Module Definition Form (MDF)

Module code: MOD011014	**Version:** 1 **Date Amended:** 07/Mar/2025

1. Module Title
Animal Biomechanics and Pathophysiology

2a. Module Leader
Roberta Blake

2b. School
Writtle School of Agriculture, Animal and Environmental Sciences

2c. Faculty
Faculty of Science and Engineering

3a. Level
6

3b. Module Type
Standard (fine graded)

4a. Credits
30

4b. Study Hours
300

5. Restrictions			
Type	**Module Code**	**Module Name**	**Condition**
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	BSc Equine Therapy, rehabilitation and performance, BSc Animal Therapy, rehabilitation and performance, BSc Canine Therapy rehabilitation and performance. MVetphys Veterinary Physiotherapy, Canine and Equine.		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This module integrates the study of veterinary pathophysiology and biomechanics so you can understand how intrinsic, extrinsic factors, diseases and injuries affect the musculoskeletal and nervous systems in animals, particularly focusing on dogs and horses. This module has a special focus on the important factors relating to animal structure and movement and integrates the functional aspects of correct movement and changes that occur due to injury and disease. The module presents an in-depth exploration of the underlying principles of biomechanics, and veterinary pathophysiology.

You'll learn to identify, assess, and manage common pathologies and conditions affecting movement and function, focusing on applying biomechanical principles in veterinary physiotherapy to develop appropriate rehabilitation strategies.

The module will make use of taught sessions and practical on live animals in order to give you a detailed understanding of musculoskeletal structure and function, and implications on injury and disease and rehabilitation. This will enable you to develop gait evaluation skills, qualitatively and quantitatively. A focus will be placed on relating form to function, giving an appreciation of how the musculoskeletal and nervous systems act to generate locomotion. Musculoskeletal and nervous dysfunction will also be discussed in order to enhance understanding of the above principles and the implications on their pathology. You'll integrate theoretical knowledge with practical knowledge and have the opportunity to gain skills in using biomechanics technology.

By combining pathophysiology and biomechanics, this module gives you the tools to approach rehabilitation in a targeted, informed, and ethical way, ensuring the best outcomes for animal patients under your care.

6b. Outline Content

1. Veterinary Pathophysiology

- Overview of pathophysiology in veterinary medicine
- Inflammation and tissue healing-revisited
- Pain management-revisited
- Degenerative joint diseases (e.g., osteoarthritis, OCD)
- Non-sport related Musculoskeletal pathologies (e.g., elbow dysplasia, laminitis)
- Neurological conditions affecting movement (e.g., intervertebral disc disease, nerve injuries)
- Endocrine, cardiovascular and respiratory conditions affecting exercise tolerance

2. Sports Medicine

- Anatomy and physiology relevant to performance
- Sports biomechanics and gait analysis
- Demands of different disciplines and how this informs nutrition
- Common musculoskeletal injuries (tendons, ligaments, bones)
- Diagnosis and treatment of equine sports injuries (diagnostic imaging, therapies)
- Injury prevention and rehabilitation protocols
- Innovation in veterinary treatments for sport animals
- Drugs and doping regulations in equine sports
- Performance and Poor performance assessment
- The role of therapists in sports settings

3. Biomechanics of Normal and Pathological Movement

- Neuromuscular control of locomotion and how neurological disorders affect the gait
- Biomechanics of limbs and back movement
- Biomechanics of injuries and effects of lameness on gait
- Compensatory mechanisms during pathological movement
- Assessment of movement disorders using kinematics and kinetics
- Postural compensations
- Biomechanics of physiotherapy and rehabilitation modalities
- Extrinsic (saddle, rider, surface, shoeing and trimming) and intrinsic (breed and conformation) factors affecting biomechanics, performance and injury

4. Integrating Pathophysiology and Biomechanics in Veterinary Physiotherapy

- Biomechanical impact of common pathologies (e.g., tendonitis, CCLR)
- Understanding the progression of degenerative diseases
- The role of biomechanics in injury prevention and rehabilitation
- Biomechanical adaptations during recovery from surgery or injury
- Evaluating and modifying exercise programs for specific pathologies
- The importance of proprioception, posture and neuromuscular control in rehabilitation
- Using biomechanical tools accessible to the veterinary physiotherapist to detect and follow up biomechanical abnormalities

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources
All the equipment and computer software required for this module is available on the ARU Writtle campus. However, the number of available computers with the required software needs to be evaluated in relation to student numbers.

7. Learning Outcomes (threshold standards)

No.	Type	On successful completion of this module the student will be expected to be able to:
1	Knowledge and Understanding	Apply veterinary physiotherapy principles based on the understanding of pathophysiology and biomechanics.
2	Knowledge and Understanding	Critically assess rehabilitation strategies for individual cases based on clinical findings and biomechanical analysis.
3	Intellectual, practical, affective and transferrable skills	Explain the pathophysiological processes of common musculoskeletal, neurological, and systemic diseases in animals.
4	Intellectual, practical, affective and transferrable skills	Analyse biomechanical principles and their application to normal and pathological movement in animals.
5	Intellectual, practical, affective and transferrable skills	Evaluate the impact of pathophysiological conditions on biomechanics and functional performance.

8a. Module Occurrence to which this MDF Refers

Year	Occurrence	Period	Location	Mode of Delivery
2026/7	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence

Learning Activities	Hours	Learning Outcomes	Details of Duration, frequency and other comments
Lectures	48	1-5	16 x 3 hours a week of lectures
Other teacher managed learning	18	1,4,5	6 x 3 hours practicals or visits
Student managed learning	234	1-5	elf-Directed Learning, VLE tasks, pre- and post-session activities
TOTAL:	300		

9. Assessment for the above Module Occurrence

The assessment for some modules includes a presentation (see below for details on how this particular module is assessed). We recognise that presenting, especially to a large group, can cause significant anxiety or distress for some students. If this may affect you, please contact your Module Leader or the Disability and Neurodiversity Service as early as possible. We will work with you to consider appropriate reasonable adjustments. Depending on your individual needs, these might include, for example, presenting to a smaller group or presenting only to a member of academic staff.

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
010	Coursework	1-5	100 (%)	Fine Grade	30 (%)
6000 words - 3 components					

Assessment components for Element 010

Component No.	Assessment Title	Submission Method	Weighting (%)	Components needed for Mark Calculation?
010/1	Biomechanics analysis and report		30 (%)	All
010/2	Evidence-Based Presentation		30 (%)	
010/3	Case Study		40 (%)	

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]