



## **Course Title and Description**

APBI 410 (3) Animal Health/Applied Animal Physiology and Health

This course is designed for students interested in applied physiology and pathology principles. The underlying plan is to provide third and fourth year students with an understanding of homeostasis, homeorhesis, different examples of pathophysiology processes of major diseases, animal welfare and ethical views, and current interventions in animals, including companion, laboratory and food production animals.

## **Rationale and Intended Audience**

This course is intended primarily for students in degree programs provided in with the Faculty of Land and Food Systems (Applied Biology) and the Faculty of Science (Biology or Whole Animal Biology), who wish to increase their understanding of basic and applied physiological processes related to common disorders in domesticated animals, including zoonotic diseases. The primary objective of the course is to focus on knowledge application in an interdisciplinary fashion to identify interventions that improve health and welfare of the animals. It will be a valuable elective for students with an interest in applied animal biology, food nutrition and health, and veterinary medicine. In summary, the course is expected to integrate different areas (physiology, biochemistry, pathology, pharmacology, animal welfare) using a combination of traditional classes and problem based learning using case scenarios that highlight current application of knowledge.

## **Overview**

Students in this course will be exposed to an integrative approach to general pathophysiology processes.

Specifically students will be required to:

- apply and integrate principles and concepts of Applied Animal Biology to their basic understanding of integrative physiology and its application to real-life scenarios
- apply knowledge and principles learned in the classroom
- gain new knowledge and understanding of areas relevant to their study major.

This course provides a comprehensive overview with emphasis on mechanisms of disease and modern diagnostic technologies. Topics include concepts of homeostasis, homeorhesis, general mechanisms of disease (inflammation, infection, immune injury, neoplasia), acute and chronic stress concepts, ethical concerns and animal welfare.

## **Course Structure and Operation**

The course is proposed as a 3-credit course that students can take during their 3<sup>rd</sup> or 4<sup>th</sup> year in the Winter Term 2. It is designed primarily for Land and Food Systems students, particularly in the Applied Animal Biology stream and Faculty of Science students, particularly those in the whole animal biology stream who have an interest in animal biology, animal science and veterinary medicine. Enrolment will be initially limited to a maximum of 40, but could be increased.

The structure of the course will be based on a twice-weekly 90 minute classes. No laboratory is planned. The instructor is responsible for class material and content, supervising and ensuring completion of tasks, reports and quizzes. Invitation of guest presenters who are experts in specific disorders related to weekly topics will be incorporated into the syllabus. The teaching assistant will have office hours, mark assignments and assist during class discussions on case scenarios.

## **Logistical Requirements**



The course will require a classroom with an initial capacity of 40 to 50 students. One or two teaching assistants will be required

### **Learning Outcomes**

Upon completion of the course, students will be able to:

- Describe pathological mechanisms that govern disease processes (cell injury, inflammation, immunity, neoplasia, vascular disturbances)
- Differentiate processes related to infectious, metabolic, genetic diseases.
- Understand the clinical and sub-clinical manifestations of pathological processes through molecular, physiological and morphological changes.
- Critically analyze and present case studies which investigate pathological conditions and treatment mechanisms
- Analyze current topics involving physiological health, and implications to welfare and ethical issues in domestic animals

### **Course Format and Evaluation:**

Overview:

20%	Case assignments (every other week)
25%	Mid-term I (in class)
20%	Mid-term II (take home)
35%	Final exam

### **Bi-weekly Case Assignments (20%):**

Assignments about a disease/situation (see below possible research topics) will be handed to students every week. Students will be expected to research the topic and return in the next class for a group discussion in which a one page summary and discussion will be evaluated in the last 15-20 minutes of class.

### ***Possible assignment topics:***

- Define Health: homeostasis, homeorhesis and animal welfare
- Sub-fertility and metabolic disorders in high-producing dairy cows
- Zoonotic diseases; challenges affecting animal and human health associated with increasing human densities in close contact with animals
- Links between obesity, diabetes and cardiac disease
- What health issues may be causing population declines in wild salmon stocks?
- Occurrence and prevention of genetic disorders in livestock due to inbreeding
- The horse as an athlete and the dangers of high-performance training
- Rehabilitating sick and injured wildlife
- The geriatric companion animal: Health factors to consider when contemplating end of life decisions



### **Mid-term I and II (25 and 20%)**

The mid-term I examination will be scheduled for the middle of the term (Mid-February) and will be composed of short answer and essay questions related to the basic (principles) portion of class material. The mid-term II examination (Mid-March) will be a take home exam composed of questions related to two or three specific new cases.

### **Final examination (35%):**

The final examination will be cumulative and composed of short answer and essay questions based on basic principles and case studies.

### **Textbook, Primary Literature & Library Impact**

There are no required textbooks for this course. All assigned readings will be taken from the primary literature (i.e. journal articles) and will be directly available through the UBC library or provided in a readings package made available through the UBC bookstore. Peer-reviewed reference materials are also used to provide background information in areas such as physiology, pathophysiological processes and welfare. Thus, it is anticipated that this course will have minimal impact on library resources.

### **Example readings list and case studies:**

Bubendorf, L., Nocito, A., Moch, H., & Sauter, G. 2001. Tissue microarray (TMA) technology: miniaturized pathology archives for high-throughput in situ studies. *The Journal of pathology*, 195(1), 72-79.

DeGaris, P. J., & Lean, I. J. 2008. Milk fever in dairy cows: A review of pathophysiology and control principles. *The veterinary journal*, 176(1), 58-69.

Furness, M. C., Bienzle, D., Caswell, J. L., DeLay, J., & Viel, L. 2010. Immunohistochemical identification of collagen in the equine lung. *Veterinary Pathology Online*, 47(5), 982-990.

Masuno, K., Yanai, T., Hirata, A., Yonemaru, K., Sakai, H., Satoh, M., ... & Nakai, Y. 2006. Morphological and immunohistochemical features of *Cryptosporidium andersoni* in cattle. *Veterinary Pathology Online*, 43(2), 202-207.

Sacco, R. E., McGill, J. L., Pillatzki, A. E., Palmer, M. V., & Ackermann, M. R. 2013. Respiratory syncytial virus infection in cattle. *Veterinary Pathology Online*, 0300985813501341.

Glatzel M, Stoeck K, Seeger H, Lührs T, Aguzzi A. 2005. Human prion diseases: molecular and clinical aspects. *Arch Neurol*. 2005 Apr;62(4):545-52.

Shearer JK, Stock ML, Van Amstel SR, Coetzee JF. 2013. Assessment and management of pain associated with lameness in cattle. *Vet Clin North Am Food Anim Pract*. 29(1):135-56.

### **Course Schedule**

- Week 1: Introduction. Class presentation (evaluation, expectations)
- Week 2: Homeostasis and function of core systems (cardio-vascular, respiratory)
- Week 3: Function of core systems (digestive, endocrine)
- Week 4: Homeorhesis and key adaptations (salinity adaptation, pregnancy, lactation)
- Week 5: Immune system and stress physiology



- Week 6: Bacteria, virus and other external agents
- Week 7: Pathology principles (inflammation, infection)
- Week 8: General pharmaceutical groups: antibiotics, anti-inflammatory, hormones
- Week 9: Case studies: infectious diseases (agents, treatments, pathophysiology)
- Week 10: Case studies: metabolic diseases (agents, treatments, pathophysiology)
- Week 11: Case studies: auto-immune diseases (agents, treatments, pathophysiology)
- Week 12: Case studies: disorders caused by toxic agents (agents, treatments, pathophysiology)
- Week 13: Case studies: welfare issues (agents, treatments, ethics)

### **Pre-requisite**

Pre-requisite: 3rd year standing or higher; Basic biochemistry and physiology

### **Relationship to Faculty and University Priorities**

The undergraduate Applied Biology degree program allows students to pursue interests in applied aspects of physiology, disease and rationale for treatments. This course will expand course offerings for Applied Animal Biology students in this Faculty to include experiential learning. The course aligns strongly with the Faculty of Land and Food System's theme, in that students will learn how to apply concepts and knowledge from the basic biological sciences to situations in real case scenarios. Additionally, it provides students with a critical sense of integrative biology. This course will be especially valuable to students interested in pursuing careers in veterinary medicine, animal science, and animal care. This course will also attract animal and human oriented students from programs such as Biology, Biochemistry, Human Nutrition and Science. The course provides direct complement to 3<sup>rd</sup> and 4<sup>th</sup> year LFS courses such as APBI 311, APBI 312, APBI 314, APBI 315, APBI 398, APBI 411, APBI 415.

### **Academic Integrity**

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

### **Budget Impact**

No budget impact on Department is expected.

For further information contact:  
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