Module Title

Tissues, Systems and Functional Analysis

The aim of this module is to give the student an advanced understanding of the human bodys' system . This will be achieved through advanced knowledge of cellular and functional anatomy, musculo-skeletal biology in relation to biomechanics of movement.. The module will make use of knowledge within these fields to explain and illustrate the themes discussed on different days. Students will already have a sound knowledge of gross anatomy and biomechanics and will be encouraged to develop a better understanding of the relationship between anatomical structure, function and disease.

School: Healthcare Studies	
Module Code HCT 126	
External Subject Code	
Number of Credits 20	
Level M	
Module Leader V Sparkes	
Module offered on a free-standing basis?	Yes
Any restrictions to free-standing basis? Students must possess a first degree or UK diploma in Physiotherapy and have at least two years post registration experience with evidence of continuing development.	
Maximum Number on Module	40
Language of module delivery	English

On completion of the module a student will be able to:

The following learning outcomes incorporate a combination of the key areas:

- ***Knowledge and Understanding [K)***
- ***Intellectual Skills [S 1]***
- ***Discipline Specific (including practical) Skills. [S 2]***
- ***Transferable Skills [T]***

At M level, these categories reflect components of competency and have therefore been integrated within each learning outcome.

1.Discuss the functional anatomy of the musculo-skeletal system (K S!).

2.Relate the biomechanical properties of the musculo-skeletal and neural tissues to their reaction to normal and abnormal applied stress (K S1 S2).

3. Determine the effect of pathological or mechanical changes within the neuro musculo-skeletal system (K T).

4.Collect data in a Laboratory setting in relation to human function, for example, functional analysis of movement, muscle activity of exercises and spinal posture during varied activities. (K S1 T S2).

How the module will be delivered

Within the notional learning time of 150 hours, each student will receive 36 contact hours with the School academic staff. Some sessions will be practical sessions and demonstrations in the Research Centre for Clinical Kinaesiology at the School of Healthcare Studies, some lectures or presentations by invited speakers.. Researchers from the Department of Biosciences in Cardiff will discuss musculo-skeletal tissue repair, regeneration and replacement and demonstrate current methods in biological sciences.

As well as the 36 contact hours, students will be required to undertake approximately 114 hours of self-study.

Skills that will be practised and developed

Effect of loading on limbs/joints , with reference to functional activities. Movement and postural, muscle activity analysis, quantitative data collection techniques. Basic statistics techniques, Pathological changes in tissues ie cartilage, muscle nerve. Analysis and synthesis of pathological changes relating to symptom presentation. In depth anatomical knowledge of musculoskeletal tissues.

How the module will be assessed

The assessment procedure will consist of two essay’s (summative) (2,500 words maximum)

1. Quantitative Data collection in relation to musculoskeletal function for example functional analysis of movement and spinal posture, muscle activity of exercise. (Learning outcomes tested No 4)

2.Exploring the link between pathological changes due to disease and injury in tissues to symptom presentation in humans .

Learning outcomes tested: No's 1, 2 and 3.

Type of assessment	% Contribution	Title	Duration (if applicable)	Approx. date of Assessment
CW/LW	50%	Undertake and write an assignment on data collection associated with measurement of some aspect of the Neuromusculoskeletal system (MSc NMS students) or any other aspect of Physiotherapy (MSc Physiotherapy students).		20th December
CW	50%	Discuss the changes that occur to a chosen anatomical structure due to disease or injury and relate this to the subsequent impact on the function and/or symptom presentation of the surrounding region.		4th May

The potential for reassessment in this module

Each student will be given the opportunity to re-present their essay. The date will be usually within 6 weeks of the exam board where the previous marks will have been presented unless other circumstances are presented.

Syllabus content

Functional anatomy and neuromusculo-skeletal biology

Themes for this part of the module include:

- Introduction to functional anatomy
- Regional anatomy of the neuromusculo-skeletal system in terms of structure related to function
- Biomechanics of joint stability
- Joint loading, normal and abnormal stresses and their functional consequences
- The biomechanical effects of exercise on joint pathology
- Biomechanical and molecular properties of connective tissue, muscle tissue, fibro-cartilage in tendons and ligaments, and cartilage with emphasis on tissue stress and repair.
- Advanced musculoskeletal anatomical knowledge

Theoretical discussions are mixed with visits to the dissection room and laboratories of the Department of Biosciences in Cardiff University. Pathological changes, its consequences for the musculo-skeletal and neural system and the functional consequences of injuries are discussed in the context of stress and strain and the relation between anatomical/cellular structure and function.

Indicative Reading and Resource List:
Bold indicates Key text NMS MSc

Adams M.A., Bogduk N., Burton K. and Dolan P. (2002) *The Biomechanics of Back Pain*. Edinburgh: Churchill Livingstone

Bell F. (1998) *Principles of Mechanics and Biomechanics*. Cheltenham: Nelson Thornes

Craik R.L. and Oatis C.A. (1995) *Gait Analysis: Theory and Applications*, St Louis, MI: Mosby

Durward B., Baer G., and Rowe P. (1999) *Functional Human Movement*. Oxford: Butterworth-Heinemann

Dvir Z. (2000) *Clinical Biomechanics*. Edinburgh: Churchill Livingstone

Enoka R.M. (1994) *Neuromechanical Basis of Kinesiology*. Champaign, IL: Human Kinetics

Fleck S.J. and Kraemer W.J. (1997) *Designing Resistance Training Programs*. Champaign, IL: Human Kinetics

Herzog W. (2000) *Clinical Biomechanics of Spinal Manipulation*. Edinburgh: Churchill Livingstone.

Knudson D.V. and Morrison C.S. (2002) *Qualitative Analysis of Human Movement*. Champaign, IL: Human Kinetics

Latash M.L. (1998) *Neurophysiological Basis of Movement*. Champaign, IL: Human Kinetics

Lephart S.M. and Fu F.H. (2002) *Proprioception and Neuromuscular Control in Joint Stability*. Champaign, IL: Human Kinetics

Low J. and Reed A. (1996) *Basic Biomechanics Explained*. Oxford: Butterworth-Heinemann

Neumann D.A. (2002) *Kinesiology of the Musculoskeletal System: Foundations for Physical Rehabilitation*. St Louis: Mosby

Nigg B.M., Herzog W. (1999) *Biomechanics of the Musculoskeletal System.* New York: John Wiley & Sons

Nigg B.M., MacIntosh B.R., and Mester J. (2000) *Biomechanics and Biology of Movement*, Champaign, IL: Human Kinetics.

Oliver J. and Middleditch A. (1991) *Functional Anatomy of the Spine*. Oxford: Butterworth Heinemann

Palastanga N.P., Field D., and Soames R. *Anatomy and Human Movement: Structure and Function*, Oxford: Butterworth Heinemann, 2002. 677 pages.

Perry J. (1997) Gait Analys*is: Normal and Pathological Function.* New Jersey: Slack

Richardson C., Jull G., Hodges P. et al (1999) *Therapeutic Exercises for Spinal Stabilization in Low Back Pain: Scientific Basis and Clinical Approach*. Edinburgh: Churchill Livingstone

Rosenbaum D.A. (1991) *Human Motor Control*. San Diego: Academic Press

Shumway-Cook A. and Woollacott M. H. (2001) *Motor Control: Theory and Practical Applications.* Baltimore: Williams & Wilkins

Whiting W.C. and Zernicke R.L. (1994) *Biomechanics of Musculoskeletal Injury*. Champaign, IL: Human Kinetics

Whittle M. (2002) *Gait Analysis: an Introduction.* Oxford: Butterworth-Heinemann

Winter D.A.(1991) *Biomechanics and Motor Control of Human Gait: Normal, Elderly and Pathologica.* Waterloo: Waterloo Biomechanics

Winter D.A. (1998) *Biomechanics and Motor Control of Human Movement*. New York: John Wiley & Sons, Inc

Zatsiorsky V.M. (1995) *Science and Practice of Strength Training.* Champaign, IL: Human Kinetics.

Zatsiorsky V.M. (1998) *Kinematics of Human Motion*. Champaign, IL: Human Kinetics

Zatsiorsky V.M. (2002) *Kinetics of Human Motion*, Champaign, IL: Human Kinetics