



**SPORT SCIENCE & MANAGEMENT
SS3111 ENVIRONMENTAL EXERCISE PHYSIOLOGY**

Pre-requisites	SS1105 Foundations of Exercise Physiology
No of AUs	3
Contact Hours	Total hours: 39 Lecture: 20 Laboratory: 19

Course Aims

The aim of this course is to examine the role and challenges the environment plays in sport. The course is designed to be an upper level exercise physiology module for undergraduate sport science students. The course will introduce you to the physiological adaptations and challenges faced by athletes across the entire spectrum of environments including heat, cold, altitude, pollution, underwater and in response to microgravity and bed rest. Strategies to overcome these challenges will be examined. Laboratories will provide hands-on opportunities to examine some of these challenges and guest lectures/visits will support the lecture material.

Intended Learning Outcomes (ILO)

By the end of the course, you should be able to:

1. Describe body heat production at rest and during exercise.
2. Explain how the environment affects heat loss.
3. Discuss the physiological responses to exercise in the heat.
4. Provide examples and compare strategies to mitigate heat gain during exercise.
5. Critically discuss and examine the need for fluid provision during exercise.
6. Discuss the role of air pollution on the exercising individual.
7. Recognise and illustrate the stresses on the body during diving.
8. Articulate how the body changes and adaptations that occur in cold environments and at altitude.
9. Describe the changes to the body during conditions of microgravity or bed rest.

Course Content

The following topics will be covered:

1. Thermoregulation
2. Exercise in the heat
3. Fluid provision during exercise
4. Cold exposure
5. Exercise and air pollution
6. Diving physiology
7. Exercise at altitude
8. Effects of microgravity and bed rest on exercise performance

Assessment (includes both continuous and summative assessment)

Component	Course ILO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/ Individual	Assessment rubrics
1. Laboratory report	1-5	A1, A2, A3, B1, B2, C1, C2, D1, E1	40%	Team/Individual	Appendix 1
2. Examination	1-9	A1, B1, B2	60%	Individual	
Total			100%		

Graduates of the SSM programme should show:

Competence

A1: {Understanding}	process and interpret information, evidence and methodologies related to sport science or sport management
A2: {Self-discipline}	independently apply themselves to solve relevant problems
A3: {Modern Tool Usage}	use technology to communicate and provide feedback on sports activities, improve sports performance, monitor and increase physical activity, provide exercise prescription, solve problems for disadvantaged athletes/sportspeople, and commercialize and innovate sports products, events and services

Creativity

B1: {Critical Thinking}	critically assess the applicability of sport science and sport management tools toward problems and in the workplace
B2: {Analytical Thinking}	critically analyse data from a multitude of sources
B3: {Interdisciplinary Thinking}	connect the subfields of sport science and sport management to tackle problems
B4: {Innovation}	be able to develop new applications or improve existing techniques
B5: {Entrepreneurship}	develop new ideas and plans for sport science, businesses and events

Communication

C1: {Effective Communication}	present findings or ideas from sport science and sport management research logically and coherently at the appropriate level for the intended audience and in all forms of communication
C2: {Teamwork}	work in teams on projects that require sport science or sport management application, and communicate results via demonstration, verbally and in written form
Civic-Mindedness	
D1: {Professionalism}	act in a manner that respects the profession and meets the expectations of the sport science and sport management industry
D2: {Inclusiveness}	promote sport and physical activity in all individuals to bring people together and improve physical, social and psychological outcomes
Character	
E1: {Ethical behaviour}	act with integrity and in a socially responsible and ethical manner in line with societal and legal expectations in relation to collecting and analysing data of people and protecting personal data with appropriate computer security
E2: {Sportspersonship}	demonstrate appropriate safety, concern and good conduct in sport situations towards other individuals involved in the activity

Formative feedback

Feedback for learning will be verbal provided during laboratory classes where you have the opportunity to learn techniques and apply yourselves to problems related to each organ system. Generic verbal and written feedback will be provided for the laboratory report and final examination.

Learning and Teaching approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Lectures will provide information for key learning concepts and theories and support understanding of key concepts
Laboratories	Laboratories will: <ul style="list-style-type: none"> - Give hands-on experiential learning to support key theories and information provided in class - Provide tasks for you to utilise what you have recently learned to solve specific problems. - Give space and time for small group activities and discussions to allow you to assimilate the content and for

	sharing learning - Allow opportunity for verbal feedback from instructor on techniques and material.
Online learning	Time will be given over for learning from online materials as a part of a flipped teaching approach. These materials will support key concepts covered in lectures and laboratories.

Reading and References

Recommended texts:

- McArdle, W.D., Katch, F.I., & Katch, V.L. (2015). *Exercise Physiology: Nutrition, Energy, and Human Performance*. 8th Edition. Lippincott Williams & Wilkins
- Powers, S.K., & Howley, E.T. (2015). *Exercise Physiology: Theory and Application to Fitness and Performance*. 9th Edition. McGraw-Hill.

Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned pre-class readings and activities, attend all classes – lecture and laboratory - punctually and submit the scheduled assignment by the due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for sessions missed. You are expected to participate in all discussions and class activities unless there is a valid medical reason not to do so.

(2) Absenteeism

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

If you miss a lecture, you must inform the course instructor via email prior to the start of the class.

(3) Absence Due to Medical or Other Reasons

If you are sick and not able to complete a test or submit an assignment, you have to submit the original Medical Certificate (or another relevant document) to the Sport Science & Management (or Home School) administration to obtain official leave. Without this, the missed assessment component will not be counted towards the final grade. There are no make-ups allowed.

(4) Attire and safety

You are expected to participate in practical laboratory activities. Some of these activities involve exercise. All of you are expected to wear appropriate attire for participation, obey laboratory safety rules, and take appropriate care of and return all equipment after use.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Collaboration is encouraged for your work in the class and laboratories because peer-to-peer learning helps you understand the subject better and working in a team trains you to better communicate with others. Working together and exchanging ideas and experiences will help improve the quality of your assessed presentation. It is important to credit others for their contribution to your work which promotes ethical practices and academic integrity.

Course Instructor

Instructor	Office Location	Phone	Email

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1	Introduction to environmental exercise physiology	LO1 – LO9	Chapter XX, Pages XX-XX
2	Thermoregulation and fluid balance	LO1, LO2	Chapter XX, Pages XX-XX
3	Exercise in the heat Part I Laboratory assignment – data collection	LO1 – LO3	Chapter XX, Pages XX-XX
4	Exercise in the heat Part II Laboratory assignment – data collection	LO1 – LO3	Chapter XX, Pages XX-XX
5	Fluid provision during exercise in the heat Laboratory assignment – data collection	LO5	Chapter XX, Pages XX-XX
6	Hyponatraemia	LO5	Chapter XX, Pages XX-XX

7	Assignment work	LO1 – LO5	Chapter XX, Pages XX-XX
8	Half-term		
9	Air pollution and exercise	LO6	Chapter XX, Pages XX-XX
10	Sport diving	LO7	Chapter XX, Pages XX-XX
11	Cold	LO8	Chapter XX, Pages XX-XX
12	Altitude	LO8	Chapter XX, Pages XX-XX
13	Microgravity and bed rest	LO9	Chapter XX, Pages XX-XX
14	Revision	LO1 – LO9	

Appendix 1: Assessment Criteria for Laboratory Assignment (40% Final Grade – marked out of 100%)

	A+, A, A-	B+, B	B-, C+, C	D+, D	F
Team: Groupwork and data collection* (max 20)	Clear teamwork, planning and group cohesion with appropriate division of work by each member of the group contributing to the successful collection of data.	Good teamwork and cohesion but improvement needed in planning of roles by group members for data collection.	Obvious improvements needed in teamwork and cooperation of members to improve data collection.	Team members working in small cliques with infrequent whole group cooperation.	Poor teamwork with little or no cooperation among group members during data collection processes.
Individual: Structure and clarity of writing & presentation (max 10)	Well structured. Very minor grammatical and spelling errors. Table and/or figures well presented.	Some improvement in structure possible. Few grammatical and spelling errors. Tables and/or figures well presented.	Improvement in structure needed. Obvious grammatical and spelling errors. Tables and figures need improving.	Poor structure. Many spelling and grammatical errors. Poor presentation of tables and figures.	Coherent structure absent. Copious spelling and grammatical errors. Very poor presentation of tables and figures.
Individual: Introduction, background, aims, hypotheses and objectives (max 20)	Background statement of problem clearly defined. Aim clear.	Background statement of problem could be clearer. Small improvement in defining aim of study needed.	Background statement of problem and aim need improving.	Background statement and aim not clear.	Background statement and aim unclear.
Individual: Methods (max 20)	Comprehensive description of methods.	Good description of methods with few errors.	Methods described but with some errors or omissions.	Methods described difficult to follow and omissions.	Little coherent description of methods.
Individual: Data analysis and interpretation (max 20)	Appropriate data analysis applied and interpretation of results.	Good data analysis and interpretation of results with few errors.	Incorrect data analysis in parts and interpretation of results incorrect or inappropriate in parts.	Poor data analysis and interpretation of results.	Inappropriate or very poor data analysis and interpretation of results.
Individual: Discussion and	Conclusion(s) clearly related to results.	Conclusion(s) clear with small errors.	Some conclusion(s) not supported	Conclusion(s) generally	Conclusion(s) unclear, poor

concluding remarks (max 10)			by study results.	inappropriate or incorrect.	and inappropriate.
*All individuals within the group are expected to contribute to work involved in the planning, data collection and output. An individual's score may vary from that of the team based on feedback and observations in this area.					