: Potential therapeutic agents. • FRENTP Ch 9. Le Prell and Lobarinas 2015. Strategies for evaluating antioxidant efficacy in clinical trials assessing prevention of NIHL. • TRANHS – Ch 5. Lynch, Kil, and Le Prell. Development of drugs for NIHL.
Wed 4/1	**Gene Therapy/Stem Cell Therapy**	• POA - Chapter 20: Regeneration of Hair Cells • TRANHS – Ch 8. Staecker, Klickstein, Brough. Developing a molecular therapeutic for hearing loss. • FRENTP Ch 18. Green and Raphael. Strategies for the treatment of hereditary hearing loss.
Wed 4/11	**Tinnitus** Lobarinas guest lecture	• Dobie 1999. • TRANHS – Ch 7. Allman, Schormans, Typlt, Lobarinas. Past, present, and future pharmacological therapies for tinnitus. • 20Q with Bob DiSogra: Dietary Supplements for Tinnitus – Really?
Wed 4/18	**Challenges for Drug Development** (No class meeting, view Audiology online videos and complete discussion board)	• Ear Drug Delivery Systems, presented in partnership with American Auditory Society ○ https://www.audiologyonline.com/audiology-ceus/course/ear-drug-delivery-systems-23814 • Trafficking of ototoxic drugs across the blood-labyrinth barrier into the inner ear. ○ https://www.youtube.com/watch?v=lyiCbLiTEuU
Wed 4/25	**Review and Wrap-up**	• POA - Ch 22: Staying Current: Web Sites and Resources for Pharmaceutical Information
~Wed 5/2	**Final exam**	**The University will post their scheduled final examination information after January 24, 2018. Please tentatively plan on the final exam being on May 2, 2018 from 4-6 pm with this time and date to be updated pending the University's posted schedules.**

Examinations: True/False, Multiple Choice, Short Answer, and Essay questions that will assess factual knowledge, understanding of theories and controversies, ability to assess levels of evidence, and ability to identify gaps in knowledge. Exams cover assigned readings, assigned videos, and lectures.

- Exam 1 covers weeks 1-4.
- Exam 2 covers weeks 6-9.
- The third (Final) Exam is comprehensive and covers weeks 11-14 in addition to key concepts and information from the earlier portions of the course.

Week of February 14: in lieu of in-class lecture, please watch the assigned Audiology Online video. You will need to sign-up for an account to access the video; access to the videos is free.

You may earn up to 5 bonus points, to be added to your exam 2 score, by questioning, commenting on, discussing, or posting thoughtful, insightful, or otherwise stimulating questions related to either the assigned video or the assigned readings on the class discussion board by Friday 2/16/18. Factual content clarification questions are encouraged, but are worth fewer points. Comments must stimulate discussion to earn full 5 points.

Rubric:

0 points: Comments such as "I wondered the same thing" will not earn any bonus points

1 point: Requests for factual/content clarification, or answers posted in response to student queries

2 points: Analytic or interpretation questions, observations from your clinical rotations with comments on how this matches or does not match what you have learned so far.

3 points: Analytic or interpretation questions, observations from your clinical rotations, responses to other students, and other comments resulting in active discussion (3 or more classmate responses).

4 points: Identify a relevant study from the primary (research) literature that extends on the information presented in the video and the readings and post a short summary (150-200 words) describing the new information generated in that study on the discussion board, including any directions where additional research is needed. [Do not copy/paste text from the abstract or the paper.]

Week of April 18: in lieu of in-class lecture, please watch the assigned Audiology Online video. You will need to sign-up for an account to access the video; access to the videos is free.

You may earn up to 5 bonus points, to be added to your final examination score, by questioning, commenting on, discussing, or posting thoughtful, insightful, or otherwise stimulating questions related to either the assigned video or the assigned readings on the class discussion board by Friday April 20. Factual content clarification questions are encouraged, but are worth fewer points. Comments must stimulate discussion to earn full 5 points. The rubric is as identified above.

Quizzes. There are no planned quizzes. Pop quizzes may be added without notice; students are expected to complete readings prior to class, and to come to class prepared to contribute to discussion.

Grading

Assignment	Due date	% of final grade*
Exam 1	2/7/2018	30%
Exam 2	3/21/2018	30%
Final examination	Week of May 1-7	40%

*if quizzes are added, each quiz will be worth 3% of your course grade, and the weighting of each exam will correspondingly be reduced by 1% per exam.

Grading System: Course grades will be based on the weighted percent of points earned.

Minimum Percent Required	Letter Grade	Grade Points
94	A	4
90	A-	3.67
87	B+	3.33
84	B	3
80	B-	2.67
77	C+	2.33
74	C	2
70	C-	1.67
67	D+	1.33
64	D	1
60	D-	0.67
below 60	E	0
	WF	0
	I	0
	NG	0

Sample weighted grade calculation:
90% on exam 1, 80% on exam 2, 85% on final exam
=(90%*0.3)+(80%*0.3)+(85%*0.4)
=27+24+34
=85
Class grade = 85% = B

Please be aware that per the AuD program handbook a C+ or poorer does not demonstrate adequate mastery of course content and is not an acceptable grade for a clinical doctoral student.

As per the AuD program handbook, a grade of C+ or poorer will require remediation or repetition of the course.

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar's Grade Policy regulations at:
http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Exam Policy

Exams are closed book and are to be completed independently.

Policy Related to Make up Exams or Other Work

Make up examinations will be allowed when exam is missed for illness (with physicians note), family emergency, military service, or religious holidays, or other university approved excuses.

Discussion board extra credit/bonus points require posting be completed by due date. Partial credit may not be earned after the due date.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor; changes will be announced in class and via e-learning.