Master of Science

Clinical Exercise Science

Coursework

TCE Programme Book
2021/2022 Academic Session

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INTRODUCTION TO AMDI

The preceding decade has witnessed numerous new developments with regards to medical knowledge, medical technology and healthcare. To avoid being left behind, it is imperative that we initiate steps to be more innovative in exploiting these new advances for the benefit of patients, particularly in Malaysia and throughout the Asia Pacific. To realise this aim, the Malaysian government has taken the initiative in establishing the Advanced Medical and Dental Institute (AMDI) which will function to manifest these aspirations particularly for the benefit of the public in the northern part of Peninsular Malaysia as well as the whole of Malaysia.

The main mission of AMDI is to function as the prime catalyst in producing specialists and scientists in both medical and dental fields, who are competent, holistic and contemporary in their practice and profession as well as capable of generating novel discoveries. AMDI adopts a comprehensive approach, embracing both the clinical and the pure sciences in all aspects of operationalisation. It is envisioned that this “cross fertilisation” philosophical approach will foster a fertile and inventive environment that increases the probability of new discoveries in both dentistry and medicine. The AMDI infrastructure has been designed to facilitate this cross-fertilisation approach.

The operational structure of AMDI, encompassing both clinical services and administration, classifies a functioning entity as a “cluster” consisting of specialists from various disciplines and specialisations. The collaborative approach, involving both specialists and researchers, is in tandem with the aspirations of USM, i.e. raising the standards of research and teaching activities. AMDI will place great emphasis on medical and dental studies at the postgraduate level. The postgraduate medical and dental studies programme is supported by the teaching faculty of all clusters. The selection of courses to be offered also take into consideration services yet to be provided by the Malaysian Health Ministry so that there will be no overlapping of programmes.

With regards to academic programmes, AMDI will focus on postgraduate programmes such as Master of Medicine (specialisation), Master of Science (coursework mode) and research mode programmes at master’s and doctorate levels. AMDI will initiate efforts to offer sub-specialisation medical courses such as Master Specialisation and in medical sub-categories, e.g. Master of Medical Specialisation (Infectious Diseases). AMDI also plans to offer new programmes at Master’s and doctorate levels as well as new “sandwich” programme, i.e., M. Med/PhD which is envisioned as the products of the integration of pure and clinical science approach propounded by AMDI.

WELCOMING REMARKS

Dear all new students,

As the Director of Advanced Medical and Dental Institute (AMDI), it gives me a great pleasure to extend a warm welcome to all our new Clinical Exercise Science postgraduate students. Welcome to Universiti Sains Malaysia, welcome to Advanced Medical and Dental Institute (AMDI) and, to our international students, welcome to Malaysia. As a new student in AMDI, you have many great and exciting year ahead of you.

MSc Clinical Exercise Science programme which is a brainchild of AMDI and is fairly new coursework programme started in 2017, and one of a kind to be offered in Malaysia so far. This unique postgraduate programme was designed to produce health practitioners who are competent in clinical exercise field specifically in treating and consulting clinical population with diverse clinical background.

It is the aim of the programme to prepare the candidates to become clinical exercise specialist that will assume a variety of roles in academia, industry and government. As a graduate of this versatile postgraduate program, you will be prepared to work along side with other health practitioners in the prevention and management of chronic disease and conditions. In addition, you will also be prepared to work with the sporting community such as fitness and sports rehabilitation.

I am hoping that you will make the best of all the high-end clinical equipments and expertise available in AMDI and USM and enjoy the experience of pursuing MSc. Clinical Exercise Science programme. May this be the stepping stone towards advancement in the future career in clinical exercise discipline.

Last, but certainly not the least, thank you for choosing Advanced Medical and Dental Institute (AMDI), Universiti Sains Malaysia and best of luck with your studies. We sincerely hope you will stay here for many good years to come as part of AMDI community.

Thank you.

YM Profesor Dr. Tunku Kamarul Zaman Bin Tunku Zainol Abidin
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TCE 508 (Exercise Programming for Clinical Populations)
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TCE 510 (Injuries and Rehabilitation)
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TCE 511 (Clinical Exercise Practicum)
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TMR 504 (Professional and Research Skills)
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UNIVERSITI SAINS MALAYSIA

ACADEMIC CALENDAR - ACADEMIC SESSION 2021/2022
FOR ALL SCHOOLS (EXCEPT FOR SCHOOL OF MEDICAL SCIENCES AND SCHOOL OF DENTAL SCIENCES)

Main and Engineering Campus : Registration for New Student (03 & 04 October 2021) / **Orientation Week (05 - 08 October 2021)
Health Campus : Registration for New Student (03 October 2021) / **Orientation Week (04 - 07 October 2021)

SEM	WEEK	ACTIVITY	DATE	REMARKS
ONE	1	Teaching & Learning (T&L - 7 Weeks)	Monday, 11.10.2021 - Sunday, 17.10.2021	
	2		Monday, 18.10.2021 - Sunday, 24.10.2021	18.10.2021, Monday - Prophet Muhammad's Birthday
	3		Monday, 25.10.2021 - Sunday, 31.10.2021	
	4		Monday, 01.11.2021 - Sunday, 07.11.2021	03.11.2021, Wednesday - Deepavali**
	5		Monday, 08.11.2021 - Sunday, 14.11.2021	11 & 12.11.2021, Thursday & Friday - Sultan of Kelantan's Birthday (Kelantan)
	6		Monday, 15.11.2021 - Sunday, 21.11.2021	
	7		Monday, 22.11.2021 - Sunday, 28.11.2021	
	8	Mid Semester Break	Monday, 29.11.2021 - Sunday, 05.12.2021	
	9	Teaching & Learning (T&L - 7 Weeks)	Monday, 06.12.2021 - Sunday, 12.12.2021	
	10		Monday, 13.12.2021 - Sunday, 19.12.2021	
	11		Monday, 20.12.2021 - Sunday, 26.12.2021	25.12.2021, Saturday - Christmas
	12		Monday, 27.12.2021 - Sunday, 02.01.2022	01.01.2022, Saturday - New Year of 2022
	13		Monday, 03.01.2022 - Sunday, 09.01.2022	
	14		Monday, 10.01.2022 - Sunday, 16.01.2022	
	15		Monday, 17.01.2022 - Sunday, 23.01.2022	18.01.2022, Tuesday - Thaipusam**
	16	Revision Week	Monday, 24.01.2022 - Sunday, 30.01.2022	
	17	Examination (3 Weeks)	Monday, 31.01.2022 - Sunday, 06.02.2022	01 & 02.02.2022, Tuesday & Wednesday - Chinese New Year**
	18		Monday, 07.02.2022 - Sunday, 13.02.2022	
	19		Monday, 14.02.2022 - Sunday, 20.02.2022	
	20	Mid Semester Break / Industrial Training (4 Weeks)	Monday, 21.02.2022 - Sunday, 27.02.2022	28.02.2022, Monday - 18.03.2022, Friday - PPJJ Intensive Course
	21		Monday, 28.02.2022 - Sunday, 06.03.2022	
	22		Monday, 07.03.2022 - Sunday, 13.03.2022	
	23		Monday, 14.03.2022 - Sunday, 20.03.2022	
TWO	24/1	Teaching & Learning (T&L - 7 Weeks)	Monday, 21.03.2022 - Sunday, 27.03.2022	
	25/2		Monday, 28.03.2022 - Sunday, 03.04.2022	03.04.2022, Sunday - Awal Ramadan
	26/3		Monday, 04.04.2022 - Sunday, 10.04.2022	
	27/4		Monday, 11.04.2022 - Sunday, 17.04.2022	
	28/5		Monday, 18.04.2022 - Sunday, 24.04.2022	19.04.2022, Tuesday - Nuzul Al-Quran
	29/6		Monday, 25.04.2022 - Sunday, 01.05.2022	01 & 02.05.2022, Sunday & Monday - Labour Day
	30/7		Monday, 02.05.2022 - Sunday, 08.05.2022	02 & 03.05.2022, Monday &Tuesday - Eid-ul fitr**
	31/8	Mid Semester Break	Monday, 09.05.2022 - Sunday, 15.05.2022	15 & 16.05.2022, Sunday & Monday - Wesak Day
	32/9	Teaching & Learning (T&L - 7 Weeks)	Monday, 16.05.2022 - Sunday, 22.05.2022	
	33/10		Monday, 23.05.2022 - Sunday, 29.05.2022	
	34/11		Monday, 30.05.2022 - Sunday, 05.06.2022	30 & 31.05.2022, Monday & Tuesday - Pesta Kaamatan (Sabah) 01 & 02.06.2022, Wednesday & Thursday - Hari Gawai (Sarawak)
	35/12		Monday, 06.06.2022 - Sunday, 12.06.2022	06.06.2022, Monday - Agong's Birthday
	36/13		Monday, 13.06.2022 - Sunday, 19.06.2022	
	37/14		Monday, 20.06.2022 - Sunday, 26.06.2022	
	38/15		Monday, 27.06.2022 - Sunday, 03.07.2022	
	39/16	Revision Week	Monday, 04.07.2022 - Sunday, 10.07.2022	07.07.2022, Thursday - Penang Heritage 09.07.2022, Saturday - Penang Governer's Day 09 & 10.07.2022, Saturday & Sunday - Eid-ul adha**
	40/17	***Examination (2 Weeks) / Examination (3 Weeks)	Monday, 11.07.2022 - Sunday, 17.07.2022	11.07.2022, Monday - Eid-ul adha** (Kelantan)
	41/18		Monday, 18.07.2022 - Sunday, 24.07.2022	
	42/19		Monday, 25.07.2022 - Sunday, 31.07.2022	30.07.2022, Saturday - Awal Muharram
*KSCP / LONG VACATION	43/20	Long Vacation / Industrial Training (10/11 Weeks)	Monday, 01.08.2022 - Sunday, 07.08.2022	
	44/21		Monday, 08.08.2022 - Sunday, 14.08.2022	
	45/22		Monday, 15.08.2022 - Sunday, 21.08.2022	
	46/23		Monday, 22.08.2022 - Sunday, 28.08.2022	
	47/24	*T&L	Monday, 29.08.2022 - Sunday, 04.09.2022	31.08.2022, Wednesday - National Day
	48/25		Monday, 05.09.2022 - Sunday, 11.09.2022	
	49/26	Examination	Monday, 12.09.2022 - Sunday, 18.09.2022	16.09.2022, Friday - Malaysia Day
	50/27		Monday, 19.09.2022 - Sunday, 25.09.2022	
	51/28		Monday, 26.09.2022 - Sunday, 02.10.2022	
	52/29		Monday, 03.10.2022 - Sunday, 09.10.2022	08.10.2022, Saturday - Prophet Muhammad's Birthday

PROGRAMME SCHEDULE

SEMESTER	DURATION
Semester 1	**11 October 2021 – 20 March 2022**
Course/Modules: **TCE 501**: Pathophysiology of Non-communicable Diseases and Obesity **TCE 502**: Nutrition in Health and Diseases **TCE 503**: Applied Psychology **TCE 504**: Applied Exercise Physiology **TCE 505**: Principles of Exercise Testing and Perscription **TMR 504**: Professional and Research Skills	11 October 2021 – 23 January 2022
Revision	24 – 30 January 2022
End of semester Exam	31 January 2022 – 20 February 2022
Mid Semester Break	21 February 2022 – 20 March 2022
Semester 2	21 March – 31 July 2022
Course/Modules: **TCE 506**: Perspectives and Practice in Health Promotion **TCE 507**: Clinical Exercise Physiology **TCE 508**: Exercise Programming for Clinical Populations **TCE 509**: Health Psychology **TCE 510**: Injuries and Rehabilitation	21 March 2022 – 3 July 2022
Revision	4 -10 July 2022
End of semester exam	11 July – 31 August 2022
Semester 3	**1 August – 9 October 2022**
Course/Modules: **TCE 511**: Clinical Exercise Practicum	1 August 2022 - 9 October 2022

Note:
IPS Registration Guidelines for new postgraduate students:
https://ips.usm.my/images/New_Student_20212022/REGISTRATION_GUIDELINES_CWMM_MAINCAMPUS_OCT2021.pdf
Candidature matters:
https://ips.usm.my/index.php/current-student/candidature-matters/coursework-and-mixed-mode-

programme

PROGRAMME STRUCTURE / COURSE REGISTRATION LIST

	Code	Course (Module)	Type	Unit
Semester 1				
Lecture/practical	TCE 501	Pathophysiology of Non-communicable Diseases and Obesity	Core	3
	TCE 502	Nutrition in Health and Diseases	Core	3
	TCE 503	Applied Psychology	Core	3
	TCE 504	Applied Exercise Physiology	Core	3
	TCE 505	Principles of Exercise Testing and Perscription	Core	3
	TMR 504	Professional and Research Skills	Core	3
Total unit		**Total unit to register Sem. 1**		18
Semester 2				
Lecture/practical	TCE 506	Perspectives and Practice in Health Promotion	Core	2
	TCE 507	Clinical Exercise Physiology	Core	3
	TCE 508	Exercise Programming for Clinical Populations	Core	4
	TCE 509	Health Psychology	Core	3
	TCE 510	Injuries and Rehabilitation	Core	3
Total unit		**Total unit to register Sem. 2**		15
Semester 3				
Clinical Exercise Practicum	TCE 511	Clinical Exercise Practicum	Core	8
		Total unit to register Sem. 3		8
Total unit				**41**

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COURSE /MODULE COORDINATORS

SEMESTER 1		
MODULE	**UNIT**	**COORDINATORS**
TCE 501 (Pathophysiology of Noncommunicable Diseases and Obesity)	3	Dr. Salbiah Binti Isa
TCE 502 (Nutrition in Health and Diseases)	3	Dr. Noorsuzana Binti Mohd Shariff
TCE 503 (Applied Psychology)	3	Dr. Nor Shuhada Binti Murad @ Mansor
TCE 504 (Applied Exercise Physiology)	3	Dr. Hazwani Binti Ahmad Yusof
TCE 505 (Principles of Exercise Testing and Perscription)	3	Dr. Ooi Cheong Hwa
TMR 504 (Research and Professional Skills)	3	A.P Dr. Rafidah Binti Zainon

SEMESTER 2		
MODULE	**UNIT**	**MODULE COORDINATORS**
TCE 506 (Perspectives and Practice in Health Promotion)	2	Dr. Rohayu Binti Hami
TCE 507 (Clinical Exercise Physiology)	3	Dr. Nurdiana Binti Zainol Abidin
TCE 508 (Exercise Programming for Clinical Populations)	4	A.P Dr. Ahmad Munir Bin Che Muhamed
TCE 509 (Health Psychology)	3	Dr. Nurul Izzah Binti Shari
TCE 510 (Injuries and Rehabilitation)	3	Dr. Noor Mastura Binti Mohd Mujar
SEMESTER 3		
MODULE	**UNIT**	**MODULE COORDINATORS**
TCE 511 Clinical Exercise Practicum	8	A.P Dr. Ahmad Munir Bin Che Muhamed

MODULE SYNOPSES

TCE 501

Pathophysiology of Non-Communicable Diseases and Obesity (3 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To explain the pathophysiology of NCDs and obesity with regards to their risk factors, clinical features and health consequences.
2. To interpret the common diagnostic investigations findings (including biomarkers) and describe the basic management of the NCDs and obesity.
3. To evaluate the exercise interaction with medications, nutrients and herbal products commonly prescribed in patients with NCDs and the impact of exercise on the management of operation wound.
4. To demonstrate social skill and ability to work in team during case discussion.

SYNOPSIS

The aim of this module is to provide the students with the knowledge and understanding of relevant pathophysiology of NCDs and obesity with regards to the risk factors, clinical features, health consequences, relevant investigations and basic management of the disease. Preliminary understanding of the disease is important to ensure the effectiveness of exercise and other lifestyle intervention in the clinical populations.

	Topics
1.	Pathophysiology of metabolic conditions (and obesity)
2.	Pathophysiology of cardiovascular condition
3.	Pathophysiology of respiratory conditions
4.	Pathophysiology of rheumatalogical & musculoskeletal conditions
5.	Pathophysiology of cancer
6.	Pathophysiology of neurological conditions
7.	Epidemiology of paediatric conditions Pathophysiology of paediatric conditions (Obesity, diabetes and others)
8.	Wound healing and post-operative care
9.	Physiology of aging

10.	An overview of drugs, nutrients, herbs and exercise interactions

REFERENCES

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2. Greenberg, M. [et al.] Occupational, Industrial, and Environmental Toxicology. Mosby. Edisi terbaru: 2003 (Available at Health campus/IPPT - In Order, ISBN:9780815139294).

3. Harbison R.D. Hamilton & Hardy's Industrial Toxicology. Mosby.
Latest edition: 5th edition,1998 (Available at IPPT, In Order, ISBN:9780815141815).

4. Lewis R.J. Rapid Guide to Hazardous Chemicals in the Workplace. John Wiley & Sons. Latest edition: 2000 (Available at Transkrian / IPPT, In Order, ISBN:9780471355427).

5. Ladou J. Current Occupational & Environmental Medicine. McGraw-Hill Medical. Latest edition: 2006 (Available at IPPT, In Order, ISBN:9780071443135).

6. Ming-Ho, Y. and Landis W. G. Introduction to Environmental Toxicology: Impacts of Chemicals upon Ecological Systems. CRC. Lates edition: 2003 (Available at Transkrian /USM, ISBN:9781566706605).

7. Ming-Ho, Y. Environmental Toxicology: Biological and Health Effects of Pollutants. Taylor and Francis. Lates edition: 2004 (Available at IPPT, In Orders ISBN:9781566706704).

8. Occupational Safety and Health Act 1994: Regulations & Orders (as at 25th June 2004). International Law Book Series Latest edition: 2007 (To order).

9. Pohanish P.R. and Greene S.A. Hazardous Chemical Safety Guide for the Machining and Metalworking Industries. McGraw Hill. Latest edition: Nov 1998 (Available at IPPT – In Order, ISBN:9780070504998).

10. Rosenstock L. [et al.] Textbook of Clinical Occupational and Environmental Medicine. Saunders. Latest editions: 2004 (Available at IPPT, In Order, ISBN:9780721689746).

TCE 502

Nutrition in Health and Disease (3 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To master and analyze the concepts and the theories of the influence of socioeconomic, cultural, and psychological factors on food and nutrition behaviour..
2. To demonstrate ability in critical and lateral thinking and logical reasoning producing new idea in planning and calculating menus for healthy persons; and in disease prevention and management.
3. To demonstrate ability in write, speak and listen effectively about the nutritional concept in health or strategies for disease prevention and management.
4. To demonstrate teamwork in gathering scientific information on nutrition to prevent diseases and manage non-communicable diseases.

SYNOPSIS

At the end of the course the students will be able to apply the principles of nutrition and dietetics to prevent and manage non-communicable diseases including obesity. In addition, students will be able to conduct nutritional screening and evaluate the nutritional status of the normal and clinical populations.

	Topics
1.	Basic nutrition and its metabolism
2.	Nutrition and exercise
3.	Dietary assessment and planning reference tools: a. Dietary reference intakes b. Dietary guidelines for Malaysians c. Myplate d. Nutrition labels e. Exchange system
4.	Nutritional counselling: • Sociodemographic and cultural influence on nutrition
5.	Energy needs, equations to estimate the energy needs for Malaysians
6.	Obesity and weight management • Therapeutic guidelines for lifestyle changes (TLC)
7.	Metabolic syndrome
8.	Diabetes • glycemic index and glycemic load
9.	Hypertension and Heart diseases • Dietary approaches to stop hypertension (DASH)
10.	Cancer • American Cancer Society (ACS)
11.	Bone diseases (Osteoporosis, Osteomalacia, Arthritis, Gout)

12.	Allergies
13.	Eating disorders
14.	Specific conditions 1: • Pregnancy and pediatrics
15.	Specific conditions 2: • Post-operative and aging
16.	Fad diets
17.	Panel discussion: Nutrition and non-communicable diseases
18.	Small group discussions on case studies and presentation

REFERENCES

1. Mahan K, Escott-Stump S, and Raymond, J. Krause's Food and the Nutrition Care Process. 13th Edition. Saunders/Elsevier, 2012.

2. Whitney, E., Rolfes, S., Hammond, G., & Piché, L. Understanding Nutrition 1st Canadian Edition. Toronto: Nelson. 2013.

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4. Marcia Nelms, Kathryn P. Sucher, Karen Lacey, Sara Long Roth, Nutrition Therapy and Pathophysiology Cengage Learning; 2nd Edition. 2010

5. Ruth A Roth, Nutrition & Diet therapy, Cengage Learning; 11th Edition.2013

6. Betsy Hornick, Roberta Larson Duyff, Alma Flor Ada. American Dietetic Association Complete Food and Nutrition Guide, Revised and Updated 4th Edition, Houghton Mifflin Harcourt; 4th Revised and Updated Edition. 2012

7. Yoshinori Mine PhD, Kazuo Miyashita, Fereidoon Shahidi. Nutrigenomics and Proteomics in Health and Disease: Food Factors and Gene Interactions. Hui: Food Science and Technology (Book 13), Wiley-Blackwell; 1st Edition, 2009

8. Frances Sienkiewicz Sizer, Leonard A. Piché, Eleanor Noss Whitney. Nutrition: Concepts and Controversies. Nelson Education limited, 2nd Edition, 2012

TCE 503

Applied Psychology (3 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To apply the fundamental theories in psychology for behavioral intervention..
2. To demonstrate understanding and critically analyzes the basic theory of psychology that should be used in behavior management.
3. To demonstrate an effective communication skill related to psychological theory of behavior management in oral or written.

4. To use various resources/platforms to find an appropriate approach for individual behavior modification programs in clinical setting.

SYNOPSIS

The aim of this module is to expand students' understanding of psychological theories in various approaches employed in behavioral intervention programs. Specifically, students will learn what possible obstacles that could render some intervention ineffective are and how they can capitalize on patients' or clients' strengths to help them succeed in modifying some of the behaviors that might hinder them from living a healthy lifestyle.

	Topics
1.	Introduction to Psychology: • Psychology response to injury (biopsychosocial & cognitive appraisal models)
2.	The Brain: • The brain – regions & neurotransmitters • The mind
3.	Consciousness: • Stages and functions of sleep • Altering consciousness
4.	Learning: • Classical (Pavlovian) & Operational Conditioning • Modelling/Observational Learning
5.	Remembering/Memory: • Types of Memory • Interference • Process of Remembering
6.	Motivation: • Theories of motivation • Self-regulation; goal-setting theory
7.	Emotions & Social Cognitive Theory: • Identifying, understanding and managing emotions • Self-efficacy & self-monitoring
8.	Developmental Psychology/Theories: • Prenatal development – childhood – adolescence – emerging adulthood – adulthood – aging • Erikson's stages of psychosocial development

9.	Exercise & Cognitive Functions: • Models and mediators of exercise effects on cognition • Exercise effects on mental resources and reserves • Exercise and physical resources and reserves influencing cognition • Exercise, chronic disease and cognition
10.	Anxiety & Depression, Eating Disorders & Substance Abuse
11.	Positive Psychology
12.	Therapies in Psychology: • Cognitive Behavioral Therapy • Classical Conditioning Techniques • Psychotherapies and other behaviour modification therapies

REFERENCES

1. Laura A. King 2014. The Science of Psychology: An Appreciative View, Third edition. McGraw Hill Education, New York NY

2. Kate Hefferon 2013. Positive Psychology and The Body: The somatopsychic side to flourishing. McGraw Hill Education, New York NY

3. Waneen W. Spirduso, Leonard W. Poon & Wojtek Chodzko-Zajko Eds. 2008. Exercise and Its Mediating Effects on Cognition. Human Kinetics.

4. Charles Duhigg 2012. The Power of Habit: Why we do what we do in life and business. Random House, Baltimore MD

5. Paula E. Hartman-Stein & Asenath La Rue Eds. 2011. Enhancing Cognitive Fitness in Adults. Springer New York.

6. Susan Krauss Whitbourne & Richard P. Halgin 2014. Abnormal Psychology: Clinical Perspectives on Psychological Disorders, Seventh Edition. McGraw Hill Education, New York NY.

TCE 504

Applied Exercise Physiology (3 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To apply knowledge in the exercise sciences including various physiological systems of the human body and physiological responses during exercise..
2. To think critically in addressing statements and arguments exercise physiology.
3. To present clear and accurate scientific information on the physiology of exercise in written or oral form.
4. To display a responsible attitude and employs social skills.

SYNOPSIS

This module will describe the acute and chronic physiological responses during exercise onto the human body. The interactions of various physiological systems of the human body to support the exercise requirements will also be discussed in this module. In addittion, students will also be highlighted to the short and long term physiological adaptations and maladaptations of exercise.

	Topics
	Molecular Exercise Physiology
1.	The cellular life span
2.	Energy turnover and substrate utilization • Exercise and protein metabolism • Exercise and carbohydrate metabolism • Exercise and lipid metabolism
3.	Genetics, epigenetics and human physical performance
	The Muscle and Its Contraction
4.	Form and functions of the skeletal muscle • Skeletal muscle architecture • Neuromuscular activation • Mechanical efficiency of muscle contraction
5.	Neuromuscular performance and exercise • Muscular training response and adaptations • Muscular fatigue • Muscle damage and repair
	Cardiovascular and Pulmonary Adaptation to Exercise
6.	Hemodynamics • Regulation of circulation at rest and during exercise • Cardiac output and transportation of oxygen

7.	Pulmonary ventilation • Responses at rest and during exercise • Training induced alterations in the ventilatory response to exercise
	Fatigue
8.	Exercise induced fatigue • Central limitation • Peripheral limitation • Metabolic factors in muscle fatigue • Measurements of human muscle fatigue
	Environmental Physiology
9.	Exercise in a heat stress environment
10.	Exercise in a cold environment
11.	Exercise at high altitude
	Exercise Issues for Children, Women, and Aging Population
12.	Children's exercise physiology • Growth and exercise • Cardiorespiratory and neuromuscular responses to exercise
13.	Physiology of exercising female • Menstrual cycle and pregnancy menopause • Special consideration of exercise for female
14.	Physiology of aging in active and sedentary human • Age related physiological changes • Cardiorespiratory and neuromuscular responses to exercise • Energy expenditure

REFERENCES

1. Nigel A.S. Taylor and herbert Groeller (eds) 2008. Physiological Bases of Human Performance during Work and Exercise. Churchill Livingstone Elsevier.

2. Charles M. Tipton, Michael N. Sawka, Charlotte A. Tate (eds) 2006. ACSM's Advanced Exercise Physiology. Lippincott Williams and Wilkins

3. William D. McArdle, Frank I. Katch and Victor L. Katch (2009). Exercise Physiology: Energy, Nutrition and Human Performance. 7th Ed. Lippincott Williams and Wilkins

TCE 505

Principles of Exercise Testing and Perscription (3 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To apply knowledge of the principles and importance of exercise testing and prescription.
2. To perform various exercise tests as an approach for healthy lifestyle promotion.
3. To critically evaluate an appropriate exercise testing protocols to a particular health condition.
4. To demonstrate an effective oral or written communication skills related to the principles of exercise testing and prescription.

SYNOPSIS

The aim of this module is to develop students' skills in exercise testing for the determination of health and fitness and prescribing the general community with a safe and effective exercise program.

	Topics
1.	An overview of Exercise Testing and Prescription
2.	General Health Evaluation and Risk Screening (Medical History)
3.	Cardiopulmonary Resuscitation (CPR)
4.	Principles of Exercise Testing
5.	Metabolic Equations
6.	Body Composition Assessment
7.	Testing and Prescription for Cardiorespiratory Fitness
8.	Testing and Prescription for Flexibility, Muscular Strength and Endurance
9.	Testing and Prescription for Children, Disable and Aging Population
10.	Graded Exercise Testing and Stress ECG
11.	Exercise Prescription for Clinical Populations

REFERENCES

1. American College of Sports Medicine 2010. ACSM's Resource Manual for Guidelines for exercise testing and prescription, 6th Ed. Lippincott, Williams and Wilkins, Baltimore MD

2. James S. Skinner 2005. Exercise testing and exercise prescription for special cases. 3rd Ed. Lippincott Williams and Wilkins. Baltimore MD

3. Larry J. Durstine and Geoffrey E. Moore 2009. ACSM's exercise management for persons with chronic diseases and disabilities. 3rd Ed. Human Kinetics. Champaign, IL

4. Dunbar, C.C. and Saul, B (2009). ECG Interpretation for the Clinical Exercise Physiologist. Lippincott, Williams and Wilkins, Baltimore MD.

TCE 506

Perspectives and Practice in Health Promotion (2 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To analyze the latest theories on disease patterns, the importance of a healthy lifestyle, and health promotion practices.
2. To communicate effectively in verbally and writing in promoting health.
3. To work well and are accountable to a team in carrying out a given task.

SYNOPSIS

Lectures focusing on the epidemiology of 'lifestyle' diseases as well as the current models underpinning practices in health promotion will be delivered. The candidates will evaluate the different models used in health promotion under different cultural contexts. Group work is used as part of the assessment to emphasize the importance of teamwork in managing health issues.

	Topics
1.	The changing patterns of diseases pre-antibiotic and post-antibiotic era
2.	Risk factors of Lifestyle related diseases
3.	Prevention of diseases (primary, secondary and tertiary prevention)
4.	Theories of Health Behaviour • currently used models • influence of society and culture
5.	Ethics in health promotion
6.	Effects of smoking, alcohol and other lifestyle habits detrimental to health
7.	Evaluating an existing health promotion activity
8.	Designing a health promotion project either for an individual or a community

REFERENCES

1. Glanz K, Rimer BK, Viswanath K (2008). Health Behavior and Health Education: Theory, Research and Practice. San Francisco: Jossey-Bass Publications

TCE 507

Clinical Exercise Physiology (3 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To assess the potential of a physiological approach to the study of clinical and clinical studies.
2. To analyze health issues, health assessments and safety training for clinical population.
3. To present oral and written information on the physiology of clinical exercise effectively.
4. To demonstrate good interpersonal skills with the ability to work together as part of a team that plays a variety of different team roles.

SYNOPSIS

This module will describe the physiological responses and adaptations during exercise among the clinical population. Students will also be exposed to the application of various exercise principles for clinical populations in order to minimize any associated risk involve during exercise. In addition, students will also be exposed to the influence of pharmacological agents to exercise in clinical populations.

	Topics
1.	Exercise is Medicine
2.	General health evaluation and risk screening
	Exercise and Metabolic Disorder
3.	Obesity • Physical activity and exercise continuum • Exercise and biological determinants of obesity • Exercise in the prevention and treatment of obesity with exercise
4.	Diabetes • Defects in Metabolism and Insulin Resistance • Prevention of Type 2 Diabetes Through Exercise Training Managing exercise for type 2 diabetes
5.	Hyperlipidemia • Prevention of hyperlipidemia via exercise • Managing exercise for hyperlipidemia
	Exercise and Cardiopulmonary Diseases
6.	Chronic Heart Failure • Clinical considerations of exercise for chronic heart failure • Exercise recommendations for chronic heart failure
7.	Hypertension • Clinical consideration of exercise for hypertension • Prevention and treatment of hypertension with exercise

8.	Chronic Obstructive Pulmonary Disease (COPD) & Asthma nical consideration of exercise for COPD and Asthma ercise recommendations for COPD and asthma
	Exercise and the Immune System
9.	Cancer • Exercise and Immunity • Exercise recommendations for cancer patients
	Neurological, Bones and Joints Disorder
10.	Multiple Sclerosis
11.	Spinal cord injury
12.	Arthritis • Prevention of arthritis with exercise intervention • Exercise recommendations for arthritis
13.	Osteoporosis • Prevention of osteoporosis with exercise intervention • Exercise recommendations for osteoporosis
14.	Effect of medications on exercise programs
15.	Managing drug prescription in exercise program for clinical population

REFERENCES

1. Cameron, M., Selig, S. and Hemphill, D (2011). Clinical exercise: A case-based approach. Churchill Livingstone, Elsevier, Australia.

2. LeMura, L.M. and Duvillard, S.P. (2004). *Clinical Exercise Physiology: Application and Physiological Principles*. Lippincott Williams & Wilkins. Philadelphia.

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4. Ehrman, J. Gordon, P., Visich, P and Keteyian, S. (2013). Clinical Exercise Physiology. 3rd Ed. Human Kinetics. Champaign, IL.

5. Steve Jonas and Edward M. Phillips (2009). ACSM's Exercise is Medicine: A Clinician's Guide to Exercise Prescription. Lippincott Williams & Wilkins. Philadelphia.

TCE 508

Exercise Programming for Clinical Populations (4 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able to:

1. To assess the importance of exercise program prescriptions for clinical populations.
2. To apply skills in doing exercise related exercises.
3. To critically analyze exercise programs that fit a specific clinical population.
4. To formulate a business plan that fits the exercise program.

SYNOPSIS

The aim of this course is to develop students' skills in prescribing a safe and effective exercise program for individuals with a metabolic condition. This course will discuss the various exercise testing mode appropriate for individuals with a metabolic disease and the intrepretation of the results from these tests.

	Topics
	Exercise Programming for Cardiovascular Diseases
1.	Myocardial Infarction
2.	Hypertension
3.	Peripheral Arterial Disease
4.	Other related cardiovascular diseases
	Exercise Programming for Pulmonary Diseases
5.	Asthma
6.	Chronic Obstructive Pulmonary Disease
7.	Other related Pulmonary Diseases
	Exercise Programming for Metabolic Diseases
8.	Obesity
9.	Diabetes
10.	Hyperlipidemia
11.	Other related Metabolic Diseases
	Exercise Programming for Immunological/Hematological Diseases
12.	Cancer

13.	Anemia

	Exercise Programming for Rheumatologic/Orthopedic Diseases
14.	Arthritis
15.	Osteoporosis
16.	Lower Back Pain
	Exercise Programming for Neurological Disorder
17.	Stroke and Brain Injuries
18.	Spinal Cord Injuries/Dysfunction
19.	Other related Neurological Disorder
	Exercise Programming for Special Population
20.	Pregnancy
21.	Aging
22.	Children

REFERENCES

1. Larry J. Durstine and Geoffrey E. Moore 2009. ACSM's exercise management for persons with chronic diseases and disabilities. 3rd Ed. Human Kinetics. Champaign, IL

2. American College of Sports Medicine 2010. ACSM's Resource Manual for Guidelines for exercise testing and prescription, 6th Ed. Lippincott, Williams and Wilkins, Baltimore MD

3. James S. Skinner 2005. Exercise testing and exercise prescription for special cases. 3rd Ed. Lippincott Williams and Wilkins. Baltimore MD

TCE 509

Health Psychology (3 units)

LEARNING OUTCOMES

At the end of this clerkship, the candidates will be able:

1. To apply basic understanding of psychological theory and counseling for health behaviors.
2. To critically assess issues related to behavioral modification from a psychological and counseling perspective.
3. To work responsibly and effectively in groups.
4. To manage information on health behaviors using the online database.

SYNOPSIS

The aim of this module is to expand students' understanding of psychological theories adapted to human and psychological health settings. Specifically, students will learn factors that contribute to healthy and unhealthy lives.

	Topics
1.	Overview of health psychology
2.	Health behavior & primary intervention
3.	Stress and coping
4.	Patient in the treatment setting
5.	Management of chronic and terminal illness
6.	Counselling theories
7.	Rapport building
8.	Behavioural modification to exercise program
9.	Counselling in exercise program
10.	Relaxation techniques and coping skills (stress management)
11.	Supporting patient and family
12.	Crisis intervention (Psychological First Aid)
13.	Understanding and dealing with addiction

REFERENCES

1. Shelley E. Taylor 2012. Health Psychology. McGraw-Hill.

2. Ian P. Albery & Marcus Munafo. Key Concepts in Health Psychology. SAGE Publications

3. David F. Marks, Michael Murray, Brian Evans, Carla Willig, Cailine Woodall & Catherine M. Sykes. Health Psychology: Theory, Research & Practice

4. Yuval Neria, Sandro Galea & Fran H. Norris 2009. Mental Health and Disasters. Cambridge University Press

5. Kaplan and Sadock's Synopsis of Psychiatry: Behavioral Sciences/Clinical Psychiatry 10th Edition

TCE 510

Injuries and Rehabilitation (3 units)

LEARNING OUTCOMES

At the end of this clerkship, the candidates will be able:

1. To apply a basic understanding of tissue injury recovery as a result of sports activities, the types of injuries that occur during sports activities and therapeutic equipment used during treatment.
2. To critically evaluate various therapeutic exercise techniques in terms of their usefulness, efficiency and effectiveness.
3. To provide clear and accurate information on sports injury prevention measures with an oral or written emergency action plan.
4. To demonstrate social skills, responsibility and ability to work collaboratively in completing projects / assignments given.

SYNOPSIS

This module will review the human anatomy relating to sports injury and highlights the underlying mechanisms involve in injured tissue healing. In addition, students will be exposed to the various types of injury commonly experienced by athletes and the preventive steps taken to avoid these injuries.

	Topics
	Fundamentals of Rehabilitation
1.	Concept of Rehabilitation
2.	Concept of Healing
3.	Examination and Assessment
4.	Tissue Injury, Inflammation and Repair
5.	Pain and Pain relief
	Therapeutic Exercise Parameters and Techniques
6.	Range of Motion and Flexibility
7.	Manual Therapy Techniques
8.	Functional Exercise
9.	Aquatic Therapeutic Exercise
	Therapeutic Modalities

10.	Cold and Superficial Heat
11.	Clinical uses of electrical stimulation
12.	Massage therapy
	Injuries
13.	Musculoskeletal injuries
14.	Fractures
15.	Providing emergency care

REFERENCES

1. Cartwright L.A. and Ritney, W.A (2005). Fundamentals of Athletic Training. 2nd Ed. Human Kinetics. Champaign, IL.
2. Houglum, P.A and Perrin, D.H (2005). Therapeutic exercise for musculoskeletal injuries. 2nd Ed. Human Kinetics. Champaign, IL.
3. Denegar, C.R, Saliba, E, and Saliba, A. (2006). Therapeutic modalities for musculoskeletal injuries. 2nd Ed. Human Kinetics. Champaign, IL.
4. Flegel, M.J (2008). Sport First Aid. 4th Ed. Human Kinetics. Champaign, IL.

TMR 504

Profesional And Research Skills (3 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To acquire communication skills and able to prepare and present papers using the latest information technology and communication methods.
2. To identify various organisations that provide local and foreign research grants as they will be provided guidance in the fundamentals of research methodologies including statistical requirements and the use of statistical software for data analysis.
3. To understand the importance for Informatics Science, specifically related to Bioinformatics, Clinical Informatics as well as Laboratory Information Systems.

SYNOPSIS

This course will commence with an introduction to medical research and general skills essential for a researcher. This course comprises of lectures, laboratory/studio internship, presentations and coursework.

	Topic
1.	Introduction to library research
2.	E-library system and Endnote program
3.	Research ethics I & II
4.	Research proposal and grant application
5.	Creativity, innovation and commercialization
6.	Research management skills
7.	Multimedia skills
8.	Communication skills
9.	Teamwork in research
10.	Introduction to medical statistics and research methodology
11.	Statistical requirement in research proposal
12.	Statistical analysis of experimental results
13.	Use of software in statistical analysis

14.	Introduction to bioinformatics and medical bioinformatics
15.	Scientific and academic writing
16.	Bioinformatics research facility at USM and Malaysia

REFERENCES

1. Bell, J. and Opise, C. (ed) Learning from Research: Getting more from your data. Open University Press. Latest edition: 2002 (Available at IPPT, ISBN:9780335206605).

2. Bland, M. (ed) An Introduction to Medical Statistics. Oxford University Press. Latest edition: 2000 (Available at IPPT, ISBN:9780192632692).

3. Claverie (ed) Bioinformatic for Dummies. John Wiley & Son Inc. Latest edition: 2006 (Available at IPPT).

4. Horris, C. (ed) Networking for Success: The NLP Approach to a Key Business and Social Skill. Oak Tree Press. Latest edition: 2000 (to order)

5. Horwood, T. (ed) Freelance Proofreading and Copy Editing: A Guide. Action Print Press. Latest edition: 1995 (Available at PPT).

6. Khosrow-pour, M. (ed) Web-based Instructional Learning. McGraw-Hill. Latest edition: 2002 (Available at IPPT).

7. Lest, A.M. (ed) Introduction to Bioinformatics. Oxford University Press . Latest edition: 2008 (to order)

8. Murrel, G. [et al] (ed) Research in Medicine: Planning a project, writing a thesis. Cambridge University Press. Latest edition: 1999 (Available at IPPT).

9. Pallant, J. (ed) SPSS Survival Manual: A Step-by-Step Guide to Data Analysis Using SPSS for Windows (Version 10). Open University Press. Latest edition: 2001 (Available at IPPT, ISBN:9780335208906).

10. Parry, H. (ed) Successful Business Presentation. Croner Publishing. Latest edition: 1994 (Available at IPPT – In order).

11. Pickering, P. (ed) How to make the most of your workday. Careean Press Incorporated. Latest edition: 2001 (Available at IPPT, ISBN:9781564145369).

12. Rahman, S. (Eds) Multimedia Networking Technology, Management and Applications. Idea Group Publishing. Latest edition: 2001 (Available at IPPT- In order).

13. Rotondo, J. and Rotondo, M. (eds) Presentation skills for managers. McGraw Hill. Lates edition: 2001 (Available at IPPT – In order).

14. Spank, S. and Templeton, M. (eds) Quick guide to great presentation skills. McGraw Hill. Latest edition:1998 (to order).

15. Turabian, K.L (ed) A Manual for Writers of Term Papers, Theses and Dissertations. University of Chicago Press. Latest edition: 1996 (Available at IPPT – In order).

TCE 511

Clinical Exercise Practicum (8 units)

LEARNING OUTCOMES

At the end of this course, the candidates will be able:

1. To gain 360 hours work experience in an appropriate setting in a supervised clinical environment.
2. To plan and facilitate a safe and effective exercise interventions and provide assessment & education services for chronic disease populations, specifically Musculoskeletal, Neuromuscular, Metabolic and Cardiorespiratory disease.
3. To develop clinical reasoning skills and expand the students awareness of the range of professional roles and relationships for Exercise Physiologists and the contexts of practice in the wider community.

SYNOPSIS

This module will require students to undertake supervised clinical practice in affiliated hospitals (public and private), clinics and community settings as required to be an accredited Clinical Exercise Physiologists.

	Topics
Week 1	**Day 1 and Day 2** Lecture 1: Introduction to Clinical Practicum • Cultural competence • Course content, clarify course assessment and revise professional standards Lecture 2: Workshop: Professional Development • Health Care in Malaysia • Practicum Reports • Job Applications & Interviewing skills **Day 3** Seminar on Exercise is Medicine **Day 4 and Day 5** Practicum: 8 hrs/day x 2 days = 16 hours
Week 2 to Week 5	**Week 2 to Week 5** Practicum 8 hrs/day x 20 days = 160 hrs
Week 6	**Day 1 and Day 3** Practicum: 8 hrs/day x 3 days = 24 hrs **Day 4 and Day 5** Seminar • Case Study on Exercise for Clinical Population • Lectures • Student Presentation
Week 7 to Week 10	**Week 7 to Week 10** Practicum 8 hrs/day x 20 days = 160 hrs

EVALUATION FORMAT

There are two components for the MSc (Clinical Exercise Science) program:

1. The formal taught courses accounting for 33 credit units.

2. The clinical exercise practicum accounting for 8 credit units.

Total credit units: 41

ASSESSMENT OF THE FORMAL TOUGHT COURSES

The formal taught courses will be graded and recorded as Grade Point Average (GPA) and the final GPA over the two semesters will be recorded as cumulative GPA (cGPA). The marking of the answer scripts will be based on the standard mark from 0 % to 100 % for a perfect answer. This mark will be converted to the GPA based on the following system:

Mark (%)	Grade	Grade Point	Result
80 - 100	A	4.00	**PASS**
70 - 79	A-	3.67	
64 - 69	B+	3.33	
58 - 63	B	3.00	
52 - 57	B-	2.67	
46 - 51	C+	2.33	
40 - 45	C	2.00	**FAIL**
36 - 39	C-	1.67	
32 - 35	D+	1.33	
28 - 31	D	1.00	
25 - 27	D-	0.67	
0 - 24	F	0.00	

For each module, continuous assessment will contribute 40% of the final mark while the end of the semester examination will contribute the other 60%.

The breakdown of the marking scheme is as follows:

A. Continuous Assessment

Break down	Marks (%)
Log book/Lab report/Practical report	10
Quiz/Mid-Term test	10
Assignment	10
Presentation/Journal club/Problem based learning/Article review	10
TOTAL	**40**

B. Semester Examination

At the end of the module there will be a semester examination, comprising of:

i. MCQ (TRUE/FALSE) = 1 hour
ii. Short Essay/Long Essay = 2 hours

The total marks for MCQ and Essay will represent 60% of the final marks.

C. The Final Grade.

The final grade for the module will be based on the summation of the Continuous Assessment (40%) and the semester exam (60%).

ASSESSMENT OF THE PRACTICUM COMPONENT

For the practicum component, candidates will be assessed as PASS or FAIL based on the reports submitted by the Program Chairman and the assessment reports by the field supervisor.

REQUIREMENT FOR GRADUATION

In order to graduate, candidates must satisfy requirement 1 and 2 below:

Requirement 1:

i. a CGPA of at least 3.0, and
ii. a GPA of not less than 2.33 for each of the formal taught courses.

And

Requirement 2:

A GPA of not less than 2.33 for the Clinical Exercise Practicum.

TEACHING VENUES

1. AMDI Academic Block, sains@bertam, Kepala Batas
2. AMDI Gymnasium
3. Selected Hospital and Rehabilation Centres (clinical exercise practicum)
4. Multimedia Room/Computer Laboratory
5. Multidisciplinary Laboratory (MDL), sains@bertam, Kepala Batas
6. Centre for Knowledge, Communication and Technology (PPKT) teleconferencing

STUDENT FACILITIES

As registered USM students, you are entitled to student facilities in AMDI or USM campus.

1. AMDI Learning Space (ALS) and student area
2. Multimedia Room/Computer Laboratory
3. Library
4. Free membership of AMDI Students Association

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