

國立體育大學全英語授課教學大綱 (Teaching Plan)

科目中文名稱 Chinese Course Title	健康體適能研究 (英語授課)
科目英文名稱 English Course Title	Advanced Health-Related Physical Fitness (Lecture in English)
授課老師 Instructor	Jackson Pui Man Wai
修課條件 Prerequisite	例：學生須有通過全民英檢中級以上之程度 Students are required to pass course “Advanced Physical Activity and Public Health (Lecture in English)”, or course “Advanced Literature (English) in Physical Activity and Health I (lecture in English)”, and to obtain permission from the course instructor.
教學目標 Objective	At the end of this semester, students will: (1) Learn fundamentals in epidemiological studies of physical fitness and health, (2) Learn components of health-related physical fitness, (3) Learn health benefits of health-related physical fitness, (4) Perform assessment of health-related physical fitness, (5) Perform health screening and risk classification (6) Learn design and administration of exercise programs.
先修科目 Pre Course	“ see prerequisite”
教材內容 Outline	Outlines Epidemiology – the target of an epidemiological study, use of epidemiological findings, measure of disease frequency: population at risk, incidence, prevalence, case-fatality proportion; measures of strength of association: relative risk, odds ratio. Mortality – annual crude death rate, age-specific death rate, cause-specific death rate, cause-race-specific death rate, proportional mortality ratio, adjustment of mortality rates, standard mortality rates. Demographic variables – age, gender, education, income, residency, marital status, Type of research in epidemiology – observational studies: correlational, prevalence, case-control, cohort; experimental studies: randomized controlled trials, field trials, community trials. Epidemiology of chronic noncommunicable diseases (CNCDS) – incidence, prevalence, morbidity, mortality Health-related physical fitness terminology and definition – Health, physical fitness, health-related physical fitness, physical activity, exercise, bout, acute exercise, prolonged exercise, long-term exercise, physical training.

Risk factors of CNCDs – Physical activity, overweight and obesity, nutrition, tobacco use, mental health, environmental quality.

Health-related physical fitness (HRPF) components and CNCDs, evaluations of HRPF

Cardiorespiratory fitness (CRF)– CRF, CNCDs and mortality, ergometry, maximal oxygen uptake, exercise stress test, estimation of maximal oxygen uptake (submaximal exercise test, non-exercise models). The oxygen transport system: heart function (cardiac output, stroke volume, end-diastolic end-systolic volume, ventricular hypertrophy, heart rate (number of cardiac contractions, relative refractory period, aging), vascular system (redistribution of blood flow, arterial dilation in the exercising muscles arterial constriction in the non-exercising areas, arterial stiffness-distensibility and compliance coefficients, stiffness of the carotid, femoral, and brachial arteries, coronary artery calcification), respiratory system (pulmonary ventilation, ventilation-perfusion matching, oxyhemoglobin saturation, hemoglobin concentration, pulmonary diffusion, pulmonary blood flow limits diffusion time, respiratory mechanics, flow-volume relationship, compliance -high compliance implies low stiffness, chest wall compliance, lung wall compliance), respiratory muscles capacity (energy ceiling, respiratory blood flow, respiratory workrate or power, respiratory muscle fatigue or endurance), muscular aerobic capacity (exercising muscle mass, aging, local muscular blood flow, capillary density, percentage of type I motor unit, size and number of mitochondria, oxidative enzymes' concentration and activity, muscle glycogen storage, removal of lactate.

Anthropometry and body composition – obesity-related CNCDs and mortality, body mass index, body circumferences, body density, fat-free mass, lean body mass, hydrostatic (underwater) weighting, skinfolds measurements, management of obesity.

Criterion of obesity, WHO classification of obesity, comorbidities risk associated with different levels of BMI and suggested waist circumference in adult Asians, Taiwan's obesity criterion, prevalence and trend of overweight and obesity among adults with gender specification in Taiwan, assessments of body composition (densitometry, total body water, total body potassium, creatinine, anthropometry, electrical conductance, dual-photon absorptiometry (DPA), dual energy x-ray absorptiometry (DXA), computerized tomography (CT), magnetic resonance image (MRI)

Muscular strength and endurance –Muscle fitness and functional ability, quality of life, CNCD, mortality.

Defining weight, load and resistance, forms of resistance / load / weight (static, free weight, mechanical friction, fluid resistance, body weight, variable resistance machine, isokinetic, difference between tension (or force) and muscle strength.

Type of muscular contraction- static/isometric, assessment of isometric strength (maximum voluntary contraction), dynamic contraction (concentric, eccentric, isokinetic, and plyometric contractions), assessment of dynamic strength (one-repetition maximum), "isotonic contraction" is "isoload contraction", characteristics of eccentric

	contraction, characteristics of isokinetic muscle contracts. Mechanics affecting muscle tension - muscle length-tension relationship, muscle velocity-tension relationship, angle of pull; accommodated/variable resistance weight training (cam design, Sliding load arm design). Principles of weight/resistance training – overloading, progressiveness, specificity Flexibility – Flexibility and functional ability, quality of life, CNCD, mortality. Static Flexibility, range of motion (ROM), single joint action, composite joint action, more than one type of action within a single joint; dynamic flexibility, structural Limits to flexibility (hard tissue), factors that affects joint movements (tightness of articulating bones, articulating bones, tension or tautness) of the tissue, position of ligaments, muscles, and tendons, structural classification of joints, joint cavity, type of connective tissue (fibrous, cartilaginous, synovial), functional classification of joints (immovable joint, slightly moveable joint, moveable joint - gliding joint, hinge joint, pivot joint, ellipsoidal joint, saddle joint, ball and socket joint), soft tissue (joint capsule, ligaments, muscle, fascia, tendons, skin), apposition of soft parts, relative contribution of soft-tissue structures to joint resistance. Assessment of static flexibility – flexometer, goniometer, electrogoniometer, electronic goniometer, field test (trunk flexion/sit-and-reach test), trunk extension test, importance of flexibility. Muscle spindle and Golgi tendon organ, myotatic/stretch reflex, inverse myotatic/tendon reflex (also called autogenic inhibition), improvement of flexibility through stretching exercise (static, ballistic, contract-reflex (C-R) or proprioceptive neuromuscular facilitation (PNF), choosing the proper stretching method (ballistic stretching, PNF stretching), other factors affecting flexibility (age, gender, physical activity, regularly exercise, disuse and immobilization, temperature, hormones, designing a flexibility program, stretching in warm-up and cool-down exercise, examples of flexibility exercise. Health screening and risk classification – preparticipation health screening (blood pressure, heart rate, electrocardiogram, blood lipids and cholesterol, blood glucose, etc.), ACSM risk stratification Designing and administration of exercise programs – physical fitness testing, basic principles of exercise program design, exercise program adherence, certification and licensure. Improvement of Health-related Physical Fitness – individual, corporative, community, nationwide, and global.
教學方式 Teaching Method	Classroom instructions, in-class oral discussions, scientific writing, and written examinations.
參考書目 References	Major text books (1) ACSM's <i>Guidelines for Exercise Testing and Prescription</i>, 2009. (2) Nieman DC. <i>Exercise Testing and Prescription: A Health-Related Approach</i>. New York, NY: McGraw Hill, 2003.

(3) **Heywood VA.** *Advanced Fitness Assessment and Exercise Prescription, 4th ed.* Champaign, IL: Human Kinetics, 2002.

Other Books, Reports, and research literatures

1. 臺灣地區國人十大死因。中華民國行政院衛生署。 <http://www.doh.gov.tw>
2. **American College of Sports Medicine.** *ACSM's Health-Related Physical Fitness Assessment Manual*, 2nd edition, Lippincott Williams & Wilkis, 2008.
3. **American College of Sports Medicine.** *ACSM's Resources Manual for Guidelines for Exercise Testing and Prescription, 5th edition.* Baltimore, Maryland: Lippincott Williams & Wilkis, 2005.
4. **Åstrand I.** Aerobic work capacity in men and women with special reference to age. *Acta Physiol. Scand.* 49(Suppl 169): 1-92, 1960.
5. **Åstrand P.-O. and Rodahl K.** *Textbook of Work Physiology.* New York: McGraw-Hill, 1986.
6. **Bonita R, Beaglehole, Kjellstrom T.** *Basic Epidemiology.* 2nd edition, World Health Organization, 2006.
7. **Baumgartner TA and Jackson AS.** *Measurement for Evaluation in Physical Education and Exercise Science.* Boston: WCM/McGraw-Hill, 1999.
8. **Consolazio CE, Johnson RE, and Pecora LJ.** *Physiological Measurements of Metabolic Functions in Man.* New York: McGraw-Hill, 1963.
9. **Ross RM and Jackson AS.** *Exercise Concepts, Calculations, and Computer Applications.* Carmel, IN: Benchmark Press, 95-103, 109, 1990.
10. **U.S. Department of Health and Human Services.** *Healthy People 2010: Understanding and Improving Health.* 2nd ed. Washington, DC: U.S. Government Printing Office, November 2000.
11. **WHO.** *Global strategy on diet, physical activity and health.* 2004.

Research Papers

1. **Åstrand P-O and Ryhming I.** A nomogram for calculation of aerobic capacity (physical fitness) from pulse rate during submaximal work. *J Appl Physiol* 7: 218-221, 1954.
2. **Blair SN, Kampert JB, Kohl...** Influences of cardiorespiratory fitness and precursors on cardiovascular disease and all-cause mortality in men and women. *JAMA* 276: 205-210, 1996
3. **Blair SN, Kannel WB, Kohl HW, Goodyear N, and Wilson PF.** Surrogate measure of physical activity and physical fitness. *Am J Epidemiol* 129: 1145-1156, 1989.
4. **Bruce RA, Kusumi F, and Hosmer D.** Maximal oxygen intake and nomographic assessment of functional aerobic impairment in cardiovascular disease. *Am Health J* 85(4): 546-562, 1973.
5. **Carroll S, Cooke CB, and Butterly RJ.** Metabolic clustering, physical activity and fitness in nonsmoking, middle-aged men. *Med Sci Sports Exerc* 32(12): 2079-2086, 2000.
6. **Deurenberg P, Yap MD, Wang J, Lin FP, and Schmidt G.** The impact of body build on the relationship between body mass index and percent body fat. *Internat . Obesiy* 23:537-542, 1999
7. **Eaton CB, Lapane KL, Garber CA, Assaf AR, Lasater MT, and Carlton RA.** Sedentary lifestyle and risk of coronary heart disease in women. *Med Sci Sports Exerc* 11: 1535-1539, 1995.
8. **George JD, Stone WL, and Burkett LN.** Non-exercise $\dot{V}O_{2max}$ estimation for physically active college students. *Med Sci Sports Exerc* 29(3): 415-423, 1997.
9. **Jackson AS, Beard EF, Wier LT, Ross RM, Stueville JE, and Blair SN.** Changes in aerobic power of men, ages 25-70 yr. *Med Sci Sports Exerc* 27(1): 113-120, 1995.
10. **Jackson AS, Blair SN, Mahar MT, Wier LT, Ross RM, and Stuteville JE.** Prediction of functional aerobic capacity without exercise testing. *Med. Sci. Sports Exerc* 22(6): 863-870, 1990.
11. **Jackson AS, Wier LT, Ayers GW, Beard EF, Stuteville JE, and Blair SN.** Changes in aerobic power of women, ages 20-64 yr. *Med Sci Sports Exerc* 28(7): 884-891, 1996.

12. **Katzmarzky PT, Gagnon J, Leon AS, Skinner JS, Wilmore JH, Rao DC, and Bouchard C.** Fitness, fatness, and estimated coronary heart disease risk: the HERITAGE Family Study. *Med Sci Sports Exerc* 33(4): 585-590, 2001.
13. **Kline GM, Porcari JP, Hintermeister R, Freedson PS, Ward A., McCarron RF, Ross J, and Rippe JM.** Estimation of $\dot{V}O_{2max}$ from a one-mile track walk, gender, age, and body weight. *Med Sci Sports Exerc* 19(3): 253-259, 1987.
14. **Kohl HW, Blair SN, Paffenbarger RS Jr, Macera CA, and Kronenfeld JJ.** A mail survey of physical activity habits as related to measured physical fitness. *Am J Epidemiol* 127: 1228-1239, 1988.
15. **Lee CD and Blair SN.** Cardiorespiratory fitness and stroke mortality in men. *Med Sci Sports Exerc* 34(4): 592-595, 2002.
16. **Lee CD, Blair SN, and Jackson AS.** Cardiorespiratory fitness, body composition, and all-cause and cardiovascular disease mortality in men. *Am J Clin Nutr* 69: 373-380, 1999.
17. **Matthews CE, Heil DP, Freedson PS, and Pastides H.** Classification of cardiorespiratory fitness without exercise testing. *Med Sci Sports Exerc* 31(3): 486-493, 1999.
18. **McMurray RG, Harrell JS, Bradley CB, Deng S, and Deng S, Bangdiwala SI.** Predicted maximal aerobic power in youth is related to age, gender, and ethnicity. *Med Sci Sports Exerc* 34(1): 145-151, 2002.
19. **Meyer HE, søgaard AJ, Tverdal A, and Selmer RM.** Body mass index and mortality: the influence of physical activity and smoking. *Med Sci Sports Exerc* 34(7): 1065-1070, 2002.
20. **Mitchell J.H., Sproule B.J., and Chapman C.B.** The physiological meaning of the maximal oxygen intake test. *J. Clin. Invest.* 37(4): 538-547, 1958.
21. **MuMurray RG, Ainsworth BE, Harrell JS, Griggs TR, and Williams OD.** Is physical activity or aerobic power more influential on reducing cardiovascular disease risk factors? *Med Sci Sports Exerc* 30(10): 1521-1529, 1998.
22. **Morey MC, Pieper CF, and Cornoni-Huntley J.** Physical fitness and functional limitations in community-dwelling older adults. *Med Sci Sports Exerc* 30(5): 715-723, 1998.
23. **Owen N, Leslie E, Salmon J, and Fotheringham MJ.** Environmental determinants of physical activity and sedentary behavior. *Ex Sports Sci Rev* 28(4): 153-158, 2000.
24. **Paffenbarger RS Jr, Wolf PA, Notkin J, et al.** Chronic disease in former college students. I. Early precursors of fatal coronary heart disease. *Am J Epidemiol* 83: 314-328, 1966.
25. **Prud'homme D, Bouchard C, Leblanc C, Landry F, and Fontaine E.** Sensitivity of maximal aerobic power to training is genotype-dependent. *Med Sci Sports Exerc* 16(5): 489-493, 1984.
26. **Sharpe AG, and Wannamethe G.** Physical activity and ischemic heart disease in middle-aged British men. *Br Heart J* 66: 384-394, 1991.
27. **Sobolski J, Kornitzwr M, De Backer G, et al.** Protection against ischemic heart disease in the Belgian Physical Fitness Study: physical fitness rather than physical activity? *Am J Epidemiol* 125: 601-610, 1987.
28. **Taylor HL, Buskirk E, and Henschel A.** Maximal oxygen intake as an objective measure of cardio-respiratory performance. *J Appl Physiol* 8: 73-80, 1955
29. **Wagner PD.** Muscle O_2 transport and O_2 dependent control of metabolism. *Med Sci Sports Exerc* 27(1): 47-53, 1995.
30. **Wang J, Thornton JC, Russell M, Burastero S, Heymsfield S, and Pierson RN Jr.** Asians have lower body mass index (BMI) but higher percent body fat do whites: comparisons of anthropometric measurements. *Am J Clin Nutr.* 60: 23-28, 1994.
31. **Wei M, Kampert J B, Barlow CE, Nichaman MZ, Gibbons LW, Paffenbarger Jr RS, and Blair SN.** Relationship between low cardiorespiratory fitness and mortality in normal-weight, overweight, and obese men. *JAMA* 282: 1547-1553, 1999.
32. **Whaley MH, Kamperg JB, Kohl III HW, and Blair SN.** Physical fitness and clustering of risk factors associated with metabolic syndrome. *Med Sci Sports Exerc* 31(2): 287-293, 1999.
33. **Williford HN, Sport K, Wang N, Scharff-Olson M, and Blessing D.** The prediction of fitness levels of United States Air Force Officers: validation of cycle

	ergometry. <i>Mil Med</i> 159: 175-178, 1994. 34. Wilson DF. Energy metabolism in muscle approaching maximal rates of oxygen utilization. <i>Med Sci Sports Exerc</i> 27(1): 54-59, 1995.
教學進度 Syllabi	請詳載 18 週授課內容(Teaching contents in 18 weeks) Week 1-2: Epidemiology, mortality. Week 3: Demographic variables, Type of research in epidemiology Week 4: Epidemiology of chronic noncommunicable diseases (CNCDs) Week 5: Health-related physical fitness terminology and definition Week 6: Risk factors of CNCDs Health-related physical fitness (HRPF), Week 7-8: Cardiorespiratory fitness.components and CNCDs, evaluations of HRPF. Week 9: Mid-term examination Week 10-11: Anthropometry and body composition. Week 12-13: Muscular strength and endurance. Week 14-15: Flexibility. Week 16: Health screening and risk classificatio., Designing and administration of exercise programs. Week 17: Improvement of Health-related Physical Fitness and review session. Week 18: Final examination.
評量方式 Evaluation	評量方式與百分比 (Method and percentage) In-class oral discussions (20%) Scientific reports (30%) Mid-term examination (20%) Final examination (30%)

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	40	Demonstrate understandings and application of the context of health-related physical fitness.	Academic skill	Classroom instructions, Laboratory / field work , Scientific writing skill	Written examinations, Scientific reports, In-class oral assessment, Laboratory / field test skills
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, In-class oral discussions, Scientific writing skills	Situational simulation test, In-class oral assessment, Scientific reports.
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	15	Able to search, identify, screen, and implement research literatures Able to write a concise and readable scientific report	Integrative skill	Classroom instructions, In-class oral discussions, Scientific writing skills Citation methods	Evidence-based oral discussion, Citation of SCI literatures, Scientific reports.
5.具備國際運動科學概念與學術發表的能力	15	Expression and implementation of acquired knowledge	Integrative skill	In-class oral discussions Writing skills,	In-class oral assessments, Scientific report, Written examinations

In-Class Discussion Rubric (20% of course evaluation)

Objectives	Low Performance	At or Below Average	At or Above Average	Exemplary Performance	Earned Points
	1-4 points	5-6 points	7-8 points	9-10 points	
Student responds to other students in the discussion group. (20%)	Student seems distracted or engages in unrelated conversations while other students speak.	Student often interrupts other students' comments and opinions by insulting them or by forcefully adding their own opinions.	Student occasionally interrupts other students, but generally adds a related argument or opinion.	Student waits until the speaker is done speaking before contributing and integrates past comments into their own statement.	
Student is prepared for discussion. (30%)	Student is unable to discuss due to not completing the assignment or activity leading to the discussion.	Student makes random comments that repeat what others have said without contributing anything new or randomly adds opinions that are off topic.	Student is engaged in the discussion, occasionally using references from the preparatory assignment or activity.	Student is engaged in the discussion, and often cites specific references to the preparatory assignment or activity and clearly connects the references to main opinions.	
Student demonstrates understanding of topic being discussed. (50%)	Student does not engage in the discussion.	Student offers opinions that are only occasionally related to the topic.	Student connects the topic to life experiences and previous knowledge.	Student uses examples to help struggling students see the ways the topic connects to life experiences and previous knowledge, and student is able to answer group members' questions with ease.	
				Score (max 100):	

Scientific Report Rubric (30% of course evaluation)

	Poor 1-4	Average 5-6	Good 7-8	Excellence 9-10	Score
Introduction (10%)	Does not give any information about what to expect in the report.	Gives very little information.	Gives too much information.	Presents a concise lead-in to the report.	
Answers to the issues (60%)	Answers does not related to the issues.	Answers only slightly related to the issues.	Answers are somewhat related to the issues.	Answers are directly related to the issues.	
Conclusion (10%)	Presents an illogical explanation for findings and does not address any of the questions suggested in the template.	Presents an illogical explanation for findings and addresses few questions.	Presents a logical explanation for findings and addresses some of the questions.	Presents a logical explanation for findings and addresses most of the questions.	
Grammar & Spelling, Attractiveness, Timeliness (20%)	Very frequent grammar and/or spelling errors. Illegible writing, loose pages, no page numbering, no student name. Report handed in more than two days late. No references cited.	More than two errors. Legible writing, some ill-formed letters, print too small or too large, wrong page numbering, papers stapled together. Report handed in up to two days late. References cited but only some SCI.	Only one or two errors. Legible writing, well-formed characters, clean and neatly bound in a report cover, illustrations provided. Report handed in up to one late. Mostly SCI references.	All grammar and spelling are correct. Word processed or typed, clean and neatly bound in a report cover, illustrations provided. Report handed in on time. All SCI references.	
				Total (max. 100)	