

What is Exercise Physiology?

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What is Exercise Physiology?

1. An Academic Program of Study, and a Course in Exercise Science

The study of how exercise and physical activity alters the structure and function (physiology) of the human body.

2. A Profession

A profession of appropriately trained individuals who have studied a suitable curriculum within the exercise sciences, with an emphasis in exercise physiology.



Development of Exercise Physiology

- Beginnings ? - 1960
- Era of Sports and Athletics..... 1960 - 1980
- Era of Medical Awakening 1970 - present
- Present Status of Exercise Physiology
Research and Knowledge 1990 - present



Beginnings ? - 1960, cont'd.

In early history, fitness was synonymous with survival

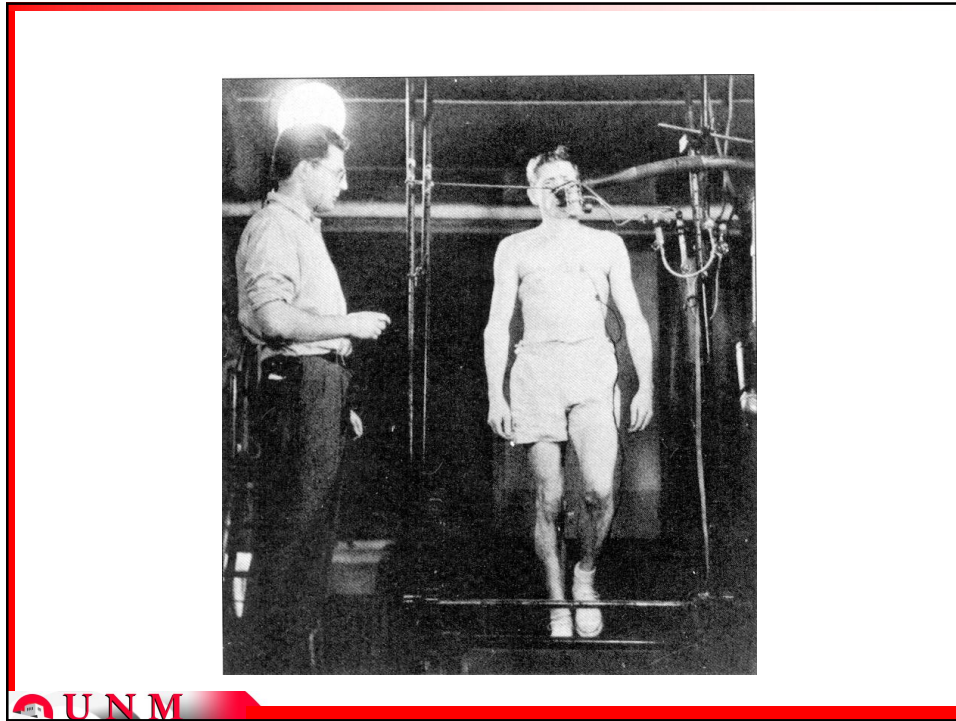


Ancient Greece



Ancient Egypt





Beginnings ? - 1960, cont'd.

Archibald V. Hill: “maximal oxygen consumption”



Archibald Vivian Hill

“In running the oxygen requirement increases continuously as the speed increases,; the actual oxygen intake, however, reaches a maximum beyond which no effort can drive it. The oxygen intake may attain its maximum and remain constant merely because it cannot go any higher owing to the limitations of the circulatory and respiratory system.”

(Hill A.V. and H. Lupton. QQ J Med 1923; 16:135-171.)



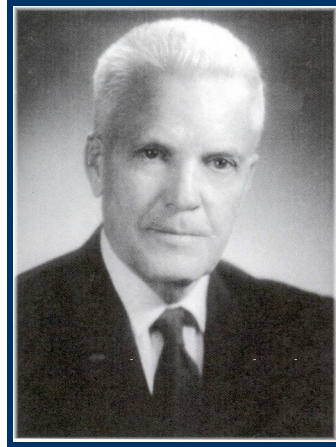
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Beginnings ? - 1960, cont'd.

Harvard Fatigue Laboratory 1927-1947

David Bruce Dill (Director)

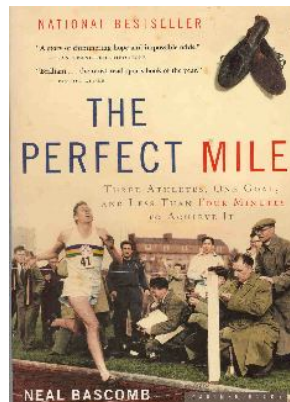
Initial research focused on how different **occupations** affected the body, **environmental** physiology (altitude, dry, moist heat), **metabolism** during exercise and aging, blood gas transport, acid-base balance, and nutrition

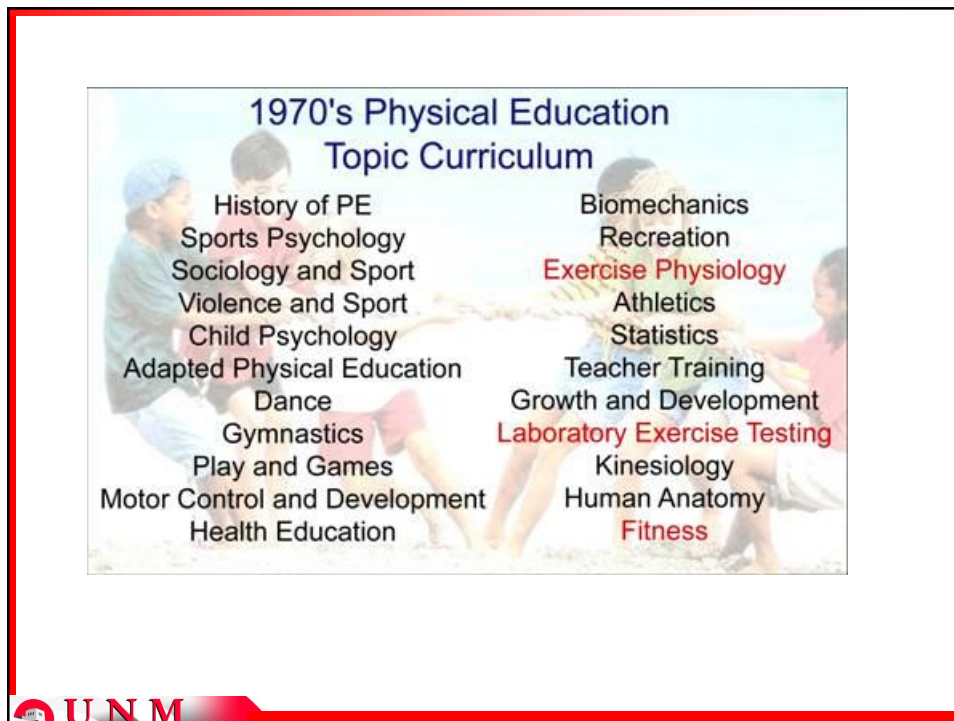
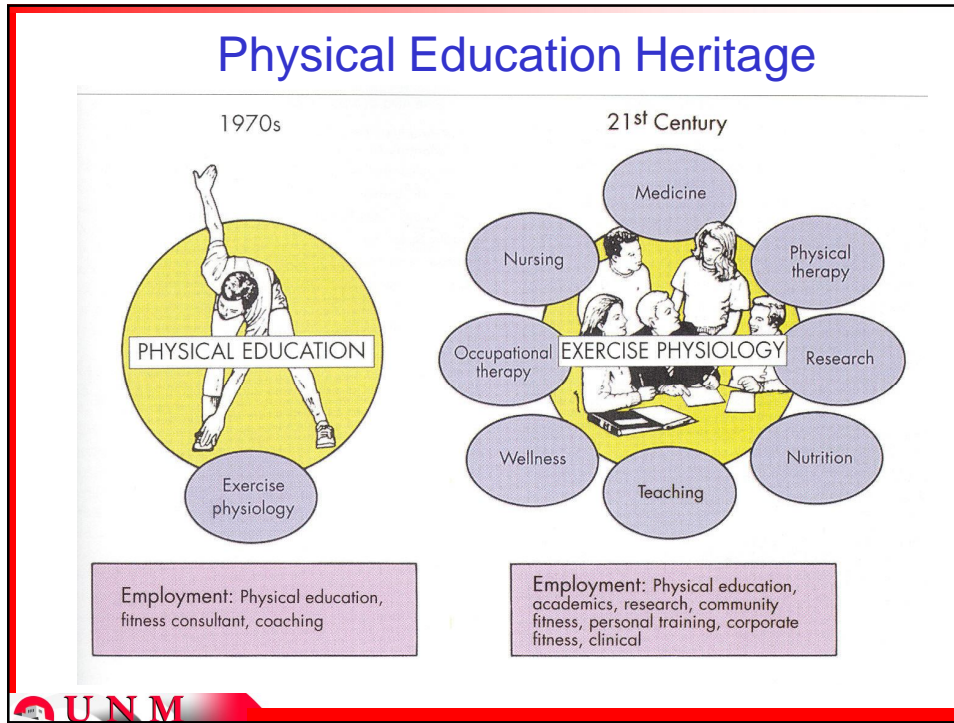


May 6, 1954

(Iffley Road, Oxford, England)

Roger Bannister crossing the finish line for the mile in 3:59.4





1980's

Physicians hooked on exercise: **Kenneth Cooper & George Sheehan**

Covert Bailey: "If exercise could be packaged into a pill, it would be the most prescribed medication in all of history".

The benefits of exercise training on the following was recognized:

- Health Promotion & Quality of Life
- Blood lipids
- Heart Function in Diseased Populations
- Disease Prevention & Rehabilitation

CHD, PVD, COPD, Hypertension, Diabetes, Obesity, Cancers, Depression/Mood States, ..

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Medical-Pharmaceutical Complex Still Struggling With Exercise & Disease Prevention

<http://www.youtube.com/watch?v=xsuK7BeOvvQ>



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**1990's Exercise Science
Topic Curriculum**

Computer Studies	Biomechanics-Intro.
Sports Psychology	Biomechanics-Adv.
Sociology and Sport	Chemistry-Intro.
Body Composition	Exercise Physiology-Intro.
Electrocardiography	Exercise Physiology-Adv.
Motor Development	Statistics
Aerobics Instruction	Organic & Biochemistry
Exercise Prescription	Growth and Development
Exercise and Disease Prevention	Laboratory Exercise Testing
Aging and Exercise	Kinesiology
Physics	Human Anatomy
Math-Algebra	Fitness

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**Present Status of Exercise Research
and Knowledge 1990 - present**

- Role of exercise in supporting body functions in **microgravity**
- Exercise in **special populations**: disabled, elderly, children, pregnant women, etc.
- Development of **new equipment, technologies and techniques**: stable isotopes (substrate use and cellular metabolism); magnetic resonance imaging and spectroscopy (muscle metabolism and blood flow)

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NASA & Exercise Physiology

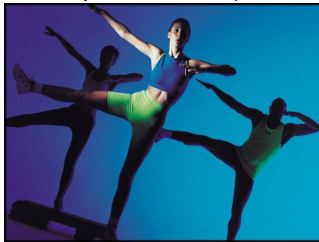


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Exercise Physiology is the Ultimate Physiological Science

CONTENT

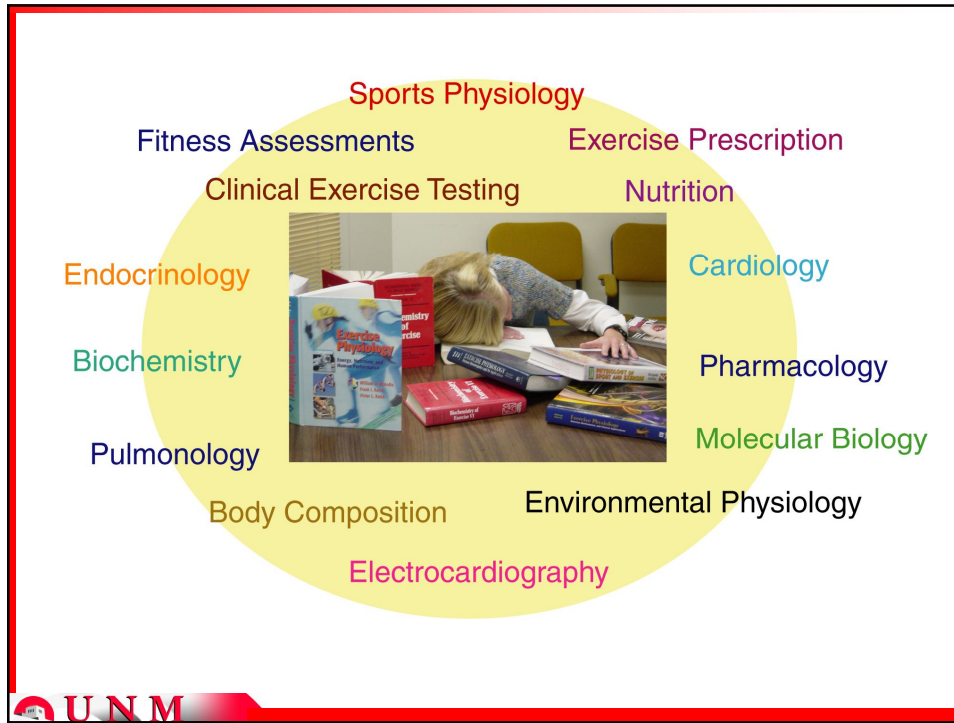
Metabolic Biochemistry
Skeletal
Cardiovascular
Pulmonary
Nutrition
Neuromuscular
Body Composition
Calorimetry
Pharmacology
Health and Disease
Exercise Testing and Prescription



APPLICATION

Exercise Modes
Exercise Intensities
Fitness Components
Environments
Special Populations
Age
Sex
Disease
Elite
Sports
Athletics

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Exercise Physiology Topic Curriculum	
<p>Basic Science Component</p> <ul style="list-style-type: none"> Computer Studies Sports Physiology Athletic Injuries Physics Math-Algebra Chemistry-Intro. Organic & Biochemistry Statistics Kinesiology Human Anatomy 	<ul style="list-style-type: none"> Resistance Exercise Exercise Biochemistry Exercise Physiology-Intro. Exercise Physiology-Adv. Growth and Development Laboratory Exercise Testing Clinical Exercise Testing Fitness Aerobics Instruction Exercise Prescription Exercise and Disease Prevention
<p>Exercise Physiology Component</p> <ul style="list-style-type: none"> Body Composition Electrocardiography 	<ul style="list-style-type: none"> Aging and Exercise Motor Development Professional Issues

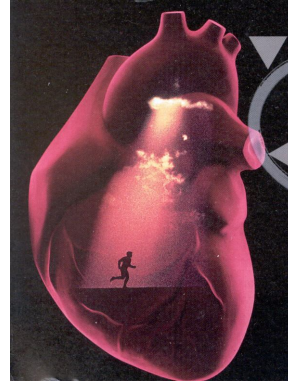
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Suggested undergraduate course content preparation for study in exercise physiology		
<i>Undergraduate</i>		
<i>Science Pre-requisites</i>	<i>Core Curriculum</i>	<i>Electives</i>
Human biology/physiology	Kinesiology	Molecular biology
Human anatomy	Historical and professional issues	Cell biology
Organic chemistry	Fitness assessment and exercise prescription	Calculus
Biochemistry	Clinical exercise testing	Trigonometry
Physics	Exercise and disease prevention	Nutrition
Algebra	Electrocardiography	Motor development
Biomechanics	Strength training and assessment	Computer programming
First Aid	Body composition	Business
Computer skills	Pediatric/Aging and Exercise	Sports administration
Human nutrition	Exercise physiology-Intro	Athletic injuries
	Exercise physiology-Advanced	Statistics
	Cardiac/Pulmonary/Diabetes rehabilitation	
	Personal training	
	Sports physiology	

Suggested graduate course content preparation for study in exercise physiology		
<i>Graduate</i>		
All undergraduate science and core curriculum	Exercise and metabolic biochemistry	Molecular biology laboratory techniques
	Environmental physiology	Epidemiology
	Advanced human physiology (neural, muscular, cardiovascular, pulmonary, endocrine, renal)	Pharmacology
	Advanced exercise physiology	Medical physiology
	Statistics- ANOVA, multiple regression, multivariate	
	Advanced laboratory techniques	
	Advanced clinical exercise testing	

What is Clinical Exercise Physiology?

A sub-component of exercise physiology that involves the application of exercise physiology principles, knowledge and skills for purposes of the **rehabilitation or diagnosis of disease or disability** in humans.



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Cardiovascular System

Central circulation

- Cardiac output (heart rate, stroke volume)
- Arterial blood flow
- Hemoglobin concentration

Peripheral circulation

- Flow to nonexercising regions
- Muscle blood flow
- Muscle capillary density
- Oxygen diffusion
- Oxygen extraction
- Hemoglobin-oxygen exchange

Respiratory System

- Oxygen diffusion
- Ventilation
- Alveolar ventilation: perfusion ratio
- Arteriovenous oxygen difference

Skeletal Muscle

- Enzymes and oxidative potential
- Energy stores and delivery
- Myoglobin
- Mitochondria size and number

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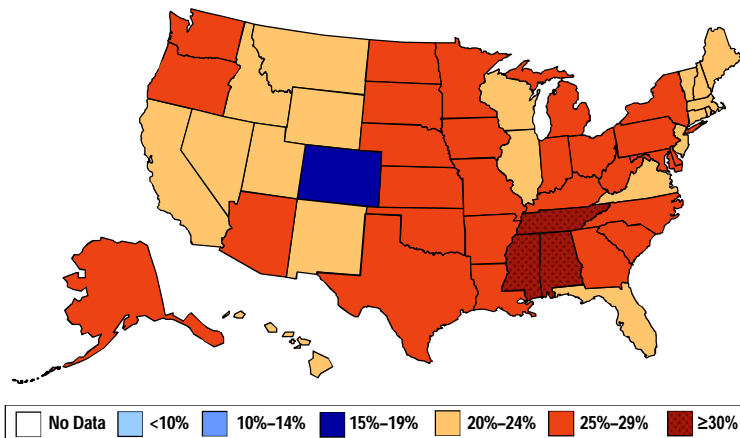
U.S. Health Status

- 5 leading causes of death - Heart, Cancers, stroke, COPD, unintentional
- population >65 years - 12%
- overweight adults - 65%
- obese adults - 28%
- highest obesity by race - 50% Non-Hispanic black women
- adult men and women who are inactive - 22% Men; 28% Women
- New Mexico's ranking for raising children - 48th
- population <65 years with no health insurance - 16%
- HS students not enrolled in PE - 53%



Obesity Trends* Among U.S. Adults BRFSS, 2007

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



New Frontiers in Exercise Physiology

In the future an exercise physiologist will be required to master the following:

- broad **pure science** academic base
(molecular biology, biochemistry, neurophysiology, cardiology, pulmonary physiology, endocrinology)
- broad **applied academic** base (body composition, exercise prescription, athletic/sport training)
- sophisticated **equipment & technologies**
- superior **research** skills





Professional Issues

Organizations	Web site
U.S.A.	
American Society of Exercise Physiologists (ASEP)	www.asep.org
American College of Sports Medicine (ACSM)	www.acsm.org
American Physiological Society (APS)	www.the-aps.org
American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR)	www.aacvpr.org
In addition, within the U.S. there are more than 300 additional organizations or businesses that certify candidates in the fitness industry regardless of university education qualifications	
Canada	
Canadian Society of Exercise Physiology	www.csep.org
Australia	
Australian Association of Exercise and Sports Sciences (AAESS)	www.aaess.com.au
Brazil	
Exercise and Fitness (ENAF) (personal trainers)	www.enaf.com.br
South Korea	
Korean Association of Certified Exercise Professionals (KACEP)	www.kacep.or.kr



ASEP EPC Exam




AMERICAN SOCIETY OF EXERCISE PHYSIOLOGISTS

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General Information

ASEP Mission Statement

The American Society of Exercise Physiologists, the professional organization representing and promoting the profession of exercise physiology, is committed to the professional development of exercise physiology, its advancement, and the credibility of exercise physiologists.

What is Exercise Physiology?

Exercise Physiology is the identification of physiological mechanisms underlying physical activity, the comprehensive delivery of treatment services concerned with the analysis, improvement, and maintenance of health and fitness, rehabilitation of heart disease and other chronic diseases and/or disabilities, and the professional guidance and counsel of athletes and others interested in athletics, sports training, and human adaptability to acute and chronic exercise.

Who is an Exercise Physiologist?

Exercise Physiologist is a person who has an academic degree in exercise physiology, or who is certified by ASEP to practice exercise physiology (via the Exercise Physiologist Certified exam (EPC)), or who has a doctorate degree with an academic degree or emphasis in exercise physiology from an accredited college or university.

ASEPNewsletter

The ASEPNewsletter is devoted to informative articles and news items about exercise physiology. It is a monthly magazine of news, opinions, professional issues and concerns, and events that shape exercise physiology. While it contains views and opinions of the Editor-In-Chief,

Announcements

ASEP Annual 2010 DUES

ASEP Student Research Grant Proposal

ASEP Student Research Grant Guidelines

The International Federation of Exercise Physiologists (IFEPE) was founded in 2009 with the Memorandum of Affiliation agreement between the American Society of Exercise Physiologists and the Indonesian Society of Exercise Physiologists. For more information, contact the ASEP National Office.

Exercise Physiology: An Allied Health Profession

ASEP Board of Directors and The Center for Exercise Physiology online approved the EPC Petition Guidelines for doctorate exercise physiologists to become Board Certified.

Advertisements

CAMRIS International is seeking a Physiologist II to support the Naval

Exercise Physiology Research Journals

Journal

Acta Physiologica Scandinavia

American Journal of Physiology (APS)

Canadian Journal of Applied Sports Sciences

European Journal of Applied Physiology

International Journal of Sports Medicine

International Journal of Sports Nutrition

Journal of Applied Physiology

Journal

Journal of Exercise Physiology_{online} (ASEP)

Journal of Physiology

Journal of Sports Medicine and Physical Fitness

Journal of Strength and Conditioning Research

**Medicine and Science in Sports and Exercise
(ACSM)**

**Professionalization of Exercise Physiology_{online}
(ASEP)**

Research Quarterly For Exercise and Sport

Sports Medicine

