

**MASTER OF SCIENCE IN STRENGTH TRAINING AND CONDITIONING
FACULTY OF SPORTS SCIENCES
RAJIV GANDHI UNIVERSITY**



SCHEME OF EXAMINATION, STRUCTURE & COURSE CONTENT

FOR THE DEGREE OF

Master of Science Strength Training & Conditioning

(A Central University)

Rono Hills: Doimukh

Arunachal Pradesh-791112

SYLLABUS DETAILS

Title of the Course: M. Sc. (Strength Training and Conditioning)

Duration of the Course: Two Years (Four Semesters)

Course Objective:

The concept behind introducing this program is based on to explore the ample opportunities present in field of sports training and conditioning. The concept is to prepare the experts who could be well equipped with knowledge of latest concept of fitness management and will be able to manage the fitness program of players at different levels and according to diversified requirement of sports. So that these trainer can incorporate with coaches and physio of teams to achieve the long and short term goal of the teams and players.

1. Develop Sports Scientist who can develop new means and methods of fitness training for sports.
2. Prepare experts of fitness training who can contribute to attaining desired level of fitness for teams and players.
3. Prepare experts of fitness training who will equipped with the knowledge of preparing long and short term training plan.
4. Course can prepare trainees in such a way where trainees will have adequate expertise to assess the fitness level of players as well as individuals with the help of standardized testing protocols.
5. Purpose of the course is to prepare trainers in such a way so that they can help coaches and team managers to prepare team long and short term strategies.
6. Motive of the course is to prepare trainee in such a way so that they could be efficient to manage a personalized fitness training structure according to requirement of different professions.
7. Empower trainees to inculcate standard teaching skills also so that they could explore the opportunities in teaching profession also, even they could be able to manage there own training centers, where they can prepare future trainers and fitness experts for requirement of sports and fitness industry.

Eligibility: Bachelor's Degree in Sports Science / Physical Education and Sports / One Year Diploma In Sports Coaching /One Year Diploma in Strength and Fitness Management/ One Year Diploma in Sports Nutrition as one of the course there to in 10+2+3 or 10+2+4 pattern from a recognized university with a minimum of 55% marks in aggregate with 5% relaxation for (SC/ST).

**Orientation of Courses: Four Semesters (2 years) for M. Sc. in
Strength Training and Conditioning**

Subject Code	Theory/ Practical	Paper Title	Marks		Credit
			External	Internal	
1st Semester					
MSSTC - CC:101	Theory	Human Anatomy and Physiology	80	20	4
MSSTC - CC:102	Theory	Kinesiology	80	20	4
MSSTC - CC:103	Theory	Principles and Methods of Sports Training	80	20	4
MSSTC - CC:104	Theory	Nutritional Requirement for Sports and Fitness	80	20	4
Elective (chose any one)					
MSSTC - EC:105	Theory	Sports Biomechanics	80	20	4
MSSTC - EC:106	Theory	Health Education and Weight Management	80	20	4
Practical					
MSSTC - PC:101	Practical	Human Anatomy and Physiology & Kinesiology	80	20	4
MSSTC - PC:102	Practical	Principles and Methods of Sports Training & Nutritional Requirement for Sports and Fitness	80	20	4
			700		28
2nd Semester					
MSSTC - CC:201	Theory	Fitness and Conditioning	80	20	4
MSSTC - CC:202	Theory	Performance Evaluation and Testing	80	20	4
MSSTC - CC:203	Theory	Applied Statistics in Sports Applied	80	20	4
MSSTC - CC:204	Theory	Research Methodology in Sports	80	20	4
Elective (chose any one)					
MSSTC - EC:205	Theory	Sports Genetics and Performance	80	20	4
MSSTC - EC:206	Theory	Sports Medicine, Physiotherapy and Rehabilitation	80	20	4
Practical					
MSSTC - PC:201	Practical	Fitness and Conditioning & Performance Evaluation and Testing	80	20	4
MSSTC - PC:202	Practical	Applied Statistics in Sports Applied & Research Methodology in Sports	80	20	4
		Total	700		28
3rd Semester					
MSSTC - CC:301	Theory	Applied Sports Physiology	80	20	4
MSSTC -	Theory	Motor Fitness Training	80	20	4

CC:302					
MSSTC - CC:303	Theory	Applied Psychology in Sports	80	20	4
MSSTC - CC:304	Theory	Dissertation	80	20	4
Elective (chose any one)					
MSSTC - EC:305	Theory	Motor Control in Sports	80	20	4
MSSTC - EC:306	Theory	Yoga and Fitness	80	20	4
Practical					
MSSTC - PC:301	Practical	Applied Sports Physiology	80	20	4
MSSTC - PC:302	Practical	Motor Fitness Training & Applied Psychology in Sports	80	20	4
		Total	700		28
4th Semester					
MSSTC - CC:401	Theory	Ergogenic Aids and Doping in Sports	80	20	4
MSSTC - CC:402	Theory	Sports Fitness Management	80	20	4
MSSTC - CC:403	Theory	Management of Gym and Fitness Centre	80	20	4
MSSTC - CC:404	Theory	Dissertation	80	20	4
Elective (chose any one)					
MSSTC - EC:405	Theory	Sports Management	80	20	4
MSSTC - EC:406	Theory	Sports Anthropometry	80	20	4
Practical					
MSSTC - PC:401	Practical	Ergogenic Aids and Doping in Sports & Sports Fitness Management	80	20	4
MSSTC - PC:402	Practical	Sports Anthropometry	80	20	4
		Total	700		28

**Detailed Syllabus for Two-year M. Sc. Course in Sports Training
Management, RGU, Rono Hills, Doimukh
1st Semester**

MSSTC-CC: 101: Human Anatomy and Physiology

Learning Outcome: Students will be ready to study effect of exercise in detail and in application perspective. Students will also be able to measure the changes and interpret them in the context of sports.

Unit: I (Skeleton System and Muscular System)

1. Skeleton System: Structure and functions of skeleton
2. Classification of Skeleton (according to structure and according to location)
3. Joints: Definition and function of joints, Classification and characteristics of joints
4. Bones articulation at different joints: Shoulder, Elbow, Knee, Ankle, Inter-vertebral joints, Wrist joint
5. Definition, classification and function of muscles
6. Classification of Skeleton Muscles: Structural and functional

Unit: II (Cardiorespiratory and Endocrine System)

1. Definition of Cardiorespiratory System
2. Components of Cardiorespiratory System
3. Structure and function of Heart
4. Structure and function of Lungs
5. Definition of Endocrine and Exocrine Gland
6. Location and Function of Endocrine Glands
7. Effect of Pituitary, Thyroid and Adrenal Gland on health of bone and muscles

Unit: III (Bioenergetics for Exercise)

1. Aerobic and Anaerobic Glycolysis
2. Aerobic and Anaerobic System during Rest and Exercise
3. Exercise and Thermal Stress
4. Physiology of Aquatic Strength Training

Unit: IV (Neural Control of Exercise Muscle)

1. Function of Nerve, The Nerve Impulse
2. Nerve to Nerve Synapses, Neuromuscular Junction
3. Motor Unit, All or Non Law, Neuromuscular Fatigue
4. Muscles Spindles

Unit: V (Effect of Exercise on Different Systems of Human Body)

1. Effect of Exercise on Skeleton System
2. Effect of Exercise on Muscular System
3. Effect of Exercise on Cardiovascular System
4. Effect of Exercise on Respiratory System
5. Effect of Exercise on Endocrine System

References:

1. Exercise Physiology by J. Stregemann : Geroge Thieme Verlag, Stuttgart, NY
2. Human Physiological work capacity by Shephard : Cambridege Univ., Press, NY
3. Principles of Anatomy & Physiology : Harper Collins Publisher.
4. Sports Physiology by E.L Fox : W.B. Saunde5rs Co., Philadelphia
5. The Autonomic Nervous System & Exercise by J. Hillary Green : Ms. Chapman & Hall Ltd., London
6. Exercise Physiology by William D. McArdle, Frank L. Katch and Victor L. Katch
7. Exercise Physiology for Health, Fitness and Performance by Sharon A. Plowman and Denise L. Smith, Wolters Kluwer Publisher
8. Physiology of Sports and Exercise by W. Larry Kenney, Jack H. Wilmore and David L. Costill, Human Kinetics Publication

MSSTC-CC: 102: Kinesiology

Learning Outcome: Students will be able to understand the interpretation of Kinesiological concept to understand the mechanics of fitness and how Kinesiological factors determine the fitness.

Unit: I

Foundations of Kinesiology

1. Definition, Importance in Human Motion Analysis.
2. Anatomical and Fundamental Standing Position
3. Terminology of Fundamental Movements
4. Posture: Meaning, Types and Factors affecting Posture
5. Importance of Good Posture.

Unit: II

Kinesiology of Skeletal System:

1. Functions of Skeleton System
2. Bone Growth and Development
3. Bone Hypertrophy and Atrophy
4. Function and Classification of Joints: Structural and Axial Classification
5. Articulation of Bones at different Joints: Shoulder joint, Elbow joint, Wrist joint, Hip joint, Knee joint and Ankle joint

Unit: III

Kinesiology of Skeletal Muscles:

1. Physiological Properties of Skeletal Muscles
2. Classification of Skeletal Muscles: Structural and Functional Classification
3. Types of Muscle Contraction, Muscle size and its effect on force production
4. Composition and Role of Tendons and Ligaments in Locomotion
5. Muscles Proprioception

Unit: IV

Kinesiology of Human Upper Extremities:

1. Muscles of Glenohumeral Joint, Movements at Glenohumeral Joint and muscles involvement in the movement
2. Muscles of Humeroulnar Joint, Movement at Humeroulnar Joint and muscles involvement in the movement
3. Muscles of Radiocarpal Joint, Movement at Radiocarpal Joint and muscles involvement in the movement

Unit: V

Kinesiology of Human Lower Extremities:

1. Muscles of Hip Joint, Movements at Hip Joint and muscles involvement in the movement
2. Muscles of Tibiofemoral Joint, Movements at Tibiofemoral Joint and muscles involvement in the movement
3. Muscles of Talocrural Joint, Movements at Talocrural Joint and muscles involvement in the movement

References:

1. Bruce Abernethy, Vaughan Kippers, Stephanie Hanrahan, Marcus Pandy, Ali McManus, Laurel Mackinnon. Biophysical Foundations of Human Movement 3 Edition. 2013; Human Kinetics.
2. Declan Connolly. Basic and Applied Sports Kinesiology. 2016; LWW
3. Hay, J. G. & Reid, J. G.(1988).Anatomy, Mechanics and Human Motion. Englewood Cliffs, N.J.: Prentice Hall Inc.
4. Peter Klavara. Foundations of Kinesiology Studying Human Movement and Health. 3rd Edition, 2007; Sport Books Publisher.
5. Susan J. Hall, Basic of Biomechanics. 4th Edition. 2004, McGraw Hill.
6. Terry Wood, Weimo Zhu. Measurement Theory and Practice in Kinesiology. 2006; Human Kinetics.

MSSTC-CC: 103:

Principles and Methods of Sports Training

Learning Outcome: Students will be able to understand the concept of sports training, they will be able to interpret the principles of training to prepare the training plan for beginners to elite players. Students will be able to manage the training load of players according to their fitness level and long term training goal.

Unit: I

1. Sports training, definition aim and characteristics
2. Sports performance: Definition, model structure, factors, performance structure, performance capacity and training structure.
3. General principles of sports training
4. Means and methods of sports training.

Unit: II

Judgment of Load:

1. Training Load: Definition, Types of Load and Supercompensation
2. Principles of Load Adaptation
3. Over Load: Cause and Effect of Over Load
4. Judgment of Load

Unit: III

Concept of Motor Fitness

1. Strength: Components and Factors of Strength
2. Speed: Components and Factors of Speed
3. Endurance: Components and Factors of Endurance
4. Flexibility: Components and Factors of Flexibility
5. Coordinative Abilities: Components and Factors of Coordinative Abilities

Unit: IV

Strategy & Tactic Training

1. Technique, skill & style, skill acquisition process
2. Factors affecting technique, skill and style
3. Relearning of technique and skill
4. Tactics nature of tactics and strategy, tactical action, tactical training

Unit: V

Planning and Periodization:

1. Periodization: Concept and Importance
2. Components of Periodization and Classification of Periodization
3. Training Session: Importance, types, structure, class organization and training session plan
4. Long term training process and its stages
5. Planning : definition principles of planning, formulation of a plan, planning of Micro, meso and macro cycles
6. Competition: Importance and types of competitions, competition system and direct preparation for a competition

References:

1. Beachle, T.R.: Earle, R.W.: Essentials of strength training and conditioning, NSCA Publication, 2000.
2. Bompa Tudor, O.: Theory and methodology of training: They key to athletic Performance, 1990.
3. Harre, D.: Principles of Sports Training. Sportsverlag, Berlin, 1988.
4. Kansal, D.K.: Test and measurement in sports and physical education, DVS Publication, New Delhi, 1996.
5. Matweyev, L.P.: Fundamentals of Sports training, Publication Moscow, 1984.
6. Michael Kent: The Oxford dictionary of sports sciences and medicine Oxford University Press, Inc., New York, 1994.
7. Scholisch, M.: Circuit Training, Sportvertag, Berlin, 1988
8. Singh, H.: Science of Sports Training. DVS Publication, New Delhi, 1991
9. Singh, H.: Sports Training: General Theory and methods, NIS, Patiala, 1984.

MSSTC-CC: 104:

Nutritional Requirement for Sports and Fitness

Learning Outcome: Students will be able to understand how nutrition determines fitness in and how different sports require different nutritional supplements. They will efficient to learn how medical condition of players may be considered as a factor to design proper diet plan.

Unit: I

Concept of Energy and Macronutrients in Sports

1. Concept of Energy, Energy Balance and Energy Imbalance
2. Balanced Diet and Mal Nutrition in respect to sports and fitness.
3. Nutritional Guidelines and Nutritional Requirements for players of different sports
4. Requirement of Carbohydrate - pre, during and post event/training.

5. Requirement and Importance of Proteins in different sports
6. Requirement and Importance of Fat in different sports

Unit: II

Micronutrient Supplements:

1. Role of vitamins and minerals in sports and fitness
2. Vitamins: Ergogenic role of B-complex vitamins, Vitamin B12 & folic acid, Vitamin D supplements
3. Mineral supplements: Calcium-Magnesium- Iron supplements, supplements, Electrolyte replacement drinks
4. Fluid and electrolyte requirements-Hydration strategies in athletes based on rules of the sport, available time and opportunities to hydrate on the field.

Unit: III

Water, Electrolyte and Fluid Balance in Sports Homeostasis and its maintenance

1. Hydration in Sports and Principles of Hydration Pre, during and post event/training
2. Symptoms of Dehydration & Use of rehydration in sports
3. Factors that affect water and electrolyte balance
4. Effect of dehydration on sports performance and fitness
5. Individual plan for fluid and electrolyte intake

Unit: IV

Benefits/Mechanism of Action and Applications of Herbal Supplements

1. Ergogenic Herbal supplements:-Ashwagandha, Rhodiola, Shilajit, Ginseng, Grape seed extract,
2. Herbal Testosterone-boosters (e.g. Tribulus terrestris, Nettle root, Long jack root etc)

Functional foods/phytochemicals

3. Green tea extract, Tart cherries, Caffeine, Curcumin, Phytosterols, Flavonoids, Beta-alanine, L-Carnitine

Unit: V

Nutritional Concerns for Players with Diseases

1. Anemia and osteoporosis
2. Diabetes mellitus
3. Hypertension, atherosclerosis
4. Gastro intestinal diseases-Peptic Ulcer, GI disturbance due to anxiety, IBS

References:

1. Aluko, R.E. (2012). Functional Foods and Nutraceuticals. Springer
2. Gibson, GR and William, CM. 2000. Functional foods - Concept to Product. Woodhead publishing.
3. Helms, E. R., Aragon, A. A., & Fitschen, P. J. (2014). Evidence-based recommendations for natural bodybuilding contest preparation: nutrition and supplementation. Journal of the International Society of Sports Nutrition, 11(1), 20.
4. Jeukendrup, A., & Gleeson, M. (2010). Sport nutrition: an introduction to energy production and performance (No. Ed. 2). Human Kinetics.
5. Manore, M., Meyer, N. L., & Thompson, J. (2009). Sport nutrition for health and performance. Human Kinetics.
6. McArdle, W. D., Katch, F. I., & Katch, V. L. (2009). Sports and exercise nutrition. Lippincott Williams & Wilkins
7. Mike Kane (2015) Sports Psychology: The Ultimate Guide For Mastering The Mental Aspects Of Sports Performance
8. Ranchordas, M. K., Rogerson, D., Ruddock, A., Killer, S. C., & Winter, E. M. (2013). Nutrition for tennis: practical recommendations. J Sports Sci Med, 12(2), 211-24.
9. Rankin J W, Nutrition for very high intensity sports in Sports Nutrition: A Practice manual for professionals edited by Marie Dunford 2006

10. Seebohar, B. (2011). Nutrition periodization for athletes: Taking traditional sports nutrition to the next level. Bull Publishing Company.
11. Slater, G., & Phillips, S. M. (2011). Nutrition guidelines for strength sports: sprinting, weightlifting, throwing events, and bodybuilding. Journal of sports sciences, 29(sup1), S67-S77.

MSSTC -EC: 105: Sports Biomechanics

Learning Outcome: Describe motion with precise, well defined mechanical understand and quantify linear and angular characteristics of motion. Understand the quantitative relationships between angular and linear motion characteristics of a rotating body

Unit: I

Introduction to Biomechanics

1. Meaning and definition of Sports biomechanics.
2. Importance of biomechanics in the field of Sports and Physical education.
3. Axis and Plane, Dynamics, Kinetics, Centre of gravity, Line of Gravity, Vector and Scalars
4. Linear kinematics-Distance, displacement, speed and velocity, acceleration

Unit: II

Principles of Biomechanics

1. Meaning and definition of motion, Newton's law of motion, Types of Motion: Linear motion, angular motion, circular motion, uniform motion.
2. Principles related to law of Inertia, Law of acceleration and law of counter force.
3. Meaning and definition of Force, Sources of force and force components,
4. Force applied at an angle –pressure-friction- Buoyancy. Spin, Centripetal and centrifugal force.

Unit: III

Biomechanics and Energetic

1. Meaning of work, power and energy. Kinetic energy and Potential energy,
2. Leverage- classes of lever and its practical application in sports. Equilibrium.
3. Factors influencing equilibrium. Guiding principle of Stability, Static and Dynamic stability.
4. Water resistance, Air resistance, Aerodynamics

Unit: IV

Biomechanical and Performance Analysis

1. Biomechanical analysis of various fundamental movements of Human body: Walking, jogging, Running, Pushing, Pulling jumping, Throwing.
2. Methods of analysis – Qualitative, Quantitative and predictive
3. Complex movement analysis in sports

References

1. Bruce Abernethy, Vaughan Kippers, Stephanie Hanrahan, Marcus Pandy, Ali McManus, Laurel Mackinnon. Biophysical Foundations of Human Movement 3 Edition. 2013; Human Kinetics.
2. Declan Connolly. Basic and Applied Sports Kinesiology. 2016; LW
3. Peter Klavara. Foundations of Kinesiology Studying Human Movement and Health. 3rd Edition, 2007; Sport Books Publisher.
4. Terry Wood, Weimo Zhu. Measurement Theory and Practice in Kinesiology. 2006; Human Kinetics.

MSSTC -EC: 106: Health Education and Weight Management

Learning Outcome: Through this paper the students will acquire knowledge about the nutrition and its components. The students will acquire knowledge regarding the relationship between nutrition and weight management.

Unit: I

Health Education and Health Problems

- 1 Concept, Dimensions, Spectrum, and Determinants of Health, Positive Health
- 2 Concept, Aims, Objectives, Scope, and Principle of Health Education,
- 3 Methods of Communication in Health Education
- 4 Communicable and Non-Communicable Diseases

Unit: II

Personal and Environmental Hygiene & Community Health

1. Nutrition and Environmental Sanitation, Medical Care
2. Population
3. Care of skin, mouth, nails, clothing, bathing etc., Importance of rest, sleep, and exercise
4. Brief account of housing, water supply, sewage and refuse disposal

Unit: III

Weight Management

1. Meaning of weight management Concept of weight management in modern era
2. Factor affecting weight management and values of weight management
3. Concept of BMI, WHR, WHtR
4. Common Myths about Weight Loss & Myth of Spot reduction

Unit: IV

Hazard of Obesity

1. Obesity – Definition, meaning and types of obesity,
5. Obesity - Causes and its hazard
2. Health Risks Associated with Obesity
3. Solutions for overcoming Obesity.

Unit: V

Steps in Weight Management Planning

1. Nutrition – Daily calorie intake and expenditure,
2. Determination of desirable body weight
3. Balanced diet for Indian School Children,
4. Maintaining a Healthy Lifestyle
5. Weight management program for sporty child,
6. Role of diet and exercise in weight management,
7. Design diet plan and exercise schedule for weight gain and loss

References:

1. Astrand, P.O. and Rodahl, K. (2003) Text book of Work Physiology Physiological basis of exercise. Hu- man Kinetics, USA.
2. Butryn, M.L., Phelan, S., & Hill, J. O. (2007). Consistent Self-Monitoring of Weight: a Key Component of Successful Weight Loss Maintenance. Obesity (Silver Spring). 15(12), 3091-3096.
3. C.L. Ghai (2013) A Textbook of Practical Physiology Jaypee Brothers Medical Publishers (P) Ltd. New Delhi.
4. De Maria, E. J. (2007). Bariatric Surgery for Morbid Obesity. N. Engl J Med, 356(21), 2176-2183.
5. Dixon, J.B., O'Brien, P.E., Play fair, J. (n.d.). Adjustable Gastric Banding and Conventional Therapy for type 2 Diabetes: A Randomized Controlled Trial. JAMA. 299(3), 316-323
6. Joseph P. Winnick and Francis X. Short. (2014) Brockport physical fitness test manual a health-related assessment for youngsters with disabilities.
7. K. Birch, D. MacLaren, K. George. (2005) Instant notes in sport and exercise physiology.

Garland Science/BIOS Scientific Publishers.

8. Scott Kline Powers, Edward T. Howley. Exercise Physiology Theory and Application to Fitness and Performance, 2012; McGraw-Hill, Boston
9. Scott Powers and Edward Howley (2014) Exercise Physiology Theory and Application to Fitness and Performance. McGraw-Hill Higher Education
10. Tudor Hale (2003) Exercise Physiology A Thematic Approach. John Wiley & Sons Ltd, England
11. Werner W.K. Hoeger, Sharon A. Hoeger (2010) Principles and Labs for Physical Fitness. Wadsworth, Cengage Learning.
12. William D. McArdle, Frank I. Katch, Victor L. Katch (2010) Exercise physiology nutrition, energy, and human performance. Lippincott Williams & Wilkins, Baltimore, USA.

Practical

MSSTC -PC: 101: Human Anatomy, Physiology & Kinesiology

1. Preparation of Model of Different Organs.
2. Identification of Bones: Axial, Appendicular
3. Identification of Synovial Joints and Understanding Movements around synovial Joints
4. Locating Major Muscles in the body
5. Analysis of muscles involve in different sports movements.
6. Measurement of heart rate and blood pressure during and after exercise.
7. Heart rate response recording during sporting activities. (To be carried out as project and on sports persons). At least three different sports are to be covered by each student)
8. Body Temperature monitoring before, during and after exercise.
9. Preparation of flow chart for different endocrine glands of human body.
10. Determining standard fundamental and anatomical standing position.
11. Identification of muscular contraction during different sports activities.

MSSTC -PC: 102: Principles and Methods of Sports Training & Nutritional Requirement for Sports and Fitness

1. Calculation of Training Load
2. Determining load intensity and volume
3. Graphical Presentation of Load adaptation principle
4. Analysis of players individual match strategy: PPT on analysis
5. Analysis of fitness requirement in sports: Wrestling, Judo, Hockey, Football, Badminton
6. Calculation of Caloric value of different foods
7. Calculation of daily caloric requirement of players
8. Determining liquid requirement:
 - According to sports

- According to weather
 - According to gender
9. Measurement of glucose level and its interpretation
 10. Measurement of Blood Pressure and its interpretation

Semester: II

MSSTC -CC: 201: Fitness and Conditioning

Learning Outcome: Students will be able understand the concept of Warm-up and will be able to utilize as according to requirement of different sports activity and according to individual requirement. They will be well prepared for designing fitness plan with proper blend of exercise and yogic practices.

Unit: I

Concept of Warm-up and Preparation of Warm-up Plan

1. Concept of Warm-up: Physical, Physiological and Psychological
2. General and Specific Warm-up (Targeted and Structured Warm-Ups)
3. Factors determining Warm-up Plan
4. Selection and inclusion of exercise and equipments for Warm-up session
5. Preparation of Individualized and Sports Specific Warm-up Plan
6. Warm-down: Physical and Physiological Concept and Importance of Warm-down to maintain the fitness

Unit: II

Concept Fitness:

1. Meaning and Definition of Fitness
2. Classification of Fitness: General, Specific and Sports Specific
3. Factors Determining Fitness: Children's, Adult Male & Female.
4. Significance of Fitness for sports persons and non-sports
5. Fitness Assessment

Unit: III

Resistance Training:

1. Definition, Uses and Principles of Resistance training
2. Evaluation of Strength (Maximum, Explosive, Strength Endurance & Relative Strength)
3. Modalities of Resistance Training:
 - Own Body weight.
 - Partner Resistance.
 - Free Weight.
 - Cybex Machine
 - Medicine Ball.
 - Elastic TheraBand
 - Water & Environmental Resistance Training
 - Core Stability and Balance Training
 - Variable-Resistance Training
4. Training Frequency, Exercise Order, Training Load and Repetitions Rest Periods

Unit: IV

Program Design and Technique for Plyometric Training

1. Mechanics and Physiology of Plyometric Training

2. Mode of Plyometric Training: Lower Body Plyometrics, Upper Body Plyometrics, Trunk Plyometrics and Aquatic Plyometric
3. Plyometric and Other forms of Exercise: Plyometric Exercise and Resistance Training and Plyometric and Aerobic Exercise
4. Equipment and Facilities for Plyometric training

Unit: V

Yogic Interventions for Fitness

1. Concept of Yogasana
2. Principles and Precautions of Asana Practice
3. Asana for Strength: Shoulder, Chest, Core, Back and Lower Back
4. Asana for Flexibility: Upper Extremities and Lower Extremities
5. Asana for Balance and Stability
6. Designing a Yogasana Plan for Strength, Flexibility, Balance and Endurance

References:

1. Bill Foran, High Performance Sports Conditioning.
2. Frank W. Dick, Sports Training Principles. 4th Edition, Friends Publication, 2006
3. G. Gregory Haff & N. Travis Triplett, Essentials of Strength Training and Conditioning. 4th Edition, Human Kinetics, 2016
4. Singh, H.: Science of Sports Training. DVS Publication, New Delhi, 1991
5. Beachle, T.R.: Earle, R.W.: Essentials of strength training and conditioning, NSCA Publication, 2000.
6. Susan Hollister. (2017). Yoga: The Top 100 Best Yoga Poses: Relieve Stress, Increase Flexibility, and Gain Strength,
7. Gregor Maehle. (2006). Ashtanga Yoga: Practice and Philosophy, Kaivalya Publications.

MSSTC –CC: 202: Performance Evaluation and Testing

Unit: I

Concept and Preparation of testing

1. Guidelines for Exercise Testing and Prescription,
2. Pre-test considerations
3. Risks associated with exercise testing
4. Risk stratification and medical clearance
5. Additional preparticipation assessments
6. Exercise testing and testing supervision recommendations
7. ACSM guidelines for when to stop a test
8. Medical emergency equipment

Unit: II

Cardiovascular Testing:

1. Risks of cardiac events during exercise testing
2. Calculation of HR MAX and 70% HR max depending on protocol for Adult and Old age Persons
3. Exercise Stress Testing for Diagnosis of CHD
4. Equations used to estimate aerobic power from TM protocols
5. Cycle ergometer protocols (arm and leg)
6. Equations used to estimate aerobic power from cycle ergometer protocols
7. CV endurance field tests
8. VO₂max testing

Unit: III

Motor Fitness Assessment:

1. Assessment of muscular endurance;
2. Assessment of flexibility;
3. Assessment of anaerobic power-
4. Mergaria power test, de Bruyn Prevost test;
5. Wingate test-Peak power output, Relative peak power output,
6. Anaerobic fatigue, Anaerobic capacity/power.
7. Running based Anaerobic Sprint Test (RAST)- Maximum power, Minimum power,
8. Fatigue index. Peak lactate and its importance in talent selection and transfer of talent, Changes of lactate peak during season,

Unit: IV

Monitoring of Athletes:

1. Athlete Monitoring and Analysis,
2. Time-motion analysis in sport;
3. Analysis of athlete tracking systems;
4. GPS and accelerometer analysis of training and competition;
5. Monitoring and analysis of sport-specific physical, physiological and psychological variables;
6. External sources of data relating to sports performance; reliability of data and sources.

Unit: V

Performance Analysis:

1. Use of performance indicators in performance analysis
2. Feedback based analysis of performance,
3. Sport-specific notational systems; computerized notational analysis; notation in individual sports; notation in team sports;
4. Augmented feedback through video-based technologies on Competitive sport;
5. Analysis of structures of sports informing performance indicators;

References:

1. Astrand, P.O. and Rodahl, K. (2003) Text book of Work Physiology Physiological basis of exercise. Human Kinetics, USA.
2. C.L. Ghai (2013) A Textbook of Practical Physiology Jaypee Brothers Medical Publishers (P) Ltd. New Delhi.
3. Joseph P. Winnick and Francis X. Short. (2014) Brockport physical fitness test manual a health-related assessment for youngsters with disabilities.
4. K. Birch, D. MacLaren, K. George. (2005) Instant notes in sport and exercise physiology. Garland Science/BIOS Scientific Publishers.
5. Scott Kline Powers, Edward T. Howley. Exercise Physiology Theory and Application to Fitness and Performance, 2012; McGraw-Hill, Boston.
6. Scott Powers and Edward Howley (2014) Exercise Physiology Theory and Application to Fitness and Performance. McGraw-Hill Higher Education
7. Tudor Hale (2003) Exercise Physiology A Thematic Approach. John Wiley & Sons Ltd, England
8. Werner W.K. Hoeger, Sharon A. Hoeger (2010) Principles and Labs for Physical Fitness. Wadsworth, Cengage Learning.
9. William D. McArdle, Frank I. Katch, Victor L. Katch (2010) Exercise physiology nutrition, energy, and human performance. Lippincott Williams & Wilkins, Baltimore, USA.

MSSTC –CC: 203: Applied Statistics in Sports

Learning Outcome: Students will be able to understand the basics of statistics and will be able to interpret the statistical techniques for research purpose.

Unit: I

Concept of Statistics:

1. Basic concepts of Statistics and Parameter
2. Parametric and Non- Parametric Statistics
3. Different Statistical Techniques

Unit: II

Parametric Statistics:

1. Dependent and Independent T-test
2. One Way ANOVA, Two Way ANOVA, Repeated ANOVA
3. One way ANCOVA
4. Correlation: Regression Analysis, Assumptions, Calculation, and Interpretation.

Unit: III

Non- Parametric Statistics:

Rank Correlation, Chi-Square, Mann Whitney U Test, Assumptions, Calculation, and Interpretation.

Unit: IV

Introduction of Statistical Software

1. Statistical Software Package: SPSS & SAS
2. Preparations of data file: Types of data, defining variables and its properties,
3. Data entry validating data.
4. Installing and starting the statistical package.
5. Computations of descriptive statistics and its interpretation.

Unit: V

Computing Statistical Techniques using the software:

1. Prepare the correlation matrix and compute partial and multiple correlations,
2. Regression analysis with step and step down methods,
3. Application of t, F and Z tests, one and two way Analysis of variance, Chi Square tests

References:

1. Dutta N.K. Fundamentals of Bio-Statistics. 2002; Kanishka Publishers, New Delhi.
2. Garrett ,H.E (2000) Statistics in Psychology and Education, Hyderabad: International Book Bureau
3. Gupta S.P. Statistical Methods. 2004; S. Chand & Sons, New Delhi
4. J. P. Verma(2012) Using SPSS: An Interactive Hands – On Approach, Sage South Asia
5. J. P. Verma(2015) Repeated Measures Design for Empirical Researchers, Wiley-Blackwell
6. Jerry R Thomas & Jack K Nelson (2000) Research Methods in Physical Activities; Illonosis; Human Kinetics;
7. Kamlesh, M. L. (1999) I Methodology in Physical Education and Sports, New Delhi
8. Rothstain A (1985) Research Design and Statistics for Physical Education, Englewood Cliffs: Prentice Hall, Inc
9. Ruud H. Koning and James H. Albert(2008) Statistical thinking in sports. Chapman & Hall/CRC, Taylor & Francis Group
10. Sivaramakrishnan. S. (2006) Statistics for Physical Education, Delhi; Friends Publication

MSSTC –CC: 204: Applied Research Methodology in Sports

Learning Outcome: Student will be able to understand the process of conducting research and will be able to conduct research activities for innovative knowledge and future growth

Unit: I

Basic concept of Research, types and Steps of Research

1. Methods of research
2. Hypothesis: Meaning, Basis, Types, Testing of hypothesis-
3. Type I Error, Type II Error, One Tailed Test and Two Tailed Test.

Unit: II

Sampling:

1. Sampling: Population, Sample, Sampling Techniques-
2. Probability Sampling and Non- Probability Sampling,
3. Size of sample and Sampling Error.
4. Variables and its classification.
5. Review of literature: Sources, types and importance.

Unit: III

Research Tools and Methods:

1. Research Tools: Characteristics, Types, Selection of appropriate tool
2. Construction and Standardization of tools-Reliability, Validity and Norms.
3. Experimental Research
4. Case Study
5. Normative Survey

Unit: IV

Ethical Issues in Research

1. Ethical issues in research:
2. Areas of scientific dishonesty;
3. Ethical issues regard copyright;
4. Scientific Misconduct;
5. Human Subjects.

Unit: V

Research Reporting:

1. Research Report and proposal: Quality Proposal;
2. Salient features of Proposal
3. Basic guidelines of Research Report;
4. Parts of research Reports.

References:

1. Barrow, H. M. (1979). Practical Approach to Measurement in Health & Physical Education. (3rd ed.). Philadelphia: Lee & Febigeer
2. Clark, D. H. & Clark, H. H. (1979). Research process in Physical Education, recreation & health. Englewood Cliffs: prentice Hall.
3. Johnson, B. & Christensen, L. (2008). Education Research, Quantitative, Qualitative and Mixed Approaches. (3rd ed.). Sage Publication: England.
4. Miller, David. K. (2002). Measurement by the Physical Educator. New York: McGraw Hill companies. John & Nelson (1998). Practical Measurements for Evaluation in Physical Education. Delhi: Surjit Publication.

5. Sprinthall, R. C. (1997). Basic statistical Analysis. (5th ed.). USA: Allyn & Bacon
6. Thomas, J. R. & Nelson, J. K. (2001). Research Methods in Physical Education, (4th ed.).USA: Human Kinetics.

MSSTC –EC: 205: Sports Genetics and Performance

Learning Outcome: Students will be able to learn the effect of genetics on human performance and fitness. Students will be able to prepare the training on basis of trainee genetic code.

Unit: I

1. Basic Genetic Concepts
2. Mendelian Inheritance
3. Population Genetics
4. Human Chromosome Karyotype
5. Chromosome Disorders

Unit: II

1. Genome Structure and Genetic Mapping,
2. Mitochondrial Inheritance,
3. The Genetic Code and Genetic Alterations,
4. DNA Injuries and Repair,
5. Monogenic and Polygenetic Diseases,
6. Molecular Diagnostics

Unit: III

1. Ethics of Genetic Testing and Research in Sport
2. Current Challenges and Directions to the Future
3. Genetic Modifications in Sports
4. Ethical Considerations of Genetic Manipulation in Sport
5. Gene Therapy and Gene Doping

Unit: IV

1. Connecting Sports and Genetics
2. The Genetics of Sports Injuries and Athletic Performance
3. Genetic Contributors to Hypertrophic Cardiomyopathy
4. Chronic Traumatic Encephalopathy
5. Different Classes of Performance Enhancing Genetic Variants.

Unit: V

1. Effect of Genetics in Team Sports
2. Effect of Genetics in Individual Sports
 - Combat Sports
 - Aquatics
 - Regulatory Sports
 - Racquet Sports
 - Athletics
3. Talent identification and Genetics

References:

1. Bruce R. Korf and Mira B Irons (2012) Human Genetics and Genomics, Wiley-Blackwell.
2. Elaine A. Ostrander, Heather J. Huson, and Gary K. Ostrander Genetics of Athletic Performance (2009) Annu. Rev. Genomics Hum. Genet. 2009.10:407–29.

3. Giuseppe Lippi, Umile Giuseppe Longo, Nicola Maffulli (2009) Genetics and sports, British Medical Bulletin 2010; 93: 27–47 DOI:10.1093/bmb/ldp007.
4. Guilherme JPLF et al (2014) Genetics and sport performance: current challenges and directions to the future, Rev Bras Educ Fís Esporte, (São Paulo) 2014 Jan-Mar; 28(1):177-93.
5. Lisa M. Guth and Stephen M. Roth (2013) Genetic influence on athletic performance, Curr Opin Pediatr. 2013 December; 25(6): 653–658. Doi:10.1097/MOP.0b013e3283659087.
6. Manu L Kothari, Lopa A Mehta, Sadhana S roychoudhury, (2009) Principles of Genetics, Universities Press.
7. Michael Posthum and Malcolm Collins (2016) Genetics and Sports, Karger Publisher.
8. Nicola Mafulli et al (2013) the genetics of sports injuries and athletic performance. Muscles, Ligaments and Tendons Journal, 3 (3): 173-189.
9. Ricki Lewis (2017) Human Genetics the basics, Routledge, ISBN:978-1-138-66801-0

MSSTC –EC: 206: Sports Medicine, Physiotherapy and Rehabilitation

Learning Outcome: Students will be able to understand the injuries and rehabilitation in sports. Concept of first aid, hydrotherapy, thermotherapy and different electrotherapeutic modalities

Unit: I

Sports Medicine:

1. Sports Medicine: Meaning, Definition, Aims, Objectives, Modern Concepts and Importance.
2. Athletes Care and Rehabilitation: Contribution of Physical Education Teachers and Coaches.
3. Need and Importance of the study of sports injuries in the field of Physical Education
4. Prevention of injuries in sports – Common sports injuries – Diagnosis –
5. First Aid – Treatment – Laceration – Blisters – Contusion – Strain – Sprain – Fracture – Dislocation and Cramps – Bandages – Types of Bandages – trapping and supports.

Unit: II

Physiotherapy

1. Definition – Guiding principles of physiotherapy
2. Importance of physiotherapy
3. Introduction and demonstration of treatments:
 - Electrotherapy
 - Infrared Rays
 - Ultraviolet Rays
 - Short Wave Diathermy.

Unit: III

Hydrotherapy:

1. Introduction and demonstration of treatments
2. Cryotherapy; types and its applications
3. Thermo-therapy:
 - Contrast Bath, Whirlpool Bath
 - Steam Bath
 - Sauna Bath
 - Hot Water Fomentation;
4. Massage: History of Massage – Classification of Manipulation (Swedish System) physiological Effect of Massage.

Unit: IV

Therapeutic Exercise:

1. Definition and Scope

2. Principles of Therapeutic Exercise – Classification, Effects and Uses
3. Therapeutic exercise – passive Movements (Relaxed, Forced and passive – stretching)
Active movements (concentric, Eccentric and static)

Unit: V

Application of the therapeutic exercise; Free Mobility Exercise

1. Shoulder, Elbow
2. Wrist and Finger Joints
3. Hips, Knee,
4. Ankle and Foot joints
5. Head and Neck exercises.

References:

1. Christine, M. D., (1999). Physiology of Sports and Exercise. USA: Human Kinetics.
2. Conley, M. (2000). Bioenergetics of Exercise Training. In T.R. Baechle, & R.W. Earle, (Eds.), Essentials of Strength Training and Conditioning (pp. 73-90). Champaign, IL: Human Kinetics.
3. David, R. M. (2005). Drugs in Sports, (4th Ed). Routledge Taylor and Francis Group.
4. Hunter, M. D. (1979). A Dictionary for Physical Educators. In H. M. Borrow & R. McGee, (Eds.), A Practical Approach to Measurement in Physical Education (pp. 573-74). Philadelphia: Lea & Febiger
5. Jeyaprakash, C. S., Sports Medicine, J.P. Brothers Pub., New Delhi, 2003.
6. Khanna, G.L., (1990). Exercise Physiology & Sports Medicine. Delhi: Lucky Enterprises.
7. Mathew, D.K. & Fox, E.L, (1971). Physiological Basis of Physical Education and Athletics. Philadelphia: W.B. Saunders Co.
8. Pandey, P.K., (1987). Outline of Sports Medicine, New Delhi: J.P. Brothers Pub.
9. Williams, J. G. P. (1962). Sports Medicine. London: Edward Arnold Ltd.

MSSTC –PC: 201: Fitness and Conditioning & Performance Evaluation and Testing

Practical:

Calculation of Relative Strength

Warm-up Drills:

- High-Knees - 10 yards down and back
- Heel-Ups – 10 yards down and back
- Forward Lunge with Elbow to Instep – 10 yards
- Side Lunge with Squat – 4 each side
- High Knee Foreleg Extension – 10 yards down slow, 10 yards back quick

Technique Fundamentals and Spotting:

- Handgrips for weight training
- Grip Width for weight training
- Stable Body and Limb Positioning
- Breathing Considerations
- Types of Exercises that Require Spotting
- Spotting Overhead Exercises
- Spotting Over-the-Face Exercises
- Spotting Considerations for Power Exercises

Number of Spotters:

- Communication between Athlete and Spotter
- Amount and Timing of Spotting Assistance

Spotting Techniques:

- Barbell Bench Press - Spotting Technique
- Dumbbell Incline Bench Press - Spotting Technique
- Barbell Standing Behind the Neck Shoulder Press Spotting Technique
- Barbell Back Squat - Spotting Technique with One Spotter

- Barbell Back Squat - Spotting Technique with Three Spotters

Plyometric Drills:

- Drop Jump
- Vertical Jump
- Tuck Jump
- Broad Jump with Vertical Jump
- Depth Jump
- Box Shuffle Step
- Double Box Shuffle Step
- Lateral Box Jump

Calculation of Target Heart Rate

Calculation and interpretation of VO₂ Max

Administration of Endurance, Flexibility, Speed and Agility test

MSSTC -PC: 202: Applied Statistics in Sports & Applied Research Methodology in Sports

Research Methods

- Types of Research
- Reviews of Literature
- Preparation of synopsis
- Methods of data collections (Preparation and data recording)
- Referencing (APA, MLA & Chicago)
- Plagiarism Software

Applied Statistics:

- Descriptive statistics (Central tendency, dispersion, CI, distribution test).
- Box plot, X-Y plot, fitting equations, non-linear plots, funnel plot.
- Student 't' test, ANOVA, ANCOVA.
- Correlation and regression (Linear), partial correlation, Logistic regression.
- Non-parametric tests (Chi, Kendall's Tau, Odds ratio, etc.) Application of Statistical software SPSS, STATISTICA etc.

Semester: III

MSSTC -CC: 301: Applied Sports Physiology

Learning Outcome: Enables the students to gain an overall understanding of human body functioning during exercise and thus provide appropriate nutrition/fuel. Students will be able to 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.

Unit 1

1. Physiology of Endurance Performance:
2. Cardiovascular control during exercise,
3. cardiovascular responses to endurance exercise,
4. Respiratory regulation during exercise,
5. Cardiovascular and respiratory adaptation to training.

Unit 2

1. Physiology of Strength Performance: Types of muscle fibers,
2. Generation of muscle force,
3. Factors influencing force generation,
4. Strength curve and rate of force development for various muscles

5. Resistance training, Periodization of resistance training development for various muscles.
6. Measuring muscular performance, Muscle size, Muscle hypertrophy and hyperplasia,
7. Physiological adaptation in response to resistance training, Delayed Onset Muscle Soreness (DOMS).

Unit 3

1. Environment and Exercise Thermoregulation,
2. Exercise in cold - physiological responses to exercise in cold,
3. Health risks during exercise in cold, and effect of cold on human performance.
4. Physiological changes in desert, heat illness, heat stroke
5. Exercise in hot environment- physiological responses to exercise in heat
6. Health risks during exercise in heat,

Unit 4

1. Exercise in high temperature and humidity; Human Adaptation
2. Hypobaric and Hyperbaric Condition Physiological changes in Hypobaric and Hyperbaric Condition,
3. Safety and management.
4. Exercise underwater; Pressure, O₂, CO₂, Temperature and Relative humidity,

Unit 5

1. The travelling athlete altitude- Altitude training
2. Effect of altitude on sports performance
3. Adaptation to altitude detraining.
4. Atmospheric requirements of Man in space

References:

- 1 Astrand, P.O. and Rodahl, K. (2003) Text book of Work Physiology Physiological basis of exercise. Human Kinetics, USA.
- 2 C.L. Ghai (2013) A Textbook of Practical Physiology Jaypee Brothers Medical Publishers (P) Ltd. New Delhi.
- 3 Joseph P. Winnick and Francis X. Short. (2014) Brockport physical fitness test manual a health-related assessment for youngsters with disabilities.
- 4 K. Birch, D. MacLaren, K. George. (2005) Instant notes in sport and exercise physiology. Garland Science/BIOS Scientific Publishers.
- 5 Scott Kline Powers, Edward T. Howley. Exercise Physiology Theory and Application to Fitness and Performance, 2012; McGraw-Hill, Boston
- 6 Scott Powers and Edward Howley (2014) Exercise Physiology Theory and Application to Fitness and Performance. McGraw-Hill Higher Education
- 7 Tudor Hale (2003) Exercise Physiology A Thematic Approach. John Wiley & Sons Ltd, England
- 8 Werner W.K. Hoeger, Sharon A. Hoeger (2010) Principles and Labs for Physical Fitness. Wadsworth, Cengage Learning.
- 9 William D. McArdle, Frank I. Katch, Victor L. Katch (2010) Exercise physiology nutrition, energy, and human performance. Lippincott Williams & Wilkins, Baltimore, USA.

Learning Outcome: Students will be able to understand the specific fitness requirements of different sports. It will help them to prepare a customized training program for sports persons related to the different nature of games.

Unit: I

Strength Training:

1. Role of Strength in Sports (Water, Combat, Team, Athletics, Racquet)
2. Testing of Strength
3. Modalities of Strength Training
4. Principles of Strength Training
5. **Periodization of Strength:**
 - Designing an Strength Program: Exercise Mode, Training Frequency, Training Intensity, Exercise Duration and Exercise Progression
 - Application of Program Design to Training Seasons: Off-Season, Preseason, In-Season (Competition) & Postseason (Active Rest)

Unit: II

Endurance Training:

1. Role of Endurance in Sports (Water, Combat, Team, Athletics, Racquet)
2. Testing of Endurance
3. Modalities of Endurance Training
4. Principles of Endurance Training
5. **Periodization of Strength:**
 - Designing an Endurance Program: Exercise Mode, Training Frequency, Training Intensity, Exercise Duration and Exercise Progression
 - Application of Program Design to Training Seasons: Off-Season, Preseason, In-Season (Competition) & Postseason (Active Rest)

Unit: III

Speed Training:

1. Role of Speed in Sports (Water, Combat, Team, Athletics, Racquet)
2. Testing of Speed
3. Modalities of Speed Training
4. Principles of Speed Training
5. **Periodization of Speed:**
 - Designing a Speed Program: Exercise Mode, Training Frequency, Training Intensity, Exercise Duration and Exercise Progression
 - Application of Program Design to Training Seasons: Off-Season, Preseason, In-Season (Competition) & Postseason (Active Rest)

Unit: IV

Flexibility Training:

1. Role of Flexibility in Sports (Water, Combat, Team, Athletics, Racquet)
2. Testing of Flexibility
3. Modalities of Flexibility Training
4. Principles of Flexibility Training
5. Periodization of Flexibility:
 - Designing a Flexibility Program: Exercise Mode, Training Frequency, Training Intensity, Exercise Duration and Exercise Progression
 - Application of Program Design to Training Seasons: Off-Season, Preseason, In-Season (Competition) & Postseason (Active Rest)

Unit: V

Coordinative Abilities Training:

1. Role of Coordinative Abilities in Sports (Water, Combat, Team, Athletics, Racquet)
2. Testing of Coordinative Abilities
3. Modalities of Coordinative Abilities Training
4. Principles of Coordinative Abilities Training
5. Periodization of Coordinative Abilities:
 - Designing a Coordinative Abilities Program: Exercise Mode, Training Frequency, Training Intensity, Exercise Duration and Exercise Progression
 - Application of Program Design to Training Seasons: Off-Season, Preseason, In-Season (Competition) & Postseason (Active Rest)

References:

1. Ackland, J. (2007). Endurance Training, Bloomsbury Publishing
2. Bill Foran, High Performance Sports Conditioning.
3. Frank W. Dick, Sports Training Principles. 4th Edition, Friends Publication, 2006
4. G. Gregory Haff & N. Travis Triplett. (2016) Essentials of Strength Training and Conditioning. 4th Edition, Human Kinetics.
5. Lee, E. B & Vance, A. F. (2015). Training for Speed Agility & Quickness, 3rd Edition, Human Kinetics
6. Singh, H. (1991). Science of Sports Training. DVS Publication, New Delhi
7. Tudor, O. B. (1999). Periodization Training for Sports, Human Kinetics
8. Walter, R. T. (2010). Resource for the Personal Trainers, 3rd Edition, Philadelphia

MSSTC -CC: 303: Applied Psychology in Sports

Learning Outcome: Students will be able to understand how psychology of players should be understood. Students will also learn to monitor players emotions and will be able to motivate them at right time.

Unit – I

Personality and Personality Assessment

1. Theories of personality
2. Personality and Sports
3. Personality assessment

Unit: II

Motivational Orientation in Sports

1. Athlete's needs of motivation
2. Motivational inhibitors
3. Motivational techniques
4. Sports Achievement Motivation and Assessment

Unit: III

1. Anxiety and Aggression in Sports

- Sports Anxiety (Trait and State Anxiety)
- Pre-competitive Anxiety
- Effect of PCA on performance
- Factors of Sports Anxiety and there Management

2. Sports Aggression

- Causes and Management of Sports Aggression
- Theories of aggression
- Role of Sports Aggression in Different Sports

Unit: IV

Intervention strategies in Sports:

1. Relaxation Procedures – Progressive Relaxation – Autogenic Training, Transcendental Meditation.
2. Biofeedback
3. Cognitive Strategies: Imagery, Thought Stopping and Centering, Self-Talk,
4. Psyching up strategies

Unit: V

Energy Management among Athletes:

1. Understanding Energy Management – Arousal affecting Performance, Effects of Under arousal and Over arousal in Performance
2. Developing Athlete Energy Management Skills
3. Phases in energy management – Education Phase, Acquisition Phase and Implementation Phase
4. Athletes choking under pressure, preparatory routines in self-paced events (Beginner to skilled athletes)

References:

1. Grafiti: Psychology in contemporary sports, Prentice Hall. Basmajian: Biofeedback
2. Morgan and King: Introduction to Psychology - Tata McGraw Hill.
3. Murphy, S.M. (1995), *Sport Psychology Interventions*, Human Kinetics, Auckland.
4. Sanjiv P. Sahni: Handbook of Sports Psychology – A comprehensive manual of Mental Training
5. Sport Psychology Intervention by Shane M Murphy, Human Kinetics
6. Suinn: Psychology in Sports: Methods and applications, Surjeet Publications.
7. Weinberg, R.S, Gould D (2003), *Foundation of Sport & exercise Psychology*, 3rd Edition, Human Kinetics, South Australia.

MSSTC -CC: 304: Dissertation

1. Review of Literature
2. Location of Research Problem
3. Selection of Research Problem
4. Formulation of Research Topic
5. Preparation of Synopsis
6. Presentation of Synopsis

References:

1. Best, J. W. Research in Education. U.S.A.: Prentice Hall.
2. Clark, H. H., & Clark, D. H. Research Process in Physical Education. Englewood Cliffs, New Jersey: Prentice Hall, Inc.
3. Jerry R Thomas & Jack K Nelson (2000) *Research Methods in Physical Activities*; Illonosis; Human Kinetics;
4. Kamlesh, M. L. (1999) *Reserach Methodology in Physical Education and Sports*, New Delhi
5. Rothstain A (1985) *Research Design and Statistics for Physical Education*, Englewood Cliffs: Prentice Hall, Inc

MSSTC -EC: 305: Motor Control in Sports

Learning Outcome: Students will be able to differentiate various Motor Learning Process

and describe the mechanism responsible for the movement. Develop an Understanding of how the body controls posture and the Factors of Inefficiency

Unit: I

Concept of Motor Control:

1. Basics of Motor Control
2. Concept of Motor Control
3. Concept of Motor Learning
4. Forms of Learning
5. Non Associative Learning
6. Associative Learning - Classical Conditioning, Operant Conditioning, Procedural and Declarative Learning

Unit: II

Physiology of Motor Control:

1. Physiology of Motor Control
2. Proprioception and Motor Control- Muscle Spindle, Stretch Reflex Loop, Golgi tendon organ, Joint Receptors
3. Vision and Motor Control
4. Action System-Motor Cortex and its Function
5. Role of Cerebellum and Basal Ganglia

Unit: III

Mechanism of Posture:

1. Posture and Balance Control
2. Defining the task and System of Postural Control
3. Motor Mechanism for Postural Control
4. Senses Contribution for postural Control
5. Adaption of Senses for Postural Control

Unit: IV

Performance and Motor Control:

1. Motor control and performance
2. Classification of Motor Skill
3. Performance Characteristics of Complex Skills
4. Causes of Inefficient Movement
5. Efficiency of Muscle

Recommended Books:

1. Cook A. Shumway, Woollacott Marjorie; Motor Control Theory and Practical Application Lippincott Williams & Wilkins, Baltimore USA
2. Perry J. Gait Analysis: Normal and Pathological Function. Thorofare, NJ:Slack Inc ., 1992
3. Schmidt RA , Motor Control and Learning 2nd Ed Champaign, IL: Human Kinetics , 1988
4. Winter A. David 1979 : Biomechanics of Human Movement John Wiley and Sons, Inc USA

MSSTC -EC: 306: Yoga and Fitness

Learning Outcomes: Students will be able to understand the philosophy of yoga and will be able to use yogic practices as per requirement of player's fitness (physical and mental) need

Unit: I

Concept of Yoga:

1. Meaning and Importance of Yoga for Sports and Fitness
2. Principles of Yoga Practice
3. Concept of Astanga Yoga

4. Implication of Yama and Niyama to attain the appropriate fitness level
5. Concept of Breathing Practices

Unit: II

Philosophy of Pranayama:

1. Concept and Components of Pranayama
2. Principles and Preparation of Pranayama
3. Classification of Pranayama
4. Implication and effect of Pranayama for mental and physiological fitness

Unit: III

Philosophy of Asana:

1. Concept and Precaution of Asana practice
2. Principles and Preparation of Asana
3. Classification of Asana
4. Asana as a mean for fitness
5. Physical and Physiological Effect of Asana on fitness

Unit: IV

Meditation for Mental Fitness

1. Foundation of Meditation
2. Preparation for Meditation
3. Regulation of Mind
4. Classification of Meditation
5. Importance and use of Meditation in sports

Unit: V

Relaxation Techniques for Fitness:

1. Yog Nidra
2. Yogic Massage
3. Pranayama Practices
4. Visualization
5. Self Directory Relaxation

References:

1. Dean Pohlman. (2018). Yoga Fitness for Men: Build Strength, Improve Performance, and Increase Flexibility. 1st Edition, DK
2. Iyengar B.K.S. (1985). Light on Prānāyāma: The Yogic Art of Breathing. Crossroad; First Thus Used edition
3. Iyengar B.K.S. (2013). Yoga: The Path to Holistic Health. DK; Revised edition
4. Iyengar B.K.S.: Light on Yoga
5. Swami Rajarshi Muni (2007). Classical Hatha Yoga. Life Mission Publications
6. Yoga Mind and Body. (2008). Sivananda Yoga Vedanta Centre

MSSTC -PC: 301: Applied Sports Physiology

Practical:

- Estimation of Target Heart Rate
- Measurement of blood hemoglobin (Hemometer)
- Estimation of energy cost of exercise Blood pressure measurement (sphygmomanometer, blood pressure, apparatus electronic)
- Measurement of aerobic and anaerobic power
- Measurement of Respiratory rate (Spirometry)
- Electromyography

- Heart rate response recording during sporting activities. (To be carried out as project and on sports persons). At least three different sports are to be covered by each student)
- Cardio-pulmonary resuscitation practice on Human Mannequin

MSSTC -PC: 302: Motor Fitness Training & Applied Psychology in Sports

Motor Fitness Training:

- Measurement and analysis of motor skills
- Reaction Time
- Hand eye co-ordination,
- Foot-Eye Coordination,
- Hand-Foot Eye Coordination
- Preparing Schedule of various training components
- Planning of Training Session for age group
- Periodization of Strength
- Periodization of Endurance
- Periodization of Speed
- Periodization of Coordinative Abilities

Applied Psychology in Sports:

- Measurement of Personality and Personality Profile (Questionnaire – Big Five and EPQ-R) Assessment of Sports Anxiety (STAI by Spielberger, Martens, SCAT)
- Measurement of Motivation (Incentive Motivation, SMS-28, Achievement Motivation) Measurement of aggression.
- Stress management techniques
- Coping Strategies assessment
- Goal setting techniques (Task and Ego Orientation)
- Relaxation Procedures
- Biofeedback Training
- Developing Schedule for Athletic management, Preparation of PST Programme
- Strategies for relaxation and activation
- Designing and implementing PST programme

Semester: IV

MSSTC -CC: 401: Ergogenic Aids and Doping in Sports

Learning Outcomes: Students will be able to understand the interpretation of ergogenic aids as per requirement of athletes. Students will also learn about the consequences of doping. Students will be able to teach their athletes about an important clause of WADA.

Unit: I

Concept of Ergogenic:

1. Introduction to Ergonomics
2. Ergonomical Risk Factors in Sports
3. Physical Properties of Human Structures
4. Environmental Stress, Circadian Rhythms and Sports training
5. Ergonomics Models and Training Modes in Sport

Unit: II

Sports and Ergogenic:

1. Influence of Sports Equipment and Playing Surfaces on Performance
2. Ergonomics in Physical Activities

3. Clinical Aspects in Sports Ergonomics
4. Holistic and Nutritional Ergonomics Perspective

Unit: III

Unethical Approach of Ergogenic:

1. Ergogenic Aids in Sports
2. Researching Ergogenic Aids
3. Nutritional Ergogenic Aids
4. WADA and NADA
5. Anti-Doping Codes and Drug Testing

Unit: IV

Doping:

1. Prohibited Substances and Techniques
2. Recants of Doping:
 - Blood Doping
 - Gene Doping
 - Herbal Doping
3. Whereabouts Clause of WADA

Unit: V

Clauses of Doping:

1. Prohibited List of Substances
2. Therapeutic Use Exemption
3. Consequences of Anti-Doping Rule Violations
4. Sample Collection Process
5. B Sample Process

References:

1. A Textbook of Sports & Exercise Physiology by Dey Swapan Kumar, Jaypee Publishers
2. Ergonomics in Sport and Physical Activity Enhancing Performance and Improving Safety by Thomas Reilly, Human Kinetics, 2010
3. Handbook of Ergonomics in Sport and Exercise Edited by Youlian Hong, Routledge 2013
4. Physiology of Sport and Exercise 6th Edition with Web Study Guide-Loose-Leaf Edition by W. Larry Kenney, Jack Wilmore, David Costill
5. WADA Anti Doping Code
6. WADA Athlete Reference Guide

MSSTC -CC: 402: Sports Fitness Management

Learning Outcome: Students will be able to understand the requirement of fitness level in different sports and will be able to differentiate the training plan according to nature of sports activity.

Unit: I

Concept of Sports and Specific Fitness

1. Concept of Sports and Classification of Sports
2. Factors of Sports Performance: Physical, Physiological, Psychological & Nutritional
3. Concept of Fitness and Sports Specific Fitness
4. Correlation of Fitness with Sports Performance

Unit: II

Fitness Management in Team Sports

1. Analysis of Fitness in Hockey
2. Analysis of Fitness in Football
3. Analysis of Fitness in Cricket

4. Analysis of Fitness in Kabaddi
5. Analysis of Fitness in Basketball, Volleyball and Handball
6. Preparation of Fitness Management Plan for (Hockey, Football, Cricket, Kabaddi, Basketball, Volleyball & Handball)

Unit: III

Fitness Management in Racquet Sports

1. Analysis of Fitness in Badminton
2. Analysis of Fitness in Squash
3. Analysis of Fitness in Lawn Tennis
4. Analysis of Fitness in TT
5. Preparation of Fitness Management Plan for (Badminton, Squash, Lawn Tennis & TT)

Unit: IV

Fitness Management in Combat Sports

1. Analysis of Fitness in Boxing
2. Analysis of Fitness in Wrestling
3. Analysis of Fitness in Judo & Taekwondo
4. Analysis of Fitness in Fencing
5. Preparation of Fitness Management Plan for (Boxing, Wrestling, Judo, Taekwondo & Fencing)

Unit: V

Fitness Management in Athletics & Aquatics Sports

1. Analysis of Fitness in Sprint Event
2. Analysis of Fitness in Middle and Long Distance Running Event
3. Analysis of Fitness in Throwing Event
4. Analysis of Fitness in Jumping Event
5. Analysis of Fitness in Water Polo & Swimming
6. Preparation of Fitness Management Plan for (Sprint Event, Middle and Long Distance Running Event, Throwing Event, Jumping Event, Water Polo and Swimming)

References:

1. Gary Todd. (2013). Greatest Ever Boxing Workouts, John Blake Publishing, Limited
2. Thomas Hauser. (2009). The Boxing Scene, Temple University Press
3. Thomas Hauser. (2016). A Hard World: An Inside Look at Another Year in Boxing, University of Arkansas Press
4. Darren Yas Parr. (2018). Strength and Conditioning for Combat Sports, The Crowood Press
5. Combat Conditioning: Functional Exercises for Fitness and Combat Sports. (2000). Matt Furey Enterprises
6. Richard Blagrove. (2015). Strength and Conditioning for Endurance Running, Crowood
7. John Shepherd. (2015). Strength Training for Runners: Avoid injury and boost performance, Bloomsbury Publishing
8. Mark Jarvis. (2013).
9. Strength and Conditioning for Triathlon: The 4th Discipline, A&C Black
10. Keith Barker, Debby Sargent. (2018). Strength and Conditioning for Female Athletes, The Crowood Press

Learning Outcome: Students will be able to understand the current challenges in fitness industry and may prepare technically to overcome these challenges. Students may efficiently manage the health and fitness center.

Unit: I

Health and Fitness Industry

1. Introduction and History of Health and Fitness Industry
2. Ideal Fitness Centre
3. Program offering
4. Facilities type
5. Career opportunities
6. Current issues
7. Health club
8. Structure & planning of health & fitness clubs.
9. Theory of Jacuzzi, chilled shower and their effects.
10. Theory of steam bath, contrast bath and their effects.
11. Theory of sauna bath and its effects.

Unit: II

Management and Manager

1. Managerial Knowledge based skills
2. Understanding Traditional Manager Functions
3. Implementing of the management process
4. Health Club / Gym membership and its types

Unit: III

Safety and Legal Issue

1. Facility and Equipment layout
2. Facility and Equipment Maintenance
3. The Legal system (Law division, Contract law etc)
4. Legal duties of Personal Trainer
5. Protective legal document

Unit: IV

Marketing and Sales

1. Marketing, advertising and sales responsibility
2. Marketing and sales process
3. Service Desk Responsibility & Public Relation
4. Marketing & Promotion
5. Purchasing Health Fitness Equipment
6. Maintaining Health Fitness Equipment

References:

Bolitho, S. & Conway, P. (2014). The Complete Guide To Fitness Facility Management, Bloomsbury Press

Bolitho, S. & Conway, P. (2015).The Complete Guide to Fitness Facility Management, Bloomsbury Publishing

Mike Bates. (2008).Health Fitness Management: A Comprehensive Resource for Managing and Operating Programs and Facilities, Human Kinetics

Paul Conway. (2015). Complete Guide to Fitness Facility Management, Bloomsbury Publishing PLC

S Dr. Tyagi. (2016). The Gym Management, Friends Publication, India

MSSTC -CC: 404: Dissertation

1. Collection of Data
2. Calculation and Interpretation of Data
3. Discussion of Findings

4. Conclusion and Recommendations
5. Presentation of Findings and Viva-voce

References:

1. Garrett ,H.E (2000) Statistics in Psychology and Education, Hyderabad: International Book Bureau
2. J. P. Verma(2012) Using SPSS: An Interactive Hands - On Approach, Sage South Asia
3. J. P. Verma(2015) Repeated Measures Design for Empirical Researchers, Wiley-Blackwell
4. Rothstain A (1985) Research Design and Statistics for Physical Education, Englewood Cliffs: Prentice Hall, Inc
5. Sivaramakrishnan. S. (2006) Statistics for Physical Education, Delhi; Friends Publication

MSSTC -EC: 405: Sports Management

Learning Outcome: Understanding the process of organizing Sports Events. Identify importance of scale in planning and managing Sports Events. Conceive, plan, execute and evaluate a Sports Event.

Unit: I

Meaning, Features & Strategic Planning

- 1 Introduction to Sports Event Management
- 2 Planning Process – Features & Limitations of Planning
- 3 Steps of Implementation of Strategy
- 4 Growth, Challenges, & Future of Sports Events in India

Unit: II

Functions of Sports Management

1. Organizing Functions of Sports Management
2. Directing Functions of Sports Management
3. Defining & Developing Objectives for Sports Events
4. Designing & Executing Sports Marketing Plan

Unit: III

Sports Budgeting & Sponsorship

1. Stages of Budgeting Process
2. Identifying Revenue Streams
3. Event Operation Cost
4. Sponsorship

Unit: IV

Sports Event Review and Evaluation

1. Reviewing the games – Post games Review
2. Post-event promotions and media coverage
3. Following-up with Sponsors; Post-event Debriefing
4. Evaluating objectives and outcome of Sport Event

References:

1. Allen, L.A.(1958) Management and Organization,Mc-Graw Hill Book Company, Inc., London.
2. Bucher, C.H.(1983) Administration of Physical Education and Athletic Programmes, The C.V. Mosby Company, London.

3. Huges, W.L. et. al. (1962) Administrative of Physical Education, The Ronald Press, Company, New York.
4. Jackquelyn Cuneed & M. Joy Sidwell, (1994) Sports Management Field Experiences, Fitson Information Technology; Inc.
5. Larry Horine, (1991) Administration of Physical Education and Sports, Wm.C. Brown Publishers (IInd Edition).
6. Rober L. Mathis & John H. Jackson (2000) Human Resource Management (Ninth Edition) South Western College Publishing.
7. Venderzwaq, H.J. (1935) Sports Management in Schools and Colleges, McMillan Publishing Company, New York.
8. Zeigler, E.M. and Dewie, G.W. (1983) Management Competency Development in Sports and Physical Education, Lea and Febiger, Philadelphia.

MSSTC -EC: 406: Sports Anthropometry

Learning Outcome: Student will be able to understand the concept of somatotyping and its relation with fitness and sports performance. Students will be able to measure the different segments of body and can use for training purpose.

Unit: I

Concept of Anthropometry:

1. Introduction, scope and general considerations.
2. Application of anthropometric data in sports.
3. Analysis within and between sports.
4. Static and Dynamic body measurements pertinent to
5. Sports Anthropometry.

Unit: II

Anthropometric Measurement:

1. Anthropometric Measurements and Procedures,
2. Equipment for anthropometric measurements,
3. Gross Body Measurements and procedures,
4. Measurements and procedures: Length of Body Parts
5. Measurements and procedures: Diameters of Body Parts,
6. Measurements and procedures: Circumferences of Body Parts
7. Measurements and procedures: Skinfold Measurement

Unit: III

Maturity Measurement:

1. Physiological Maturation
2. Decimal age and concept of Physiological maturity in sports.
3. Measures of maturity.
 - Assessment of skeletal maturity of athletes.
 - Age-based competitions and the maturity status.
 - Prediction of adult height and its applications.
4. Importance in sports and various methods to estimate body composition,

Unit: IV

Body Classification:

1. The Heath-Carter method of Somatotyping.
2. Classification of Somatotypes
3. Somatochart and Somatoplot.
4. Somatotypes of Athletes.

Unit: V

Anthropometric Estimation:

1. Sport specific anthropometric measurements.
2. Estimation of muscle mass.
3. Estimation of bone mass.

4. Estimation of fat mass.

References:

1. Clarke, H. H. and Clarke, D. H. (1987). Application of Measurement to physical Education. 6TH ed, Prentice – hall Inc
2. Johnson, B. L. and Nelson, J. K. (1982). Practical Measurement for Evaluation in Physical Education. Delhi : Surjeet Publications.
3. Kinanthropometry by Roger Eston and Thomas Reilly, E & F.N. SPON, London.
4. Kinanthropometry by S.P. Singh and P. Malhotra, Luna Publication, Patiala.
5. Physique and Selection of Sportsmen by H.S. Sodhi and L.S. Sidhu.
6. Skeletal Maturity by S.P. Singh, L.S. Sidhu, and J. Singh, Human Biology Publication Society, Punjabi University, Patiala
7. Sports Anthropometry by H.S. Sodhi, ANOVA Publication.

MSSTC -PC: 401: Ergogenic Aids and Doping in Sports & Sports Fitness Management Practical:

- Identification of Different mean of Ergogenic Aids
- Preparing list of Steroids
- Preparing list of Diuretics and Beta Blockers
- PPT on fitness components analysis of Cricket, Football, Hockey, Basketball, Handball, Kabaddi
- PPT on fitness components analysis of Boxing, Wrestling, Judo, Taekwondo & Fencing
- PPT on fitness components analysis of: Badminton, Lawn Tennis, TT, Sqash
- PPT on fitness components analysis of Athletics and Aquatic Sports
- Measurement of Strength (Explosive, Maximum and Strength Endurance)
- Measurement of Endurance
- Measurement of Speed (Reaction Ability, Movement of Speed, Acceleration Ability)
- Determining intensity and volume
- Determining recovery

MSSTC -PC: 402: Management of Gym and Fitness Centre & Sports Anthropometry Practical:

- Identification and familiarity with equipments
- Measurement of Flexibility (Different joints)
- Measurement of Girth
- Measurement of Height and sitting Height.
- Measurement of Biacromial Diameter (Shoulder Width)
- Measurement of Humerus Bicondylar Diameter (Elbow Width)
- Measurement of Chest Circumference Normal and Maximal)
- Measurement of Body Mass Index.
- Evaluation of Percent Body Fat and Lean Body Mass by the through skin fold (Durnin and Rehman chart)
- Measurement of Bone length
- Measurement of Skin fold
- Measurement of Head Circumference
- Measurement of Body Composition (BOEI)
- Measurement of Bone Density (DEXA)
- Determination of Body Type through Heath and Carter Method
- Preparation of Heath and Carter Method Chart

