# .- Animal Morpho-physiology and introduction to the genetics of metabolism

## Prof. Paolo Ajmone Marsan

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

The course will deal with the basic physical and chemical processes of the main animal tissues, organs and apparata, in order for students to understand the mechanisms that govern the maintenance, integration and adaptation of livestock to production and environmental challenges.

**Knowledge and ability to understand**

At the end of the course, students will be able to know and understand the anatomy and physiology of the main organs and systems of monogastric and ruminant livestock and how they can be influenced by genetics.

**Understanding and applying knowledge**

At the end of the course, students will be able to describe livestock morphology and apply knowledge acquired on animal physiology to face the main problems of animal farming.

**Autonomous judging skills.**

At the end of the course, students will be able to evaluate the physiological responses of livestock to environmental variations, for the maintenance of homeostasis.

**Communication skills**

At the end of the course, students will be able to appropriately use scientific language and the specific vocabulary of animal anatomy and physiology.

**Learning ability**

At the end of the course, students will be able to learn more about animal anatomy and physiology independently, through the consultation of texts, scientific articles and web resources.

***COURSE CONTENT***

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|  | ECTS |
| Animal cells, tissues, organs and apparatuses | 1.0 |
| The animal cell: structure and function of the membrane and cellular organelles. Cell junctions, ion channels, membrane and action potential. Signal transduction mechanisms. Animal tissues: epithelial, connective, nervous, muscular. Organisation and description of the animal organism's apparatuses. | 1.0 |
| Digestive system: anatomy of the alimentary canal and associated glands; physiology: feed prehension and mastication, gastric and forestomach motility, gastric juice, bile, pancreatic juice, enteric juice, nervous and humoral regulation of gastrointestinal functions, digestion and absorption, rumen biochemistry. | 1.5 |
| Endocrine system: hormones and receptors; anatomy and physiology of endocrine glands. | 1.0 |
| Female reproductive system: anatomy; physiology of oogenesis, oestrous cycle, hormones involved during puberty, oestrous cycle, pregnancy and parturition; anatomy and physiology of the mammary gland: mammogenesis, lactogenesis, galactopoiesis, milk synthesis and ejection. Milking. The dry period. | 1.0 |
| Introduction to the genetics of metabolism: basis of animal genetics; example of major genes influencing metabolism. | 0.5 |
| Tutorials. Technical visits, topical seminars. | 1.0 |

***READING LIST***

##### OYSTEIN V. SJAASTAD, IAV SAND, KNUT HOVE, *Fisiologia degli animali domestici,* Rev. by C. Tamanini, Casa Editrice Ambrosiana, 2013

R. BORTOLAMI, E. CALLEGARI, P. CLAVENZANI, V. BEGHELLI, *Anatomia e fisiologia degli animali domestici,* Edagricole, Bologna, 2009

G. BERTONI, *Il rumine: alcuni aspetti di anatomia, di fisiologia, di modulazione e di fisiopatologia*, CUSL, 1985

R. BARONE, *Atlante di osteologia e miologia del cavallo e del bovino*, Edagricole, Bologna, 1981

J.C. CUNNINGHAM, *Textbook of veterinary physiology*, Philadelphia, Saunders, 2002.

Further reading references will be provided during the course.

The slides used in lectures will be made available on Blackboard.

***TEACHING METHOD***

- Dialogic and theoretical frontal lectures with support of PowerPoint slides, in which the relationships between the form and function of cells, tissues, organs and systems of the animal organism are presented and discussed. The digestive, endocrine and reproductive systems, fundamental for the various types of animal production, will be dealt with in greater detail.

- The course will be supplemented with seminars by external experts on specific topics relevant to the physiology, productive efficiency and environmental impact of the animals in production.

- Classroom tutorials on how to recognise the different tissues making up animal organs will also be conducted.

- Visits to the experimental company, CERZOO, and other zootechnical companies will be organised, which will include a description and discussion of the animal morphological evaluation criteria and how these are applied in the field.

***ASSESSMENT METHOD AND CRITERIA***

An interim written test is scheduled on the content covered in the first part of the course. The duration of the test is 120 minutes. Each test will consist of four questions covering the contents of the frontal lectures, each carrying a maximum of 7 marks, and one question covering the tutorials, carrying a maximum of 4 marks, for a total of 32 marks. The student's mark will depend on the completeness and clarity of their answers and their command of the language. The results will be communicated on the Blackboard platform. Any learning-related issues emerging from the written test will be discussed in class.

At the end of the course a final oral test will be held; this will cover the second part of the course for those who obtained a mark of at least 18 and accepted the assessment of the interim tests, and the entire course program for the others. The final mark will be weighted 1/3 interim test score and 2/3 oral exam.

***NOTES AND PREREQUISITES***

Students may only enrol for the final exam once they've passed the General Chemistry and Organic Chemistry exams. Knowledge of the chemical structure of biological molecules and the basic principles of biochemistry is recommended.

Information on office hours available on the teacher's personal page at <http://docenti.unicatt.it/>.

 In case the current Covid-19 health emergency does not allow frontal teaching, remote teaching will be carried out through synchronous or asynchronous procedures that will be promptly notified to students

 