

## Paper Outline

### Paper Outline - 2010

# MASSEY UNIVERSITY

COLLEGE OF SCIENCES

**Paper Number & Title:** Muscle Mechanics 234.701

**Credits Value:** 15

**Semester:** One

**Campus:** Palmerston North

**Mode:** Internal

**Calendar Prescription:** *An advanced level study of skeletal muscle structure, function, and neural control during contraction and exercise of a varying nature, and how these may change with chronic contractile activity.*

**Prerequisite(s):** 194.241 (Physiological Control Systems) or 234.203 (Exercise Physiology), 214.170 (Structural Kinesiology) or Anatomy or similar.

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**Aim:** To provide knowledge at an advanced level of selected aspects of muscle mechanics of particular relevance to Sport and Exercise science, and to provide students with skills in accessing, interpreting and reviewing the research literature in muscle physiology.

**Learning Outcomes:** A student having completed this paper should have:

1. The ability to obtain information on topics in muscle physiology from text books, review articles and the primary literature.
2. The ability to assimilate this information and communicate it to others in both written and oral form.
3. The ability to interpret data and to draw scientifically sound conclusions from the data
4. An understanding at an advanced level of selected topics in muscle physiology in relation to Sport and Exercise Science.

### Objectives

The objectives of this paper are to provide students with:

- Skills in accessing, interpreting and reviewing the research literature in muscle physiology
- The ability to write reviews of the research literature in muscle physiology at both a scientific and general level
- The ability to give an oral presentation about a research paper in muscle physiology

- Problem solving skills based on experimental design
- Knowledge at an advanced level of selected aspects of muscle physiology (as indicated by the topics above) of particular relevance to Exercise and Sport science.

### ***Assessment***

Assessment is 60% based on assignments completed during the year, and 40% on a 3-hour final examination held in June.

Three assignments will be completed, with the general format indicated below:

#### Assignment 1

**Topic:** Write a historical review on the development of knowledge of one of the topics listed below **or** another relevant topic of your interest (with agreement with the lecturers). Focus your discussion on the key milestones in the progression of knowledge, and finish by giving a summary of the present understanding of that area.

1. Muscle performance, training and pennation angle.
2. Methods of fibre-typing
3. Sliding filament theory of muscle contraction
4. Spatial recruitment to increase tension (size principle)
5. Understanding the recognition and role of titin in muscle function

**Hours:** Estimate 10-20, but this will vary greatly between students – see note below.

**Due Date:** To be handed in during week 6 of Semester.

**Value:** 20% of total marks for paper.

**Learning outcome:** The assignment is designed to develop literary research skills and better understand the concepts behind muscle contraction.

#### Assignment 2

**Topic:** From the research article provided, write a 300 word abstract which summarises the aims, methods, results and conclusions of the article.

**Hours:** Estimate 8, but this will vary greatly between students – see note below.

**Due Date:** To be handed in during week 8 of Semester

**Value:** 10% of total marks for paper; with assessment emphasis on the ability to succinctly relay the contents of the paper.

Learning outcome: The assignment is designed to provide students with skills in interpreting a research article, and summarize the findings.

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### Assignment 3

Topic: Group experiment. During the block course in April, we will be undertaking a series of experiments based around the interaction between muscle mechanics and exercise physiology. You will be required to participate in data collection, analysis and interpretation as part of the group. The group will also develop and poster for (virtual) conference presentation. Full write up of the study will be an individual effort, and individual marks will be assigned for presentation. The write up should be in the form of a journal article based on the structure and style of the Journal of Applied Physiology.

Hours: Estimate 30 hours, but this will vary somewhat between students.

Due Date: To be handed in, and the oral presentation given, at Block Course 2.

Value: 30% of total marks for paper; 20% for data interpretation and conclusions, and 10% for poster presentation and the ability to work as part of a team.

Learning outcome: The assignment is designed to provide students with skills in working in a research team environment where accuracy/precision of data collected is paramount. It is also designed to provide the student with the opportunity to vertically integrate all aspects of the research process, culminating in the dissemination of results via the literature.

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### *General information on completion of assignments:*

Completion of all assignments is an essential requirement for a pass in this paper.

Details of requirements for each assignment will be handed out and discussed at the block course. Assignments must be typed using a word processor, and must be submitted in electronic format as well as a hard copy. The electronic form of assignments will be checked for plagiarism using a programme that scans text and identifies sections of text that have been directly copied from other sources. Referencing for assignments should follow the format of the Journal of Applied Physiology. Note that the estimates of hours required for each assignment as given above may not be reliable for any particular student. The time required will vary greatly depending on the knowledge and background of each student, the efficiency with which the student works, and the grade the student is aiming to obtain for the assignment.

### **Final Examination:**

The final examination is 3 hours in duration, and will consist of writing essay-style answers to questions on three topics selected from those covered in the paper. Details as to what is expected of students in the final examination, and the extent to which assignment material is included in the final examination, will be discussed at block courses during the year.

**Alignment of Assessment to Learning outcomes**

Assessment Description	Learning Outcomes Assessed					Contribution to Paper Mark
	1.	2.	3.	4.		
Assessment						
Assignment 1	✓	✓		✓		20%
Assignment 2	✓	✓				10%
Assignment 3	✓	✓	✓	✓		30%
Final Exam				✓		40%

**Deadlines and Penalties:**

Assignments turned in late will be marked down 10% unless prior arrangement is made with the paper coordinator. Assignments will not be accepted more than a week after the due date.

Assessment	Due Date / Deadline	Penalty
Assignment 1	2 April	10% off if late
Assignment 2	16 April	10% off if late
Assignment 3	7 May	10% off if late
Final Exam		mandatory

**Requirements to Successfully Complete the Paper:**

To pass the paper all assignments must be completed, and an aggregate of 50% of the total assessment is required.

## **Conditions for Aegrotat and Impaired Performance:**

If you are prevented by illness, injury or serious crisis from attending an examination (or completing an element of assessment by the due date), or if you consider that your performance has been seriously impaired by such circumstances, you may apply for aegrotat or impaired performance consideration. You must apply on the form available from the Examinations Office, the Student Health Service or the Student Counseling Service.

To qualify for an aegrotat pass on the final examination, you must have attempted **at least 40%** of the total formal assessment and your performance must be well above the minimum pass standard, so that the examiners can be confident that you would have passed the paper if you had completed the final examination. You may also apply for aegrotat consideration for other compulsory assessment elements (such as Semester Tests) that occur at a fixed time and place if you are prevented by illness, injury or a serious crisis from attending.

## ***Timetable:***

The paper is taught in a block course mode. Students are required to attend two four-hour lecture/tutorial sessions during the semester. Attendance at these block courses is compulsory for completion of the paper. The block courses will be held from 12-14 April in Palmerston North. Some course notes and reference material are provided for each section of the paper, but students are primarily required to spend additional time in library work, literature searching and completing assignments.

## **Textbooks:**

### *Highly recommended:*

Vogel, S. Prime Mover: A Natural History of Muscle. W.W. Norton and Company: New York, 2001.

MacIntosh BR, Gardiner P and McComas AJ. Skeletal Muscle. 2<sup>nd</sup> Ed. Human Kinetics Publishers; Champaign IL, USA, 2006.

Jones DA and Round JM. Skeletal muscle in health and disease. Manchester: Manchester University Press, 1990.

### *Recommended:*

Astrand, P.O., Rodahl, K., Dahl, H.A. and Stromme, S.B. Textbook of Work Physiology (4<sup>th</sup> Ed). Human Kinetics, 2004.

Brooks, Fahey, White and Baldwin. Exercise Physiology: Human Bioenergetics and its Applications (3<sup>rd</sup> Ed). Mayfield Publishing, 2002.

**Additional reference material:**

Some additional reference material will be provided with each section of the paper, and students will also be required to search for reference material for completion of Assignments 1, 2 and 3.

**Additional Course Costs:**

Students who do not live in either Palmertson North or Auckland will need to travel to the Palmerston North campus to attend the block course. The costs of attending block courses must be paid by the student, as must purchase of the text book and expenses for photocopying references and library interloans. There is no additional charge for course materials that are provided.