

McMASTER UNIVERSITY
Department of Kinesiology

KINESIOLOGY 4C03: INTEGRATIVE PHYSIOLOGY OF HUMAN PERFORMANCE

Term: Winter 2018
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DESCRIPTION

A detailed analysis of the physiological factors that regulate human physical performance. Emphasis is placed on the body's integrative response to exercise and the influence of physical training and altered environmental or metabolic conditions.

OBJECTIVES

The main objective of the course is to provide students with a detailed appreciation for the physiological processes that regulate energy supply and demand during exercise in humans, with a focus on skeletal muscle metabolism and cardiorespiratory function.

The course places a heavy emphasis on reading and interpreting scientific literature, including original journal articles and reviews. It is hoped that students will develop science communication skills by orally presenting findings from an original research study and writing a paper that concisely summarizes information on a topic of interest.

REQUIRED TEXT / READINGS

There is no textbook or printed courseware pack for the course. Required readings and other material will be posted to the course website on Avenue to Learn. It is expected that students will enter the course with a solid, fundamental understanding of exercise physiology, i.e., to a level developed after the introductory core course KINESIOL 2CC3. Students may find it useful to review lecture notes and readings from the 2CC3 course related to specific topics that will be addressed in greater detail in 4C03.

Journals can be accessed on-line via the McMaster University Library e-journals database (<http://library.mcmaster.ca/ejournals>) or the PubMed search engine maintained by the U.S. National Library of Medicine and National Institutes of Health (<https://www.ncbi.nlm.nih.gov/pubmed>).

TOPICS TO BE COVERED

1. Regulation of oxygen delivery and utilization during exercise
Key question: What limits maximal oxygen uptake during exercise?
2. Fundamentals: Regulation of exercise metabolism and adaptation to training
Key question: What limits the maximal rate of fat oxidation during exercise?
3. Interval exercise training: Physiological, performance and health adaptations
Key question: How does interval training compare to traditional aerobic exercise?
4. Altitude/hypoxia: Physiology, performance and the effect of training
Key question: Does altitude/hypoxic exposure enhance training adaptations?
5. Manipulation of the acute exercise response and chronic adaptation to training
Key question: Theory versus practice: What strategies work in the real world?

EVALUATION

The following scheme will be used to determine the student's final grade. No changes to the grading scheme will be permitted under any circumstances.

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|----|------------------------|-----|
| 1. | Term test #1: | 25% |
| 2. | Term test #2: | 25% |
| 3. | Research presentation: | 25% |
| 4. | Research paper: | 25% |

The term tests are cumulative will consist mainly of short answer questions and will be written during regularly scheduled class time (TBD). Details regarding the research presentation and research paper are outlined in Appendices A and B, respectively.

WEEKLY LABS/TUTORIALS: LABORATORIES AND STUDENT PRESENTATIONS

These sessions will usually involve a laboratory demonstration or student presentations. There will also be the opportunity for "hands on" experience as both a subject and investigator. The student presentation schedule depends upon the number of students enrolled in the course and will be finalized during the first two weeks of classes. Students are strongly encouraged to attend all sessions except in those instances where they are prevented due to illness or other legitimate reason, and to actively participate in discussions to enrich the overall learning environment.

DROP BOXES

Course drop boxes are located on the second floor of the IWC near IWC 224. Please do not place assignments in the administrative drop box located outside IWC 219C.

POLICY REGARDING DEFERRED TESTS AND EXAMS

Students who miss a term test for legitimate reasons such as illness may be allowed to write a deferred or "make-up" test. The format is similar to the regularly scheduled test. Any missed test will be written on the last day of classes for the term. In all instances, appropriate documentation must be submitted to the Office of the Associate Dean, Faculty of Science.

Students who miss a Registrar-scheduled final exam can apply to the Associate Dean's office for permission to write in the deferred final exam schedule. In all cases, appropriate documentation must be submitted to the Office of the Associate Dean, Faculty of Science, for consideration of deferred examination permission. Under no circumstances will the instructor re-schedule a final exam for individual students.

STUDENT ABSENCES

The McMaster Student Absence Form (MSAF) is not applicable in this course owing to the evaluation system employed in the course, i.e., all components are worth 25% of the final grade. Any absence for any reason that impacts on a course assignment must be reported to your Faculty/Program office, with documentation, and relief from term work may not necessarily be granted. After reporting any absence to your Faculty/Program, contact the instructor by email within 2 working days to learn what relief may be granted for the work you have missed, and relevant details such as revised deadlines.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone (905) 525-9140 ext. 28652 or email sas@mcmaster.ca. For further information, consult McMaster University's Policy of Academic Accommodation of Students with Disabilities.

<http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf>

ACADEMIC INTEGRITY

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences (e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript reading "Grade of F assigned for academic dishonesty", and/or suspension or expulsion from the university). It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at:

<http://www.mcmaster.ca/univsec/policy/AcademicIntegrity.pdf>

The following illustrates only three forms of academic dishonesty:

- Plagiarism (e.g. the submission of work that is not one's own or for which other credit has been obtained),
- Improper collaboration in group work.
- Copying or using unauthorized aids in tests and examinations.

ONLINE LEARNING RESOURCES

In this course, we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

MODIFICATIONS TO COURSE

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

USE OF COURSE MATERIALS

Course materials provided by the instructor are for use by students registered in this class only. Under no circumstances are these materials to be shared, posted, sold or disseminated in any manner. Recording of lectures is also prohibited without explicit written permission from the instructor.

EMAIL COMMUNICATION POLICY

For any correspondence related to this course, please use your @mcmaster.ca account and include "4C03" in the subject line, along with an appropriate salutation, explanatory text and a signature to indicate your identity. For online security reasons, messages that include attachments only without appropriate explanation in the text will be deleted.

FEEDBACK

In addition to those times when student feedback will be specifically requested, student comments on any aspect of the course are welcome at any time. Constructive feedback is always appreciated and the suggestions can enhance future offerings of the course.

APPENDIX A: STUDENT PRESENTATION GUIDELINES

The goal of this assignment is to provide students with experience presenting in front of a group. Typically, four to eight presentations pertaining to a specific topic are arranged during a single tutorial session. While each session will have a general theme, students are free to choose any research article that relates the main topic, provided the focus was on healthy adult humans. There is no specific “date range” in terms of publication year. Students may select a “classic” paper in the field, or a relatively recent publication, but the goal should be to present research that is significant and/or timely. The paper should address physiological mechanisms and not simply exercise performance.

At least one week prior to their scheduled presentation, each student must advise the course TA of the article they wish to present by delivering a pdf copy of the article by e-mail. Please note that it is not the responsibility of the TA to “vet” the article or gauge whether the article would make for a “good” presentation. Students are encouraged to contact their TA well in advance of their scheduled date as duplicate presentations will not be permitted. A copy of the PowerPoint presentation MUST be delivered to the TA by e-mail at least 24 hours (i.e., one week day, not including weekend days) prior to the scheduled presentation time. This will allow time for revision in case there are any problems associated with the presentation file, and also avoid unnecessary delays during the tutorial sessions. All presentations will be loaded in advance onto a single laptop computer that will be arranged and facilitated by the TA.

Each 10-min presentation should summarize the findings from one scientific study that has been published as an original journal article. Presentations will be evaluated on the following criteria with 40% weighting for style and content, and 20% for overall timing.

Evaluation criteria and tips for an effective oral presentation:

Study (format of presentation) based on:

- consider using the “one slide per minute” rule to help keep on time
- speak in a strong clear voice and minimize word whispers (“um”, “ah”)
- show enthusiasm for topic area
- address audience rather than screen and avoid use of “crib” notes
- use large, bold lettering on screen (i.e., at least 24 pt font)
- minimize use of text (e.g., use bullet points rather than full sentences or paragraphs)
- consider making custom figures or tables if the original versions are not appropriate

Content (evaluation of article) based on:

- include relevant background information by way of an appropriate introduction
- emphasize the study purpose, aim(s) and/or main hypothesis
- include an overview of research design and essential methodology
- make use of appropriate figures and/or tables to convey key results
- strive for balance and highlight the main findings while avoiding non-essential details
- tell the audience why the study was significant and emphasize the key message
- attempt to place findings in context with respect to the field of research

APPENDIX B: RESEARCH PAPER GUIDELINES

The topic of the research paper should broadly relate to the content of the course, however considerable latitude will be permitted in this regard. The paper could be an expansion of a topic discussed in class, or a topic not specifically addressed during lectures but one that is of interest to the student. Students are encouraged to consult with the instructor and start thinking about potential topics early in the term.

Students must submit a one-page topic proposal to the course instructor by the last day of class before the mid-term break. Submissions prior to this date are encouraged. The page should contain the student's name and student number at the top of the page, a tentative title, a one-sentence purpose statement, a ~100-word summary and five relevant references. Within one week of submission (not including the break), the instructor will either formally approve the topic proposal or suggest revisions by e-mail.

The final version of the research paper, based on an approved topic proposal, is due at noon on the last day of classes for the term. Late papers will be accepted for up to five days following the due date, subject to a grade reduction of 5% per day. This means that a paper submitted five days late would be subject to a late penalty equivalent to a 25% deduction. No extensions will be granted after the late submission deadline under any circumstances. Students must submit one electronic copy of their research paper in PDF format by e-mail to the course instructor and one identical hard copy of their paper to the 4C03 drop box on IWC Level 2.

The research paper should introduce the topic, summarize important relevant literature, integrate the findings from various studies and highlight key issues that remain to be resolved. It is not sufficient to simply describe the results from a number of studies. Rather, a major objective for the student is to present his/her own view of the literature, and frame their ideas and opinions into a coherent message. The majority of information contained in the paper should come from primary research articles published in scientific journals. Secondary sources, such as review articles and textbooks, should be used sparingly but these can be effective to cite well-established or classic findings.

The entire document should be double-spaced with 1-inch margins around. Use Arial or Times font and 12-pt size throughout. Include a cover page with name, student number and title. The main body of the paper, excluding the abstract and references, should be five pages or ~1500 words, depending on the inclusion of any figures or tables. Adhere strictly to the following page guidelines:

Page 1 (Abstract): The abstract is not an introduction, but rather should be a concise, ~200-word summary of the information contained in the main body of text.

Pages 2-6 (Main text): Include a clearly defined introduction including statement of purpose; appropriate subheadings that attempt to integrate and interpret study findings; and a summary/concluding section that reinforces key points and highlights topics to be resolved and specific suggestions for future research initiatives.

Cite references numerically in the text. Students are encouraged to incorporate one or two figure panels, which are effective to highlight key findings and aid the reader by breaking up the main text. Insert figures directly into the document (i.e., do not include on separate pages at the end), accompanied by an appropriate legend that concisely explains the material presented and acknowledges the source. If figures are inserted, reduce the total amount of main text accordingly in order to meet the five-page limit. Judge figure size accordingly in order to make judicious use of total space available and the page limit, but as a guide, a figure might account for ~100 words. Note there is no “one sized fits all” approach, and it is up to the student to determine what is the most appropriate manner in which to format their paper and convey their information.

Pages 7+ (References): Cite a minimum of 15 and a maximum of 30 references, which can include reviews as well as original articles. Cite references numerically in the text and in alphabetical order in the reference list, using the style recommended for American Physiological Society journals:

<http://www.the-aps.org/mm/Publications/Info-For-Authors/Composition#references>

Tips for getting started and general evaluation criteria:

Begin by trying to find one or two review papers that are dedicated to your general topic area. Your instructor can be of assistance in this regard, or perform a PubMed search and include the word “review” as one of the search criteria (this will narrow the search results to review articles only). Review papers help direct you to the relevant body of scientific literature which has been published on various aspects of the topic, and should help you narrow or broaden the focus of your own research paper. Review articles are also a good source of references (i.e., primary journal articles which describe the results of original research studies). Following this initial search, try to sketch an outline of your intended research paper. What are the major sub-categories of the main topic that you plan to cover? Identify several potential key references for each area. Perform your own search for additional original articles. Finally, begin to develop the various sections of the paper in greater detail and be prepared to further expand or condense the topic depending on available information. Have a classmate or friend read an initial draft and offer suggestions for revision.

Similar to the evaluation of the presentation, the research paper will be mainly judged on style and content in equal measure, according to the following grading scheme:

20% of mark: Overall presentation, based on a visual assessment of the paper, including the proposal, and considering adherence to the general guidelines.

40% of mark: Writing style, including grammar, sentence structure and overall quality.

40% of mark: Writing content, in terms of integration, interpretation and critical appraisal of literature cited, and insight into the topic.