

## ANFS 440/640: Comparative Histopathology

Course Syllabus- Spring 2016

*Welcome to Comparative Histopathology. Every day in my career, I am fascinated by what can be observed by looking at tissues under a microscope. Each tissue is quite intricate and beautiful, even when healthy, and only becomes even more intriguing as it changes during disease. Add in the discovery of pathogenic microorganisms, and I sincerely hope you will come to experience some of the same excitement and passion I developed through similar courses. And remember, you do not have to be, or to become, a pathologist to be amazed at what lies within each of us...merely curious. Enjoy!*

*-Dr. Brannick*

**Course Description:** ANFS 440/640 is an annual course in the Department of Animal & Food Sciences offered in the Spring semester. Classes emphasize pattern recognition of normal tissue and organ structure (histology), correlation of tissue architecture with normal physiologic function, and comparison to microscopic processes and lesions observed in the diseased state (histopathology). Laboratories will focus on recognition of diseased tissue as compared to normal tissue structure, as well as application of appropriate terminology and light microscopic techniques used in histologic and histopathologic analysis. Comparative microscopic analysis across human and animal tissues and across fundamental disease processes (inflammation, necrosis, neoplasia, etc.) will be emphasized. Class sessions will consist of 3 hours of lecture and 3 hours of laboratory weekly (4 CREDITS). Coursework will incorporate active learning experiences, production of a 3-dimensional tissue model comparing normal and diseased tissue, and group problem solving to stimulate and promote independent thought, communication, teamwork, and critical thinking.

### ***Professor and Teaching Assistant Contact Information:***

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**Office hours:** To be announced.

**NOTE ON COMMUNICATIONS:** The professor will make every effort to respond to email and phone messages within 24 hours. Due to family constraints, this may not always be possible. Please be patient and send a reminder email if you have not received a response within 24 hours.

### ***Prerequisites:***

**BISC 208- Requirement may be waived with permission of instructor.**  
**ANFS 140 (Functional Anatomy) or equivalent anatomy course is highly recommended.** Basic understanding of gross anatomic structure of organ systems and related terminology is necessary to keep pace with the information covered in this course.

**Textbook:**

***Wheater's Functional Histology: A Text and Colour Atlas. (5<sup>th</sup> or 6<sup>th</sup> Edition).*** By B. Young, J.S. Lowe, A. Stevens, J.W. Heath and P.J. Deakin. Elsevier Limited.

**An E-book version of the text is available for Kindle and is acceptable for use as long as the Kindle version used allows for viewing of color images.**

**Optional Text: *Pathologic Basis of Veterinary Disease (5<sup>th</sup> Edition).***

By J. F. Zachary and M. D. McGavin. Mosby, Inc. 2012. Several copies of this text will be available for use by students during all laboratory sessions. Students may also elect to purchase this text for individual use.

***Overall Learning Objectives and Goals:***

This course fulfills the University of Delaware (UD) learning objectives that students will:

- (2) Communicate effectively in writing, orally, and through creative expression.
- (3) Work collaboratively and independently within and across a spectrum of differences.
- (5) Reason scientifically.

The course also fulfills the following UD Animal & Food Science program learning goals:

- Students will demonstrate oral and written communication skills important for communicating scientific ideas.
- Students will use critical thinking and reasoning, skeptical inquiry and scientific approach to solve problems.
- Students will demonstrate knowledge of the major core concepts in the animal sciences.

***Course-Specific Learning Objectives***

By completion of the course, each student should be able to:

- Demonstrate appropriate light microscopic techniques (operate microscope independently and show a histologic structure or lesion on a tissue section to the instructor or a peer).
- Define and correctly use terminology related to microscopes, cellular morphology (shape), tissue architecture, component parts of animal cells, tissues, and organs, and fundamental disease processes.
- Distinguish normal tissues and organs by microscopic appearance when shown a microscopic image (light or electron microscopic photomicrograph) or glass slide.
- Categorize tissues into organ systems based upon epithelial or muscle type visualized and other unique characteristics.
- Compare and contrast known tissues across species or across diseased states.
- Identify or describe the diseased area of a given tissue when given a tissue diagram or photomicrograph and a comparison "normal" tissue.
- Correlate anatomic and microscopic tissue structure with functional purpose in a given organ or tissue and the pathologic processes occurring to produce lesions observed.
- Construct and explain a 3-dimensional model of a tissue representing both normal histologic architecture and abnormal (histopathologic) changes in a selected disease.

### *Course Policies:*

- 1) **Attendance is strongly encouraged and will account for 25 points toward the final grade.** Up to 3 absences from lecture will be excused regardless of cause prior to deduction of points from the student's final grade. The student is responsible for notifying the instructor as soon as possible in the event of an absence from a lecture, laboratory session or examination. Only students with excused absences (illness, family emergency, etc.) will be allowed to complete missed assignments and examinations for credit at another time upon arrangement with the instructor. **Students must make arrangements with peers to attain missed lecture and laboratory notes.**

**Lecture** sessions will meet twice weekly (T/Th 3:30 – 4:45p.m.) in **Room 002 Townsend Hall** and **laboratory** sessions will be held once a week (TBD) in the microscope laboratory, **Room 205 Worrilow Hall.**

- 2) **Students are responsible for completing reading assignments prior to attending laboratory sessions.** It is imperative to review both text and images to adequately prepare for analysis of normal and diseased tissues during laboratory portion of the course.
- 3) **Materials for this course will be administered through Canvas (Log in at: <http://www.udel.edu/canvas/>).** This syllabus, the course calendar, and other course materials will be available electronically through this site. It is the student's responsibility to access the site regularly to attain course materials.
- 4) **A respectful learning environment is expected in the classroom and laboratory.** Electronic devices beyond those used to take notes during lecture/lab should be silenced and put away prior to the start of class. Microscopes must be cleaned of oil residue, covered, and returned to the cabinet prior to leaving the laboratory.
- 5) **Academic Dishonesty:** Academic dishonesty will NOT be tolerated in this class. Students are expected to complete their own work in laboratories and on examinations and to contribute fully when working in groups. Students found cheating or "freeloading" on assignments/examinations and any students assisting classmates in this behavior will be reported immediately to The Office of Student Conduct for disciplinary action. Students with knowledge of peer misconduct should notify the instructor or the Office of Student Conduct (<http://www.udel.edu/studentconduct/>).

### *Disability Statement:*

Students who may require accommodation in course or test administration should notify the instructor **within the first two weeks of the course**. The student is also responsible for contacting the Office of Disabilities Support Services [Phone: 302-831-4643, Address: Alison Hall, Suite 119, 240 Academy St.]. Additional information about support services is available online at <http://www.udel.edu/DSS/>. **Colorblindness can interfere with a student's ability to discern detail in some slides and images used in this class.** Please notify the instructor if you have this condition so that accommodations can be made.

### Grading and Examinations:

Grading will be based upon four (4) examinations, attendance and participation in lecture and laboratory sessions, and completion of a histopathologic model project (described below). Final grades are based upon the percentage of points accumulated up to the maximum of 600 points as follows:

**Examinations** will be **non-cumulative**, with 60 points devoted to a *written portion* involving multiple choice, short answer, essay, and diagram-labeling questions and 40 points devoted to a timed *practical portion* which will include tissue, histologic structure, and lesion identification on projected images or slides.

COURSE ITEM	POINTS POSSIBLE
Exam 1: Written	60
Practical	40
Exam 2: Written	60
Practical	40
Exam 3: Written	60
Practical	40
Final: Written	60
Practical	40
Laboratory points	100
Group model project	75
Attendance	25
<b>TOTAL POINTS</b>	<b>600</b>

**Laboratory** points for all students will be based upon completion of in-lab worksheets which will also serve to indicate attendance for each session. While students may review missed laboratory materials at their own convenience, only those students with an excused absence will be allowed to complete the in-laboratory assignments for credit.

**Model Project-** Paired or individual students will be responsible for making a 3D model of a histologic tissue or structure to be used for demonstration purposes to their peers and future students in this course (instructions to follow in subsequent lectures). Group model projects will be graded using a rubric system with **25 points each** allotted to **group evaluation** (individual's contribution to the project), **whole class evaluation** (usefulness as a teaching tool), and **instructor's evaluation** (group creativity, accurate depiction of a tissue or histologic structure, structure labeling, and description).

**\*\*\*Undergraduate Honors and Graduate Students** enrolled in ANFS 640 will complete an additional assignment for 100 points beyond those outlined above for a total of 700 points possible. Students will review and present a peer-reviewed journal article demonstrating the importance of histologic and histopathologic analysis in research.

Final grades will not be curved and the final letter grade will be issued on the following grade standard:

Points Accumulated		%	Letter Grade
Undergraduate	Honors/Grad.		
> 552	>644	> 92	A
540 – 552	630-644	90 – 92	A-
522 – 539	609-629	87 – 89	B+
498 – 521	581-608	83 – 86	B
480 - 497	560-580	80 – 82	B-
462 - 479	539-559	77 – 79	C+
438 - 461	511-538	73 – 76	C
420 - 437	490-510	70 – 72	C-
402 - 419	469-489	67 – 69	D+
360 - 401	420-468	60 – 66	D
< 360	<420	<60%	F

## LECTURE AND LABORATORY OUTLINE

WK Dates	READING TOPIC	LECTURES (Tu/Th)	LABORATORY (W)
1	Cell structure/function Cell cycle Connective tissues	1. Introduction to histology, stains, cellular structures 2. Connective Tissue/Project overview	Basic microscopy Skills, Lesion identification
2	Epithelial tissues Muscle	3. Epithelial tissues 4. Muscle tissue	Connective and epithelial tissues
3	Nervous tissue Circulatory System	5. Nervous tissue/Review 6. Heart and Vessels	Muscle/nervous tissue & Review
4	Blood	<b>EXAM 1 (to Nervous)</b> 7. Blood cells	Heart and Vessels
5	Immune System Skeletal Tissues	8. Lymphoid organs 9. Skeletal tissues	Blood and lymphoid organs
6	Endocrine Liver and pancreas	10. Endocrine 11. Liver & Pancreas	Skeletal organs & Review
7	Oral tissues Digestive system	12. Oral & Gastrointestinal <b>EXAM 2 (Heart to Skeletal)</b>	Digestive organs Hepatobiliary/Endocrine
8	Urinary System Female Reproductive	13. Urinary 14. Female Reproductive	Urinary
9	Male Reproductive Respiratory system	15. Male Reproductive 16. Mammalian airways & Lung	Reproductive /Review
10	Reading posted on Canvas	17. Modified respiratory organs <b>EXAM 3 (Endocrine to Repro.)</b>	Respiratory
11	Skin Special sense organs	18. Skin 19. Special Sense organs	Skin & Skin Structures
12	Central nervous system	20. Special sense organs (cont.) 21. Central Nervous System	Special sense (guest)
13	Project handouts	22. MODEL PROJECTS 23. MODEL PROJECTS	CNS & Special sense (cont.)
14	Honors/Grad handouts (due by Mon. 11/24)	24. Applied histopathology HOLIDAY	HOLIDAY (No lab session)
15	Honors/Grad handouts	25. Applied histopathology (cont.)	Honors/Grad presentations/Review
16 FINAL		<b>Exam 4 (Respiratory to applied histopathology)</b>	

### ***Histopathologic topics for laboratory by syllabus week***

Each week, in addition to reviewing the normal histology of the tissues covered during lecture, I will introduce abnormal tissues and describe important concepts about the disease processes commonly encountered in animal species. Topics covered include:

Week 1- Lesion identification (normal vs. abnormal, margins, etc.)

Week 2- Epithelial erosion and ulceration, fibrosis, wound healing

Week 3- Myofiber degeneration, necrosis, and regeneration

Week 4- Vascular disturbances (congestion, hemorrhage, thrombosis, etc.)

Week 5- Lymphoid depletion and neoplasia (lymphoma/leukemia)

Week 6- Developmental and nutritional skeletal growth disturbances

Week 7- Hepatocellular degeneration (lipidosis, etc.) and patterns of liver injury, Hypertrophy and hyperplasia in gastrointestinal and endocrine tissues

Week 8- Intracellular and extracellular deposits (crystals, calcification, amyloid, etc.)

Week 9- Reproductive tract neoplasia

Week 10- Identification of etiologic agents (bacteria, viruses, fungi, protozoa, helminths, etc.) in respiratory tissues

Week 11- Inflammation (types and patterns) in skin

Week 14- Patterns of ocular disease

Week 15- Honors and graduate student presentations- applications and examples of histology and histopathology in research

## **STUDENT CONTRACT OF APPROPRIATE CONDUCT**

Please return completed page to the instructor by the 2<sup>nd</sup> week of class. The student code of conduct can be found at:

<http://www.udel.edu/stuguide/11-12/code.html>

I have read the Comparative Histopathology course syllabus and the University of Delaware's student code of conduct and agree to adhere to standards of appropriate academic and personal conduct as outlined therein throughout the course.

Student name (printed) \_\_\_\_\_

Student signature \_\_\_\_\_

Date \_\_\_\_\_