

國立體育大學授課教學大綱 (Teaching Plan)

科目中文名稱 Chinese Course Title	運動生理學研究 (在職專班)
科目英文名稱 English Course Title	Advanced Exercise Physiology (Part-time Program)
授課老師 Instructor	Jackson Pui Man Wai 衛沛文
修課條件 Prerequisite	Undergraduate level courses in anatomy, human physiology, and exercise physiology are required. Students with deficiency in prerequisite courses are required to obtain permission from the course instructor.
教學目標 Objective	At the end of this semester, student will be able to understand the acute and prolonged (training) physiological responses of exercise and its application in physical education teaching and physical training.
先修科目 Pre Course	“ see prerequisite”
教材內容 Outline	Terminology of exercise: acute exercise, chronic and prolonged exercise, short-term, prolonged exercise, and long-term (training) exercise Bioenergy: Aerobic and anaerobic energy systems, ATP hydrolysis, source of ATP - anaerobic systems (ATP-PC, lactic acid, glycolysis), aerobic systems (oxidative glycolysis, Krebs cycle, electron transport system, fat metabolism, protein metabolism); predominance of energy system during activities (the energy continuum concept); oxygen uptake, oxygen deficit and oxygen debt, steady state, anaerobic (lactate/ventilatory) threshold, excess post-exercise oxygen consumption (EPOC), Cardiovascular functions and maximum oxygen uptake ($\dot{V}O_{2max}$) : Functional anatomy of the cardiovascular system, oxygen transport system (heart rate, stroke volume, cardiac output, arterial blood and venous blood oxygen contents), redistribution of blood flow during exercise, oxygen utilization capacity of exercising muscle tissue, determinant of maximum oxygen uptake (maximal aerobic power). Respiratory system in exercise: Functional anatomy of the respiratory system, breathing action, respiratory volume, flow and capacity, ventilatory responses during exercise, gas exchange during exercise, the role of acid-base regulation of the respiration. Muscle fiber composition: types of motor unit (fast and slow twitch), distribution of muscle fiber type, biomechanical and functional characteristics of fast and slow twitch fibers, size principle of motor-unit recruitment, Muscular contraction and muscle strength: Resistance/load/free weight, static (isometric) and dynamic (concentric, eccentric, isokinetic, plyometric) exercise, angle of pull and strength, force-velocity curve, force-length curve,

	measurements – maximal voluntary contraction, one-repetition maximum, isokinetic peak torque. Body composition: Lean body mass, fat mass, fat free mass, 2-compartment model, 3-compartment model, 4-compartment model, subcutaneous fat, brown fat, visceral fat, measurement of body composition, estimation of body composition, management of body fat by exercise.
教學方式 Teaching Method	Classroom instructions and discussions
參考書目 References	Text books 1. American College of Sports Medicine. <i>ACSM's Resource manual for Guidelines for Exercise Testing and Prescription.</i> LWW, 5th ed., 2006. 2. Åstrand P-O and Rodahl K. <i>Textbook of Work Physiology.</i> McGraw-Hill, 1986; Human Kinetics, 2003. 3. British Journal of Sports Medicine. 4. DeVries HA. <i>Physiology of Exercise for Physical Education and Athletics.</i> Wm. C. Brown, 1986. 5. DeVries HA and Housh TJ. <i>Physiology of Exercise for Physical Education, Athletics, and Exercise Science (5th Ed).</i> Dubuque, IA: Brown and Benchmark, 1994. 6. European Journal of Applied Physiology. 7. Foss ML and Keteyian SJ. <i>Fox's Physiological Basis for Exercise and Sport.</i> WCB McGraw-Hill, 1998; 2001. 8. Fox, Bowers and Fuss. <i>The Physiological Basis for Exercise and Sport.</i> 5th Ed. WCB, 1998; 1993 9. Guyton AC. <i>Textbook of Medical Physiology.</i> Saunders, 1991/later edition. 10. Guyton AC and Hall JE. <i>Human Physiology and Mechanisms of Disease.</i> W.B. Saunders, 1997/later edition. 11. International Journal of Obesity. 12. McArdle WD, Katch FI, and Katch VL. <i>Essentials of Exercise Physiology.</i> Lippincott Williams & Wilkins, 2001; 2005. 13. New England Journal of Medicine. 14. Nieman DC. <i>Exercise Testing and Prescription.</i> McGraw Hill, 2003. 15. Powers SK and Howley ET. <i>Exercise Physiology: Theory and Application to Fitness and Performance.</i> WCB, 1994; McGraw-Hill 2004. 16. Seeley RD, Stephens TD, and Tate P. <i>Anatomy & Physiology.</i> Mosby, 1992/later edition. 17. Tortora GJ and Grabowski SR. <i>Principles of Anatomy and Physiology.</i> Harp Col, 1993/later edition. 18. Vander A, Sherman J, and Luciano D. <i>Human Physiology.</i> 6th Ed. McGraw-Hill.2001/later edition.
教學進度 Syllabi	請詳載 18 週授課內容 (Teaching contents in 18 weeks) Week 1-3 Terminology, bioenergy Week 4-7 Cardiovascular functions and maximum oxygen uptake ($\dot{V}O_{2max}$) Week 8-9: Respiratory system in exercise Week Week 10 Mid-term examination Week 11-12: Muscle fiber composition Week 13-15: Muscular contraction and muscle strength Week 16-17: Body composition Week 18: Find examination, term paper.

評量方式 Evaluation	評量方式與百分比 (Method and percentage) Mid-term examination (written test) (30%) Final examination (written test) (40%) Term paper (30%)
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注意事項：

- 1.課程之中英文名稱請依各開課單位學分科目表填寫。
- 2.本表各欄位如有不足，請自行增列後填寫。

Core Ability Rubric

Core ability	%	Course objectives	Level of skill	Teaching strategy	Evaluation method
1. 具備運用運動生理、運動營養與運動科技知識的能力	60	• Demonstrate understandings and application of the context of course material	Academic skill	• Classroom instructions • Stimulation of thinking	• Term paper • Written examination
2. 具備分析與解決運動科學相關問題的能力	30	• Can identify problem types. • Understands the level of complexity of a problem • Develop, evaluate, and test possible solutions	Analytical skill	• Classroom instructions • Encourage critical thinking • Guiding writing skills	• Written examination • Term paper
3. 具備運動科學專業文獻 (含外語) 之閱讀、寫作及發表 (含外語) 的能力	10	• Able to search, identify, screen, and implement research literatures • Able to write a concise and comprehensible term paper	Integrative skill	• Classroom instructions • Instructions on effective writing	• Term paper
4. 具備運動科學研究之團隊合作與溝通能力	0				
5. 具備運動科學國際觀	0				

Term Paper Rubric (30% of course evaluation)

Criteria	Poor 1-4	Average 5-6	Good 7-8	Excellence 9-10	Score
Ideas (20%)	• Does not have a clear central idea or does not respond appropriately to the assignment. • Too vague or obvious to be developed effectively • May misunderstand sources	• Adequate but weaker and less effective, responding less well to the assignment. • Presents central idea in general terms, often depending on platitudes or cliches. • Usually does not acknowledge other views. • Shows basic comprehension of sources, with lapses in understanding	• Responding appropriately to assignment • Clearly states a central idea, have minor lapses in development. • Begins to acknowledge the complexity of central idea and the possibility of other points of view. • Shows careful reading of sources, but may not evaluate them critically.	• Excels in responding to assignment • Demonstrates sophistication of thought • Central idea is clearly communicated and worth developing • Recognizes some complexity, knowledge contradictions, or limits • Understands and critically evaluates its sources	
Organization & coherence (30%)	• Lacking internal paragraph coherence and using few or inappropriate transitions • Paragraphs lack topic sentences or main ideas, or too general or too specific to be effective • Paragraphs not all relate to paper's theme	• Ideas are arranged with some evident logical structure • May use transitions, but they may not logic-based • Paragraph may relate to central idea, but logic is not always clear • Topic sentences may be overly general, and sentence arrangement may lack coherence	• Shows a logical progression of ideas and uses fairly sophisticated transitional devices; e.g., may move from least to more important idea • Some logical links may be faulty, but each paragraph clearly relates to paper's central idea.	• Uses a logical structure appropriate to paper's subject, purpose, audience, thesis, and disciplinary field. • Sophisticated transitional sentences often develop one idea from the previous one or identify their logical relations • It guides the reader through the chain of reasoning or progression of ideas.	

Support (30%)	▪ Depends on clichés or overgeneralizations for support, or offers little evidence of any kind. ▪ Personal narrative rather than essay, or summary rather than analysis.	▪ Often uses generalizations to support its points. May use examples, but they may be obvious or not relevant. ▪ Often depends on unsupported opinion or personal experience, or assumes that evidence speaks for itself and needs no application to the point being discussed.	▪ Begins to offer reasons to support its points, perhaps using varied kinds of evidence ▪ Begins to interpret the evidence and explain connections between evidence and main ideas. ▪ Its examples bear some relevance.	▪ Uses evidence appropriately and effectively, providing sufficient evidence and explanation to convince.	
Style and mechanics (20%)	▪ Vague and abstract, or too personal and specific ▪ Usually contains awkward sentences; sentence structure is simple or monotonous ▪ Contains either many mechanical errors or a few important errors that may impede the reader's understanding and ability to see connections between thoughts	▪ Relatively vague and general words, may use some inappropriate language ▪ Sentence structure generally correct, but sentences may be wordy, unfocused, repetitive, or confusing ▪ Usually contains several mechanical errors, which may temporarily confuse the reader but not impede the overall understanding	▪ Generally uses words accurately and effectively, but may sometimes be too general ▪ Sentences generally clear, well structured, and focused, though some may be awkward or ineffective ▪ Contain a few errors, which may confuse the reader but not impede understanding	▪ Chooses words for their precise meaning and uses an appropriate level of specificity ▪ Sentence style fits paper's audience and purpose ▪ Sentences are varied, yet clearly, carefully focused, not long and rambling ▪ Almost entirely free of spelling, punctuation, and grammatical errors.	
				Total (max. 100)	