



COURSE CURRICULUM

Course Title: Exercise Physiology and Ergonomics

Credit Units: 05

Course Level: PG

Course Code:

L	T	P/ S	SW/ FW	TOTAL CREDI T UNITS
4	0	2	0	5

Course Objectives: This course aims at imparting an understanding of: Application of ergonomics & sports physiology in human being & society.

Pre-requisites: Knowledge of anatomy & physiology

Course Contents/Syllabus:

	Weightage (%)
Module I: Ergonomics	25
<ul style="list-style-type: none">Physical work—its definition and nature—isotonic, isometric and isokinetic, positive and negative work. Concept of physiological work. Power and capacity relation. Work-load – light, moderate (submaximal) and heavy (maximal) depending on intensity and duration of work. Exercise inducing equipment –	

<p>bicycle ergometer, treadmill and stepping stool.</p> <ul style="list-style-type: none"> • Energetics of work –sources of energy and energy demand for different activities. Assessment of energy cost of various physical work – direct and indirect methods with their limitations. • Physiological responses to work – cardiovascular, respiratory, metabolic and muscular – short-term and long-term. Work-rest cycle and importance of rest pause. • Ergogenics aids. Basic concept of ergonomics and its application in industry to improve efficiency and industrial safety as well as to restrict occupational health hazards. Anthropometry and its implication in ergonomics in general. 	
<p>Module II: Sports Physiology</p>	<p>25</p>
<ul style="list-style-type: none"> • Concept of endurance, strength and speed in sports activities. • Physical training –principles and their impact on performance level in sports with reference to cardiovascular, respiratory and muscular changes. • Overtraining and detraining. • Warm up and cool down. • Brief general idea about nutritional aspects of sports. • Aerobic and anaerobic power—concept, factors affecting, methods of measurement and significance of maximal oxygen consumption and excess post exercise oxygen consumption. • Lactate threshold, lactate tolerance and their usefulness. • Concept of recovery processes and occurrence of fatigue in physical work. • Concept of physical fitness and its assessment by Harvard and modified Harvard Step Tests. 	
<p>Module III: Skin and Body Temperature Regulation</p>	<p>25</p>

<ul style="list-style-type: none"> • Structure and functions of skin. • Cutaneous circulation. • Sweat glands –structure and composition of sweat. Sweat formation, secretion and its regulation. Insensible perspiration. • Regulation of body temperature in homeotherms – its physical and physiological processes, roles of neural and hormonal processes. Pyrexia, hyperthermia and hypothermia. 	
<p>Module IV: Human and Environment</p>	<p>25</p>
<ul style="list-style-type: none"> • Environment – Physical and biological aspects. • Effects of exposure to hot and cold environment. • Acclimatization to hot and cold environment. Heat disorders and its preventive measures. • Effects of hypobaric and hyperbaric environment. • Caisson disease. Preventive measure for hypobaric and hyperbaric effects. • Acclimatization to high altitudes. G force, ionizing and non-ionizing radiations - physiological effects and preventive measures. • Air, noise and water pollutions – causes, effects, prevention measures and control. Brief idea of the hazards of pesticides, carcinogens, mutagens, neurotoxins and war gases. • Impact of green house effects on life. 	

Student Learning Outcomes: On completion of the study of this subject the student should be able to understand the following:

Application of ergonomical principles in human being & society.

Importance & applications of sports physiology in the society.
Importance of exercise physiology for improvement of quality of life.

Pedagogy for Course Delivery: The class will be taught using theory and case based method. Classes are conducted on the basis of power presentation, demonstration and discussion sessions.

Lab/ Practicals details, if applicable:

- a) Sphygmomanometric measurement of arterial blood pressure at rest and after exercise.
- b) Modified Harvard step test and determination of physical fitness. Recording of recovery heart-rate after standard exercise and graphical plotting.
- c) Pneumographic recording of effects of talking, drinking, laughing, coughing, exercise, hyperventilation and breath - holding.
- d) Spirometric measurement of vital capacity.
- e) Measurement of some common anthropometric parameters- stature, weight, eye height, shoulder height, eye height (sitting), elbow height, sitting height, elbow rest height (sitting), knee height (sitting), shoulder elbow length, arm reach from wall, elbow-to-elbow breadth, knee-to-knee breadth (sitting), shoulder breadth, head length, head breadth, head circumference and neck circumference, mid-arm circumference, waist circumference, hip circumference, chest circumference.
- f) Calculation of Body Surface Area (using nomogram), Body Mass Index and Ponderal Index from anthropometric measurements.
- g) Experiments on respiratory rate, pulse rate and blood pressure in relation with exercise and posture.

- h) Anthropometry, Body composition.
- i) Handgrip dynamometer.
- j) Pulmonary function test during and after exercise.
- k) Determination of Hemoglobin before and after exercise.
- l) Determination of diurnal variation of pulse rate and respiratory rate.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
80	20	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Components	Attendance	Class test	Home Assignment	Case/Presentation
Weightage (%)	Weightage (%)	5	15	5	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment	End Term Examination

Components (Drop down)	Attendance	Practical Test	Home Assignment	Case/Presentation	Practical Paper
Weightage (%)	5	15	5	5	70

Text:

1. Human Factors in Engineering and Design by E.O. McCormick and M. Sanders. Tata Mc Graw Hill.
2. Energy, Work and Leisure J.V.G.A.Durin and R.Passmore, Heinemann Educational Books.
3. Sports Physiology by E.L. Fox, Saunders College Publishing. Holt-Saunders.
4. Vander's Human Physiology, E.P. Widmaier *et al.*, McGraw-Hill, Higher Education.
5. Concise Medical Physiology by S.K. Chaudhuri, New Central Book Agency.
6. Exercise Physiology – Energy, Nutrition and Human Performance by W.D. McArdle, F.Katch and V.L. Katch. Lippincott, Williams and Wilkins.
7. Essentials of Exercise Physiology by L.G. Shaver, Surjeet Publications.
8. Text Book of Environmental Physiology by C. Edger Folk Jr. Lea and Febiger.