

## The University of Hong Kong Institute of Human Performance

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**User** (case sensitive): **BSc\_AdEP**

**Password** (case sensitive): **advpep**

**Module Title:** Advanced Exercise Physiology  
**Code Number:** PBSL3334 - (6CU) - (PBSL0923 for Med Eng students)  
**Semester:** 1  
**Day and Time:** Thurs 9.30-12.30 (lectures - PMB 101 & laboratories - PMB labs)  
**Staff Responsible:** Dr D J Macfarlane : djmac@hku.hk

**Aims of the Module:** To provide a good understanding of exercise prescriptions (how to plan/prescribe exercise) and common exercise testing procedures (laboratory and field tests) including the automated measurement of maximum oxygen uptake; to provide an introduction to carbohydrate/glycogen metabolism and its importance in exercise; a good understanding of blood lactate threshold testing procedures (using direct and indirect techniques) and its importance in performance. In addition, an introduction to areas of applied exercise physiology will include water balance and the maintenance of adequate hydration status in exercise; factors affecting heat and cold stress, how to measure human thermal stress and how to avoid thermal stress; an overview of common ergogenic aids used to try to enhance performance, their efficacy and dangers; and the effects of aging and gender difference on exercise performance. Providing adequate time, an overview of factors related to physiological responses to performance at altitude will be covered.

**Learning Outcomes :** On completion of this module students should be able to: - apply and adapt common exercise prescriptions and testing procedures to a wide variety of athletic situations; - show competence in undertaking and analysing a variety of physiological measurements in lab situations as well as the ability to interpret the results; - explain ethical principles and practices as they apply to exercise programmes, testing, and research (eg. ergogenics); - explain the metabolism of carbohydrates and lactic acid (including lactate threshold testing principles); - critically evaluate the factors that effect water balance and thermal stress during activity; - be able to critique the likely success of ergogenic substances; and explain how age and gender can alter exercise performance.

Table below shows how the module's learning outcomes (LO) align with the BSc (Ex&H) Program Level Outcomes (PLO) objectives, and the HKU's University Aims (UA).

Module Learning Outcome (aligned PLO shown in brackets)	Program Level Outcomes (aligned UA shown to the right)	University Aims
apply and adapt common exercise prescriptions and testing procedures to a wide variety of athletic situations (1a, 1b, 2a, 2b, 3b, 6a, 6b)	1a. apply theoretical knowledge to practice and real life situations, demonstrating an awareness of the limitations of existing theories and practices in exercise and health 1b. apply rigorous analysis of health and exercise data, drawing appropriate conclusions. 1c. apply multiple learning strategies in exercise and health	Aim 1. (critical intellectual inquiry and life long learning)
show competence in undertaking and analysing a variety of physiological measurements in lab situations as well as the ability to interpret the results (1a, 1b, 1c, 2a, 2b, 3a, 4a, 4b, 5a, 5b, 5c, 6b)	2a. identify and apply alternate solutions to unique problems in exercise and health 2b. think creatively and laterally to generate innovative and effective solutions to exercise and health problems	Aim 2. (tackling novel situations and ill-defined problems)
explain ethical principles and practices as they apply to exercise programmes, testing, and research (eg. ergogenics) (1a, 3a, 3b, 4a, 4b, 6a)	3a. demonstrate an awareness of the importance of personal health and fitness 3b. demonstrate an appreciation of commonalities and differences amongst clients, being responsive to their individual needs and preferences	Aim 3. (critical self-reflection and greater understanding of others)
explain the metabolism of carbohydrates and lactic acid (including lactate threshold testing principles) (1a, 1b, 3a, 6a, 6b)	4a. demonstrate an awareness of ethical practices and procedures and respect for human rights 4b. demonstrate interpersonal skills and integrity for establishing relationships with clients of diverse cultures	Aim 4. (intercultural communication, multi-cultural understanding and global citizenship)
critically evaluate the factors that effect water balance and thermal stress during activity (1a, 1b, 1c, 3a, 6a, 6b)	5a. interact ethically with clients and colleagues 5b. able to communicate effectively, concisely, and effectively when presenting ideas, concepts and solutions to both technical and non-technical audiences 5c. able to present and interpret data using a range of technologies to both scientific and non-scientific audiences	Aim 5. (collaboration and communication)
be able to critique the likely success of ergogenic substances (1a, 1b, 3a, 4a, 6a, 6b)	6a. act as an advocate for the profession and the public interest in exercise and health situations. 6b. participate in the generation, interpretation, application and dissemination of important advances in exercise and health knowledge	Aim 6. (leadership and advocacy for the improvement of the human condition)
explain how age and gender can alter exercise performance (1a, 1b, 1c, 3a, 6a, 6b)		

**Syllabus:** Areas to be covered are likely to include:

**Lectures:** Exercise tests; Exercise prescriptions; Meaning of peak-VO<sub>2</sub>; Carbohydrate loading/feeding and nutrition; Lactate threshold; Water balance; Temperature stress (cold and heat); Ergogenic Aids; Age and Gender differences; Altitude (if time permits - note that this year the teaching semester will only include a maximum of 11 rather than the usual 12 weeks).

- Labs:**
1. Exercise Tests - Wingate, PWC-170, Astrand, 20m-Shuttle
  2. Peak-VO2 tests - using on-line systems
  3. Lactate threshold testing
  4. Thermal responses to exercise (hot and cold stress)

**Assessment:** Two tests: mid-term (30%) and end of term (30%) these tests will be a mixture of multiple-choice and short answer questions, based mainly on the lecture notes; plus 4 laboratory assignments (10% each) that must be individually written up and handed in within 1 week, these reports will require an analysis of the lab and some related questions). Due dates for each lab: 1=Sept 22; 2=Oct 27; 3=Nov 17; 4=Dec 1).

**Note - your lab reports MUST be handed to the IHP Academic Office at the Jockey Club Building for Interdisciplinary Research (3/F 5 Sassoon Rd) (or direct to me before class is easiest) before the start of your morning's lectures on the specified dates, that is, by 9.30am else it will be LATE - any late reports will automatically receive a lower grade (10% per day, and a Fail after 5 days late). Attendance at labs is compulsory - if you miss a lab, a valid reason is needed to avoid penalty grade of zero marks.**

**Please note that any signs of copying or plagiarism in any submitted material is likely to result in a FAIL grade for the entire assignment. Do NOT share answers - those with evidence of copying are also likely to FAIL (both the person who copied the answer and the person who supplied the answer). Each assignment is YOUR OWN individual assignment - complete is yourself, do not copy, do not plagiarize else you risk a FAIL grade and the possibility of further disciplinary action. If you are unsure about plagiarism and copying and how to avoid such penalties, then see these two excellent links (a) [explanation of plagiarism](#); (b) [how to avoid it - with examples and self-test](#).**

**Useful examples to help with Assignments/Exams:**

See this web-link for an example of the [Generic Grading Criteria](#) that helps explain how aspects of your work will be assessed (not fully applicable to lab work or exams).

See also this web-link for an example of [Model Answers for LAB ASSIGNMENTS](#): Please read this to make sure you are aware of the style, precision, concise nature of the answers expected. The examples show some typical questions, different answers with their grades, and why they got low, medium or high grades. Please use this guide to help improve the quality of your assignments.

See also this web-link to show some examples of possible [question formats](#) for the mid- and final-exam (eg. definitions, multiple-choice, single answer, short answer, calculations etc).

**Teaching Locations:** The module will be taught in **Seminar Room 101 (Patrick Manson Building, 7 Sassoon Road)** with labs at the **Patrick Manson Building Labs**.

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**Provisional 2011/12 lecture schedule:** (as the teaching pace can vary considerably, this outline is for guidance only)

lecture	Date	Provisional topics are below: Lecture Topic	Some suggested Readings in McArdle texts		
			(5th edition)	(6th edition)	(7th edition)
1	Sep 1	Intro - Review Exercise tests 1	222-234, 240-246	229-242, 247-253	225-247
2	Sep 8	Exercise tests 2 & 3 Exercise prescriptions 1	458-495	469-507	451-489
3	Sep 15	Exercise prescriptions 1 & 2 <b>Lab. 1:- Ex.tests - Wingate, PWC-170, Astrand, Shuttle</b>	500-547	509-553	490-532
4	Sept 22	Exercise prescriptions 3 & 4	500-547	509-553	490-532
	Sep 29	<b>NO CLASS</b>			
5	Oct 6	Meaning of peak-VO2	233-240	242-247	235-242
6	Oct 13	CHO loading/feeding <b>Lab. 2:- Measuring peak-VO2 via on-line systems</b>	5-18, 82-104, 578-580	7-19, 82-107, 591-595	7-19, 82-105, 571-576
	Oct 20	<b>NO CLASS - READING WEEK</b>			
7	Oct 27	<b>MID-SEMESTER EXAM 9.30-11.00am PMB101</b> Anaerobic threshold/lactate threshold	158-162	166-170	163-166
8	Nov 3	Water balance	97-99, 636-641	104-106, 651-656	101-105, 625-630
9	Nov 10	Temperature stress (cold) <b>Lab. 3:- Anaerobic/Lactate threshold tests</b>	624-632, 647-650	638-648, 662-665	611-624, 635-639
10	Nov 17	Temperature stress (heat)	626-628, 633-647	641-643, 648-661	614-635
11	Nov 24	Ergogenic Aids Age and Gender differences (if time permits) <b>Lab. 4:- Thermal responses to ex.</b>	548-595 877-887, 226-227, 505-9, 761-3	555-610 515-518, 783-785	533-585 495-498, 524-527, 821-822, 842-859
	Dec 1 & 8	<b>REVISION WEEK</b>			
	Dec 15	<b>Exam TBC- 9.30-11.00am PMB101</b>			

**Provisional grades pdf (updated grades will be posted here periodically)**

**Required Textbook:**

McArdle, W.D., Katch, V. and Katch, F.I. (2010). [Exercise Physiology](#) (7th edition). Baltimore: Lipponcott, Williams & Wilkins.

or: McArdle, W.D., Katch, V. and Katch, F.I. (2006). [Exercise Physiology](#) (6th edition). Baltimore: Lipponcott, Williams & Wilkins.

or: McArdle, W.D., Katch, V. and Katch, F.I. (2001). Exercise Physiology (5th edition). Baltimore: Williams & Wilkins.

**Other recommended Textbooks:**

Eston, R. and Reilly, T (eds). (2009) Kinanthropometry and Exercise Physiology Laboratory Manual (Vol 2). Routledge, London.

Wilmore, J. H. and Costill, D. L. (2004) Physiology of Sport and Exercise (3rd ed). Champaign (IL, USA). Human Kinetics.

Robergs, R. A. and Roberts, S. O. (1997). Exercise Physiology. St Louis. Mosby.

McArdle, W.D., Katch, V. and Katch, F.I. (2000). Essentials of Exercise Physiology (2nd edition). Baltimore: Lippincott, Williams & Wilkins.

Powers, S. K. and Howley, E. T. (1996) Exercise Physiology (3rd ed). Boston. W.C.B. McGraw Hill.

Fox, E. L., Bowers, R. W. and Foss, M. L. (1988) The Physiological Basis of Physical Education and Athletics (4th ed). Philadelphia. Saunders.

Astrand, P. O. and Rodahl, K. (1986) Textbook of Work Physiology (3rd ed). New York. McGraw-Hill.

**Some useful websites:**

<http://www.pecentral.org/> - some basic PE teaching areas, but links to more details facts

<http://home.hia.no/~stephens/exphys.htm> some interesting information on exercise physiology

<http://www.tahperd.sfasu.edu/links3.html> - a huge list of interesting links

<http://www.sportsci.org/> - a good site for some serious exercise information

<http://www.gssiweb.com/> - some good information on nutrition and applied areas especially

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