

THE UNIVERSITY OF NEW SOUTH WALES

**Exercise Physiology Program
School of Medical Sciences
Faculty of Medicine**

HESC3641

Advanced Exercise Physiology

Semester 1, 2011
Course Outline

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Staff Contact Details

Course convener

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Teaching staff

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School of Medical Sciences

Course details

Credit Points: 6 UOC

Course Prerequisites / Assumed Knowledge

HESC2501

Course Description

This course gives an overview of advanced exercise physiology. It is a more advanced version of HESC2501 Exercise Physiology. Concepts in advanced exercise physiology such as bodily response to exercise as well as exercise adaptations will be covered. Literature related to acute and chronic response/adaptations to exercise as well as the mechanisms underlying the adaptations will also be discussed. In this course, students will have hands-on experience in carrying out a range of laboratory-based experiments.

Aims of the Course

The course aims to provide student with:

1. An overview of advanced exercise physiology
2. An understanding of how the human body works during exercise
3. An understanding of how the human body adapts to regular exercise
4. A variety of hands-on experience in carrying out laboratory-based experiments

Student Learning Outcomes

At the end of the course you should be able to:

- Understand advanced integrated exercise physiology
- Understand the major physiological adaptations to exercise
- Acquire conceptual understanding from laboratory experiences

Graduate Attributes

- Understand the concepts and mechanisms underlying exercise-induced cardiovascular health
- Competent in delivering/advising exercise dose-response relationship to clients with regard to preventative lifestyle strategies
- Competent in designing exercise training programs for aerobic and resistance based athletes
- Engage in independent and continual reflective learning and in line with current scientific knowledge as well as following an evidence-based approach

Rationale for the inclusion of content and teaching approach

How the course relates to the Exercise Physiology profession – The content of Advanced Exercise Physiology allows students to learn and explore integrated exercise physiology. Students will have a greater understanding of concepts, underlying mechanisms, and relationships between exercise and physiological changes. Thus, a stronger background in integrated exercise physiology will make students more confident and competent in delivering exercise prescription as an exercise physiologist.

How the course relates to other courses in the Exercise Physiology program – The course is a continuation of HESC2501 Exercise Physiology. The content of Advanced Exercise Physiology (both lecture material and labs) is also related to HESC3504 Physical Activity and Health and HESC3541 Clinical Exercise Physiology. Advanced Exercise Physiology also gives a foundation for those students who are also interested in working with athlete.

Teaching strategies

Lectures – Lectures are on Tuesdays, 5-6 pm (Mathews 312) and Wednesdays, 1.-2 pm (Biomed F). Although the lectures notes are provided (see below) it is important that you attend each lecture as it is not possible to include all information delivered in class into the PDF lecture notes. The content of lectures will be taken from core and suggested textbooks and readings (articles). Thus, it is essential that you do the readings prior to attending the lectures. Also, punctual arrival is expected for every lecture.

Lecture notes are available in PDF format on Blackboard:
<http://lms-blackboard.telt.unsw.edu.au/webapps/portal/frameset.jsp>

Lectures are recorded and available at:
<http://telt.unsw.edu.au/lectopia%5Fdiv/>

Laboratories – Laboratories are on Mondays, 10-12 noon and 1-3 pm (Wallace Wurth 202). Punctual arrival is expected in every lab as important information including the procedure of each lab is discussed prior to the lab activity. Late entry will be refused and marked as absent; allow at least 10 min arrival before each lab as you may need to change your attire for lab activity and re-read the procedure for the lab activity. The lab manual can be downloaded and printed from the BLACKBOARD. During the labs all of you are expected to be involved actively as a tester or/and a subject. **Eating is not permitted** except bottles of water. You are expected to wear appropriate attire for lab activities (shorts, shirt, and trainers). **Open shoes, sandals, tongs are not permitted** and you will be refused entry and participate in the lab activities. In the case that you cannot participate in the lab as a subject/tester you are required to produce a medical certificate.

Independent study – It is essential that you set aside the time for independent study. You are expected to read the core and supplement text book as well as articles provided to give you background information about the upcoming lectures/labs. You are reminded that UNSW recommends that a 6 units-of-credit course should involve about 150-180 hours of study and learning activities.

Assessment and submission of tasks

Lab report	25%
Research question	25%
Final exam	50%

- Lab report - Students are expected to write a lab report, which is mainly answering questions and creating graphs and tables from the data obtained. **Do not submit the lab report through email.** The lab report has to be handed in before the next lab is started (in the lab - **there is no extension**). Lab reports received after the due date **will not be allocated a mark.** It is recommended that you have a discussion group between/among you for brain storming related to the labs questions. **However, under no circumstances must you produce similar/identical reports. If two or more reports are found to be similar both/all reports will be marked zero.**
- Research question - Students are expected to write not less than 10 pages (doubled spaced) not including tables, graphs, and references list on a research question in Exercise Physiology or related area. Students will choose the research question from a list provided. The submission date is **11th May 2011 (week 10) by 4.00 pm (submitted to Sue Cheng).** **Do not submit similar topics that have been previously submitted in another course.**
- Final exam - The final exam will consist of multiple choice and short answer questions. The multiple choice and short answer questions will be based on the material covered in the lectures, labs, and readings (articles and textbooks).

Marking criteria

Laboratory report – Each laboratory report is worth 5% (total of 25% for five lab reports). The content of the laboratory report should mainly answer questions related to the data that are collected during the lab activity. You are expected to answer the questions and present the findings from your lab activity concisely and clearly. You need to include graphs/figures and may also include calculations (if required) as well as some simple statistical analyses. It is recommended that you use APA style (citation) when you prepare your lab report (see APA style: http://www.lc.unsw.edu.au/onlib/ref_apa.html).

Research question assignment

Criteria	High Distinction	Distinction	Credit	Pass	Pass Conceded	Fail	Mark
Introduction	Clearly written, concise, comprehensive overview of the paper's scope	Clearly written, concise, good overview of the paper's scope	Acceptable written expression, good overview of the paper's scope	Some errors in written expression, adequate overview of the paper's scope	Poorly written, cursory overview of the paper's scope	Poorly written, no overview of the paper's scope	10
Synthesis of the Literature	Clearly written, concise, comprehensive and critical analysis of relevant studies	Clearly written, concise, critical analysis of many relevant studies	Acceptable written expression, critical analysis of some relevant studies	Some errors in written expression, Adequate analysis of some relevant studies	Poorly written, Some reference to relevant studies	Poorly written, No reference to relevant studies	30
Arguments in response to the question	Clearly written, concise, original ideas well supported by evidence	Clearly written, concise, Some original ideas with supporting evidence	Acceptable written expression, Some original ideas and clear interpretation of sourced arguments	Some errors in written expression, Acceptable presentation of sourced arguments	Poorly written, weak presentation of sourced arguments	Poorly written, Unconvincing arguments	30
Use of figures and tables	Good use of tables and figures with excellent presentation	Good use of tables and figures and well presented	Some tables and figures and well presented	Some tables and figures but poorly presented	Either a table or figure but poorly presented	No tables, no figures	10
Conclusions	Clearly written, concise, Insightful synthesis of main points in the paper	Clearly written, concise, adequate synthesis of main points in the paper	Acceptable written expression, adequate synthesis of main points in the paper	Some errors in written expression, acceptable presentation of main points in the paper	Poorly written, weak presentation of main points in the paper	Poorly written, no synthesis of main points in the paper	10
Presentation	Neat, legible, correct referencing, correct length	Neat, legible, few errors in referencing, correct length	Neat, legible, some errors in referencing, correct length.	Legible, some errors in referencing	Untidy, many errors in referencing, inappropriate length	Illegible, no referencing, inappropriate length	10

Penalties for late submission of assignment

In cases where an extension has **NOT** been granted, the following penalties will apply:

- The lab report has to be handed in before the next lab is started (**there is no extension**). Lab reports received after the due date **will not be allocated a mark**.
- The last lab report has to be submitted in **week 12: 25 May 2011 during the Wednesday lecture**. Lab reports received after the due date **will not be allocated a mark**.
- Assignment (research question) submitted after **4.00 pm** on the due date will incur a penalty of 50% of the maximum mark available for that assignment. A further 25% of the maximum possible allocated marks (i.e., a total of 75%) will be deducted from assignments which are two days late. Assignments received two or more days after the due date **will not be allocated a mark**, however, the assignment **must** still be submitted to pass the unit.

Academic honesty and plagiarism

Plagiarism is using the words or ideas of others and presenting them as your own. Plagiarism is a type of intellectual theft and is regarded by the University as academic misconduct. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. The University has adopted an educative approach to plagiarism and has developed a range of resources to support students. The Learning Centre can provide further information via <http://www.lc.unsw.edu/plagiarism>.

WHAT IS PLAGIARISM?

Plagiarism is the presentation of the thoughts or work of another as one's own (1). Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed (2).

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism. Knowingly permitting your work to be copied by another student may also be considered to be plagiarism. Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material. The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does not amount to plagiarism.

UNSW POLICY ON PLAGIARISM

At UNSW plagiarism is considered to be a form of academic misconduct and is viewed very seriously. UNSW is committed to helping students understand the conventions which govern academic communication to assist them avoid action which may result in academic misconduct (further information on the Student Misconduct Rules is available at:

<https://my.unsw.edu.au/student/academiclife/assessment/StudentMisconductRules.html>).

In the interests of maintaining high standards in scholarship and research, the University reminds students that when they are writing essays, theses, and assessment items of any nature, they are ethically bound to refrain from plagiarism in all its forms. Students are advised to inform themselves about University policies and practices concerning assessment and Academic Misconduct (including plagiarism). Wherever possible, students should also take up those opportunities provided to them by the University to improve their academic and/or information literacy.

(1) Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.

(2) Adapted with kind permission from the University of Melbourne.

Course schedule

Week	Date	Lecture 1 Matthews 312 Tuesday 5-6 pm	Lecture 2 Biomed F Wednesday 1-2 pm	Laboratory Wallace Wurth 202 Monday 10-12 noon; 1-3 pm
1	1-2/3/11	Introduction (YB)	Metabolic adaptations to exercise (SB)	
2	8-9/3/11	Muscle adaptations to exercise (SB)	Fat loss and exercise (SB)	7/3/11: Resting metabolic rate (RMR) and energy balance
3	15-16/3 /11	Autonomic nerve system and exercise (YB)	Cardiovascular control and exercise (YB)	
4	22-23/3/11	Cardiac adaptations to exercise (YB)	Vascular adaptations to exercise (YB)	
5	29-30/3/11	Arterial stiffness and exercise (YB)	Hemodynamic & body fluid adaptation to exercise (YB)	28/3/11: Blood pressure and exercise
6	5-6/4/11	Exercise in the heat (YB)	Exercise in the cold (YB)	
7	12-13/4/11	Exercise and hypoxia (YB)	Athletic body (YB)	11/4/11: Plasma and blood volume response to exercise
8	19-20/4/11	Microgravity and bed rest conditions (YB)	Hyperbaric condition and exercise (YB)	
22/4/11 – 1/5/11 Mid-session recess				
9	3-4/5/11	Exercise economy (YB)	Ergogenic aids (YB)	2/5/11: Exercise economy
10	10-11/5/11	Fat and exercise performance (SB)	Carbohydrate and exercise performance (SB)	
11	17-18/5/11	Training issues (YB)	Training and performance (YB)	16/5/11: Wingate test
12	24-25/5/11	Exercise and genetics (YB)	Review (YB)	

Note

YB: Yati Boutcher; SB: Steve Boutcher

Weekly readings (textbook-article)

Week 1

Lect 1: -

Lect 2: McArdle, W.D., Katch, F.I., and Katch, V.L. (2001). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 22, 491-532.

Week 2

Lect 3: Romijn, J.A. et al. Regulation of endogenous fat and carbohydrate metabolism in relation to exercise intensity and duration. **American Journal of Physiology**, 1993;265: E380-E391.

Lect 4: Boutcher, S.H., & Dunn, S. (2009). Factors that may impede the weight loss response to exercise-based interventions. **Obesity Reviews**, 10, 6, 671-680. Boutcher, S.H. High-intensity intermittent exercise and fat loss. **Journal of Obesity**, 2011;868-305.

Week 3

Lect 5: De Meersman RE, Stein PK. Vagal modulation and aging **Biol Psychol**. 2007; 74(2):165-73.

Lect 6: (1) McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 16, 324-339; (2) Krieger EM, Da Silva GJ, Negrão CE. Effects of exercise training on baroreflex control of the cardiovascular system. **Ann N Y Acad Sci**. 2001;940:338-47.

Week 4

Lect 7: Goodman JM et al.. Left ventricular adaptations following short-term endurance training. **J Appl Physiol**, 2005; 98: 454-460.

Lect 8: Tinken TM, Thijssen DHJ, Black MA, Cable NT, Green DJ. Time course of change in vasodilator function and capacity in response to exercise training in humans. **J Physiol** 2008; 586(20): 5003–5012.

Week 5

Lect 9: (1) Edwards DG, Schofield RS, Magyari PM, Nichols WM, Braith RW. Effect of exercise training on central aortic pressure wave reflection in coronary artery disease. **Am J Hypertens**. 2004; 17:540–543; (2) Gates PE and Seals DR. Decline in large elastic artery compliance with age: a therapeutic target for habitual exercise **Br. J. Sports Med**. 2006;40:897-899.

Lect 10: Gillen CM et al. (1991). Plasma volume expansion in humans after a single intense exercise protocol. **J App Physiol**, 1991;71(5):1914-1920.

Week 6

Lect 11: (1) McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 25, 611-639; (2) Coris, EE. et al. Heat illness in athletes:

The dangerous combination of heat, humidity and exercise. **Sports Medicine**, 2004;34(1):9-16.

Lect 12: Üçok K, Şenol D, Gökbel H, Akar S. Prevalence of exercise-induced bronchospasm in long distance runners trained in cold weather. **Lung** 2004;182:265–270.

Week 7

Lect 13: (1) McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 24, 591-610; (2) Castellani JW, Muza SR, Cheuvront SN. Effect of hypohydration and altitude exposure on aerobic exercise performance and acute mountain sickness. **J Appl Physiol** 2010;109:1792–1800.

Lect 14: Fry AC, Ciroslan D, Fry MD, Leroux CD, Schilling BK, Chiu LZ. Anthropometric and performance variables discriminating elite american junior men weightlifters. **J Strength Cond Res** 2006;20(4):861–866.

Week 8

Lect 15: (1) McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 27, 665-719; (2) Convertino, VA. Cardiovascular consequences of bed rest: effect on maximal oxygen uptake. **Medicine and Science in Sports and Exercise**, 1997;29(2):191-196; (3) Edgerton, VR. et al. Human fibre size and enzymatic properties after 5 and 11 days of space flight. **Journal of Applied Physiology**, 1995;78:1733-1739.

Lect 16: McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 26, 640-664.

Week 9

Lect 17: (1) McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 10, 206-224; (2) Greiwe, JS and Kohrt, WM. Energy expenditure during walking and jogging. **Journal Sports Medicine and Physical Fitness**, 2000;40:297-302.

Lect 18: (1) McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 23, 533-585; (2) Maughan RJ. Nutritional ergogenic aids and exercise performance. **Nutr Res Rev** 1999;12:255-280.

Week 10

Lect 19: Hawley, J. (2002). Nutritional strategies to enhance fat oxidation during aerobic exercise. **Clinical Sports Nutrition**. Chapter 16, 428-449.

Lect 20: Maughan, R. (2002). Fluid and carbohydrate intake during exercise. **Clinical Sports Nutrition**. Chapter 14, 369-390.

Week 11

Lect 21: McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). **Exercise Physiology: Energy, nutrition, and human performance** (7th edition). Chapter 21, 451-485

Lect 22: Tanaka H and Swensen T. Impact of resistance training on endurance performance: A new form of cross-training? **Sports Med**, 1998;25(3):191-200.

Week 12

Lect 23: (1) Roth SM. Perspective on the future use of genomics in exercise prescription. **J Appl Physiol**. 2008;104(4):1243-1245; (2) Bray MS. Genomics, genes, and environmental interaction: the role of exercise. **J Appl Physiol**. 2000;88(2):788-792.

Resources for students

Blackboard

Information about the course and a number of electronic study resources can be accessed via the UNSW Blackboard system. Blackboard is an internet-based set of Course Tools designed to enable online learning. You can access the system from the following site:

<http://lms-blackboard.telt.unsw.edu.au/webapps/portal/frameset.jsp>

You can use Blackboard to download lecture notes, access your grades, find reference material in the course (such as this document), and communicate with the lecturer and your peers. Please see the lecturer if you would like more information to help you to make the most of this resource.

Lectopia

The Lectopia system (iLecture) provides digital audio recordings of lectures that can be accessed via streaming media over the web or as a podcast (if permitted by the lecturer). Lecture slides may be embedded in these presentations. <http://telt.unsw.edu.au/lectopia/content/default.cfm?ss=1>

UNSW Library

The University Library provides a range of services to assist students in understanding how to identify what information is required for assignments and projects; how to find the right information to support academic activities; and how to use the right information most effectively.

<http://www.library.unsw.edu.au>

Reserve (MyCourse)

Many items (books and journal articles) set as recommended reading for courses will be located in Reserve, which is on Level 2 of the Main Library. Some of the journal articles will be available in electronic format via MyCourse. To search for these items, go to the library website catalogue and search for the course code.

Textbooks

- McArdle, W.D., Katch, F.I., and Katch, V.L. (2010). Exercise Physiology: Energy, nutrition, and human performance (7th edition). Lippincot Williams & Wilkins. Baltimore, MD, USA.

Suggested Reference Books

- Tipton CM (editor) (2006). ACSMS's Advanced Exercise Physiology. Lippincot Williams & Wilkins.
- Mooren FC and Volker K (editors) (2005). Molecular and cellular exercise physiology. Eds. Human Kinetics. Champaign Illinois, USA.
- Bourke L and Deakin V (eds) (2002). Clinical Sports nutrition 2nd ed. The McGraw-Hill companies. Roseville, NSW, Australia.
- Eston R and Reilly T (eds) (2001). Kinanthropometry and Exercise Physiology Laboratory Manual: Test, procedures and data (2nd edition), Volume 2: Exercise physiology. Routledge, London & New York.

Course evaluation and development

The course is always evaluated each year through the Course and Teaching Evaluation and Improvement (CATEI). At the end of the course students are encouraged to give feedback on both lecturers and content of the course. Based on students' feedback then necessary changes or improvement are made. The development of the course content includes some revisions on the content needed and/or current readings.

Occupational Health and Safety

Class activities must comply with the NSW Occupational Health & Safety Act 2000 and the Occupational Health & Safety (OHS) Regulations 2001. It is expected that students will conduct themselves in an appropriate and responsible manner in order not to breach OHS regulations. Further information on relevant OHS policies and expectations is outlined at: http://www.hr.unsw.edu.au/ohswc/ohs/ohs_policies.html

Examination procedures and attendance requirements

Attendance is expected at all lectures. Attendance at practical classes is compulsory and will be recorded Students who do not participate at practical classes for any reason other than medical or misadventure, will be marked absent and will be awarded a grade of FAIL for the entire course. If absent for medical reasons, a medical certificate must be lodged with the lecturer within 7 days of the time period of the certificate's expiry. No consideration will be given after this time. Although lectures will be available on ilecture, student participation is encouraged in all lectures and these are important to attend.

Deferred Exams

If you miss an exam for medical reasons you must supply adequate documentation (including a medical certificate). Your request for consideration will then be assessed and a deferred exam may be granted. You cannot assume you will be granted supplementary assessment. The deferred exam may include a significant oral element. ***It is intended that supplementary exams for School of Medical Sciences courses in Semester 1, 2011 will be held in the week commencing Monday 11th July, 2011.***

Special consideration in the event of illness or misadventure

Please note the following Statement regarding Special Consideration.

If you believe that your performance in a course, either during session or in an examination, has been adversely affected by sickness, misadventure, or other circumstances beyond your control, you should notify the Registrar and ask for special consideration in the determination of your results. Such requests should be made as soon as practicable after the problem occurs. **Applications made more than three working days after the relevant assessment will not be accepted except in TRULY exceptional circumstances.**

When submitting a request for special consideration you should provide all possible supporting evidence (eg medical certificates) together with your student number and enrolment details. Consideration request forms are available from Student Central in the Chancellery or can be downloaded from the web page linked below.

Note that normally, if you miss an exam (without medical reasons) you will be given an absent fail. If you arrive late for an exam no time extension will be granted. It is your responsibility to check timetables and ensure that you arrive on time.

Students who apply for consideration to Student Central must also contact the Course Convenor immediately.

All applications for Special Consideration will be processed in accordance with UNSW policy (see: <http://my.unsw.edu.au/student/atoz/SpecialConsideration.html>). If you miss an assessment and have applied for Special Consideration, this will be taken into account when your final grade is determined. You should note that marks derived from completed assessment tasks may be used as the primary basis for determining an overall mark. Where appropriate, supplementary examination may be offered, but only when warranted by the circumstances.

Student equity and diversity issues

Students requiring assistance are encouraged to discuss their needs with the course convenor prior to, or at the commencement of the course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (EADU) (9385 4734). Further information for students with disabilities is available at <http://www.studentequity.unsw.edu.au/disabil.html>