Phar 6752 Integrated Endocrinology

Course Syllabus Spring 2020
2.1 Credits

This course adheres to the items listed in the College of Pharmacy Central Syllabus:
https://docs.google.com/a/umn.edu/document/d/1artQ5e1rbzxe8lEtWo7BE8k8snZAEgMMz_QcW8yJ-II/edit?pli=1

Meeting Times & Locations

Day	Time	Duluth Room	Twin Cities Room
Wed.	8:00 – 9:55	410 Lib	WDH 7-135
Thurs.	8:00 – 9:55	410 Lib	WDH 7-135
Fri.	8:00 – 9:55	LSci 165	Moos 1-450

Course Website: http://canvas.umn.edu
Technology Help, Duluth: 218-726-8847 itsshelp@d.umn.edu
Technology Help, Twin Cities: 612-301-4357 help@umn.edu

Instructional Team

Course Director: Duluth	**Course Director: Twin Cities**	**Instructor**
Grant Anderson, Ph.D. 225 Life Science 218-726-6007 ander163@d.umn.edu Preferred method of contact: either Office Hours: By appointment; please email to schedule a time	Sarah Westberg, Pharm.D., BCPS 7-174 Weaver-Densford Hall 612-625-4632 swestber@umn.edu Preferred method of contact: email Office Hours: By appointment; please email to schedule a time	Carrie Haskell-Luevano, Ph.D. 8-102 Weaver-Densford Hall 612-626-9262 chaskell@umn.edu Preferred method of contact: email Office Hours: By appointment; please email to schedule a time

Teaching Assistants

Gerrit Vreeman Canvas TA	Ibrahim Abdelgawa Twin Cities TA abdel217@umn.edu	Benjamin Hanson Duluth TA hans4984@d.umn.edu

Course content:
This course will integrate all pertinent endocrinology topics (excluding diabetes) into one course. Specifically, the pathophysiology, medicinal chemistry, pharmacology and the therapeutic application of this knowledge will be covered in an integrated approach via specific modules. All major endocrine pathways will be taught including: hypothalamic/pituitary, steroids, female sex hormones, hormonal contraception, menopause/hormone therapy, bone health, male gonadal hormones, medication use in pregnancy & lactation, sexual dysfunction and thyroid hormone.

Course format:
Students' time in class will consist of lectures, in-class case discussions, and a variety of active learning activities. Students will be expected to come prepared for class as assigned in the course schedule, which will include assigned readings and some online presentations which will be applied during in-class case discussions. Assessments will be completed through paper examination, group project, and care plan documentation. This course will connect with content covered in the Pharmaceutical Care Learning Center for additional integration and application of knowledge.

Students will also be held responsible for this content in the integrated oral exam in the Spring PD2 semester.

Prerequisites

- Students will need to have successfully completed: Molecular metabolism/Nutrition, Cardiovascular Pharmacotherapy & Pharmaceutical Care Skills Lab 1-3. Students will be concurrently enrolled in Kidney, Fluids, and Electrolytes.
- Students should be able to describe the function of the overall endocrine systems and the multiple roles of hormones in the body.

Requirements

Course Materials

Required

- DiPiro, JT, et. al. Pharmacotherapy, A Pathophysiological Approach, 11th edition. McGraw-Hill. 2019.

Optional

- Lemke, T. L., & Williams, D. A. (2013). *Foye's principles of medicinal chemistry* (7th ed.). Baltimore: Lippincott Williams & Wilkins.
- Biomedical Library e-texts in Endocrinology, Physiology, Pharmacology, etc.

Attendance Policy

Students are expected to attend every class for which they are registered. Students are expected to attend classes on the campus where they are enrolled. Instructors may choose to take attendance. See COP Central Syllabus for information on what is considered an excused absence.

Case Discussion Sessions

Case discussion sessions and active learning sessions, including ethics session may not be recorded. If you are absent for one of these sessions, you will miss this learning opportunity. You can 'catch up' for test purposes by reviewing the required pre-class materials and by talking to your colleagues. Case sessions are excellent learning opportunities and you are expected to attend. Material from case sessions will be assessed on exams.

Goals & Objectives

The University of Minnesota, College of Pharmacy identified content Domains and Scientific Foundations, based on factors including ACPE Accreditation standards, the expertise of our faculty body, and more. The learning objectives of this course are based on these Domains and Scientific Foundations. A complete, detailed list of how our goals are linked to the Domains and Scientific Foundations is available on the Canvas site for this course.

Learning Objectives

1. Explain endocrine physiology and pathophysiology and mechanism of action of hormonal agents, hormonal derivatives, and other small molecule drugs used in treating endocrine disorders.
    a. Explain targets for hormonal agents; effect on receptor type or enzyme in biosynthetic pathways.
    b. Explain and predict the relationship between chemical structure and pharmacological activities of endocrine and endocrine-related drugs and predict risks and benefits of the individual agents
    c. Understand the biosynthetic pathways for hormone formation and disposition.
2. Apply the Pharmacist Patient Care Process to develop a care plan for a patient with endocrine disorder(s), including a thorough assessment of the status of the endocrine disorder, through application of knowledge of the condition, evidence-based treatment options and consideration of an individual patient characteristics and needs.
    a. Given a specific drug and basic pharmacokinetic/pharmacodynamics information, students should be able to determine the risk/benefit of a medication to fetus or the infant of a lactating mother.
    b. Assess a patient, determine most appropriate evidence-based treatment options, and develop a care plan for a patient with thyroid disease, contraception, hormone therapy, adrenal abnormalities, vitamin D deficiency and bone health.
    c. Determine treatment based on knowledge of the role of natural hormones as well as synthetic hormonal agonists and antagonists in endocrine and non-endocrine related pathologies.
    d. Describe the ethical implications and defend a position related to the use of certain hormonal agents (examples may include emergency contraception, growth hormone (could link to pediatrics).
    e. Describe the process for FDA approval of generic medications, using levothyroxine as an example.

Assignments and learning activities

Care Plans: Each student will complete 3 written care plans using the electronic PASS system. This will be a “finish the note” care plan, in which students are provided subjective and objective information, and then asked to complete the assessment and plan.

Group Project: Students will be placed into groups for this assignment. The focus is on understanding the known and hypothesized molecular basis of action of selective estrogen receptor modulators (SERMs) in the context of clinical use. Full details for this assignment will be posted in Canvas.

Assessments and Grading

The approach to assessment in this course includes a variety of evidence-based practices designed to most accurately and effectively gauge student knowledge acquisition. This will include several types of assessment (short answer, care plans, group projects) at various points in the semester, which will provide both summative and formative feedback to students and faculty.

Student learning will be evidenced by performance on 3 written exams, 1 group project, 3 care plans, and 1 integrated oral assessment. Final grades will be rounded to the nearest whole number using common rounding

rules (as per Microsoft Excel® where values ≥ 0.5 are rounded up). Letter grade assignments appearing on transcripts will reflect the table below:

Graded Assessments

Assessment	Learning Goals	Points	% of Grade
3 short answer exams	1A, 1B, 1C, 2A, 2B, 2C	100 points each (300 total)	60%
3 care plans	2	45 - 45 - 35 points each (125 total)	25%
Group project	1B	50 points	10%
Integrated oral assessment		25 points	5%
Total		**500**	**100%**

Course Letter Grades

Grade	A	A-	B+	B	B-	C+	C	C-	D	F
%	100-93	92-90	89-87	86-83	82-80	79-77	76-73	72-70	69-60	59-0

Absence from Exams

All exams will be given during scheduled class time as stated on the course schedule. Exams will **not** be graded on a curve. **The use of electronic devices such as tablets, smartphones, programmable calculators, and other devices with electronic data bases is not permitted during written or oral exams unless specified by course or section director.** Standard analysis of composite class response for all exam questions will be conducted by the authors of those exams prior to releasing the grades. Exam dates will not be changed from those printed in the course schedule. Should the University be closed due to an unforeseen event, the exam will be rescheduled.

Exams are updated and reused from year to year and are therefore not returned to the student. Post-exam review sessions with faculty and TAs will be scheduled within 2 weeks following each exam. Students will be given the opportunity to review their exams at this time. Thus, students desiring to review their exams need to attend the scheduled review sessions. If you have extenuating circumstances which preclude participating in reviewing at the scheduled time, you may request an appointment with a TA to review the exam outside of those set times. Faculty discretion will be used to determine if the extenuating circumstance is reasonable. Any questions regarding exams should be referred to the course directors by email.

Exam Regrade Policy: If you would like to submit your examination for regrade, you need to email your issue directly to the instructor for the exam, with information that details the question number and reasons why you feel your answer is correct **within 1 week** from the date of exam viewing. Exams will not be returned. However, students will have an opportunity to review their exam as described above.

Statement on Penalties for Late Work

All assignments must be turned in on time. Any unexcused late assignments will result in a 10% reduction in the grade for every 24 hours it is late. Late work may be accepted in certain circumstances such as emergencies and other unforeseen events. It is imperative you contact the instructor before the due date for more information. Contacting your instructor after the due date will preclude any allowance for late work.

Overview of Course Schedule

Week	Topic	Goals	Activities/ Assignments/ Assessments/
1	Module 1: Intro to Endocrine Module 2: Hypothalamic & Posterior Pituitary Module 3: Steroids	1	Lecture & discussion
2	Module 4: Adrenal Steroids & Diseases Module 5: Male Gonadal Hormones	1, 2	Lecture, small group activities, discussion, reading
3	Module 6: Female Sex Hormones	1, 2	Lecture, discussion, reading
4	Module 6: Female Sex Hormones	1, 2	Exam #1 Modules 1-5 Lecture, discussion, reading
5	Module 6: Female Sex Hormones Module 7: Menopause and Menopausal Hormone Therapy	1, 2	Lecture, discussion, reading
6	Module 7: Menopause and Menopausal Hormone Therapy Module 8: Bone Health	1, 2	Lecture, small group activities, discussion, reading Care Plan for Contraception Due
7	Module 8: Bone Health		Exam #2 Modules 6 &7 Lecture, small group activities, discussion, reading
8	Module 9: Drugs in Pregnancy & Lactation	1, 2	Lecture, discussion, reading
9	Module 9: Drugs in Pregnancy & Lactation Module 10: Thyroid Disorders	1, 2	Lecture, small group activities, discussion, reading Care Plan for Bone Health Due
10	Module 11: Sexual Dysfunction	1, 2	Lecture, discussion, readings
11	Module 11: Sexual Dysfunction & SAPH Group Project Presentations Mock Oral Exam	1, 2	Group Project Due Group Presentations Care Plan for Thyroid Due Exam #3 Modules 8-12

Detailed Course Schedule

Date (each row is 1 50 minute class period)	**Core Faculty**	**Topic**	**Activities/Assignments**
Week 1			
1/15	Anderson Westberg	Module 1: Intro to Endocrine 1. Course overview;PPCP overview and incorporation into this course 2. Introduction to endocrinology and the pharmaceutical treatment of endocrine disease, and use of drugs targeting hormone receptors and pathways	Lecture, in-class discussion
1/15	Anderson	Module 2: Hypothalamus Hypothalamus - Pituitary-Circumventricular organ Relationships	Lecture, in-class discussion
1/16	Anderson	Module 2: Posterior Pituitary	Lecture, in-class discussion **TC class meets in Moos 5-125– Duluth meets in LS 165**
1/16	Anderson	Module 3: Steroids Subsection 1:Molecular basis of steroid hormone receptor action - biochemistry and pharmacology	Lecture, in-class discussion **TC class meets in Moos 5-125 – Duluth meets in LS 165**
1/17	Anderson	Module 3: Steroids Subsection 1:Molecular basis of steroid hormone receptor action - biochemistry and pharmacology	Group learning activity: molecular basis of steroid hormone receptor action
1/17	Haskell-Luevano	Module 3:Subsection 2: Biosynthesis and metabolism of steroid hormones	Lecture
Week 2			
1/22	Haskell-Luevano	Module 4:Adrenals Steroids & Disease	Lecture
1/22	Westberg	Module 4:Clinical application of Adrenals Steroids & Diseases	Lecture, in-class discussion
1/23	Westberg	Module 4:Clinical application of Adrenals Steroids & Diseases	Lecture, in-class discussion
1/23	Anderson	Module 5: Male Gonadal Hormones Pathophysiology of androgen deficiency	Lecture, in-class discussion
1/24	Haskell-Luevano	Module 5: Male Gonadal Hormones	Lecture
1/24	Anderson	Module 6: Female Sex Hormones Subsection 1: Basics of Sex Hormones (Part 1) - Physiology of menstruation, fertilization, and pregnancy - Role of hormones in these processes	Lecture, in-class discussion
Week 3			

1/29	Sauer (guest)	Module 5: Transgender Health	Lecture
1/29	Pereira	Module 5: Male Gonadal Hormones Androgen Deficiency	Lecture, in-class discussion
1/30	Anderson	Module 6: Female Sex Hormones (Part 2) Subsection 1: Basics of Sex Hormones - Physiology of menstruation, fertilization, and pregnancy - Role of hormones in these processes	Lecture, in-class discussion
1/30	Anderson	Module 6: Female Sex Hormones (Part 2) Subsection 1: Basics of Sex Hormones - Physiology of menstruation, fertilization, and pregnancy - Role of hormones in these processes	Group learning activity: biology meets contraception
1/31	Haskell-Luevano	Module 6:Female Sex Hormones Subsection 2: Clinical Use of Estrogen and Progesterone for Contraception Be able to compare attributes of human, non-human, and synthetic estrogen preparations with respect to structural characteristics, pharmacology, PK, metabolism,	Lecture
1/31	Westberg	Module 6:Female Sex Hormones Subsection 3: Clinical Use of Estrogen and Progesterone for Contraception	Lecture; in-class discussion
Week 4			
2/5	ALL	**Exam #1: Modules 1-5**	
2/6	Westberg	Module 6:Female Sex Hormones Subsection 3: Clinical Use of Estrogen and Progesterone for Contraception	
2/6	Westberg	Module 6:Female Sex Hormones Subsection 3: Clinical Use of Estrogen and Progesterone for Contraception	
2/7	Westberg	Module 6:Female Sex Hormones Subsection 3: Clinical Use of Estrogen and Progesterone for Contraception	Lecture; active learning with cases
2/7	Westberg	Module 6: Female Sex Hormones Subsection3: Treatment of Polycystic Ovarian Syndrome & Endometriosis	Lecture; in-class discussion
Week 5			
2/12	Okoro	Module 6:Female Sex Hormones Subsection 5: SAPH: Patient adherence	Lecture; in-class discussion
2/12	Stratton	Module 6:Female Sex Hormones Subsection 6: Ethical Considerations & Role of Pharmacist Conscience Clause	Lecture & discussion; readings
2/13	Anderson	Module 7: Menopause and Hormone Therapy Subsection 1: Physiology of menopause	Lecture, in-class discussion
2/13	Anderson	Module 7: Menopause and Hormone Therapy Subsection 2: Pharmacology and Medicinal Chemistry of Selective Estrogen Receptor Modulators (SERMs)	Lecture, in-class discussion

2/14		Exam 1 Review (optional - first 30 minutes of class only)	
2/14	Anderson	Module 7: Menopause and Hormone Replacement Therapy Subsection 1: Pharmacology and Medicinal Chemistry of Selective Estrogen Receptor Modulators (SERMs)	Group learning activity: SERM molecular mechanism of action
Week 6			
2/19	Westberg	Module 7: Menopause and Hormone Replacement Therapy Subsection 2: Clinical Use of Hormones for Management of Menopause	Lecture, discussion
2/19	Westberg	Module 7: Menopause and Hormone Replacement Therapy Subsection 2: Clinical Use of Hormones for Management of Menopause	**Contraception Care Plan Due at 11:59 PM**
2/20	Westberg	Module 7: Menopause and Hormone Replacement Therapy Subsection 2: Clinical Use of Hormones for Management of Menopause	Lecture, in-class discussion
2/20	Westberg	Module 7: Menopause and Hormone Replacement Therapy Subsection 2: Clinical Use of Hormones for Management of Menopause	Case Studies in class
2/21	Anderson	Module 8: Bone Health Subsection 1: Hormones Regulating Calcium Homeostasis - Physiology	Lecture, in-class discussion
2/21	Anderson	Module 8: Bone Health Subsection 2: Pathophysiology of osteoporosis & osteopenia	Lecture, in-class discussion
Week 7			
2/26	Anderson	Module 8:Bone Health Subsection 3: Medicinal Chemistry and Pharmacology bone building and protecting drugs and supplements	Lecture, in-class discussion, readings
2/26	Anderson	Module 8:Bone Health	Group learning activity: physiologic targeting of pharmacologic agents
2/27	ALL	**EXAM #2 Module 6 & 7**	
2/28		**NO CLASS CPF**	
Week 8			
3/4	Westberg	Module 8: Bone Health Subsection 3: Clinical Management of osteoporosis and osteopenia	Lecture, in-class discussion
3/4	Westberg	Module 8: Bone Health Subsection 3: Clinical Management of osteoporosis and osteopenia	Lecture, in-class discussion
3/5	Westberg	Module 8: Bone Health Subsection 3: Clinical Management of osteoporosis and osteopenia	Case studies in class

3/5	Westberg	Module 8:Bone Health Subsection 4: Vitamin D Deficiency	Lecture, in-class discussion
3/6	Anderson	Module 9: Drugs in Pregnancy & Lactation Subsection 1: Physiology of pregnancy	Lecture, in-class discussion
3/6	Westberg	Module 9:Drugs in Pregnancy & Lactation Subsection 2: Clinical Use of Drugs in Pregnancy	Lecture, in-class discussion
3/9-3/13Spring Break			
Week 9			
3/18	Westberg	Module 9:Drugs in Pregnancy & Lactation Subsection 3:Use of medications and pharmacokinetics of drugs in lactation	Lecture, case studies in class
3/18	Anderson	Module 10: Thyroid Disorders Subsection 1: Physiology and Pathophysiology of the thyroid gland	Lecture, in-class discussion
3/19	Anderson	Module 10: Thyroid Disorders Subsection 2: Pharmacology and Medicinal Chemistry of thyroid and anti-thyroid drugs	Lecture, in-class discussion
3/19	Westberg	Module 10: Thyroid Disorders Subsection 2: Hyperthyroid & Hypothyroid	Lectures, small group discussion, readings **Bone Health Care Plan Due at 11:59 PM**
3/20		Exam #2 Review (optional)	
3/20	Westberg	Module 10: Thyroid Disorders Subsection 2: Hyperthyroid & Hypothyroid	Lecture, in-class discussion
Week 10			
3/25	Anderson	Module 11: Sexual Dysfunction Sexual Function Physiology and Pathophysiology	Lecture and in-class discussion
3/25	Westberg	Module 11: Sexual Dysfunction Subsection 1: Sexual Dysfunction in Clinical Settings	
3/26	Schommer	Module 11: Sexual Dysfunction Direct to Consumer Advertising & Social Networking in health care	
3/26	Schommer	Module 11: Sexual Dysfunction Direct to Consumer Advertising & Social Networking in health care	**Thyroid Care Plan Due at 11:59 PM**
3/27	Schondelmeyer	Module 11: Subsection 3: SAPH: Use of narrow therapeutic index, AB rating of generics	**Group Presentation Due at 11:59 PM**
3/27	Schondelmeyer	Module 11: Subsection 3: SAPH: Use of narrow therapeutic index, AB rating of generics	
Week 11			
4/1	ALL	Group Project Presentations	**Group Paper Due**
4/2	Westberg	Mock Oral Exam	**TC meets in Moos 5-125**
4/3		**Exam #3 Modules 8-12**	

4/16		ORAL EXAM	