



ANNAMALAI UNIVERSITY
Chidambaram, Tamilnadu



सत्यमेव जयते

**MINISTRY OF YOUTH AFFAIRS &
SPORTS**

Government of India

MYAS - AU Department of Sports Sciences

SYLLABUS

for

M.Sc. (EXERCISE PHYSIOLOGY)

Programme Code: SSPO22

(Under Choice Based Credit System)

Session: 2019-20

ANNAMALAI UNIVERSITY

Chidambaram, Tamilnadu - 608002

Approved by the

MINISTRY OF YOUTH AFFAIRS AND SPORTS

Government of India

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M.Sc. EXERCISE PHYSIOLOGY

REGULATIONS AND SYLLABUS

(For students admitted from academic year 2019-20 onwards)

1. Objectives:

The M.Sc. Exercise Physiology Programme is designed to provide an opportunity to students to apply theory into practice, which creates a highly valuable learning experience with clear vocational and professional significance. The content on M.Sc. Exercise Physiology has been carefully designed to provide quality assured professional training to meet the needs of the athletes and to foster life-long learning in participants.

This programme is designed to:

- Develop knowledge and understanding of the principles and applications of exercise physiology and their application to vocational/professional practice.
- Provide an opportunity to critically assess a broad range of theories, methodologies and research findings in exercise physiology.
- Develop a critical understanding of how to apply theories, strategies and methodologies in appropriate ways.
- Enable the student to develop empirical rigour in identifying solutions to complex problems.
- Develop the appreciation of inter-related scientific concepts that promote understanding of problems and issues in the study of exercise physiology.
- Provide a forum for the development of research skills and professional competencies in the field of exercise physiology.

2. Definition of key words:

- **Programme:** An educational programme leading to the award of a Degree, diploma or certificate.
- **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
- **Semester:** Each semester consists of 15-18 weeks of academic work equivalent to 90 days of actual teaching days. The odd semester may be scheduled from July to December and even Semester from January to June.
- **CBCS (Choice Based Credit System):** It provides choice for students to select from the prescribed courses.
- **Course:** It is usually referred to as "Papers". All courses need not carry the same weight. A course may comprise lectures/tutorials/laboratory, work/field, work/outreach activities/project work/vocational training/viva/seminars etc or a combination of some of these.

- **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching or two hours of practical work.
- **Core course:** Are course that are basic to the subject of the degree. This is a course which is to be compulsorily studied by a student as a core requirement to the completion of the program.
- **Elective Courses:** This is a course that is supportive to the discipline of study, provides an expanded scope, enables exposure to some other domains or nurtures proficiency/skills. Elective papers can be of two types: Discipline Specific Elective (DSE) and Generic Elective (GE). Core / DS Electives will not be offered as Generic Electives. Elective papers can be taken from MOOC courses and credit transfer should be allowed.
- Each of the Core courses and Discipline Specific Elective (DSE) shall be of 4 credits. Credits under DSE may vary (16/12/8) depending upon the number of DSE courses offered across the semesters.
- **Discipline Specific Elective (DSE):** These courses are inter disciplinary in nature and considered similar to core course. And, the students have to choose one course from the option provided for them.
- **Generic Elective (GE):** These courses add generic proficiency to the students. Students have to choose generic elective courses in consultation with the head of the department from the Generic Elective courses offered by other Division of study in Sports Science or from other Departments in university.

3. Course Structure:

This M.Sc. Exercise Physiology is a programme consists of core courses, soft core courses, practical courses, internship and project work. The entire programme carries credit system. The number and distribution of credits for the programme will be decided by the respective faculties.

A programme is divided into two Semesters, Odd Semester and Even Semester. The normal Semester periods are:

Odd Semester: July to November (90 Working days)

Even Semester: December to April (90 Working days)

4. Credits:

The term credit is used to describe the quantum of syllabus for various courses in terms and hours of study. It indicates differential weightage given according to the contents and duration of the courses in the curriculum design. The minimum credit requirement for a two years Master's Programme shall be 90.

One credit of theory equals one lecture hour and

One credit of practical equals two laboratory hours.

5. Programme:

Each Programme may consist of Lectures / Tutorials / Laboratory Work / Seminar / Project Work / Practical Training Report / Viva-Voce etc. Normally, in each of the programmes, credits will be assigned on the basis of the Lectures/Tutorials/Laboratory Work and other form of learning in a 18 week schedule.

6. Eligibility for Admission:

Bachelor's Degree in Sports Science / Physical Education and Sports / Physiology / Human physiology / Occupation Therapy / Physiotherapy / Biotechnology / Zoology / Microbiology / Biochemistry / Life Sciences / MBBS or an equivalent thereto in 10+2+3 or 10+2+4 pattern from a recognized university with a minimum of 50% marks in aggregate.

The B.P.E.S. qualified candidates should have passed the HSC or equivalent examination with Physics, Chemistry, Biology, or any other combination of science disciplines.

Note: Proficiency in Sports is desirable.

7. Grading System:

The term grading system indicates a 10 point scale of evaluation of the performance of students in terms of marks, grade points, letter grade and class.

8. Duration:

The duration for completion of Two Years Master's programme in any subject is four Semesters, but in any case not more than five years from the year of admission.

9. Attendance:

Every teaching faculty handling a course shall be responsible for the maintenance of Attendance Register for candidates who have registered for the course.

The teacher of the course must intimate the Head of the Department at least Seven Calendar Days before the last instruction day in the semester about the particulars of all students who have secured an attendance of less than 75%.

A candidate who has attendance less than 75% shall not be permitted to sit for the end-semester examination in the course in which the shortage exists.

However, it shall be open to the authorities to grant exemption to a candidate who has failed to obtain the prescribed 75% attendance for valid reasons on payment of a condonation fee and such exemptions should not under any circumstances be granted for attendance below 65%.

10. Examination:

There will be two sessional assessment tests and one End-Semester examination during each semester.

Sessional Test-I will be conducted after 35 working days and Sessional Test-II will be conducted after 70 working days.

Sessional Test–I will be a combination of a variety of tools such as class test, assignment and paper presentation that would be suitable to the course. This requires an element of openness. The students are to be informed in advance about the nature of assessment and the procedures. However, the tests are compulsory. Test–I may be for one hour duration. The pattern of question paper will be decided to the respective faculty. Sessional Test–I will carry 12.5% of marks of the entire course.

Sessional Test–II will be held after 70 working days for the syllabi covered between Seventh and Eleventh weeks.

Sessional Test–II will be conducted with a variety of assessment tools. It will also have an element of openness. The students are to be informed in advance about the nature of assessment and the procedures. However, the tests are compulsory. Test–II may be for two hours duration. The pattern of question paper will be decided by the respective Faculty. Sessional Test–II carries 12.5% of marks of the entire course.

There will be one End–Semester Examination of 3 Hours’ duration in each course. The end semester examination will cover all the syllabus of the course for 75% of marks.

Each course shall carry a maximum of 100 marks for the purpose of grading. The distribution of marks shall be as follows.

Theory Marks			Practical Marks		
Internal	External	Maximum	Internal	External	Maximum
25	75	100	40	60	100

11. Non-Credit Course

For the Non-Credit Courses offered in a Semester, a ‘Satisfactory Participation Certificate’ shall be issued to the Student from the concerned authorities, only after securing $\geq 65\%$ attendance in such a Course. No credits, marks or Letter Grade shall be allotted for the non-credit course.

12. Internship and Field visit:

The Internship / Practical Training shall carry 100 marks and shall be evaluated through internal assessment only. At the end of Internship / Practical training / Summer Project, the candidate shall submit a certificate from the organization where he /she has undergone training and a brief report. The evaluation will be made based on this report and a Viva-Voce Examination, conducted internally by a three member Departmental Committee constituted by the Head of the Department. Certificates (issued by the training centre or Organization) submitted by the candidate shall be attached to the mark list sent by the Head of the Department.

Field visit carry 100 marks and shall be evaluated through internal assessment only. At the end of field visit students has to submit the field visit report. Similarly, like internship evaluation will be made based on this report and a Viva-Voce Examination, conducted internally by a three member Departmental Committee constituted by the Head of the Department. Certificates (issued by the training centre or Organization) submitted by the candidate shall be attached to the mark list sent by the Head of the Department.

13. Evaluation:

Evaluation will be done on a continuous basis. Evaluation may be by Objective Type Questions, Quiz, Short Answers, Essays or a combination of these, but at the end semester it has to be a written examination.

The performance of students in each course is evaluated in terms of percentage of marks (PM) with a provision for conversion to Grade Point (GP). The sum total performance in each semester will be rated by GPA while the continuous performance from the 2nd Semester onwards will be marked by (OGPA).

14. Marks and Grading:

A student cannot repeat the Sessional Assessment Test–I and Sessional Test– II. However, if for any compulsive reason the student could not attend the test, the prerogative of arranging a special test lies with the teacher in consultation with the Head of the Department.

A minimum of 50% marks in each course is prescribed for a pass. A student has to secure 50% minimum in the End Semester Examination.

If a candidate who has not secured a minimum of 50% of marks in a course shall be deemed to have failed in that course.

The student can repeat the End Semester Examination when it is offered next in the subsequent Odd/ Even semesters till the regulations are in force. However, a candidate cannot move to the next semester if he/she has more than six papers as arrears at any point of time.

A candidate who has secured a minimum of 50 marks in all courses prescribed in the programme and earned a minimum of the credits will be considered to have passed the Master's Degree Programme.

15. Grading:

A ten point rating is used for the evaluation of the performance of the student to provide a letter grade for each course and overall grade for the Master's Programme. The letter grade assigned is given below:

Marks	Grade Point	Letter Grade	Class
90+	10	S	Exemplary
85-89	9.0	D	Distinction
80-84	8.5	D	Distinction
75-79	8.0	D	Distinction
70-74	7.5	A	First class
65-69	7.0	A	First class
60-64	6.5	A	First class
55-59	6.0	B	Second class
50-54	5.5	C	Second class
49 or less	-	F	Fail

The successful candidates are classified as follows:

I – Class 60% marks and above in over all percentage of marks (OPM).

II – Class 50–59% marks in over all percentage of marks.

Candidates who obtain 75% and above but below 91% of marks (OPM) shall be deemed to have passed the examination in First Class (Distinction) provided he/she passes all the course prescribed for the programme at the first appearance.

Candidates who obtain 90% and above (OPM) shall be deemed to have passed the examination in First Class (Exemplary) provided he/she passes the entire course prescribed for the programme at the first appearance.

For the Internal Assessment Evaluation the break up marks shall be as follows.

Test	10 marks
Assignment	05 marks
Case Study / Seminar / Short Answers etc.	05 marks
Attendance	05 marks
Total	25 Marks

Marks for Attendance Percentage

90% and above	5 Marks
80 – 89%	4 Marks
70 – 79%	3 Marks

16. Course–Wise Letter Grade:

The percentage of marks obtained by a candidate in a course will be indicated in a letter grade. A student is considered to have completed a course successfully and earned the credits if he/she secures over all grades other than F. A letter grade F in any course implies a failure in that course. A course successfully completed cannot be repeated for the purpose of improving the Grade point.

The F Grade once awarded stays in the grade card of the student and is not deleted even when he/she completes the course successfully later. The grade acquired later by the student will be indicated in the grade sheet of the Odd/Even semester in which the candidates has appeared for clearance of the arrears.

A student secures F grade in any course which is listed as course as to repeat it compulsorily when the course is offered next. If it is an elective course, a student has the option to repeat it when it is offered next or to choose a new elective if he / she is chosen in the place of failed elective failed optional will be indicated as dropped in the subsequent grade card.

If a student secures F Grade in the Project Work/ Field Work/Practical Work/ Dissertation, either he/she shall improve it and resubmit it if it involves only rewriting incorporating the clarification of the evaluators of he/she can re–register and carry out the same in the subsequent semesters for evaluation.

17. Withdrawal from the course by the student:

Within two weeks from the date of commencement of the semester.



**MYAS-AU Department of Sports Sciences
M.Sc. Exercise Physiology
Programme Code: SSPO22**

**Programme Structure
(For Students admitted from the academic year 2019-2020)**

Course Code	Course Title	Hours/Week			Marks		
		L	P	C	CIA	ESE	Total
Semester-I							
19MEPC101	Core 1: Fundamentals of Exercise Physiology	4		4	25	75	100
19MEPC102	Core 2: Kinesiology & Biomechanics	4		4	25	75	100
19MEPC103	Core 3: Research and Educational Methodology	4		4	25	75	100
19MEPP104	Core 4: Laboratory and Field Practical-I		14	7	40	60	100
19MEPD105	Dissertation I: Review of Literature/Dissertation-I		8	8*	* C.F.		
	Total Credits in Semester-I			27			
Semester-II							
19MEPC201	Core 5: Cardio-respiratory Physiology	4		4	25	75	100
19MEPC202	Core 6: Exercise & Environmental Physiology	4		4	25	75	100
19MEPC203	Core 7: Kinanthropometry and Exercise Physiology	4		4	25	75	100
19MEPP204	Core 8: Laboratory and Field Practical-II		16	8	40	60	100
19MEPD205	Dissertation II: (Posting to collect the pilot data)		4	4*	* C.F.		
	Elective 1: Interdepartmental Elective	3		3	25	75	100
	Elective 2: Department Elective	3	0	3	25	75	100
	Total Credits in Semester-II			30			

L- Lectures; P- Practical; C- Credits;

CIA- Continuous Internal Assessment; ESE- End-Semester Examination

*Carried Forward

Note:

1. Students shall take both Department Electives (DEs) and Interdepartmental Electives (IDEs) from a range of choices available.
2. Students may opt for any Value-added Courses listed in the University website.

Course Code	Course Title	Hours/Week		C	Marks		
		L	P		CI A	ES E	Total
Semester-III							
19MEPC301	Core 9: Exercise and Fitness-Health and Skill-Related Components	4		4	25	75	100
19MEPC302	Core 10: Exercise and Sports Nutrition	4		4	25	75	100
19MEPC303	Core 11: NeuroMusculoskeletal system in Exercise & Training	4		4	25	75	100
19MEPP304	Core 12: Laboratory and Field Practical-III		14	7	40	60	100
19MEPD305	Dissertation-III: (Research data collection And compilation)		6	6*	* C.F.		
	Elective 3: Interdepartmental Elective	3		3	25	75	100
	Total Credits in Semester-III			28			
Semester-IV							
19MEPC401	Core 13: Sports Psychology and Physiological Aspects	4		4	25	75	100
19MEPC402	Core 14: Applied Exercise Physiology	4		4	25	75	100
19MEPC403	Core 15: Methods of Exercise Prescription	4		4	25	75	100
19MEPP404	Core 16: Laboratory and Field Practical-IV		18	9	40	60	100
19MEPD405	Dissertation-IV: (Thesis submission)		6	6			
	Project Report	8+4+6+6 = 24			25	50	100
	Viva-Voce					25	
	Total Credits in Semester-IV			27			
	Grand Total Credits			112			
	Value Added Courses						

L- Lectures; P- Practical; C- Credits;

CI A- Continuous Internal Assessment; ESE- End-Semester Examination

*Carried Forward

Note:

1. Students shall take both Department Electives (DEs) and Interdepartmental Electives (IDEs) from a range of choices available.
2. Students may opt for any Value-added Courses listed in the University website.

Dissertation

The topic of dissertation will be allocated in first Semester and candidate will work for all four semesters and submit a written thesis in 4th semester. The final dissertation will be evaluated at the end of fourth semester for the total work done in all four semesters and grades will be awarded at the end of fourth semester.

Dissertation will include the following work. The credit hours are reflected in each semester scheme. At the end of first semester students are expected to have a research proposal ready. At the end of second semester the students are expected to be familiar with equipment handling and pilot study. At the end of third semester data collection, analysis and results should be completed. In fourth semester the work should be presented in the form of final dissertation and manuscripts should be ready for communication.

Evaluation of M.Sc. (Exercise Physiology) dissertation

Dissertation marks to be carried forward to fourth semester. i.e., the first, second and third semester marks to be carried forward to the fourth semester, by mentioning "carry forward" in each of the first three semesters.

Elective Courses

Department Electives (DE)

Sl. No	Course Code	Course Title	Hours/Week			Marks		
			L	P	C	CIA	ESE	Total
1	19MEPE207.1	Evidence Based Practice in Allied Health Sciences	3	0	3	25	75	100
2	19MEPE207.2	Women Health and Exercise	3	0	3	25	75	100

Interdepartmental Electives (IDE)

S. No.	Course Code	Course Title	Department	Hours/week			Marks		
				L	P	C	CIA	ESE	Total
1.	19 SOSE 115.1	Soft Skills	English	3	0	3	25	75	100
2.	19 MATE 215.1	Discrete Mathematics	Mathematics	3	0	3	25	75	100
3.	19 MATE 215.2	Numerical Methods		3	0	3	25	75	100
4.	19 MATE 315.1	Differential Equations		3	0	3	25	75	100
5.	19 STSE 215.1	Statistical Methods	Statistics	3	0	3	25	75	100
6.	19 STSE 215.2	Mathematical Statistics		3	0	3	25	75	100
7.	19 STSE 315.1	Bio-Statistics		3	0	3	25	75	100
8.	19 PHYE 215.1	Classical Mechanics and Special Theory of Relativity	Physics	3	0	3	25	75	100
9.	19 PHYE 215.2	Physics of the Earth		3	0	3	25	75	100
10.	19 PHYE 315.1	Bio-Medical Instrumentation		3	0	3	25	75	100
11.	19 PHYE 315.2	Energy Physics		3	0	3	25	75	100
12.	19 CHEE 215.1	Applied Chemistry	Chemistry	3	0	3	25	75	100
13.	19 CHEE 315.1	Basic Chemistry		3	0	3	25	75	100
14.	19 CHEE 315.2	Instrumental Methods of Analysis		3	0	3	25	75	100
15.	19 BOTE 215.1	Plant Tissue Culture	Botany	3	0	3	25	75	100
16.	19 BOTE 215.2	Plant Science – I		3	0	3	25	75	100
17.	19 BOTE 315.1	Gardening and Horticulture		3	0	3	25	75	100
18.	19 BOTE 315.2	Plant Science – II		3	0	3	25	75	100

(Semester-I)
M.Sc.(Exercise Physiology)
(Under Credit Based Continuous Evaluation Grading System)

19MEPC101: *FUNDAMENTALS OF EXERCISE PHYSIOLOGY*

Hour distribution

L T P
4 0 0

Learning Objective (LO):

1. The primary objective of this course is to study of the systems that allow physical activity and the acute and chronic responses to that physical activity.
2. To build skills in quantifying physiological parameters; and acquire familiarity in applied exercise physiology.
3. To link theory and practice of course concepts and application in exercise and sports performance.

Unit – I: Cardiovascular Aspects of Exercise Physiology

1. Overview of the heart, blood vessels, and blood composition, Heart size in the athlete & normal difference in strength/power trained Vs endurance trained heart, Acute HR, BP, SV, a-v-o₂ diff. cardiac output, blood flow responses to exercise at various intensities, from rest to maximal.
2. Chronic adaptations to endurance exercise training, various modes of training with respect to Heart rate, Blood pressure, Stroke volume, Cardiac output, a-v-o₂ difference, Vascularization and exercise training, Blood Pressure, responses to exercise, Determination of lactic acid and pyruvic acid in blood before and after exercise, determination of hemoglobin level before and after exercise, Anaerobic power test (Margaria method), Measurement of flexibility, agility, power and maximal work capacity, Determination of Vo₂ max by: Direct method, Queen's college step test, 12 min-run tests, Non Exercise Test. Astrand rhyming nomogram method.
3. Hemodynamics: Circulation and its control, Determinants of blood flow, Cardiovascular regulation and control mechanisms, Factors determining cardiac performance: preload, afterload, contractility, HR, EDV, ESV, Regulation of blood volume in sudden loss of blood Hemostasis and coagulation of blood, Anticlotting mechanism and anticoagulants

Unit- II: Respiratory Aspect of Exercise Physiology

1. **The basics of Ventilation:** Pulmonary anatomy, Mechanics of Ventilation. Static and dynamic lung volumes. Dead space and alveolar ventilation, Minute Ventilation, Acute and chronic responses to exercise.
2. **Control and regulation of ventilation,** Neural- humoral mechanisms, Central inputs to the inspiratory Centre. Central Command from the motor cortex Humoral & Peripheral input.
3. Acute responses to exercise from rest to maximal Chronic effects of endurance training.
4. How age, gender, and race affect pulmonary ventilation during exercise.
5. Gas exchange, oxygen consumption from rest to maximal exercise.

Unit III

1. Skeletal muscle structure and contractile properties. Types of skeletal muscle and how they are important in various sports activities Architectural properties. Neurons, motor unit recruitment and integrative control of movements. Neurological control of Movement. Neuromuscular adaptations to Resistance Training. Size Principle of motor unit recruitment. Contractile properties. Types of contractions experimental models of muscle contraction. Length-tension relationship, Force-velocity relationship.

2. Training for muscle strength, endurance, and power Principles of skeletal muscle adaptations Principles of endurance conditioning Central and neuromuscular fatigue. Ergogenic aids that enhance muscle size and function. Muscle glycogen: super-compensation during/before athletic competition.
3. The tissues of the human skeletal system. Joints Adaptive abilities and capacity of the skeletal system to exercise.

Unit IV

1. Acute effects of exercise training on hormone levels and hormone activity Control and regulation mechanisms involved in hormone homeostasis during exercise. Chronic effects of exercise training on hormone levels, especially the elite athlete Measurement of blood pressure. Sweat rate during exercise
2. Acute and chronic effects of exercise training on immunity and immune responses. Age and gender differences in immune responses. Strength training in distance runners: Impact on Running Economy
3. Hormones responsible for the anabolic and catabolic effects of exercise on muscle.

Unit- V: Applied Exercise Physiology

1. Bioenergetics: Human energy metabolism during exercise. Human energy systems and fatigue during exercise.
2. Training for aerobic and anaerobic power Training principles, Anaerobic/ Aerobic changes with training, Factors affecting training response. Exercising during pregnancy
3. Muscular strength, Strength and Resistance training, Structural and functional adaptations to resistance training, Body composition and physical performance, Measurements of heart rate at rest and different exercising conditions, Classification of workload & continuous recording of heart rate using heart rate monitor, Determination of maximal heart rate. Cardiac cost & cardiac efficiency-step test, Cycle ergometer & treadmill, Measurement of body temperature, (oral, axial, skin) at rest and different working condition, Recording and interpretation of ECG & EMG at rest and working condition; effects of posture on ECG, Determination of Pulmonary ventilation; static and dynamic lung function tests.
4. Exercise performance and Environmental Stress, Exercising at medium and High Altitude, Thermal Stress (thermoregulation) during Exercise.

Unit- VI

Contemporary methodologies in sport science for Identification of talented performers;
 Discussing the five most commonly used theories in physical activity (ie. functionalist theory, critical theory, feminist theories, interactionist theories, and conflict theory);
 A discussion on critical reading and thinking skills; Sport, socialisation and school sport;
 Gender issues in physical activity; Violence and deviance in sport; Race, ethnicity and religion in physical activity; Drugs in sport; Internationalism, globalisation and sport as big business;
 Sport, the body and identities; Sport and the environment; Sport and social division; The future and politics of sports.

M.Sc.(ExercisePhysiology)
(Semester-I)
(UnderCreditBasedContinuousEvaluationGradingSystem)

19MEPC102:KINESIOLOGY&BIOMECHANICS

Learning Objective (LO):

1. The main objective of this course is to learn the scientific foundations of human movement and successfully communicate scientific information about kinesiology and biomechanics of diverse population.
2. To enrich the knowledge and practical skills necessary to work in kinesiological and biomechanical fields.
3. To link theory and practice of course concepts and application in exercise and sports.

UNIT- I

Introduction to Kinematics

- a) Definitions, aims, objectives and role of Kinesiology in sports physiotherapy.
- b) Review of fundamental concepts (applied aspect). Centre of gravity, Line of gravity, Planes, Lever system 111 Body, Fundamental starting position.
- c) Review of linear and angular kinematics

UNIT-II

Mechanics of Musculoskeletal System

- a) Tissue loads, response of tissues to forces- Stress, Strain, Stiffness and mechanical strength, visco elasticity
- b) Physical Properties of bone, cartilage, tendon and ligaments, functional adaptation under pathological conditions.
- c) Impaired neuromuscular control, muscular force regulation in Framework and Joints of the body: Influence of trauma and classification of the muscles, Relation of structure, functions, role of muscles, types of Muscle, connections (Static. Concentric and Eccentric). Two joint Muscles. Angle of pull, Role of Gravity affecting muscular action.

UNIT-III

- a) Nature and importance of Biomechanics in Physiotherapy
- b) Principle of Biomechanics
- c) Biomechanics of shoulder and shoulder complex, elbow complex, wrist and hand complex

UNIT-IV

- a) Movement analysis
- b) Biomechanics of pelvic, hip, knee. ankle & foot complex
- c) Biomechanics of spine

UNIT-V

- a) Neuro biomechanics
- b) Posture and Gait analysis
- c) Biomechanical Analysis & Techniques Force platforms

UNIT-VI

Biomechanics, exercise physiology and skilled performance; Skill acquisition; Determinants of performance in skilled athletes

References:

1. Brunnstrom-clinical Kinesiology. EA. Davis.
2. Luttgens, K., Hamilton N; Kinesiology Scientific Basis of Human Motion 9th Edi. 1997, Brown & Benchmark.
3. Rasch and Burk: Kinesiology and Applied Anatomy, Lee and Fabiger.
4. White and Punjabi-Biomechanics of Spine -Lippincott.
5. Kapandji: Physiology of Joints Vol. I. II & 111. W.B. Saunders.
6. Mishra: Clinical Neurophysiology, B 1. Churchill Livingstone.

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Understand the anatomical and biomechanical bases of human movement;
CO2:	Understand the physiological bases of human movement.
CO3:	Apply the knowledge related to mechanics of musculoskeletal system to think critically and ethically in examining issues and solving problems associated with their chosen discipline of study.
CO4:	Describe the various nature and importance of biomechanics.
CO5:	Identify to posture, gait and movement analysis various complex.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	2	3		3		3
CO3	3	3	3	3			3	3	3	3	3	2		3
CO4	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO5	3	3	3	2		3	3	3	3	2	3	3	3	3

M.Sc.(ExercisePhysiology)
(Semester-I)
(UnderCreditBasedContinuousEvaluationGradingSystem)

19MEPC103:**RESEARCH&EDUCATIONALMETHODOLOGY**

Learning Objective (LO):

1. The primary objective of this course is to have methodological skills to develop research questions and apply appropriate analytical techniques.
2. To develop the theoretical knowledge to appropriately frame research design and analysis.
3. To have analytical skills necessary to conduct research or evaluation in exercise physiology.

UNIT- I

1. **Basic concepts**- Importance of research in clinical practice. Problem identification, Ethical issues in research, Literature review, meta-analysis.
2. **Types of Research**-Qualitative and Quantitative. Descriptive & Experimental, Longitudinal & Cross-Sectional. Survey Research.
3. **Sample Designs**- types of sampling, Reliability, Validity, Variables, Sample size.

Unit-II

1. **Processing and analysis of Data**- Central tendency, Dispersion, Correlation, regression analysis, multiple correlation and regression.
2. **Sampling and testing of hypothesis**- Concept of probability, Standard deviation, confidence intervals, null and alternate hypothesis, level of significance, correlation coefficients, ANOVA, Turkey's HSD.

Unit -III

Nonparametric Tests- Fisher Irwin test, Mc Nemar test, Wilcoxon Mali test, Mann Whitney test, Kruskal Wallis test, Spearman's rank correlation.

Unit -IV

1. Define- Symposia, Seminar, Conference, Journal, Thesis, Book, Key elements of scientific writing.
2. Presenting Research- Strategies of paper writing, Design of Paper writing, Tactics of paper writing, Reasons for rejection, Where to publish, Poster presentation (Poster space, Standard format), Plagiarism.
3. Oral Presentations at Conferences/seminars- Preparing presentation, Duration of Presentation, what to present.

Unit-V

Educational Methodology - Principles and methods of teaching. with respect to physiotherapy students and client: Strategies and planning of teaching, curriculum development, formation of course objective, time management, role of Audio visual aids, methods of knowledge dissemination.

Unit-VI

Funding trends and research priorities; future challenges in exercise research; role of exercise sciences in health care; Professional and Research Ethics; Evidence based practices in the field of exercise physiology

Practical's

The student will be required to review the literature thoroughly and prepare a research proposal for dissertation inn consultation with his/her supervisor by the end of the semester.

References:

1. Mohsin SM; Research Methods in Behavioural Sciences: Orient Publications.
2. Colton: Statistics in medicine, Little Brown Company. Boston.
- 3 Mahajan: Methods in Biostatistics, Jay Pee Brothers.
4. Vincent: Statistics in Kinesiology, Human Kinetics.
5. Hicks: Research for Physiotherapists. Churchill Livingstone

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Search for, select and critically analyse research articles and papers
CO2:	Prepare a literature review; and formulate research questions for evaluation
CO3:	Develop a research proposal
CO4:	Gain experience with instrument development and data collection methods.
CO5:	Know the principles and methods of effective teaching.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	3								3		3
CO2	3		3	23			3	3	3	3		3		3
CO3	3	3	3	3			3	3	3	2	3	3		3
CO4	3	3	3	3	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	3	23	3	3

19MEPP104: Core 4: Laboratory and Field Practical-I

- To measure the normal blood pressure and its postural effect and exercise effect
- To determine the pulse rate on human body
- To evaluate the cardiac efficiency test on sports person / normal healthy adults
- To assess the autonomic system of normal healthy adults
- To measure the cardiovascular and respiratory aspect on sports person / normal healthy adults
- Demonstration of different of different VO₂ (oxygen consumption) protocols on different platform

(Semester-II)

**M.Sc.(Exercise Physiology)
(Under Credit Based Continuous Evaluation Grading System)**

19MEPC201: CARDIO-RESPIRATORY PHYSIOLOGY

Learning Objective (LO):

1. The principal aim of this course is to learn features of cardio-respiratory physiology.
2. To develop the ability to assess the cardio-respiratory physiological fitness.
3. To link theory and practice of course concepts and application among sports person.

Unit I

Cardiorespiratory fitness (CRF), PER-Q, resting and exercise measurement, estimating CRF, PACER, walk test, graded exercise test, RPE, VO_2 max, from different response, treadmill and ergometer protocols.

Unit II

Normal heart electrophysiology

Anatomy of the heart, Location of heart in chest cavity, Blood vessels that supply the heart, Blood flow through the heart, Electrophysiology of the heart, Normal electrical pathway, Electrical-mechanical association Relationship among electrical conduction, blood flow through the heart, pressures inside the heart and mechanical connection

EKG equipment and placement of electrodes in 12-lead Goldberger's three basic laws of electrophysiology Einthoven's triangle Leads: I, II, III, AVR, AVE, AVL, V1 V6 One cardiac cycle EKG waveforms, segments, and intervals, and their representation of electrical conduction: Resting 12-lead electrocardiogram normal limits, The difference between resting and exercise EKG electrodes used

Unit III

Electrocardiogram interpretation steps Normal limits of waveforms, segments, and intervals and what it means to be out of the normal limit.

Normal sinus rhythm Sinus Bradycardia, Sinus Tachycardia Normal EKG changes during exercise-testing. What is tach act? What are the major categories of tach act? What do they look like? When do they occur?

Unit-IV

Abnormal heart electrophysiology

1. Ectopic foci, inherent rates of sinus, atrial, junctional, and ventricular rhythms, Premature: PAC, PJC, PVC escape beats, Exercise restrictions.
2. Supraventricular rhythms, sinus arrhythmias, rhythms originating from ectopic foci: atrial, junctional, ventricular exercise restrictions.
3. AV heart blocks 1st degree, 2nd degree-two types, 3rd degree exercise restrictions.
4. Bundle Branch Block, Right and Left, Hemiblocks, exercise restrictions.
5. Wolfe-parkinson-white (WPW) syndrome.LGL syndrome, exercise restrictions.

Unit-V

Other electrophysiology considerations

1. Criteria for determining ischemia, injury, and infraction
2. Determination of Axis
 - Quadrants: Normal, LAD, RAD, and extreme RAD Degrees
 - Rotation- transition Zone
 - Pacemaker rhythms
 - External and implantable
 - Pacemaker codes
 - Exercise restrictions
 - Monitoring leads
 - Electrode placement

Unit-VI

The importance of exercise on genetics, proteomics, genomics, epigenetics, and signaling pathways. Genomics, Genetic Factors and Exercise - genetic factors impact the responses and adaptations of health-related traits to exercise stimuli – polymorphism in genes and genotypes with cardiovascular responses, fitness phenotypes, as well as muscle strength and power adaptations.

References

Textbooks

1. Booth, et al. electrocardiography for health care personnel, 2nd ed., McGraw-Hill, 2008
2. De Luna. Clinical Electrocardigraphy: At textbook, 2nd ed., Futura publishing company, 1998.
3. Wagner, G. Marriot's practical electrocardiography, 11th ed., Lippincott Williams & Wilkins, 2007.

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Identify the components of cardiorespiratory functions and explain the principles of diffusion.
CO2:	Describe the mechanism of breathing, transport of gases, and process of gas exchange.
CO3:	Trace the flow of blood, and identify the heart chambers, valves and major vessels of the heart.
CO4:	Assess the morphology, hemodynamic activities, and cardiorespiratory fitness
CO5:	Monitor electrophysiology of abnormal heart

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	3	3		3		3
CO3	3	3	3	3			3	3	2	3	3	3		3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	2	3		3	3	3	3	3	3	2	3	3

M.Sc.(Exercise Physiology)
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19MEPC202: EXERCISE AND ENVIRONMENTAL PHYSIOLOGY

Learning Objective (LO):

1. The primary objective of this course is to understand the relation between environment and the functioning of the live organism.
2. To show how life processes depend on the environment at different levels from immediate environment of a cell to the impact of environment on the whole organism.
3. To examine the responses and adaptations of the human body to exercise under different environmental conditions.

Unit-I

Concept of altitude and atmospheric pressure, different types of performance, maximal O₂ consumption at altitude, cardiovascular and respiratory changes at altitude, acclimatization at altitude, training at altitude.

Unit-II

Effect of cold exposure, wind chill factor, insulating factors, heat production and factors affecting it, coping with hypothermia, concept of air pollution and different variables of air pollution.

Unit-III

Concepts of underwater physiology and its application in exercise science. zero gravity physiology and its implication on exercise physiology.

Unit-IV

Overview of heat balance during exercise, temperature measurement during exercise, overview of heat production and heat loss, heat storage in body during exercise, body's thermostat, thermal events during exercise.

Unit-V

Heat index, exercise in a hot environment, sweat rate during exercise, performance changes, exercise related heat injuries, prevention of dehydration during exercise, heat acclimatization, measurement of relative humidity and WBGT index.

Unit-VI

Protective gadgets – impact on cognition, coordination, and skill performance; Altitude physiology; Hot and humid conditions on exercise; Cold climate and wind breeze on exercise and sports performance.

References

Textbooks

1. ACSM'S Guidelines for Exercise Testing and Prescription. 8thed..Lippincott Williams & Wilkins. Philadelphia. 2009.
2. Wilmore, J., Costill, D. and Kenney. W. Physiology of Sport and Exercise. 4th ed , Human Kinetics. 2008
3. McArdle. W. Katch, F., and Katch, V. Exercise Physiology: Energy, Nutrition, and Human Performance, Lippincott Williams & Wilkins.

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Enrich the knowledge on the basic principles of physiology and its connection within the frame of biology and other natural sciences, understand the role of water, structure and function of cell membranes and transport depends functioning of the basic life processes as maintaining the ionic and osmotic balance, circulation and respiration, providing of energy etc.
CO2:	Gain a broader view on specificity of single processes and their mutual connection.
CO3:	Understand the human behaviour in connection with environment at the basis of synthesis of the knowledge on the function of processes that enable the organism to survive in specific environment.
CO4:	Understand processes at higher level including control and connection of these processes by the nervous and hormonal systems.
CO5:	Describe and discuss the stresses placed on the human body during exercise performed under different environmental conditions and the adaptations made by the body with extended or repeated exposure to those conditions.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	2	3		3		3
CO3	3	3	3	3			3	3	3	3	3	3		3
CO4	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	2	3	3	3

**M.Sc.(Exercise Physiology)
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19MEPC203: *KINANTHROPOMETRY AND EXERCISE PHYSIOLOGY*

Learning Objective (LO):

1. The key focus of this course is to learn kinanthropometric characterization and the changes in it with exercise.
2. To understand of the principles of body composition, its assessment and its relationship with health and exercise.
3. To explain the relevance of kinanthropometry in the field of exercise physiology.

Unit I

Introduction to. Kinanthropometry, history, Human body composition, and its measurement, techniques: Somatotyping and measurement techniques, concept of growth), maturation and performance, physical activity and flexibility assessment theoretical basis.

Unit II

Multidimensional characteristics of sportsperson participating in different games and sports – Kinanthropometric measurements in discriminating elite, sub-elite and amateur sportsperson.

Unit-III

Training principles: overload, Specificity, reversibility Components of a training session. warm up. Work out and cool down training to improve aerobic power

Unit IV

Injuries and endurance training, training to improve anaerobic power, training to improve muscular strength, Concurrent or strength and endurance training programs, nutritional Influence on training induced skeletal muscle adaptation.

Unit V

Muscle soreness, training to improve flexibility, year-round conditioning for athletes. common training mistakes.

Unit VI

Socio-cultural and psychological constraints in kinanthropometric and physiological testing and assessment.

References

Textbooks:

1. Kinanthropometry and Exercise Physiology Laboratory Manual Tests, procedures and data Third Edition Volume One Anthropometry
2. Kinanthropometry and Exercise Physiology Laboratory Manual Tests, procedures and data Third Edition Volume Two. Physiology Exercise Physiology: theory and Application to Fitness and Performance. Scott K Powers et al

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Competently use and understand the principles of anthropometric procedures for assessing human body composition
CO2:	Accurately use anatomical and physiological terminology
CO3:	Explain the function, structure and components of the musculoskeletal and cardiopulmonary systems in relation to exercise and sport
CO4:	Assess body composition and perform Somatotyping
CO5:	Understand the changes in body composition with growth, maturation and physical training

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	2	3		3		3
CO3	3	3	3	3			3	3	3	3	3	2		3
CO4	3	3	2	3	2	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	2	3	3	3

19MEPP204: Core 8: Laboratory and Field Practical-II

- Demonstration of ECG and its interpretation
- Demonstration of team performance physiological variables instrument
- Body composition related fat% measurement by different methods
- Somatotyping related measurement by Heath-Carter method and computational method
- Physical activity, flexibility and energy expenditure measurement

M.Sc.(Exercise Physiology)
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19MEPC207.1: *EVIDENCE BASED PRACTICE IN ALLIED HEALTH SCIENCES (ELECTIVE)*

Learning Objective (LO):

1. The aim of this course is to learn features related to evidence based practice in allied health sciences.
2. To build skills related to evidence based practice in allied health sciences.
3. To link theory and practice of course concepts and application in exercise and sports.

Unit-I

1. Introduction to evidence- based complementary medicine
2. Evidence-based health care
3. Evidence-based practices
4. Evidence-based decision making and Management

UNIT- II

Types of Evidence

- a. Definition of evidence
- b. Forms of evidence
- c. Randomized controlled trials

UNIT- III

- a. Case- control studies
- b. Cohort studies

UNIT – IV

1. Applying evidence
 - a. Pathways, guidelines and protocols
 - b. Future directions for clinical effectiveness
2. Evaluation of effectiveness and efficiency of the process

UNIT-V

- 1.Principles of evidence-based practice in exercise physiology
- 2.Elements of evidence Appraising the evidence
- 3 Evidence in practice

UNIT-VI

The role of exercise on obesity, diabetes, longevity, muscle, bone, metabolism, nervous system, hormones, brain function, circulation, immune system, respiratory, and hematology.

RNA Interference - Epigenetics and Gene Regulation - Genetic Selection and Maximal Exercise Performance - Cell Signaling: and Regulatory Molecules Impacting Metabolism and Muscle Mass - The Dynamics of Connective Tissue and Bone Adaptation With Exercise - The Role of Progenitor (satellite) Cells in Muscle Adaptation - Exercise and Endothelial Cardiovascular Biology

Physical Activity and Longevity

Professional and Research Ethics

Biomedical Informatics

Exercise mimetics - single nucleotide polymorphisms (SNPs) - Reactive oxygen species – Genomics - The muscle from inside and out - The processing of substrate fuels - cell signaling regulation - Muscle fiber, connective tissue, bone and satellite cell integration - Mechanical sensors and signaling regulators that control muscle size - Discovering biomarkers for predicting exercise and altered health settings - Extreme Environments - The link between exercising muscle and brain plasticity - Exercise and disease prevention - Mechanisms regulating aging and exercise induced longevity
Evidence based practices in the field of exercise physiology

References:

1. Martin Dawe, Philip Davies and Alistar Gray, Evidence – Based Practice; A Primer for Health Care Professionals, Elsevier Publications.
2. Albert R. Roberts and Kenneth R. Yeager, Evidence – Based Practice Manual; Research and Outcome Measures in Health and Human Services, Oxford University Press.
3. Allen Rubin, Practitioner’s Guide to use Research for Evidence – Based Practice. John Willey & Sons Publication.
4. Domhnall Mac Auley Thomas M Best, Evidence-based Sports Medicine BMJ Books.
5. Katheyn Refshauge and Elizabeth Gass, Musculoskeletal Physiotherapy: Its Clinical Science and Evidence- Based Practice, Churchill Livingstone.
6. Allen Rubin, Statistics for Evidence- Based Practice and Evaluation, Cengage Learning.

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Eliminate outdated practices in favor of more effective evidence based learning;
CO2:	Implement evidence based assessment;
CO3:	Apply evidence based management.
CO4:	Enforce evidence based professional ethics
CO5:	Conduct evidence based research and policy making

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	3	3		2		3
CO3	3	3	3	3			3	2	3	3	3	3		3
CO4	3	3	3	3	3	3	3	3	3	2	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	2	3	3	3

M.Sc.(Exercise Physiology)
(Under Credit Based Continuous Evaluation Grading System)

19MEPC207.2: WOMEN HEALTH AND EXERCISE (ELECTIVE)

Learning Objective (LO):

1. The prime goal of this course is to study features of women health and exercise.
2. To build skills to assess the health of women and the influence of exercise on health.
3. To link theory and practice of course concepts and application of exercise on women health.

UNIT-I

1. Gender difference in muscle morphology
2. Diagnosis and Treatment of Urinary Incontinence and Prolapse
3. Anaemia

UNIT-II

1. Hypertension in Women
2. Bone health: assessment and treatment of osteopenia and osteoporosis
3. Evaluation and Treatment of Common Musculoskeletal Complaints

UNIT- III

1. Strength Differences
2. Effect of weight training
3. Physical Trainability
4. Gynecological Consideration

UNIT-IV

1. Exercise for the childbearing year
2. Exercise for adolescence
3. Premenopausal and post menopausal

Unit-V

1. Exercise in Athletic Women
2. Medical Problems in Sports Women

Unit-VI

Modulation of Energy Expenditure by Estrogens and Exercise in Women
Exercise is an Adjuvant to Contemporary Dystrophy Treatments
Sedentary Behaviors and Adiposity in Young People

References:

1. Nadya Swedan (2001): Women's Sports Medicine and Rehabilitation. An Aspen Publications.
2. Mary Lloyd Ireland & Amelia Nattiv (2002): The Female Athlete. Saunders Publication.
3. Cardozo L and Staskin D (2006): Textbook of Female Urology and Urogynaecology (2nd ed) London: Isis Medical Media Ltd
4. Mantle J, Haslam J and Barton S (2004). Physiotherapy in Obstetrics and Gynaecology (2nded) London: Butterworth-Heinemann.
5. Sapsford R. Markwell S and Bullock-Saxton J (1998): Women's Health: A Textbook for Physiotherapists. London: WB Saunders Company Ltd.
6. Bo. K., Berghmans. L.C.M., Van Kampen. M., Morkved. S.(2007). Evidence-Based Physical Therapy for the Pelvic Floor: Bridging Science and Clinical Practice. London: Churchill Livingstone.

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Demonstrate an understanding of the structure, function, mechanics, control, limitations, and fatigue of the cardiorespiratory system to include ventilation, gas transport and exchange, hemodynamics, and cardiac output during rest and exercise.
CO2:	Understand the concepts involved in measuring energy, work, and power and describe/demonstrate the means by which the energy cost of exercise can be estimated and measured.
CO3:	Recognize the differences in the physiological response to exercise because of sex and as one progresses through the lifespan.
CO4:	Demonstrate an understanding of the methods of body composition assessment and recognize healthy values for body fat and what impact body composition has on athletic performance and health of women.
CO5:	Demonstrate knowledge regarding the effects of exercise training on women bone density across the lifespan.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	3								3		3
CO2	3		3	2			3	3	3	3		3		3
CO3	3	3	3	3			3	2	3	3	3	3		3
CO4	3	3	3	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	3	3		2	3	3	3	3	3	3	3	3

(Semester-III)
M.Sc.(Exercise Physiology)
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19MEPC301: EXERCISE AND FITNESS-HEALTH AND SKILL-RELATED COMPONENTS

Learning Objective (LO):

1. The primary focus of this course is to learn features of fitness; and the benefits of exercise.
2. To build skills in quantifying health and skill related fitness; and for pre-exercising screening.
3. To link theory and practice of course concepts and application in exercise physiology and fitness.

Unit- I

Pre-test considerations

1. Benefits associated with physical activity, Physical activity and fitness terminology, Benefits of regular physical activity, Exercise dose response relationship.
2. Risks associated with physical activity Sudden death among young individuals and athletes Exercise events in those with sickle cell trait Exercise-related cardiac events in adults Safety considerations.

Unit- II

1. Pre-participation screening algorithm, Risk stratification and medical clearance Pre-exercise test evaluations Baseline measurements Calculation of HR MAX and 85% HR max depending on protocol Population considerations Children, elderly, apparently healthy, etc.
2. Test Order Equations used to estimate aerobic power from: TM protocols Cycle ergometer protocols (arm and leg) Equations used to estimate aerobic power from cycle ergometer protocols ACSM guidelines for when to stop a test Calculations used to estimate aerobic power from other variables

Unit-III

Test protocols used for men
1. In the health and skill related components of illness

1. CV endurance field tests VO₂max testing Norm tables Maximal vs submaximal tests
2. Muscular strength, endurance and flexibility
3. Balance, agility, coordination, reaction time and anaerobic power

Unit- IV

Exercise testing modulations for cardiac patients

Medical clearance Physician approval for testing Risk factor identification Medical emergency equipment Risks of cardiac events during exercise testing.

Diagnostic exercise testing Exercise testing for disease severity and prognosis Functional testing Measurements during exercise testing Exercise testing after an MI

UNIT-V

Risk stratification for cardiac patient inpatient rehabilitation programs Outpatient exercise programs Recommendations for supervision and monitoring of exercise

Signs and symptoms below which an upper limit for exercise intensity should be set FITT principle and progression of exercise for the cardiac patient

Benefits of endurance exercise training in cardiac patients Benefits of resistance training for cardiac patients Risks of cardiac events during cardiac rehabilitation Prevention of exercise-related cardiac events Exercise training for return to work

UNIT-VI

Socio-cultural and psychological constraints in physiological testing and assessment

Classical biochemical/ physiological approaches toward solving biological- and health/disease-related phenomena

References

Textbooks

1. Heyward. Vivian. Advanced Fitness Assessment and Exercise Prescription, 5th ed., Human Kinetics. 2006.
2. ACSM's Guidelines for Exercise Testing and Prescription. 8th ed., Lippincott Williams and Wilkins. 2009.
3. Ed. Durstine and Moore. ACSM's Exercise Management for Persons with Chronic Diseases and Disabilities, 2nd ed. Human Kinetics. 2003
4. ACSM's Health-Related Physical Fitness Assessment Manual. 3rd ed. 2009.

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Become competent, independent, and critical thinkers by developing into allied health professionals that are proficient in the care of the physically active, and demonstrating quality injury prevention, identification, care and rehabilitation.
CO2:	Accept the role of the athletic and fitness training professional and demonstrate a positive attitude regarding the athletic training profession.
CO3:	Adhere to the Code of Ethics and the Professional Practice, and maintain high moral standards when performing professional duties.
CO4:	Enhance the athletic and fitness training profession by sharing that knowledge and expertise.
CO5:	Become involved with society outside of their professional requirements as demonstrated by assisting those in need and working to make their own piece of the world a better place by contributing to the community in which he/she lives, works and learns.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	2	3		3		3
CO3	3	3	3	3			3	3	3	3	2	3		3
CO4	3	3	3	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	2	3	3	3	3

M.Sc.(Exercise Physiology)
(Semester-III)
(Under Credit Based Continuous Evaluation Grading System)

19MEPC302: EXERCISE AND SPORTS NUTRITION

Learning Objective (LO):

1. The main objective of this course is to learn features of sports nutrition that nourishes and energizes for exercise performance.
2. To build skills in quantifying and prescribing pre, during, and post competition diet.
3. To link theory and practice of course concepts and application sports nutrition in exercise.

Unit-I

Nutrition Basic

What Nourishes You?

The basic of a Healthy Diet, The food pyramids, Energy density of macronutrients and Human Digestion and Absorption Metabolism of the energy-yielding nutrients Bioenergetics: fuels for exercise and their pathways anaerobic metabolism, ATP-CP, Myokinase, fast glycolysis, lactic acid production Fat of lactic acid, Aerobic metabolism, Transition into the mitochondria. Kreb's cycle, ETC Macronutrients: when are they used for fuel for exercise? Carbohydrates, Lipids, Proteins

Unit-II

Research related to pre-competition and post-competition meals

1. Timing, Content of pre-competition and post-competition meals
2. Glucose and insulin responses of pre-competition meals
3. Glycogen loading (super compensation)
4. Different needs for specific sports activities
5. The importance of recovery, optimal amount of recovery time to training /competition

Unit-III

1. Timing, Content of during competition nutrition
2. Different nutrient needs for specific sports activities
3. Energy production, Energy expenditure, Exhaustion and Dehydration
4. Sweat rate, role of sweat, impact of sweat on performance
5. Importance of water and sports drinks in replenishing body fluid
6. The importance of recovery, optimal amount of recovery time during competition

Unit-IV

Research related to dietary supplements and their effects on performance

1. Vitamins and minerals
2. Creatine phosphate; creatine monohydrate; other creatine supplements
3. Sodium bicarb and other buffering agents
4. Ginseng
5. Caffeine
6. Over the counter drugs: i.e., amphetamines
7. Prescribed drugs: i.e., beta blockers
8. Nutritional disorders: Anorexia Nervosa Bulimia Nervosa Binge-Eating Disorder, Other Conditions Metabolic Syndrome, Female Athlete Triad. The ethics of weight control in some sports

Unit-V

1. Illegal substances, Ergogenic aids
2. Substances banned by athletic organizations and IOC: position Stands
3. Blood Doping
4. Drug.
5. Drug Testing.
6. Ethics and philosophy of Drugs Testing

Unit-VI

1. Sports specific diet
2. Sports drinks
3. Supplementation
4. Ergogenic aids

References

Textbooks

1. Ed.Burke& Deakin. *Clinical sports nutrition*, 3rd ed., McGraw-Hill
2. Burke, *practical Sports Nutrition*, Human Kinetics, 2007
3. Ed.Gibney.et al *Introduction to Human Nutrition*, Blackwell. 2002.
4. Groff & Gropper. *Advanced Nutrition and Human Metabolism*, 3rd ed., Wadsworth. 2000.
5. Jeukendrup&Glesson. *Sports Nutrition*, Human Kinetics, 2004.
6. Anita F.P. 'Clinical Dietetics and nutrition'. III edition. Oxford University Press. Bombay, 1989. Modern Nutrition in Health and Disease. Shils, M.E. and Young V.R Bombay K.M Varghese Company (VI edition 1988)
7. Passmore, P. and M.A. Eastwork (1986) Human Nutrition and Dietetics. ELBS, Churchill, Livingstone, 8th Edition Shils, M.E and Young V.R (1988). Modern Nutrition in Health and Disease
8. Bombay K.M. Varghese Company (VI edition) Mahan, L.K & Ecott-stump, s. (2000) Krause's Food, Nutrition and Diet
9. Therapy, 10th Edition, W.B. Saunders Pvt. Ltd

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Describe contemporary dietary guidelines and demonstrate an ability to use these guidelines to provide general nutrition advice for achieving or maintaining a healthy body weight
CO2:	Describe how nutrition influences human development, exercise performance, recovery and physiological adaptations
CO3:	Discuss macronutrient metabolism during and after exercise and outline the requirements of these nutrients for athletes
CO4:	Describe the physiological functions of vitamins, minerals and major nutrients and explain how and why micronutrient requirements might be altered in athletes compared with non-exercising individuals.
CO5:	Describe the composition of common sports drinks and ergogenic aids and discuss how these can be used appropriately and safely before, during and after exercise

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	3	3		3		3
CO3	3	3	3	3			3	3	2	3	3	3		3
CO4	3	3	3	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	3	2	3	3

M.Sc. (Exercise Physiology)
(Semester-III)
(Under Credit Based Continuous Evaluation Grading System)

19MEPC303: *NEURO MUSCULO SKELETAL SYSTEM IN EXERCISE & TRAINING*

Learning Objective (LO):

1. The keyfocus of this course is to studyfeatures of neuro musculoskeletal system in exercise and training.
2. To build skills in quantifyingfitness and prescribing training load and exercise.
3. To link theory and practice of course concepts and application in exercise and training.

Unit- I

Muscle fibre types and their influence in different kind of sports, training effects on muscle development, muscle properties with changing training load, neuro muscular rehabilitation with training.

Unit- II

Training types and definition and their relation with exercise development, training to improve aerobic and anaerobic strength. Concurrent strength and endurance training programme.

Unit-III

Laboratory assessment of muscular aspect and training aspect. Muscle adaptation to aerobic and anaerobic exercise training, resistant training and training induced increase in strength.

Unit-IV

Immunologic and molecular changes during exercise and strength training, overtraining and detraining and their effects on physiological system.

Unit-V

Impact of fatigue and exhaustion during short duration high intensity exercises on neuro-muscular skeletal system. – Factors limiting all-out anaerobic performances. Impact of fatigue and exhaustion during endurance activity on neuro-muscular skeletal system – Glycogen depletion in different muscle groups – factors limiting aerobic performance.

Methods and importance of recovery.

Impact of sports injury on neuro-muscular skeletal system.

Unit-VI

Fundamental principle of the ‘training response’ – components – neuromuscular patterning.

Monitoring and managing neuromuscular stress and fatigue state.

Accumulative impact of different types of training – strength, conditioning, skill, & tactical; on the athlete’s stress/fatigue state (day, week, phase, period and session).

High levels of training – over-reached state – normal and necessary parts of training.

Long-term over training – imbalance in the stress/fatigue state.

Exercise tolerance after training and match-play – reduced or enhanced tolerance.

Catabolic activity – insufficient recovery.

Emergence of technological aids that monitors the athlete’s training response. – Heart rate monitors – Power measurement technologies – GPS technologies – Coaching software systems.

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Synthesise knowledge of the effects of exercise, immobilisation, aging and injury on the neuro-musculoskeletal system.
CO2:	Analyse biomechanical and musculoskeletal modelling techniques to estimate internal and external forces.
CO3:	Critically analyse and apply advanced biomechanical evaluation methods and techniques in the collection of biomechanical data.
CO4:	Analyse intrinsic and extrinsic factors associated with sports-related injury to integrate into practice; and critically review biomechanical principles related to the cause and treatment of sports-related injury.
CO5:	Evaluate and integrate the scope of practice of exercise scientists in the modification of exercise prescriptions for injured populations to design and implement return-to-sport plans.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	3								3		3
CO2	3		3	2			3	3	3	3		3		3
CO3	3	3	3	3			3	3	3	3	2	3		3
CO4	3	3	3	3	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	2	3	3	3	3

19MEPP304: Core 12: Laboratory and Field Practical-III

- Demonstration of Kinematic measurement system and its data collection and report analysis
- Demonstration of strength and power analysis instrument and its data export and related analysis.
- Demonstration of Dynamic force platform and its data collection and interpretation
- Demonstration of eye tracking data collection and its interpretation
- Demonstration of EEG its data collection and interpretation
- Demonstration of CANTAB data collection and report interpretation
- Demonstration of other psychological training and its implementation on sports science

M.Sc.(Exercise Physiology)
(Semester-IV)
(Under Credit Based Continuous Evaluation Grading System)

19MEPC401: *SPORTS PSYCHOLOGY AND PHYSIOLOGICAL ASPECT*

Learning Objective (LO):

1. The main objective of this course is to learn features of psychological aspects of sports that forms the basis for exercise performance.
2. To build skills in quantifying psychological skills and manipulate it for better sports performance.
3. To link theory and practice of course concepts and application in exercise and sports performance.

Unit-I

- 1. History and current status of sports psychology.**
- 2. Personality assessment and sports personality**
 - a. Theories of personality
 - b. Personality assessment
- 3. Attention and perception in sports.**
 - a. Attention
 - b. Perception
- 4. Concentration training in sports**
 - a. Basic principles of concentration
 - b. Concentration training
 - c. Concentration awareness exercises
- 5. Motivational orientation in sports**
 - a. Athlete's needs of motivation
 - b. Motivational inhibitors
 - c. Motivational techniques

Unit-II

- 1. Pre-competitive anxiety**
 - a. Source of PCA
 - b. Effects of PCA on performance
- 2. Relaxation training**
 - a. Definition
 - b. Types of relaxation
 - i) Progressive muscle relaxation
 - ii) Breathing exercise
 - iii) Yognidra
 - iv) Transcendental meditation
- 3. Aggression in sports**
 - a. Theories of aggression
 - b. Management of aggression

Unit-III

- 1. Role of Psychology in Dealing with injuries.**
- 2. Eating disorders.**
 - a. Etiology of eating disorder
 - b. Types of eating disorders
 - c. Complications of eating disorders
- 3. Goal setting**

Unit-IV

1. Psychological aspect of doping
2. Psychological preparation of elite athletes
 - a. Concept of psychological preparation
3. Biofeedback training
4. Mental imagery
5. Stress management
 - a. Principles of stress
 - b. Management stress
 - c. Management techniques

Unit-V

1. Group Behaviour and leadership
 - a. Nature of group behaviour and group
 - b. Types of group
 - c. Educational implications of group behaviour
 - d. Meaning of leadership, types of leadership, quality of leadership, training and functioning of leadership
2. Emotion
 - a. Meaning of emotion
 - b. Characteristics of emotion
 - c. Meaning of controlling and training of emotions and its importance.
 - d. Contribution of sports to emotional health
 - e. Meaning of sentiment, its types, importance and formation

Unit-VI

- Socio-cultural issues: sport and social divides (gender, class, status, race, ethnicity, age, physical/mental competency);
- Special problems in sport (illicit drug taking, violence, and corruption).
- The principal focus is with the Indian experience in contemporary sport, although discussions about the sporting cultures of various nations.
- Motivation and emotion
 - e.g. self-determination, stress appraisals and coping, burnout, mindsets.
- Cognitive sport psychology
 - e.g. attentional processes, reinvestment theory
- Sport, exercise psychology and health
 - e.g. exercise dependence and addiction; psychology and injury; PA, sedentary behaviours and psychosocial health

- Introduction of contemporary themes related to ethics and athlete lifestyle management.
- Introduction to factors impacting upon athlete lifestyle.
- Transitions in sport.
- Dual career lifestyles.
- The impact of social media upon athlete profile.
- Critiquing codes of conduct.
- Issues surrounding the moral development of athletes.
- The impact of media on the construction of gender relations.
- Aggression and violence within sport.
- Issues surrounding the drugs debate in sport.

References:

1. Morgan and King: Introduction to psychology – Tata McGraw Hill
2. Suinn: Psychology in sports: Methods and applications, Surjeet Publications.
3. Grafiti: psychology in contemporary sports, prentice Hall.
4. Basmajian: Biofeedback

Sanjiv p. Sahni: Handbook of sports psychology-A comprehensive manual of Mental Training

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Discuss and describe the structures, regions, and functions of the human brain and associated sensory systems
CO2:	Compare and contrast the data and hypotheses about the effects of exercise and mental activity, and sleep disorders
CO3:	Evaluate the research on the importance of the brain areas in eating and drinking and the differences between obesity, anorexia nervosa, and bulimia.
CO4:	Compare and contrast the components of emotion and describe the main theories that have been used to explain emotion and the functions, structures, and main regions of the brain essential to emotion expression, as well as any cultural differences in expression.
CO5:	Analyze research on etiological and psychopharmacological findings related to Autistic spectrum disorders, Anxiety Disorders, PTSD, OCD, Schizophrenia, Alzheimer’s disorder, ADHD, Major Depressive Disorder, Bipolar Disorder, and addictions. Analyze one neurological or psychological disorder in a research paper using scholarly sources to test a hypothesis related to a physiological aspect of that disorder

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		2	3								3		3
CO2	3		3	3			3	3	3	3		3		3
CO3	3	3	3	3			3	3	2	3	3	3		3
CO4	3	3	3	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	2	3	3	3

(Semester-IV)
M.Sc.(Exercise Physiology)
(Under Credit Based Continuous Evaluation Grading System)

19MEPC402:APPLIED EXERCISE PHYSIOLOGY

Learning Objective (LO):

1. The main objective of this course is to learn attributes of applied exercise physiology.
2. To build skills in screening pathophysiological conditions and exercise prescribing.
3. To link theory and practice of course concepts and application in applied exercise physiology.

Unit-I

Epidemiology and pathophysiology of stroke, functional consequences of stroke, acute responses to exercise, exercise testing and screening criteria, prescription and programing, education and counseling

Unit II

Epidemiology and pathophysiology of muscular dystrophy. spinal cord injury and brain injury patients, focus of rehabilitation by exercise. muscle strength and flexibility development, guidelines for implementing an exercise program.

Unit III

Osteoarthritis, rheumatoid arthritis and their physical examination, exercise testing and prescription, resistance exercise, counselling and education, exercise and activity for nonspecific back pain persons, exercise for acute and chronic low back pain.

Unit IV

Osteoporosis and its physical examination, exercise, fitness and functional testing, prescription and educational program, amputation and its exercise testing, prescription and programs, exercise immunology and its function under environmental stress, immunity changes after different bouts of exercise

Unit V

Assessment of cardiorespiratory disorder – prescription of exercises and monitoring physiological responses.

Diabetics – role of exercise – exercise prescription – strengthening exercises and endurance activities.

Unit-VI

- Sports science and technology (performance equipment, human dynamics of sporting endeavour);
- Recovery from sport injury
- The role of sport and exercise in managing chronic illness
- Exercise in older adults

References

ACSM's resources for Clinical Exercise Physiology 2nd Edition

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	Demonstrate knowledge in the exercise sciences including: anatomy and physiology, exercise physiology, Kinesiology and biomechanics, ECG interpretation, exercise testing and prescription, motor learning and nutrition.
CO2:	Demonstrate knowledge of and clinical proficiency in the following content areas for both apparently healthy and chronic disease populations: a) pre-participation screening/ health risk appraisal and stratification, b) fitness assessment and evaluation c) the design of individually tailored exercise prescription, d) appropriate exercise techniques
CO3:	Recognize the importance of interprofessional collaboration in the delivery of safe, high quality care within the health care system/exercise science field.
CO4:	Demonstrate the ability to communicate effectively in both oral and written formats.
CO5:	Recognize the importance of ethically-grounded care for diverse clients, patients and/or athletes.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	2	3		3		3
CO3	3	3	3	3			3	3	3	3	2	3		3
CO4	3	2	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	3	3	2	3

M.Sc.(Exercise Physiology)
(Semester-IV)
(Under Credit Based Continuous Evaluation Grading System)

19MEPC403:METHODS OF EXERCISE PRESCRIPTION

Learning Objective (LO):

1. The key focus of this course is to learn elements in methods of exercise prescription for rehabilitation and exercise performance.
2. To develop capability of different methods of exercise prescription.
3. To link theory and practice of course concepts and application in methods of exercise prescription.

Unit-I

General principles of Exercise prescription

1. Legal issues regarding Waiver, informed consent, PARQ medical clearance needed, baseline measurements taken before exercise tests.
2. Importance of warm up and cool down instructions in an exercise prescription.
3. The FITT principle and rate of progression, principles of training

Unit-II

1. Periodization – single, double and multiple periodization
2. Training cycles – micro, meso and macro cycles

Unit-III

Methods of prescribing intensity of endurance exercise
VO₂ - VO₂ reserve – HR - HR reserve - Rating of perceived exertion - Symptom-limited -
Energy expenditure

Unit-IV

Clinical conditions influencing exercise prescriptions

1. Arthritis, osteoporosis, Hypertension
2. Obesity, metabolic disorders, metabolic syndrome
3. Immunological diseases, exercise and upper respiratory tract infections
4. Peripheral arterial disease, pulmonary diseases.

Unit-V

Other special conditions in the healthy population

1. Pregnancy
2. Elderly
3. Children
4. Physically handicapped

Unit-VI

- strategies to increase population levels of physical activity,
- the role of physical activity in vascular insulin resistance in skeletal muscle and brain,
- the influence of exercise on the gut microbiome,
- blood pressure control during dynamic exercise,
- the periodization of carbohydrate performance availability to augment sports performance, and
- a framework for evaluating wearable sensors.
- Monitoring and managing neuromuscular stress and fatigue state.
- Emergence of technological aids that monitors the athlete's training response. – Heart rate monitors – Power measurement technologies – GPS technologies – Coaching software systems.

References:

Textbooks

ACSM's guidelines for exercise testing and prescription, 8thed., Lippincott, Williams, & Wilkins, 2009

Skinner, J., Exercise testing and Exercise prescription for special cases theoretical basis and clinical application, 3rd ed., Lippincott, Williams, & Wilkins, 2005

COURSE OUTCOMES (COs)

By the end of the course, the student will be able to

CO1:	use a variety of methods to identify individual needs and screen for movement dysfunction;
CO2:	evaluate physiological capacities, interpret data obtained and communicate findings to athletes and coaches
CO3:	design and implement periodised training programs to enhance physical conditioning and performance and reduce injury risk;
CO4:	monitor, evaluate and modify exercise training programs to maximise physiological adaptation and performance; and implement effective recovery strategies within physical conditioning programs;
CO5:	prescribe exercise to maintain physical conditioning and support rehabilitation following injury and develop criteria for safe return to activity.

MAPPING WITH COURSE OUTCOMES (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		3	2								3		3
CO2	3		3	3			3	3	2	3		3		3
CO3	3	3	3	3			3	3	3	3	2	3		3
CO4	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO5	3	3	3	3		3	3	3	3	3	3	2	3	3

19MEPP404: Core 16: Laboratory and Field Practical-IV

Demonstrating functional outcomes of medical history review and physical examination

Understanding informed consent and ethical concerns

- Demonstration of HRV data collection and its interpretation
- Demonstration of Skin conductance and its data collection and interpretation
- Demonstration of Spirometry data collection and report interpretation
- Demonstration of biochemical analysis (biomarkers) related to sports performance
- Demonstration of EMG, Wingate, Kinematic, Kinetic and team specific physiological monitoring.

Measurement of Physical fitness using field tests

- a) AAHPERD test battery
- b) BROCKPORT test system
- c) Static and dynamic balance measurement
- d) Blood oxygenation assessment through fNIRS System
- e) Clinical assessment of Knee laxicity

19MEPX206: Science of Exercise

Science of Exercise

Learning outcome

Understand how body responds to exercise, and will be able to identify behaviours, choices and environments that impacts athletes health and training.

Learners will explore a number of significant adjustments made by human body in order to properly respond o physical stress of exercise, including changes in carbohydrate, fat, and protein metabolism, nutritional considerations, causes of muscle soreness and fatigue, and the effectiveness of dangers of performance enhancing drugs.

Learner will examine and understand the scientific evidences for the health benefits of exercise including the prevention and treatment of heart disease, diabetes, cancer, obesity, depression and dementia.

Learning objectives

To study about the various metabolic pathways that are activated in order to supply the necessary energy required for the mechanical work of skeletal muscle during exercise.

This will also exhibit how various physiological systems are regulated during exercise to help homeostasis.

It will teach about the training guidelines needed to optimize endurance and strength adaptations associated with a regular exercise program.

It will also teach role of exercise as medicine in both the prevention and treatment of various diseases.

Unit - 1

The Energetics of Exercise – introduction to exercise science, principles in exercise physiology, calorimetry and oxygen consumption, ATP and muscle work, carbohydrate metabolism during exercise, fat metabolism during exercise, protein metabolism during exercise.

Unit – 2

Physiological system during exercise – skeletal muscle structure and function, respiratory system responses to exercise, cardiovascular system responses to exercise, endocrine system responses to exercise, immune system response to exercise.

Unit – 3

Exercise for fitness and performance – adaptation to endurance training, adaptation to strength training, nutritional consideration for exercise, causes of muscle fatigue, causes for muscle soreness, performance enhancing drugs.

Unit – 4

Exercise in health, wellness and disease – exercise is medicine, diet, exercise and weight control, exercise and risk factors for heart disease, exercise and risk factor for diabetes, exercise and risk factors for cancer, exercise and successful aging, exercise and brain function.

Unit – 5

Fundamental principle of the ‘training response’ – components – neuromuscular patterning. Monitoring and managing neuromuscular stress and fatigue state. Accumulative impact of different types of training – strength, conditioning, skill, & tactical; on the athlete’s stress/fatigue state (day, week, phase, period and session). High levels of training – over-reached state – normal and necessary parts of training.

Unit – 6

Long-term over training – imbalance in the stress/fatigue state. Exercise tolerance after training and match-play – reduced or enhanced tolerance. Catabolic activity – insufficient recovery. Emergence of technological aids that monitors the athlete’s training response. – Heart rate monitors – Power measurement technologies – GPS technologies – Coaching software systems.

19MEPX306: Exercise and Obesity

Objective: To Enhance knowledge about Various problems and proper management of Obesity

Outcome: To utilize acquired Knowledge in Decision Making and further Treatment process

UNIT-I: OBESITY

1. Introduction - the Measurement of Obesity
 - a. Oldern method of Body Composition Analysis
 - b. BMI and its Significance
 - c. Recent Advanced Method of Evaluation
2. Etiology,classification

UNIT II : HEALTH RISKS ASSOCIATED WITH OBESITY

1. Cardiovascular Disease – Hypertension - Hyperlipidemia/hypercholesterolemia – Osteoarthritis – Psychological
2. Complication - Prevalence of Obesity and Overweight - Prevalence of CVD and Obesity

UNIT III : OBESITY MANAGEMENT

1. Scientific Principles of Weight Loss
2. The Role of Nutrition/Diet and the “non dieting approach”
3. The role of Exercise/Physical Activity
 - a. Aerobic Exercise
 - b. Resistance Training
4. The role of Behavior Change – school based physical activity intervention

UNIT IV : WEIGHT LOSS PROGRAMS

1. Commercial Weight Loss Programs
 - a. Biometrics
 - b. Jenny Craig
 - c. Nutrasystem
 - d. Weight Watchers etc
2. Non-Commercial Weight Loss Programs
 - a. Medifast
 - b. Optifast
3. Non-Commercial Support Groups
 - a. Taking Off Pounds Sensibly (TOPS)
 - b. Overeaters Anonymous

UNIT V : Exercise Prescription

- a. ADA/ACSM/AMA Position Stands
- b. Health Fraud and Weight Loss Products and Programs
- c. The Future of Weight Loss

UNIT VI

The role of exercise on obesity, diabetes, longevity, muscle, bone, metabolism, nervous system, hormones, brain function, circulation, immune system, respiratory, and hematology.
Sedentary Behaviors and Adiposity in Young People

Suggested Readings:

- Bouchard, C. (Ed) (2000). Physical activity and obesity. Champaign, IL: Human Kinetics.
- Brownell, K.D. & Wadden T.A. (1999). The LEARN® Program for weight control: special medication edition. Dallas: American Health Publishing