

# Muscle-Tendon Mechanics

## Module Information

2022.01, Approved

### Summary Information

Module Code	7114SPOSCI
Formal Module Title	Muscle-Tendon Mechanics
Owning School	Sport and Exercise Sciences
Career	Postgraduate Taught
Credits	20
Academic level	FHEQ Level 7
Grading Schema	50

### Teaching Responsibility

LJMU Schools involved in Delivery
Sport and Exercise Sciences

### Learning Methods

Learning Method Type	Hours
Lecture	12
Practical	12

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

### Aims and Outcomes

Aims	This module aims to introduce the main biomechanical characteristics of human muscles and tendons and the implications for human movement, performance and biomechanical testing. The mechanical parameters and behaviour of these tissues of the human body in-vivo will also be examined in response to chronic loading and disuse in order to understand basic musculoskeletal mechanisms and adaptations underpinning changes in whole-body function and performance.
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**After completing the module the student should be able to:**

### Learning Outcomes

Code	Number	Description
MLO1	1	Critically appraise current literature on muscle-tendon mechanics and adaptations
MLO2	2	Analyse, evaluate and adapt methods used for the study of musculoskeletal system function in practice, research and development.
MLO3	3	Apply current strategies and methods for improving performance in sports and rehabilitation applications.
MLO4	4	Research, evaluate and summarise information related to muscle-tendon structure and function.

### Module Content

Outline Syllabus	The module content includes: 1. Muscle: Muscle contraction and force generation Muscle sarcomere and muscle fibre architecture Human muscle architecture: Implication for function and methods of study Force-length and force-velocity properties of muscle Adaptations of muscle structure and function to chronic use and disuse Muscle strength: theoretical and measurement considerations 2. Advanced EMG measurements Assessment of agonist and antagonist muscle activation 3. Tendon Moment arms and lever systems in the human musculoskeletal system Tendon structure and Material properties Human tendon mechanical properties in-vivo Adaptation of human tendons to chronic use and disuse
Module Overview	This module introduces the main biomechanical characteristics of human muscles and tendons and the implications for human movement, performance and biomechanical testing. The mechanical parameters and behaviour of these tissues of the human body in-vivo will also be examined in response to chronic loading and disuse to understand basic, musculoskeletal mechanisms and adaptations underpinning changes in whole-body function and performance.
Additional Information	Cutting edge equipment in our Biomechanics labs will be used for obtaining the skills to study the mechanical behaviour of the human muscle-tendon in-vivo. This includes:- Ultrasound scanners for visualizing human muscles and tendons in-vivo Electromyography for recording muscle activity Isokinetic dynamometry for quantifying muscle force Electric and magnetic stimulators for evoking muscle contraction bypassing volitional control A fully equipped gait lab and a unique instrumented staircase for the study of the musculoskeletal system and the behaviour of muscles and tendons in daily locomotor tasks.

### Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Experimental report	50	0	MLO2, MLO4
Essay	Essay	50	0	MLO1, MLO3

### Module Contacts

**Module Leader**

Contact Name	Applies to all offerings	Offerings
Constantinos Maganaris	Yes	N/A

**Partner Module Team**

Contact Name	Applies to all offerings	Offerings
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