REVA UNIVERSITY
Bengaluru, India

School of Allied Health Sciences

B. Sc. Sports Science

HANDBOOK Batch 2022

Academic Year 2024-2025

SCHOOL OF ALLIED HEALTH SCIENCES

B.Sc Sports Science Program

Hand Book

2022-25

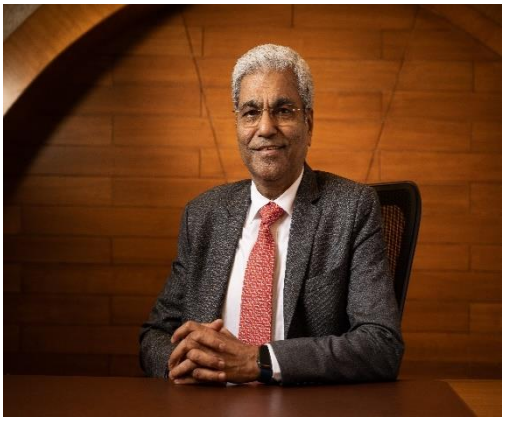
Rukmini Knowledge Park,
Kattigenahalli, Yelahanka, Bangalore-560064
Phone No: +91-080-66226622, Fax: 080-28478539

Rukmini Educational
Charitable Trust

www.reva.edu.in

Chancellor's Message

"Education is the most powerful weapon which you can use to change the world."
- Nelson Mandela.



There was a time when survival depended on just the realization of physiological needs. We are indeed privileged to exist in a time when 'intellectual gratification' has become indispensable. Information is easily attainable for the soul that is curious enough to go look for it. Technological boons enable information availability anywhere anytime. The difference, however, lies between those who look for information and those who look for knowledge.

It is deemed virtuous to serve seekers of knowledge and as educators it is in the ethos at REVA University to empower every learner who chooses to enter our portals. Driven by our founding philosophy of 'Knowledge is Power', we believe in building a community of perpetual learners by enabling them to look beyond their abilities and achieve what they assumed impossible.

India has always been beheld as a brewing pot of unbelievable talent, acute intellect and immense potential. All it takes to turn those qualities into power is a spark of opportunity. Being at a University is an exciting and rewarding experience with opportunities to nurture abilities, challenge cognizance and gain competence.

For any University, the structure of excellence lies in the transitional abilities of its faculty and its facility. I'm always in awe of the efforts that our academic board puts in to develop the team of subject matter experts at REVA. My faculty colleagues understand our core vision of empowering our future generation to be ethically, morally and intellectually elite. They practice the art of teaching with a student-centred and transformational approach. The excellent infrastructure at the University, both educational and extra-curricular, magnificently demonstrates the importance of ambience in facilitating focused learning for our students.

A famous British politician and author from the 19th century - Benjamin Disraeli, once said 'A University should be a place of light, of liberty and of learning'. Centuries later this dictum still inspires me and I believe, it takes team-work to build successful institutions. I welcome you to REVA University to join hands in laying the foundation of your future with values, wisdom and knowledge.

Dr. P. Shyama Raju
The Founder and Hon'ble Chancellor, REVA University

Vice-Chancellor's Message

Higher education in India has seen remarkable growth, blending traditional wisdom with modern innovation. With a rich history of prestigious universities, the sector has expanded to meet international standards. Interdisciplinary studies and technological integration are transforming learning and research. India is committed to providing quality education, preparing a skilled and knowledgeable workforce for global challenges.

At REVA University, we live by the principle that "Knowledge is Power." We are committed to delivering top-notch education, nurturing young minds with ethical and moral values, and enhancing their leadership, research, and innovative skills. Our sprawling 45-acre green campus, a true 'temple of learning,' boasts state-of-the-art infrastructure that fosters a superior teaching-learning environment and cutting-edge research. Our mission is to offer higher education of global standards, with programs designed to meet international benchmarks. Our highly experienced and qualified faculty, dedicated to fostering a student-centric learning environment through innovative teaching methods, are the backbone of our University.

REVA University's programs follow the Choice Based Credit System (CBCS) with an Outcome-Based Approach. Our flexible curriculum is tailored with industry-specific goals in mind, allowing educators to adapt the syllabus with the latest knowledge and inspire students' creativity. Our curriculum, benchmarked against top institutions, is a collaborative effort of esteemed faculty, industry experts, and research organizations. Our evaluation system emphasizes continuous assessment with grade point averages, ensuring it meets the aspirations of all stakeholders—students, parents, and employers.

Research, consultancy, and innovation are the pillars of success at REVA University. Our faculty members actively engage in research, attracting funded projects from prestigious organizations like DST, VGST, DBT, DRDO, AICTE, and industries. These research outcomes are shared with students through live industry projects. We nurture students' entrepreneurial spirit through EDPs and EACs.

We have forged strong partnerships with leading industries to bridge the gap between academia and the industry. Regular industry visits and mandatory internships equip our students with industry-relevant skills. Our structured training programs in soft skills and competitive exam preparation enhance students' employability. The 100% placement rate for eligible students is a testament to the effectiveness of these programs. Our entrepreneurship development activities and “Technology Incubation Centres” provide full support to budding entrepreneurs, helping them turn their ideas into successful enterprises.

With a firm belief in Albert Einstein "Education is not the learning of facts, but the training of the mind to think" we are confident that REVA University is on the right path, offering holistic education to future generations and contributing positively to nation-building. We are committed to providing top-quality education accessible to all, fostering overall personality development, and creating “GLOBAL PROFESSIONALS.”

Welcome to REVA University!

Dr. N.Ramesh

I/c Vice Chancellor, REVA University

Head of the Department's Message

Welcome to the Department of Sports & Exercise Science at REVA University!

As Joe Paterno rightly said, "The will to win is important, but the will to prepare is vital." This quote encapsulates the essence of our Sports & Exercise Science program. We believe that success in sports science, like in any field, hinges not only on the desire to achieve but also on meticulous preparation.

Our program is designed to equip you with the knowledge, skills, and practical experience necessary to excel in the dynamic field of sports science. From human movement and exercise physiology to sports nutrition and biomechanics, our curriculum integrates theoretical learning with hands-on experience. We emphasize rigorous preparation through practical sessions, research opportunities, and industry collaborations, ensuring that you are well-prepared for the challenges and opportunities in sports and exercise science.

Our dedicated faculty members are committed to your academic and professional development, providing expert guidance and fostering an environment that encourages innovation, critical thinking, and ethical practice. With access to state-of-the-art facilities and resources, you will have every opportunity to maximize your potential and make a significant impact in the field.

I look forward to seeing you thrive and succeed in the Department of Sports & Exercise Science at REVA University.

Dr.S.Srividhya

HOD, Department of Sports & Exercise Science

PREFACE

Higher education across the globe is opening doors of its academic disciplines to the real-world experiences. The disciplinary legitimacy is under critical review. Trans-border mobility and practice learning are being fore-grounded as guiding principles. Interactive learning, bridging disciplines and facilitating learners to gain different competencies through judicious management of time is viewed as one of the greatest and fascinating priorities and challenges today.

Indian economy is experiencing an upward growth right from the beginning of 21st century necessitating well qualified science graduates to work as scientists, teachers, algorithm developers, computer programmers, professionals and often administrators. At present more than 400 million youth are below 18 years of age and government is committed to increase the GER to 30% by 2020, further necessitating more number of teachers and professors to work in schools and colleges. Research has also been given equal importance. Private sector and Corporates are also looking for smart science graduates in a big way. The M.Sc. Biochemistry program of REVA University is designed to prepare biotechnologist, biochemists, genetics, scientists, teachers, professionals & administrators who are motivated, enthusiastic & creative thinkers to meet the challenges of growing economy as well as to fulfil the growing aspirations of the youth.

The program has been developed with an emphasis on knowledge assimilation, application, national and international job market and its social relevance. The outcome-based curriculum designed and followed imbibes required theoretical concepts and practical skills in the domain. By undergoing this program, you will develop critical, analytical thinking and problem solving abilities for a smooth transition from academic to real-life work environment. The L: T: P structure of teaching and learning under Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) would certainly help our students learn and build competencies needed in this knowledge based society.

This handy document containing brief information about B.Sc. Medical Radiology and Diagnostic Imaging program, scheme of instruction and detailed course content will serve as a guiding path to you to move forward in a right direction.

I am sure you will enjoy the curriculum, teaching and learning environment, the vast infrastructure and the experienced teachers involvement and guidance. We will strive to provide all needed comfort and congenial environment for your studies. I wish you and all students' pleasant stay in REVA and grand success in your career.

CONTENTS

RUKMINI EDUCATIONAL CHARITABLE TRUST

It was the dream of late Smt. Rukmini Shyama Raju to impart education to millions of underprivileged children as she knew the importance of education in the contemporary society. The dream of Smt. Rukmini Shyama Raju came true with the establishment of Rukmini Educational Charitable Trust (RECT), in the year 2002. Rukmini Educational Charitable Trust (RECT) is a Public Charitable Trust, set up in 2002 with the objective of promoting, establishing and conducting academic activities in the fields of Arts, Architecture, Commerce, Education, Engineering, Environmental Science, Legal Studies, Management and Science & Technology, among others. In furtherance of these objectives, the Trust has set up the REVA Group of Educational Institutions comprising of REVA Institute of Technology & Management (RITM), REVA Institute of Science and Management (RISM), REVA Institute of Management Studies (RIMS), REVA Institute of Education (RIE), REVA First Grade College (RFGC), REVA Independent PU College at Kattigenahalli, Ganganagar and Sanjaynagar and now REVA University. Through these institutions, the Trust seeks to fulfil its vision of providing world class education and create abundant opportunities for the youth of this nation to excel in the areas of Arts, Architecture, Commerce, Education, Engineering, Environmental Science, Legal Studies, Management and Science & Technology.

Every great human enterprise is powered by the vision of one or more extraordinary individuals and is sustained by the people who derive their motivation from the founders. The Chairman of the Trust is Dr. P. Shyama Raju, a developer and builder of repute, a captain of the industry in his own right and the Chairman and Managing Director of the DivyaSree Group of companies. The idea of creating these top notched educational institutions was born of the philanthropic instincts of Dr. P. Shyama Raju to do public good, quite in keeping with his support to other socially relevant charities such as maintaining the Richmond road park, building and donating a police station, gifting assets to organizations providing accident and trauma care, to name a few.

The Rukmini Educational Charitable Trust drives with the main aim to help students who are in pursuit of quality education for life. REVA is today a family of ten institutions providing education from PU to Post Graduation and Research leading to PhD degrees. REVA has well qualified experienced teaching faculty of whom majority are doctorates. The faculty is supported by committed administrative and technical staff. Over 15,000+ students study various courses across REVA's three campuses equipped with exemplary state-of-the-art infrastructure and conducive environment for the knowledge driven community.

ABOUT REVA UNIVERSITY

REVA University has been established under the REVA University Act, 2012 of Government of Karnataka and notified in Karnataka State Gazette dated 7thFebruary, 2013. The University is empowered by UGC to award degrees any branch of knowledge under Sec.22 of the UGC Act. The University is a Member of Association of Indian Universities, New Delhi. The main objective of the University is to prepare students with knowledge, wisdom and patriotism to face the global challenges and become the top leaders of the country and the globe in different fields. REVA University located in between Kempegowda International Airport and Bangalore city, has a sprawling green campus spread over 45 acres of land and equipped with state-of-the-art infrastructure that provide conducive environment for higher learning and research. The REVA campus has well equipped laboratories, custom-built teaching facilities, fully air-conditioned library and central computer centre, the well planned sports facility with cricket ground, running track & variety of indoor and outdoor sports activities, facilities for cultural programs. The unique feature of REVA campus is the largest residential facility for students, faculty members and supportive staff.

The University is presently offering 23 Post Graduate Degree programs, 20 Degree and PG Degree programs in various branches of studies and has 15000+ students studying in various branches of knowledge at graduate and post graduate level and 410 Scholars pursuing research leading to PhD in 18 disciplines. It has 800+ well qualified, experienced and committed faculty members of whom majority are doctorates in their respective areas and most of them are guiding students pursuing research leading to PhD.

The programs being offered by the REVA University are well planned and designed after detailed study with emphasis with knowledge assimilation, applications, global job market and their social relevance. Highly qualified, experienced faculty and scholars from reputed universities / institutions, experts from industries and business sectors have contributed in preparing the scheme of instruction and detailed curricula for this program. Greater emphasis on practice in respective areas and skill development to suit to respective job environment has been given while designing the curricula. The Choice Based Credit System and Continuous Assessment Graded Pattern (CBCS – CAGP) of education has been introduced in all programs to facilitate students to opt for subjects of their choice in addition to the core subjects of the study and prepare them

with needed skills. The system also allows students to move forward under the fast track for those who have the capabilities to surpass others.

These programs are taught by well experienced qualified faculty supported by the experts from industries, business sectors and such other organizations. REVA University has also initiated many supportive measures such as bridge courses, special coaching, remedial classes, etc., for slow learners so as to give them the needed input and build in them confidence and courage to move forward and accomplish success in their career. The University has also entered into MOUs with many industries, business firms and other institutions seeking their help in imparting quality education through practice, internship and also assisting students' placements.

REVA University recognizing the fact that research, development and innovation are the important functions of any university has established an independent Research and Innovation division headed by a senior professor as Dean of Research and Innovation. This division facilitates all faculty members and research scholars to undertake innovative research projects in engineering, science & technology and other areas of study. The interdisciplinary-multidisciplinary research is given the top most priority. The division continuously liaisons between various funding agencies, R&D Institutions, Industries and faculty members of REVA University to facilitate undertaking innovative projects. It encourages student research projects by forming different research groups under the guidance of senior faculty members. Some of the core areas of research wherein our young faculty members are working include Data Mining, Cloud Computing, Image Processing, Network Security, VLSI and Embedded Systems, Wireless Censor Networks, Computer Networks, IOT, MEMS, Nano- Electronics, Wireless Communications, Bio-fuels, Nano-technology for coatings, Composites, Vibration Energies, Electric Vehicles, Multilevel Inverter Application, Battery Management System, LED Lightings, Renewable Energy Sources and Active Filter, Innovative Concrete Reinforcement, Electro Chemical Synthesis, Energy Conversion Devices, Nano-structural Materials, Photo-electrochemical Hydrogen generation, Pesticide Residue Analysis, Nano materials, Photonics, Nano Tribology, Fuel Mechanics, Operation Research, Graph theory, Strategic Leadership and Innovative Entrepreneurship, Functional Development Management, Resource Management and

Sustainable Development, Cyber Security, General Studies, Feminism, Computer Assisted Language Teaching, Culture Studies etc.

The REVA University has also given utmost importance to develop the much required skills through variety of training programs, industrial practice, case studies and such other activities that induce the said skills among all students. A full-fledged Career Development and Placement (CDC) department with world class infrastructure, headed by a dynamic experienced Professor & Dean, and supported by well experienced Trainers, Counsellors and

Placement Officers. The University also has University-Industry Interaction and Skill Development Centre headed by a Senior Professor & Director facilitating skill related training to REVA students and other unemployed students. The University has been recognized as a Centre of Skill Development and Training by NSDC (National Skill Development Corporation) under Pradhan Mantri Kaushal Vikas Yojana. The Centre conducts several add-on courses in challenging areas of development. It is always active in facilitating student's variety of Skill Development Training programs.

The University has collaborations with Industries, universities abroad, research institutions, corporate training organizations, and Government agencies such as Florida International University, Okalahoma State University, Western Connecticut University, University of Alabama, Huntsville, Oracle India Ltd, Texas Instruments, Nokia University Relations, EMC^2, VMware, SAP, Apollo etc., to facilitate student exchange and teacher–scholar exchange programs and conduct training programs. These collaborations with foreign universities also facilitates students to study some of the programs partly in REVA University and partly in foreign university, via, M.S in Computer Science one year in REVA University and the next year in the University of Alabama, Huntsville, USA.

The University has also given greater importance to quality in education, research, administration and all activities of the university. Therefore, it has established an independent Internal Quality division headed by a senior professor as Dean of Internal Quality. The division works on planning, designing and developing different quality tools, implementing them and monitoring the implementation of these quality tools. It concentrates on training entire faculty to adopt the

new tools and implement their use. The division further works on introducing various examination and administrative reforms.

To motivate the youth and transform them to become innovative entrepreneurs, successful leaders of tomorrow and committed citizens of the country, REVA organizes interaction between students and successful industrialists, entrepreneurs, scientists and such others from time to time. As a part of this exercise great personalities such as Bharat Ratna Prof. C. N. R. Rao, a renowned Scientist, Dr. N R Narayana Murthy, Founder and Chairman and Mentor of Infosys, Dr. K Kasturirangan, Former Chairman ISRO, Member of Planning Commission, Government of India, Dr. Balaram, Former Director I.I.Sc., and noted Scientist, Dr. V S Ramamurthy, Former Secretary, DST, Government of India, Dr. V K Aatre, noted Scientist and former head of the DRDO and Scientific Advisor to the Ministry of Defence Dr. Sathish Reddy, Scientific Advisor, Ministry of Defence, New Delhi and many others have accepted our invitation and blessed our students and faculty members by their inspiring addresses and interaction.

As a part of our effort in motivating and inspiring youth of today, REVA University also has instituted awards and prizes to recognize the services of teachers, researchers, scientists, entrepreneurs, social workers and such others who have contributed richly for the development of the society and progress of the country. One of such award instituted by REVA University is **'Life Time Achievement Award'** to be awarded to successful personalities who have made mark in their field of work. This award is presented on occasion of the **"Founders' Day Celebration"** of REVA University on 6th January of every year in presence of dignitaries, faculty members and students gathering. The first "REVA Life Time Achievement Award" for the year 2015 has been awarded to Shri. Kiran Kumar, Chairman ISRO, followed by Shri. Shekhar Gupta, renowned Journalist for the year 2016, Dr K J Yesudas, renowned play back singer for the year 2017. REVA also introduced "**REVA Award of Excellence"** in the year 2017 and the first Awardee of this prestigious award is Shri Ramesh Aravind, Actor, Producer, Director, Screen Writer and Speaker.

REVA organizes various cultural programs to promote culture, tradition, ethical and moral values to our students. During such cultural events the students are given opportunities to unfold their hidden talents and motivate them to contribute innovative ideas for the progress of the society. One of such cultural events is REVAMP conducted every year. The event not only gives

opportunities to students of REVA but also students of other Universities and Colleges. During three days of this mega event students participate in debates, Quizzes, Group discussion, Seminars, exhibitions and variety of cultural events. Another important event is Shubha Vidaaya, - Graduation Day for the final year students of all the programs, wherein, the outgoing students are felicitated and are addressed by eminent personalities to take their future career in a right spirit, to be the good citizens and dedicate themselves to serve the society and make a mark in their respective spheres of activities. During this occasion, the students who have achieved top ranks and won medals and prizes in academic, cultural and sports activities are also recognized by distributing awards and prizes. The founders have also instituted medals and prizes for sports achievers every year. The physical education department conducts regular yoga classes every day to students, faculty members, administrative staff and their family members and organizes yoga camps for villagers around.

Recognizing the fast growth of the university and its quality in imparting higher education, the BERG (Business Excellence and Research Group), Singapore has awarded BERG

Education Award 2015 to REVA University under Private Universities category. The University has also been honoured with many more such honours and recognitions.

Vision

REVA University aspires to become an innovative university by developing excellent human resources with leadership qualities, ethical and moral values, research culture and innovative skills through higher education of global standards

Mission

- To create excellent infrastructure facilities and state-of-the-art laboratories and incubation centres
- To provide student-centric learning environment through innovative pedagogy and education reforms
- To encourage research and entrepreneurship through collaborations and extension activities

- To promote industry-institute partnerships and share knowledge for innovation and development
- To organize society development programs for knowledge enhancement in thrust areas
- To enhance leadership qualities among the youth and enrich personality traits, promote patriotism and moral values.

Objectives

- Creation, preservation and dissemination of knowledge and attainment of excellence in different disciplines
- Smooth transition from teacher - centric focus to learner - centric processes and activities
- Performing all the functions of interest to its major constituents like faculty, staff, students and the society to reach leadership position
- Developing a sense of ethics in the University and Community, making it conscious of its obligations to the society and the nation
- Accepting the challenges of globalization to offer high quality education and other services in a competitive manner

ABOUT THE SCHOOL OF ALLIED HEALTH SCIENCES

The School of Allied Health Sciences offers graduate and post graduate programs in Biochemistry, Medical Laboratory Technician, Medical Radiology and Diagnostic Imaging, Nutrition and Dietetics, Sports Science which are incredibly fascinating. It aims to attract talented youth and train them to acquire knowledge and skills useful to industrial sectors, research laboratories, and educational institutions. The School also facilitates research leading to PhD in Biochemistry, Microbiology and related areas of study. The School of Allied Health Sciences is shouldered by well qualified, experienced and highly committed faculty. The state-of-the-art infrastructure digital classrooms, well equipped laboratories, conference rooms and the serene academic atmosphere at REVA University will enhance the transfer as well as creation of knowledge. The school provides an interactive, collaborative peer tutoring environment that encourages students to break down complex problems and develop strategies for finding solutions across a variety of situations and disciplines. The school aims to develop a learning community of critical thinkers who serves as models of innovative problems solving in the university environment to enrich their academic and professional careers.

Vision

To nurture intellect, creativity, character and professionalism among students and impart contemporary knowledge in various specialities of allied health sciences improving best practises in clinical imaging and diagnosis sciences to treat diseases that are socially relevant and transform society and individually student become global paramedical citizen

Mission

To offer world class expertise in medical imaging and advanced diagnostic sciences including research through excellence in teaching and support interface between industry and multi-speciality hospitals

Values

- Excellence in all our academic and research endeavours
- Dedication and service to our stakeholders
- Leadership through innovation

- Accountability and transparency
- Creating conducive academic environment with service motto
- Integrity and intellectual honesty
- Ethical and moral behaviour
- Freedom of thought and expression
- Adaptability to the change
- Team-work

"The constant questioning of our values and achievements is a challenge without which neither science nor society can remain healthy" **— Aage Niels Bohr**

ABOUT THE DEPARTMENT OF SPORTS SCIENCE

In an ongoing quest to achieve high performance standards, the demand for Sport and Science is increasing globally. In keeping with this trend and with an objective of working towards making India a SPORTING Nation, REVA University has developed an innovative program in B.Sc. Sports Science.The School of Allied science provides you with an opportunity to explore this new and emerging field in Sports Science by offering the BSc. Sports Science. This program would lay the foundation for a deeperunderstanding and application of the science behind Sport performance, Exercise, Health and Physical activity. This is a three year full-time application-based program with a unique blend of theory and practical components**.**

BOS MEMBERS

S.No.	Name & Designation details of the Member	Member Category
1.	**Dr. N. Ramesh** Dean, I/c Vice-Chancellor, REVA University vc@reva.edu.in , +91 9880514718	**Chairman**
2.	**Dr. S. Srividhya,** Head of the Department & Associate Professor, Department of Sports & Exercise Science srividhya.s@reva.edu.in, +918892923811	Internal Member
3.	**Mr. Manikandan K,** Assistant Professor, Department of Sports & Exercise Science manikandan.kannan@reva.edu.in, +91 86109 53364	Internal Member
4.	**Mr. Sudip Ghatak** Teaching Associate Department of Sports & Exercise Science Sudip.ghatak@reva.edu.in, +91 8653030022	Internal Member
5.	**Mr. Sathish Kumar** Deputy Director Sports Authority of India, Netaji Subhas Southern Centre, Bangalore Sathish.sai@gov.in, +91 9910160026	External Member
6.	**Ms. Vaishali Chaudhary** Sport Psychologist Inspire Institute of Sports, JSW, Bellari. vaishali.chaudhary@inspireinstituteofsport.com , +919599925938	External Member
7.	**Prof. P. C. Krishnaswamy** **Director(i/c), Professor** Bangalore University kswamypc@gmail.com , +9194499 58295	External Member
8.	**Dr. Deepak C S** Director Department of Physical Education & Sports REVA University deepakcs@reva.edu.in, +919980985677	Invited Member
9.	**Yoogasri E** R22HF003 III year B.Sc Sports Science 22150443722@reva.edu.in , +91 82770 08726	Student Representative
10.	**Sai Vijaya B P** R22HF005 III year B.Sc Sports Science 22130139930@reva.edu.in, +91 99006 10693	Student Representative

B.Sc (Sports Science) Program Overview

Programme Overview

The B.Sc Sports Science program is designed to explore the scientific aspects of sports and physical activity. This program delves into the physiological, biomechanical, and psychological, nutritional factors that influence sports performance and physical well-being.

Sports Science is an interdisciplinary field that combines elements of physiology, psychology, Nutrition and biomechanics to understand and optimize human performance in sports and physical activities. This program focuses on the scientific principles that underlie physical fitness, training, and sports performance. It also examines the prevention and treatment of sports-related injuries.

The relevance of Sports Science programs is increasing as the importance of physical fitness and sports performance gains recognition in society. Sports science professionals play a critical role in helping athletes and individuals achieve their fitness goals while minimizing the risk of injury.
B.Sc Sports Science programs offer a comprehensive understanding of the science behind sports and physical activity, preparing graduates for diverse and rewarding careers in the sports and fitness industry, sports medicine, research, and education. This field continues to grow in importance as people prioritize health and wellness, making it an exciting and promising area of study.

Program Educational Objectives (PEOs)

PEO-1	Students will be able to use their fundamental knowledge, technical and practical competence in enhancing human performance as and when required to achieve professional excellence.
PEO-2	Students will demonstrate strong and well defined practical and technical skills in optimizing humanperformance for sporting excellence and health benefits
PEO-3	Students will be able to practice the profession maintaining high professional standards, exhibiting ethical behaviours, strong communication skills, and effective inter-personal skills to work in an inter-disciplinaryteam.
PEO-4	Students will be able to use collaborative skills to identify, assess and formulate problems and execute thesolution to the needs of athletes and organizations.
PEO-5	Students will be able to imbibe the culture of research, innovation, entrepreneurship and incubation in thesporting community.
PEO-6	Students will be able to participate in lifelong learning process for a highly productive career and will beable to relate the concepts of maximising human potentials and minimize injury risk, while serving the cause of the society.

Program Outcomes (POs)

PO-1: Professional knowledge: Possess and acquire scientific knowledge to work as a professional, optimizing human function.

PO-2: Applied Skills: Apply scientific knowledge and practical skills to assess, analyze, and enhance human performance in sports and exercise settings.

PO-3: Clinical/ Technical skills: Demonstrate and possess technical skills to provide quality care for athletes and teams.

PO-4: Teamwork: Demonstrate ability to be a team player and support shared goals within an interdisciplinary environment.

PO-5: Ethical value & professionalism: Possess and demonstrate ethical values and professionalism within the legal framework of the society.

PO-6: Measurement and Evaluation: Utilize appropriate tools and techniques to measure and evaluate physical fitness, performance, and health-related variables in individuals and athletes. Interpret assessment results to provide feedback and make evidence-based recommendations.

PO-7: Communication: Communicate effectively and appropriately within an interdisciplinary environment and the society.

PO-8: Evidence based practice: Devise assessment and programs that are evidence informed and aligns with professional excellence.

PO-9: Life-long learning: Continues to exhibit interest in enhancing knowledge and skills, which evolve over a period of time.

PO-10: Entrepreneurship, leadership and mentorship: Display entrepreneurial inclination, leadership and mentorship skills.

PROGRAMME SPECIFIC OUTCOMES (PSO)

After successful completion of the programme, the graduates shall be able to

PSO–1: Demonstrate knowledge and understanding of the fundamental principles and concepts in sports and exercise science, including Anatomy, Physiology, Biomechanics, Nutrition, Psychology.

PSO–2: Apply scientific research methods and techniques to investigate and analyze various aspects of sports and exercise performance, such as physiological responses, biomechanical movements, and psychological factors.

PSO–3: Develop practical skills in conducting fitness assessments, designing exercise programs, and implementing training interventions for individuals or groups involved in sports and exercise activities,

PSO–4: Analyze and interpret data collected from physiological, biomechanical, and psychological assessments to evaluate the effectiveness of training programs and interventions.

REVA University Regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for Science Graduate Degree Programs, 2022-2025

(Framed as per the provisions under Section 35 (ii), Section7 (x) and Section 8 (xvi) & (xxi) of the REVA University Act, 2012)

1. Title and Commencement:

1.1.These Regulations shall be called the **"REVA University Regulations for Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) for Under Graduate Degree Programs- 2022".**

1.2.These Regulations shall come into force from the date of assent of the Chancellor.

2. The Programs:

The following programs and all Graduate Degree programs to be instituted and introduced in REVA University in coming years shall follow these regulations.

B. Sc in **Sports science**

1. Definitions:

Course: Every course offered will have three components associated with the teaching-learning process of the course, namely:

- L= Lecture (ii) T= Tutorial (iii) P=Practice; where:

L stands for **Lecture** session consisting of classroom instruction.

T stands for **Tutorial** session consisting participatory discussion / self-study/ desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P stands for **Practice** session and it consists of Hands on Experience / Laboratory Experiments / Field Studies / Case Studies that equip students to acquire the much-required skill component.

2. Courses of study and Credits

2.1 The study of various subjects in B. Sc., degree program is grouped under various courses. Each of these course carries credits which are based on the number of hours of teaching and learning.

2.2 In terms of credits, every **one-hour session of L amounts to 1 credit per Semester.**
In terms of credits, every **one-hour session of L amounts to 1 credit per Semester** and a minimum of **two-hour session of T or P amounts to 1 credit per Semester** over a period of one Semester of 16 weeks for teaching-learning process.

2.3 The total duration of a semester is 20 weeks inclusive of semester-end examination.

2.4 **A course shall have either or all the four components.** That means a course may have only lecture component, or only practical component or combination of any two or all the three components.

2.5 The concerned BOS will assign Credit Pattern for every course based on the requirement. However, generally, courses can be assigned with 1-4 Credits depending on the size of the course.

2.6 Different **Courses of Study** are labelled and defined as follows:

Core Course:

A course which should compulsorily be studied by a candidate as a core-requirement is termed as a Core course. The CORE courses of Study are of THREE types, viz – (i) Foundation Course (ii)Hard Core Course, and (ii) Soft Core Course.

(i) Foundation Course (FC)

Foundation Courses are four courses including language study which are mandatory in nature prescribed by the University and should be completed successfully as part of Graduate Degree Program irrespective of the branch of study.

(ii) Hard Core Course (HC):

The **Hard Core Course** is a Core Course in the main branch of study and related branch (es) of study, if any that the candidates have to complete compulsorily.

(iii) Course (SC):

A Core course may be a **Soft Core** if there is a choice or an option for the candidate to choose a course from a pool of courses from the main branch of study or from a sister/ related branch of studywhich supports the main branch of study.

Clinical Postings/ Internship/:

Clinical Postings /Internship is a special course involving application of knowledge in solving analyzing /exploring a real-life situation / difficult problem. An internship carrying four credits and Clinical postings with 2 to 4 credits on each semester.

3.Eligibility for Admission:

Passed Standard XII (10+2) or equivalent examination from any recognized Board with a minimum of 45% marks or equivalent grade (40% Marks or equivalent grade for Scheduled Caste/ Scheduled Tribes)

Participation in sports at the International/National/State/District level (in games recognized by School Games Federation of India (SGFI) is desirable.

4.Scheme, Duration and Medium of Instructions:

4.1. The Three-Year degree program is of 6 semesters (3 years) duration. A candidate can avail a maximum of 6 semesters (3 years) as per double duration norm, in one stretch to complete the Three-Year Degree, including blank semesters, if any.

4.2. The medium of instruction shall be English.

Credit and Credit Distribution

A candidate has to earn 124 credits for successful completion of Three-Year Degree B.Sc.Sports Science with a distribution of credits as given in Table-1below:

Table-1
Credits and Credit Distribution for Three Year degree programs

Course Type	Credits for B.Sc Sports Science
Hard Core Course	**69**
Soft Core Course	**6**
Foundation Course (FC)	**5**
Ability Enhancement Courses (AEC)	**2**

Skill Enhancement Course (SEC)	**37**
Internship/Research Project (Int/RP)	**10**
Total	**129**

The concerned BOS based on the credits distribution pattern given above shall prescribe the credits tovarious types of courses and shall assign title to every course including project work, practical work, and field work, self-study elective, as **Foundation Course (FC), Hard Core (HC), Internship (IP)**.

7.1 course including project work, practical work, Clinical Postings, self-study elective should be entitled as Foundation Course (FC), Hard Core (HC) or Soft Core (SC) by the BoS concerned.
However, following shall be the RULO (REVA Unique Learning Offerings) courses withcredits mentioned against them, common to all branches of study. However, the BOS of respective program/discipline shall decide about the total credits for RULO courses.
The concerned BOS shall specify the desired Program Objectives, Program Educational Objectives, Program Specific Outcomes and Course Outcomes while preparing the curriculum of a particular program.
Only such full-time candidates who register for a minimum prescribed number of credits in each semester from I semester to VI semester and complete successfully 124 credits in 6 successive semesters shall be considered for declaration of Ranks, Medals, Prizes and are eligible to apply for Student Fellowship, Scholarship, Free ships, and such other rewards/advantages which could be applicable for all full time students and for hostel facilities.

Add-on Proficiency Certification/Diploma:

Add-on Proficiency Certification:

To acquire Add on Proficiency Certification a candidate can opt to complete a minimum of 2 extra credits either in the same discipline /subject or in different discipline /subject in excess to124 credits for the Three-Year Graduate degree programs.

Add on Proficiency Diploma:

To acquire Addon Proficiency Diploma, a candidate can opt to complete a minimum of 2 extra credits either in the same discipline /subject or in different discipline / subject in excess to 160 credits for the Three-Year Graduate degree programs.

The Add on Proficiency Certification /Diploma so issued to the candidate contains the courses studied and grades earned.

Assessment and Evaluation

a)Each course is assessed for a total weight of 100%. Out of the total 100% weight; 50% weight is for Continuous Internal Assessment (CIA or IA) and the remaining 50% for the Semester End Examination (SEE). This is applicable for theory, laboratory, workshop, studio and any such courses.

b)Out of 50% weight earmarked for Internal Assessment (IA)-15% for test-1, 15% for test-2 and 20% for Assignments and this is applicable for theory-based courses.

c)The tests and assignments are conducted as per the semester academic calendar provided bythe University.

The details as given in the table

Component	Description	Conduction	Weight Percentage
C1	Test-1: IA1	6th week from the starting dateof semester	15
	Test-2: IA2	12th week from the starting dateof semester	15
C2	1 Assignment1	7th week	10
	2 Assignment2	13th week	10
C3	SEE including practical & ClinicalPostings Report	Between 17th Week- 20th Week	50
Results to be Announced			By the end of 21st Week

Note: IA or CIA includes C1 and C2

Each test must be conducted for a duration of 60 minutes, setting the test question paper for a maximumof 30 marks. The final examination must be conducted for a duration of 3 hours and the question paper must be Set for a maximum of 100 marks.

Setting question paper and evaluation of answer scripts.

i) For SEE, three sets of question papers shall be set for each theory course out of whichtwo sets will be by the internal examiners and one set will be by an external examiner.In subsequent years by carrying forward the unused question papers, an overall threesets of question papers should be managed and depending on the consumption ofquestion papers either internal or external examiner be called for setting the questionpaper to maintain an overall tally of 3 papers with the conditions mentioned earlier. The internal examiner who sets the question paper should have been course tutor.

ii)The Chairman of BoE shall get the question papers set by internal and externalexaminers.

iii)The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation. It is the responsibility of the BoE to see that all questions contained in thequestion paper are within the prescribed syllabus of the concerned course.

iv)There shall be single valuation for all theory papers by internal examiners. However, there shall be moderation by the external examiner who has the subject back ground. Incase no external examiner with subject background is available, a senior faculty memberwithin the discipline shall be appointed as moderator.

v)The SEE examination for Practical work / Field work / Project work/Internship will be conducted jointly by internal and external examiners as detailed below: However,the BoE on its discretion can also permit two internal examiners.

vi)If a course is fully of (L=0): T:(P=0) type or course is partly P type i.e, (L=3):
(T=0) (P=1), then the examination for SEE component will be as decided by the BoSconcerned.

9. Evaluation of Practical's and Minor Project / Major Project / Dissertation/Clinical Postings

9.1. A practical examination shall be assessed on the basis of:

a) Knowledge of relevant processes.

b) Skills and operations involved.

c) Results/ products including calculation and reporting.

In case a course is fully of P type (L=0:T=0:P=4),the performance of a candidate shallbe assessed for a maximum of 100 marks as explained below:

Continuous Internal assessment (CIA) = 50marks

Semester end practical examination (SEE)=50 marks

The 50 marks for continuous assessment shall further be allocated as under (IA or CIA):

i	Conduction of regular practical throughout the semester	20marks
ii	Maintenance of lab records/ industry reports	15marks
iii	Laboratory test and viva	15marks
	Total	50marks

The 50 marks meant for Semester End Examination, shall be allocated as under:

i	Conduction of semester end practical examination	30 marks
ii	Write up about the experiment /practical conducted	10 marks
iii	Viva Voce	10 marks
	Total	50 marks

SEE for Practical work will be conducted jointly by internal and external examiners. However, if external examiner does not turn up, then both the examiners will be internal examiners.

In case a course is partly P type i.e., (L=3): (T=0) (P=1), then the examination for SEEcomponent will be as decided by the BoS concerned.

The duration for semester- end practical examination shall be decided by the concerned School/Board.

Evaluation of Internship:

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his/her progress in the form of seminars in addition to the regular discussion with the supervisor. At the end of the semester, the candidate has to submit final report

to the project/dissertation, as the case maybe, for final evaluation. The components of evaluation are as follows:

1	Clinical Observational Postings	Should be done at the commencement of 3rd semester, continued till end of 4th semester	Weightage: 0%
2	Internship	7th week of 5th semester, continued till end of 6th semester	Weightage: 25%
3	Internship	14th week from the start date ofproject semester, till end of 8th semester	Weightage: 25%
4	Project work	7th and 8th semester	Weightage: 25% for Dissertation
5	Internship	After successful completionof all 8 semesters	Weightage: 25%

Provision for Appeal

If a candidate is not satisfied with the evaluation of C1, C2 components, he/she can approach the grievance cell with the written submission together with all facts, the assignments, test papers etc., which were evaluated. He/she can do so before the commencement of semester-end examination. The grievance cell is empowered to revise the marks if the case is genuine and is also empowered tolevy penalty as prescribed by the university on the candidate if his/her submission is found to be baseless and unduly motivated. This cell may recommend taking disciplinary/corrective action on an evaluator if he/she is found guilty. The decision taken by the grievance cell is final.

For every program there will be one grievance cell. The composition of the grievance cell is as follows: -

The Registrar (Evaluation) -Ex-officio Chairman / Convener

One Senior Faculty Member (other than those concerned with the evaluation of the course concerned) drawn from the school / department/discipline and/or from the sister schools. /departments/sister disciplines– Member.

One Senior Faculty Members / Subject Experts drawn from outside the University school. /department– Member.

Eligibility to Appear Semester End Examination (SEE)

Only those students who fulfil a minimum of 75% attendance in aggregate of all the courses including practical courses / field visits etc, as part of the course(s), as provided in the succeeding sections, shall be eligible to appear for SEE examination.

Requirements to Pass a Course

Students are required to score a total minimum of 40% (Continuous Internal assessment and SEE) in each course offered by the University/ Department for a pass (other than onlinecourses) with a minimum of 25% (12) marks in final examination.

Requirements to Pass the Semester

To pass the semester, a candidate has to secure minimum of 40% marks in each subject / course ofthe study prescribed in that semester.

Provision to Carry Forward the Failed Subjects / Courses:

A student who has failed in a given number of courses in odd and even semesters of first year shall move to third semester of second and final year of the study. However, he / she shall have to clear all courses of all semesters within the double duration, i.e., within eight years of admission of the first semester failing which the student has to re-register to the entire program.

Provision to Withdraw Course:

A candidate can withdraw any course within ten days from the date of notification of final results. Whenever a candidate withdraws a course, he/she has to register for the same course in case it is hard core course, the same course or an alternate course if it is Soft Core Course.

A DROPPED course is automatically considered as a course withdrawn.

Re-Registration and Re-Admission:

a) In case a candidate's class attendance in aggregate of all courses in a semester is less than75%or as stipulated by the University, such a candidate is considered as dropped the semester and is not allowed to appear for end semester examination (C3) and he / she shall have to seek re-admission tothat semester during subsequent semester/ year within a stipulated period.

b) In such case where in a candidate drops all the courses in a semester due to personal reasons,it is considered that the candidate has dropped the semester, and he / she shall seek re-admission to such dropped semester.

Attendance Requirement:

All students must attend every lecture, tutorial and practical classes, clinical postings.

In case a student is on approved leave of absence (e g:- representing the university in sports, games or athletics, placement activities, NCC, NSS activities and such others) and / or any other such contingencies like medical emergencies, the attendance requirement shall be minimum of75% of the classes taught.

a) Any student with less than 75% of attendance in aggregate of all the courses including practicalcourses / field visits etc, during a semester shall not be permitted to appear to the end semester(C4) examination and such student shall seek re-admission as provided in 7.8.4.

b) Teachers offering the courses will place the above details in the School Board meeting during the last week of the semester, before the commencement of C3, and subsequently a notification pertaining to the above will be brought out by the Director of the School before the commencement of C3 examination. A copy of this notification shall also be sent to the office of the Registrar & Registrar (Evaluation).

during Mid Semester Examination:

In case a student has been absent from a mid-semester (C1, C2) examination due to the illness or other contingencies he / she may give a request along with necessary supporting documents and certification from the concerned class teacher / authorized personnel to the concerned Head of the School, for make-up examination. The Head of the School may consider such request depending onthe merit of the case and after consultation with course instructor and class teacher and arrange to conduct a special test for such candidate(s) well in advance before the C3 examination of that respective semester. Under no circumstances C1, C2 test shall be held after C3 examination.

Grade Card and Grade Point

Provisional Grade Card: The tentative / provisional grade card will be issued by the Registrar (Evaluation) at the end of every semester indicating the courses completed successfully. The provisional grade card provides **Semester Grade Point Average** (SGPA).

Final Grade Card: Upon successful completion of M.Sc., Degree a Final Grade card consisting of grades of all courses successfully completed by the candidate will be issued

by the Registrar (Evaluation).

The Grade and the Grade Point: The Grade and the Grade Point earned by the candidate inthe subject will be as given below.

Marks P	Grade G	Grade Point (GP=Vx G)	Letter Grade
90>100	10	v*10	O
80>90	9	v*9	A+
70>80	8	v*8	A
60>70	7	v*7	B+
55>60	6	v*6	B
50>55	5.5	V*5.5	C+
40>50	5	v*5	P
0-40	0	v*0	F
ABSENT			AB

Outstanding; A-Excellent; B-Very Good; C-Good; D-Fair; E-Satisfactory; F-Fail

Here, P is the percentage of marks (P=[C1+C2+C3]) secured by a candidate in a course which is **rounded to nearest integer**. V is the credit value of course. G is the grade and GP is the grade point.

Computation of SGPA and CGPA

The Following procedure to compute the Semester Grade Point Average (SGPA)

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored bya student in all the courses taken by a student and the sum of the number of credits of all the coursesundergone by a student in a given semester, i.e:

$$\mathbf{SGPA(Si)=\sum(CixGi)/\sum Ci}$$

Where Ci is the number of credits of the ith course and Gi is the grade point scored by the studentin the ith course.

Illustration for Computation of SGPA and CGPAIllustration No. 1

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course1	4	A+	9	4X9=36
Course2	4	A	8	4X8=32
Course3	3	B+	7	3X7=21
Course4	3	O	10	3X10=30
Course5	3	P	5	3X5=15

Course6	3	B	6	3X6=18
Course7	2	O	10	2X10=20
Course8	2	A	8	2X8=16
	24			188

Thus, **SGPA =188 ÷ 24= 7.83**

Illustration no.2

Course	**Credit**	**Grade letter**	**Grade Point**	**Credit Point (Credit x Grade point)**
Course 1	4	A	8	4X8=32
Course 2	4	B+	7	4X7=28
Course 3	3	A+	9	3X9=27
Course 4	3	B+	7	3X7=21
Course 5	3	B	6	3X6=18
Course 6	3	P	5	3X5=15
Course 7	2	B+	7	2X7=21
Course 8	2	O	10	2X10=20
	24			175
Thus, SGPA =175 ÷ 24 = 7.29				

Illustration no.3

Course	**Credit**	**GradeLetter**	**GradePoint**	**CreditPoint (Creditx Gradepoint)**
Course 1	4	O	10	4x 10 = 40
Course 2	4	A+	9	4 x 9= 36
Course 3	3	B+	7	3 x 7= 21
Course 4	3	B	6	3 x 6= 18
Course 5	3	A+	9	3 x 9= 27
Course 6	3	B+	7	3 x 7= 21
Course 7	2	A+	9	2 x 9= 18
Course 8	2	A+	9	2 x 9= 18
	24			199
Thus, SGPA =199 ÷ 24= 8.29				

Cumulative Grade Point Average (CGPA):

Overall Cumulative Grade Point Average (CGPA) of a candidate after successful completion of the required number of credits (96) for Two year Post Graduate degree program is calculated taking intoaccount all the courses undergone by a student overall the semesters of a program i. e.,

$$CGPA=\sum(CixSi)/\sum Ci$$

Where Si is the SGPA of the ith semester and Ci is the total number of credits in hat semester. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration No.1

CGPA after Final Semester

Semester (ith)	No. of Credits (Ci)	SGPA (Si)	Creditsx SGPA (CiX Si)
1	24	6.83	24 x6.83 =163.92
2	24	7.71	24 x7.71 =185.04
3	24	8.68	24 x8.68 =208.32
4	24	9.20	24 x9.20 =220.80
Cumulative	96		778.08

Thus, CGPA =24x6.83+24x7.13+24x8.68+24x9.20 =8.11

CONVERSION OF GRADES INTO PERCENTAGE:

Conversion formula for the conversion of CGPA into Percentageis: Percentage of marks scored =CGPA Earned x10

Illustration: CGPA Earned 8.10x10=81.0

Classification of Results

The final grade point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows.

CGPA	**Grade (Numerical Index) G**	**LetterGrade**	**Performance**	**FGP Qualitative Index**
9>=CGPA10	10	O	Outstanding	Distinction
8>=CGPA<9	9	A+	Excellent	
7>=CGPA<8	8	A	Very Good	First Class
6>=CGPA<7	7	B+	Good	
5.5>=CGPA<6	6	B	Above average	

>5CGPA <5.5	5.5	C	Average	Second Class
>4 CGPA <5	5	P	Pass	Satisfactory

Overall percentage=10*CGPA

Challenge Valuation

a) A student who desires to apply for challenge valuation shall obtain a photo copy of the answer script by paying the prescribed fee within 10 days after the announcement of the results. He /Shecan challenge the grade awarded to him/ her by surrendering the grade card and by submitting an application along with the prescribed fee to the Registrar (Evaluation) within 10 days after the announcement of the results. This challenge valuation is only for SEE.

b) The answer scripts for which challenge valuation is sought for shall be evaluated by the externalexaminer who has not involved in the first evaluation. The higher of two marks from first valuation and challenge valuation shall be the final.

c) With regard to any specific case of ambiguity and unsolved problem, the decision of the Vice-Chancellor shall be final.

Mapping of PEOs with Respect to POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PE01	√	√	√	√	√	√	√	√	√	√
PE02	√	√	√	√	√	√	√	√	√	√
PE03	√	√	√	√	√	√	√	√	√	√
PE04	√	√	√	√	√	√	√	√	√	√

Attainment of CO

CO Attainment	**Value**
0.4 -0.6	1
0.6 – 0.75	2
>0.75	3

Mapping of Course Outcomes with Programme Outcomes and Programme Specific Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B21AHE102	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0101	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0102	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0103	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0104	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HF0105	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B21LHM201	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HF0201	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0202	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0203	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2

	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0204	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0205	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HF0206	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HF0301	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0307	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0302	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0303	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HS0304	3	1	2	1	2	1	1	1	1	3	1	3	2	1	3
	2	2	3	2	1	2	1	2	1	2	2	2	3	2	2
	2	1	2	1	1	1	2	1	2	2	1	3	2	1	2
	3	1	3	1	3	2	1	2	1	3	1	2	3	1	3
B22HS0305	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HS0306	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HF0401	3	1	2	1	2	1	1	1	1	3	1	3	2	1	3

	2	2	3	2	1	2	1	2	1	2	2	2	3	2	2
	2	1	2	1	1	1	2	1	2	2	1	3	2	1	2
	3	1	3	1	3	2	1	2	1	3	1	2	3	1	3
B22HF0402	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0403	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0405	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HF0406	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2
B22HF0407	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0404	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0408	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0501	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0501	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0507	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

B22HF0503	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0504	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0601	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0607	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0602	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0608	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0603	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0609	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0604	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2
B22HF0610	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

B.Sc. (Sports Science) Program

(Effective from the Academic Year 2024-25)

Scheme of Instruction

B.Sc. Sports Science Programme

FC= Foundation course; CC = Core Course;
SEC= Skill Enhancement Course; HC = Hard Course,
SC= Soft core AEC= Ability Enhancement Course

S.No.	CourseCode	Course Title	Course Type	Credit Pattern andValue				Weekly Contact Hours
				L	T	P	C	
First Semester: THEORY - PART- A								
1	B21AHE102	English -I	AEC	2	-	-	2	2
2	B22HF0101	Human Anatomy - I & Human Physiology -1	FC	3	-	1	4	5
3	B22HF0102	First Aid & CPR	HC	2	-	1	3	4
4	B22HF0103	Fundamentals of Sports Science	HC	4	-	-	4	4
PART-B: Practical Course								
1	B22HF0104	Aerobics	SEC	1	-	4	5	9
2	B22HF0105	Badminton	SEC	1	-	4	5	9
		Total		13	-	10	23	33

S. No.	Course Code	Course Title	Course Type	Credit Pattern and Value				Weekly Contact Hours
				L	T	P	C	
Second Semester: THEORY - PART- A								
1	B21LHM201	Constitution of India & ProfessionalEthics	SEC	2	-	-	2	2
2	B22HF0201	Fundamentals of Kinesiology	HC	4	-	-	4	4
3	B22HF0202	Computers & Data Analysis	SC	2	-	-	2	2
4	B22HF0203	Health, Fitness and Wellness	HC	2	-	-	2	3
5	B22HF0204	Fundamentals of Nutrition	HC	4	-	-	4	3
6	B22AS020	Tree Plantation	FC	1	-	-	1	1
PART-B: Practical Course								
1	B22HF0205	Cricket	SEC	1	-	4	5	9
2	B22HF0206	Yoga	SEC	1	-	4	5	9
Total							25	33

Sl. No.	CourseCode	Course Title	Course Type	Credit Pattern and Value				Weekly Contact Hours
				L	T	P	C	
Third Semester: THEORY – PART- A								
1	B22HF0301	Human Anatomy- II & Human Physiology -II	HC	3	-	-	3	3
2	B22HF0302	Sports Psychology	HC	4	-	-	4	4
3	B22HF0303	Sports Nutrition	HC	2	-	-	2	2
4	B22HS0304	Environmental Science and Health	SC	2	-	-	2	2
PART-B: Practical Course								
1	B22HF0305	Football	SEC	-	-	3	3	6
2	B22HF0306	Athletics 1	SEC	-	-	3	3	6
3	B22HF0307	Practical-Human Anatomy-II &Human Physiology -II	HC	-	-	1	1	2
4	B22HF0308	Practical-Sports Nutrition	HC	-	-	2	2	4
Total							20	29

S.No.	Course Code	Course Title	Course Type	Credit Pattern and Value				Weekly Contact Hours
				L	T	P	C	
Fourth Semester: THEORY – PART- A								
1	B22HF0401	Sports Sociology	SC	2	-	-	2	2
2	B22HF0402	Statistics & Research Methodology	HC	4	-	-	4	4
3	B22HF0403	Strength & Conditioning	HC	3	-	-	3	3
4	B22HF0404	Sports Biomechanics	HC	3	-	-	3	3
PART-B: Practical Course								
1	B22HF0405	Athletics – 2	SEC	-	-	3	3	6
2	B22HF0406	Basketball	SEC	-	-	3	3	6
3	B22HF0407	Practical-Strength & Conditioning	HC	-	-	1	1	2
4	B22HF0408	Practical-Sports Biomechanics	HC	-	-	1	1	2
Total							20	28

S.No.	Course Code	Course Title	Course Type	Credit Pattern and Value				Weekly Contact Hours
				L	T	P	C	
Fifth Semester: THEORY – PART- A								

1	B22HF0501	Sports Management	HC	3	-	-	3	3
2	B22HF0502	Sports Injuries & Rehabilitation	HC	2	-	-	2	2
3	B22HF0503	Sports Technology	HC	3	-	-	3	3
4	B22HF0504	Sports Coaching	HC	2	-	-	2	2
PART-B: Practical Course								
1	B22HF0505	Sports Specialisation -1	SEC	-	-	3	3	6
2	B22HF0506	Internship	IP	-	-	4	4	8
3	B22HF0507	Practical-Sports Injuries & Rehabilitation	HC	-	-	1	1	2
4	B22HF0508	Practical-Sports Coaching	HC	-	-	1	1	2
Total							19	28

S.No.	**Course Code**	**Course Title**	**Course Type**	**Credit Pattern and Value**				**Weekly Contact Hours**
				L	**T**	**P**	**C**	
Sixth Semester: THEORY – PART- A								
1	B22HF0601	Exercise Physiology	HC	3	-	-	3	3
2	B22HF0602	Advanced Biomechanics	HC	3	-	-	3	3
3	B22HF0603	Research in Sports & Physical Activity	HC	3	-	-	3	3
4	B22HF0604	Advanced Strength & Conditioning	HC	3	-	-	3	3
PART-B: Practical Course								
1	B22HF0606	Internship	IP	-	-	6	6	12
2	B22HF0607	Exercise Physiology	HC	-	-	1	1	2
3	B22HF0608	Advanced Biomechanics	HC	-	-	1	1	2
	B22HF0609	Research in Sports & Physical Activity	HC	-	-	1	1	2
4	B22HF0610	Advanced Strength & Conditioning	HC	-	-	1	1	2
Total							22	32

SYLLABUS

SEMESTER I

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B21AHE102	English & Communication Skills	AEC	2	-	-	-	2

Course Objectives:

- To develop basic communication skills in English for the learners of Bachelor ofScience.
- To prioritize listening and reading skills among the learners.
- To simplify writing skills needed for academic as well as work place context.
- To examine that the learners use the electronic media such as internetand supplement the learning materials used in the class room.

Course Outcome:

On completion of the course, learners will be able to:

1. Interpret audio files and comprehend different spoken discourses /excerpts in different accents (Listening skills)
2. Demonstrate speaking ability with clarity, confidence and comprehension and communicate with one or many listeners using appropriate
3. Make use of reading different genres of texts adopting various reading strategies (Reading Skills).
4. Develop the ability to write cohesively, coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic (Writing Skills)

Mapping of Course Outcomes with Program Outcomes

Course Code	POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	P O6	PO 7	PO 8	PO 9	PO 10	PS O1	PS O2	PS O3	PS O4
B21AHE102	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

THEORY **(18 hrs)**

Behavioural Objectives:

The student at the end of training is able to

1. Read and comprehend English language
2. Speak and write grammatically correct English
3. Appreciates the value of English literature in personal and professional life,

Unit –I:
Introduction:
Study Techniques
Organisation of effective note taking and logical processes of analysis and synthesis
The use of the dictionary
Enlargement of vocabularyEffective diction
Unit – II:
Applied Grammar:
Correct usage
The structure of sentences The structure of paragraphs Enlargements of Vocabulary
Unit – III:
Written Composition:
Precise writing and 48he understand Writing of bibliography Enlargement of Vocabulary
Unit – IV
Reading and comprehension
Review of selected materials and express oneself in one's words.Enlargement of Vocabulary.
The Study of Various Forms of Composition Paragraph, Essay, Letter, Summary, Practice in writing
Verbal Communication:
Discussions and Summarization, Debates, Oral reports, use in teaching

Reference

- English Grammar Collins, Birmingham University, International Language Data Base,Rupa &Co. 1993
- Wren and Martin – Grammar and Composition, 1989, Chanda. & Co, Delhi
- Letters for all Occasions A S Myers. Pub – Harper Perennial
- Spoken English V Shasikumar and P V Dhanija_ Pub. By: Tata Mcgraw Hill, New Delhi
- Journalism Made Simple, D Wainwright
- Writers Basic Bookshelf Series, Writers Digest series
- Interviewing by Joan Clayton Platkon
- Penguin Book of Interviews.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0101	**Human Anatomy I and Human Physiology I**	HC	3	-	1	-	5

Course Objectives:

- To introduce students to the foundational concepts of leisure, play, game, sport, and physical activity and their significance in modern society.
- To examine the development of Sport Humanities, including the historical, philosophical, and literary aspects of sport.
- To explore the major fields of sports science, including exercise physiology, kinesiology, biomechanics, motor learning, sport sociology, and sport psychology.

- To provide students with a holistic view of sports science, covering areas like sport management, sport technology, sport journalism, sports medicine, coaching, and ethical issues in sports.

Course Outcomes:

1. Understand and critically analyze the nature of sport, including its historical, philosophical, and cultural dimensions.
2. Demonstrate a comprehensive understanding of the Sport Humanities, including the study of sports history, philosophy of sports, and sport literature.
3. Gain insight into the scholarly study of sport, encompassing exercise physiology, kinesiology, biomechanics, motor learning, sport sociology, and sport psychology.
4. Explore various facets of sports science, including sport management, sport technology, sport journalism, sports medicine, coaching, and ethical considerations in sports.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	P O6	PO 7	PO 8	PO 9	PO 10	PS O1	PS O2	PS O3	PS O4
B22HF0101	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

UNIT -I

Digestive system:

- Anatomical consideration of digestive track
- Historical structure of Digestive track
- Functions of the Digestive systems
- Digestion of carbohydrates, proteins and fats
- Absorption of carbohydrates, proteins and fats
- Metabolism of carbohydrates, proteins and fats

UNIT -II

Excretory System:

- Kidney –Anatomy of kidney, History of Nephron
- Formation of urine- Glomerulos functions and tubular functions
- Fluid &Electrolyte balance
- Renal regulation of Acid –Basic balance
- Skin – Body temperature regulation in human during hot and cold environment

UNIT –III

Nervous System:-

- Structural organization of different parts of brain & spinal cord
- Reflex Action, Reflex Arc
- Atomic Nervous System-
- Organization, outflow, ganglia centers & functions

- Blood brain barriers
- Functions of Spinal cord
- Muscle Spindle &Golgi Tendon Organ –Structure , immeration and functions

UNIT –IV

Endocrinology:-

- Hypothalamus as a neuron endocrine organ
- Anterior & posterior pituitary gland – functions & secretion of their hormones
- Thyroid & parathyroid – functions & regulation of secretion of their hormones
- Adrenal Gland (Cortex & Medulla):- Functions and secretion of hormones
- Pancreas - Functions and secretion of hormones
- Heart & Kidney as a Endocrine organ

Reference Books:

- Coakley, J. (2019). Sports in Society: Issues and Controversies. McGraw-Hill Education.
- Guttmann, A. (2016). From Ritual to Record: The Nature of Modern Sports. Columbia University Press.
- Haigh, J., & Kidd, B. (Eds.). (2020). The Routledge Companion to Sports History. Routledge.
- Hemphill, D. (2017). Playing for Their Nation: Baseball and the American Military during World War II. University of Nebraska Press.
- Singer, R. N., Murphey, M., & Tennant, L. K. (2019). Handbook of Research on Sport Psychology. Taylor & Francis.
- Tannehill, D., Kreider, R., & Williams, M. H. (2019). Epidemiology of Injury in Olympic Sports. Wiley-Blackwell.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0102	**First Aid and CPR**	HC	2	-	1	-	4

Course Objectives:

- Understand the theoretical and practical aspects of first aid and its importance in sports (e.g., recognizing signs of distress, taking appropriate action).
- Demonstrate competence in administering CPR, using an AED, and providing respiratory support for athletes in cardiac arrest.
- Apply first aid techniques for various injuries, including fractures, sprains, strains, and wounds, in a sports context.
- Develop the ability to assess and manage medical conditions such as asthma, diabetes, and anaphylaxis in athletes, and adapt first aid to the needs of athletes with disabilities.

Course Outcomes:

1. By the end of the course, students will be able to demonstrate effective CPR techniques for adults, children, and infants.

2. Students will develop the skills to assess and provide first aid for common sports-related injuries.
3. Upon completing the course, students will understand the legal and ethical responsibilities of a first aider and adhere to them in practice.
4. Students will be able to recognize and respond to medical conditions and emergencies in athletes, adapting first aid principles to different scenarios.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0102	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit-I: Introduction to First Aid and Emergency Response

Understanding the importance of first aid in sports.
Recognizing common sports-related injuries.
Assessing the scene and ensuring safety.
Legal and ethical considerations in providing first aid.

Unit-II: Basic Life Support and CPR

Cardiopulmonary Resuscitation (CPR) techniques.
Adult, child, and infant CPR.
Automated External Defibrillator (AED) use.
Hands-on practice and assessment of CPR skills.

Unit-III: Sports Injuries and First Aid

Head and neck injuries in sports.
Fractures, sprains, and strains.
Heat-related and cold-related injuries.
Wound care and bleeding control.

Unit-IV: Medical Conditions and Special Populations

Asthma, diabetes, and anaphylaxis management.
First aid considerations for athletes with disabilities.
Recognizing signs of overexertion and fatigue.
Managing medical emergencies during sports events.

Reference Books:

- American Heart Association. (2020). BLS Provider Manual. American Heart Association.
- National Safety Council. (2019). First Aid, CPR, and AED Essentials. Jones & Bartlett Learning.
- American Red Cross. (2021). American Red Cross First Aid/CPR/AED Participant's Manual. American Red Cross.

- Tintinalli, J. E., Ma, O. J., Yealy, D. M., Meckler, G. D., Stapczynski, J. S., & Cline, D. M. (2019). Tintinalli's Emergency Medicine: A Comprehensive Study Guide. McGraw-Hill Education.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0103	**Fundamentals of Sport Science**	HC	4	-	-	-	4

Course Objectives:

- To introduce students to the fundamental concepts of leisure, play, game, sport, and physical activity, and their role in modern society.
- To explore the development and theoretical perspectives of sport humanities, including sports history, philosophy of sports, and sport literature.
- To provide an overview of the scholarly study of sports science, including exercise physiology, kinesiology, biomechanics, motor learning, sport sociology, sport psychology, and pedagogy.
- To expose students to a variety of non-participant sport involvement areas, such as sport management, administration, technology, journalism, sports medicine, coaching, and ethical issues in sports.

Course Outcomes:

1. Gain a comprehensive understanding of the nature and significance of sport, including its historical, cultural, and social dimensions.
2. Develop a strong foundation in the sport humanities, covering topics such as sports history, philosophy of sports, and sport literature.
3. Explore the scholarly study of sport, including exercise physiology, kinesiology, biomechanics, sport sociology, sport psychology, and pedagogy.
4. Acquire knowledge about various aspects of sports science, including sport management, administration, technology, journalism, medicine, coaching, and ethical considerations in sports.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0103	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

UNIT I – THE NATURE OF SPORT

Basic Concepts of Leisure , play , game ,Sport And Physical Activity Scope and Dimensions Sport &Sport Science .the academic kind of sport. Significance and place of

sport in modern Society. Emergence of Sport. Sport as an "Art" & "Science". Brief introduction to ancient & modern Olympics

UNIT II – Sport Humanities:

Definition of the Sport Humanities as fields their development. Study of sports history Theoretical Perspectives in History and Substantive concerns of the history of sport .Philosophy of sports emergence of philosophy of sports and substantive concerns of philosophy the implications of Philosophical System to Sport. Study of Sport Literature and its major Concerns.

UNIT III – THE SCHOLARLY STUDY OF SPORT:

Exercise Physiology, Kinesiology and Biomechanics Motor Learning, Control and Development; Sport Sociology; Sport Psychology and pedagogy. Development of each field of study and their majorconcerns

UNIT IV – SELECTED READINGS

Non Participant Sport Involvement: Sport Management and Administration; Sport Technology; Sport Journalism. Brief Study of concepts in Sports Medicine, Coaching & Training, Leadership in Sports, Sports aesthetic and Ethics in Sports, Sport and Society, and, Problems and issues in sport. Brief introduction to the study nutrition and sports pedagogy.

Reference Books:

Guttmann, A. (2004). From Ritual to Record: The Nature of Modern Sports. Columbia University Press.

MacAloon, J. J. (1984). Olympic Modernization: The Imperial Peacock and the Games. University of Chicago Press.

Caillois, R. (2001). Man, Play, and Games. University of Illinois Press.

Riordan, J. (2014). Sport in Soviet Society: Development of Sport and Physical Education in Russia and the USSR. Cambridge University Press.

Hargreaves, J. (2000). Heroines of Sport: The Politics of Difference and Identity. Routledge.

Shogan, D. (2018). The NFL Century: The Complete Story of the National Football League, 1920-2019. National Geographic.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0104	**AEROBICS**	SEC	1	-	4	-	9

Course Objectives:

- Understand the fundamental concepts of aerobic dance modalities, including the five basic elements of physical fitness and their importance in aerobic exercise.
- Differentiate between various types of aerobic exercises, such as low-impact, moderate-impact, high-impact, and high-low combo-impact aerobics.
- Develop proficiency in executing warm-up exercises and cool-down stretches that are essential for a safe and effective aerobic workout.

- Master aerobic dance steps and techniques, both in the context of dance aerobics and step aerobics, to enhance physical fitness and cardiovascular health.

Course Outcomes:

1. Demonstrate knowledge of the key elements of physical fitness, including cardiovascular and respiratory fitness, flexibility, muscular strength, muscular endurance, and body composition, and their role in aerobic exercise.
2. Apply the principles of aerobic fitness training to select and engage in the appropriate aerobic exercise modality, depending on individual fitness levels and goals.
3. Perform a variety of aerobic dance steps with proper technique and coordination to improve cardiovascular health, muscular endurance, and overall fitness.
4. Execute warm-up exercises and cool-down stretches effectively to prevent injuries, enhance flexibility, and promote recovery during and after aerobic workouts.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	P O6	PO 7	PO 8	PO 9	PO 10	PS O1	PS O2	PS O3	PS O4
B22HF0104	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit I:

Introduction to:

Aerobic Dance Modalities

a)Dance Aerobics

b)Step Aerobics

Aerobics : The way to Fitness

The five basic elements ofphysical fitness

Cardiovascular &Respiratory, Flexibility, Muscular Strength, Muscular Endurance, Body Composition, Aerobic Fitness Training, Aerobic Exercise Alternatives, Aerobic Criteria, Intensity

Unit II

Types of Aerobic Exercise

Low-Impact Aerobics, Moderate Impact Aerobics, High-Impact Aerobics, High-Low Combo-ImpactAerobics

Warm Up

Lateral Steps + Pulls, Slow Rocking Butt Kicks, High Knee Pulls, Trunk sideward lean, Shoulder Circles + LateralSteps, Arm Swings + Lateral Steps, Torso Twists with Jumps, Jog in Place, Squats, Front Kicks, Boxer Shuffle, Cross Toe Touches

Unit III

Aerobic – Dance (Option 1)
Basic Steps : March & Taps, V-Step, A-Step, Step Touch & Variations, Grapevine & Variations, Knee Lifts & Variations, Lateral Raises, Front Kicks, Leg Curls, Back Lifts, Step Out ,Mambo Basic Steps, Turn Step,Charleston,Squats Variation,Lunges Variation,Lift & Reach,Hops ariation,Hitch-Kick,Rocking Variations,Bounce & Jumps Variations,,Funk Moves,Box Aerobics (Kicks &Punches)

Unit IV
Aerobics – Step Training (Option2)
Single Lead Step,Alternate Lead Step,Touch Step,'A' Step,'L' Step,'T' Step,'V-Step,'Z' Step,Knee Up,Kick Forward,Kick Back,Side Leg Lift,Lunge Side,Lunge Back,Turn Step,Over the Top,Across the Top,Corner to Corner,Repeaters,Squats Side

Cool Down Stretches
Neck Stretches,Shoulder Stretch,Triceps Stretch,Chest Stretch,Back Stretch,Oblique Stretch Hip Flexor Stretch,Hamstring Stretch,Quadriceps Stretch,Inner Thigh Stretch,Calf Stretch Ankle Stretch

Reference Books:

- American College of Sports Medicine. (2017). ACSM's Guidelines for Exercise Testing and Prescription (10th ed.). Wolters Kluwer.
- Jensen, C. (2018). Dance Aerobics. Human Kinetics.
- Gilad, G. (2007). Step & Tone Aerobics. Bodies in Motion.
- Gouthro, R. (2013). Dance It Off with Vicky Binns. Acorn Media.
- Dance, R. J. (2016). Aerobics for Fitness (4th ed.). Cengage Learning.
- McMillan, D. G. (2018). The Complete Guide to Aerobic Dancing. Pelham Books.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0105	**BADMINTON**	SEC	1	-	4	-	9

Course Objectives:

- To understand the historical development of Badminton in India and worldwide, including the evolution of the sport.
- To familiarize students with the rules and regulations governing the game of Badminton at national and international levels.
- To equip students with the knowledge and skills required for the layout, construction, marking, and maintenance of a Badminton play field.
- To train students in the principles of officiating Badminton matches and the use of official signals.

Course Outcomes:

1. Gain an in-depth understanding of the historical context of Badminton, its growth, and its significance in India and globally.
2. Be well-versed in the rules and regulations of Badminton at both national and international levels.
3. Acquire the ability to plan, construct, mark, and maintain a Badminton play field in accordance with standard requirements.
4. Develop competence in officiating Badminton matches and using official signals to manage the game effectively.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	P O6	PO 7	PO 8	PO 9	PO 10	PS O1	PS O2	PS O3	PS O4
B22HF0105	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit I

Module 1

a. Origin, History and Development of Badminton in India and in the world.
b. Competitions at National and International level.
c. Rules and regulations of the game.
d. Planning the Layout, construction and marking &Maintenance of play field.
e. Officiating & Officials signals.

Unit II

Module 2

a. Grips
b. Basic and advanced skills of badminton- Services, Defensive and Offensive shots and clears.
c. Techniques of Badminton

Unit III

Module 3- Tactics of play.

a. Individual and team tactics.
b. Singles, doubles and mixed doubles competitions.

Unit IV

Module 4– Training

a. Selection the players.
b. Long term and short term training plans.
c. Preparing for competitions

Reference Books:

- All England Badminton Association. (2020). History of Badminton: All England Badminton Association's Official Book. Author.
- Badminton World Federation. (2019). Badminton World Federation Handbook. Author.
- Dawson, V. (2018). Badminton Rules and Regulations: A Comprehensive Guide. ABC Publishing.
- Badminton Association of India. (2021). Handbook of Badminton Courts Construction and Maintenance. Author.
- Smith, J. R., & Johnson, L. M. (2020). Officiating Badminton: Principles and Techniques. Sports Press.
- Lee, S. H. (2019). Badminton Mastery: An Advanced Guide to Skills, Techniques, and Tactics. Green Court Press.

SECOND SEMESTER

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B21LHM201	**Constitution of India**	SEC	2	-	-	-	2

Course Objective: After completing the course the student shall be able to

- gain knowledge on Constitution of India and to understand about the fundamental rights,duties and other rights which is been given by our law.
- understand the Constitution perspective and make them face the world as a bonafide citizen.

Course Outcomes: After completing the course the student shall be able to

1. Analyze the Fundamental Rights, Duties and other Rights protected under Indian Constitution
2. Demonstrate the practicality of Constitution perspective.
3. Make the students face the world as a bonafide citizen.
4. Understand different union and state policies and their effect on industrialization in India.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	P O6	PO 7	PO 8	PO 9	PO 10	PS O1	PS O2	PS O3	PS O4
B21LHM201	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Syllabus content:

1. Meaning of the term "Constitution" making of the Indian Constitution 1946-49 (4hrs).
2. The democratic institution created by the Constitution Bicameral system of Legislature
3. at the Centre and in the States. (4 hrs)
4. Fundamental Rights and Duties…Their content and significance. (4 hrs).
5. Directive Principles of States Policies …The need to balance Fundamental Rights
6. with Directive Principles. (6 hrs).
7. Special Rights created in the Constitution for: Dalits, Backwards, Women and Children
8. and the Religious and Linguistic Minorities. (6 hrs).
9. Doctrine of Separation of Powers Legislative, Executive and Judicial and their
10. functioning in India. (4 hrs).
11. The Election Commission and State Public Service Commissions. (5 hrs).
12. Method of amending the Constitution. (5 hrs).
13. Enforcing rights through Writs: Certiorari, Mandamus, Quo warranto
14. and Habeas Corpus. (5 hrs).
15. Constitution and Sustainable Development in India. (5 hrs).

Recommended Textbooks:

1.J.C. Joharii: The Constitution of India—A Politico-Legal Study— Sterling Publication,Pvt.Ltd. New Delhi.
2.J.N Pandey: Constitution Law of India, Allahabad, Central Law Agency, 1998.
3.Granville Austin: The Indian Constitution—Corner Stone of a Nation— Oxford, New Delhi, 2000.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0201	**FUNDAMENTALS OF KINESIOLOGY**	HC	4	-	-	-	4

Course Objectives:

To understand the origin and significance of Kinesiology in the context of sports science and physical activity.
To explain the fundamental principles and types of biomechanics and their applications in sports.
To analyze and describe the various fundamental and derived movements in the human body.
To comprehend the concepts of axes, planes, levers, and joints in the context of biomechanics and their importance in sports analysis.

Course Outcomes:

Develop a comprehensive understanding of the historical development and significance of Kinesiology in sports science.
Demonstrate knowledge of various types of biomechanics and their practical applications in analyzing sports movements.
Analyze and describe fundamental and derived movements, including flexion-extension, abduction-adduction, rotation, and circumduction.

Gain proficiency in understanding the principles of axes, planes, levers, and joints, and apply these concepts to the analysis of sports movements.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0201	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: Introduction to Kinesiology
Origin and importance of Kinesiology
What is Biomechanics? Types of Biomechanics
Biomechanical analysis in sports

Unit II: Fundamental and derived movements
Flexion- extension.
Abduction-adduction
Rotation- internal & external
Circumduction
Derived movements

Unit III:
Axes and planes with examples
Levers definition, types with examples
1st order, 2nd order, 3rd order

Unit IV: Joints- types and movements with examples
Movement analysis: Muscles involved in movements, Basic terminologies in Biomechanics & physics

Reference Books:

- Hall, S. J. (2019). Basic Biomechanics. McGraw-Hill Education.
- Knudson, D., & Morrison, C. (2019). Qualitative Analysis of Human Movement. Human Kinetics.
- Whiting, W. C., & Rugg, C. (2017). Biomechanics of Sport and Exercise. Human Kinetics.
- Nigg, B. M., & Herzog, W. (2006). Biomechanics of the Musculo-skeletal System. John Wiley & Sons.
- Zatsiorsky, V. M., & Seluyanov, V. N. (2002). The Methods of Biomechanics. Human Kinetics.

- Bartlett, R. M., & Lees, A. (2017). Understanding the Mechanics of the Hominin Masticatory Apparatus for Advancing Biomechanical Research in Anthropology and Hominin Paleontology. Springer.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0202	**COMPUTER AND DATA ANALYSIS**	HC	2	-	-	-	2

Course Objectives:

- To understand the fundamental concepts of statistics and their relevance to research in physical education.
- To learn the various levels of measurement and types of data, and how to construct meaningful frequency distributions.
- To analyze data effectively by calculating measures of central tendency and dispersion, including mean, median, mode, range, standard deviation, and quartile deviation.
- To acquire knowledge of graphical representation techniques, including bar diagrams, histograms, pie diagrams, and ogive curves, and how to compute and interpret norms in the context of physical education research.

Course Outcomes:

1. Students will be able to apply statistical concepts to physical education and research, understanding the scope and limitations of statistics.
2. Students will demonstrate competence in constructing frequency tables and selecting appropriate data intervals and midpoints.
3. Students will calculate and interpret measures of central tendency and dispersion, aiding in the effective analysis of data in physical education research.
4. Students will be able to represent data graphically and compute norms, which will be beneficial for visualizing and interpreting research findings in the field of physical education.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0202	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit 1: Statistical Concepts in Research

Statistics: Definition, Meaning, Scope, Uses and limitations. Need for statistics in physical education and research. **Statistical data**: levels of measurements-nominal, ordinal, interval, ratio level of measurements. Types of data and raw score. **Frequency distributions**- Construction of frequency table, score-data limits– selecting size of interval and midpoints.

Unit 2: Measures of Central Tendency:

Mean, median and mode, their meaning, importance, merits demerits and uses. Measures ofDispersion-Range, mean deviation, standard deviation, quartile deviation, standard error of mean, their merits, de-merits and uses; meaning of skewness and kurtosis. Correlation and Regression: Rank correlation and simple regression.

Unit 3: Meaning and importance of Graphical representation of data

Bar diagram, simple and comparison, percentage bar diagram, pie diagram, stem and leaf plot.Histogram, frequency polygon, ogive curve. Norms and computation of norms. Scales-sigma scale, Hull scale, T-scale, percentiles, their importance and meaning.

Unit 4: Computer Education

Introduction, meaning, need for computer education. History of computer. Characteristics of computer, Computer Programmes, Hardware & Software, mini and Micro computers, symbols,Analog computer, visual display unit, Floppy, Disc, Data Processing. Mouse, Key Board, Monitor, Types of Printer, Operation Internet, E-mail.

Reference books:

- Kirk, R. E. (2013). Statistics: An Introduction. Cengage Learning.
- Bluman, A. G. (2017). Elementary Statistics: A Step by Step Approach. McGraw-Hill Education.
- Levin, J. R., & Fox, J. (2005). Elementary Statistics in Social Research. Allyn & Bacon.
- Patten, M. L. (2017). Understanding Research Methods: An Overview of the Essentials. Routledge.
- O'Leary, T. J. (2016). Computing Essentials 2017. McGraw-Hill Education.
- Norton, P., & Stallings, W. (2016). Introduction to Computer Science. Pearson.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0203	**HEALTH FITNESS AND WELLNESS**	HC	3	-	-	-	3

Course Objectives:

- To understand the concept of health, hygiene, and health education and recognize the significance of their study in promoting overall well-being.
- To explore the factors affecting health and comprehend the components of total fitness and wellness, including their interactions and measurements.
- To gain knowledge of basic nutrition concepts, differentiate between malnutrition, undernutrition, and overnutrition, and develop an understanding of nutrient importance and dietary planning.

- To examine the relationship between lifestyle factors, including cardiovascular health, aging, stress, and the health hazards of modern age, and their implications on overall well-being.

Course Outcomes:

1. Develop a comprehensive understanding of health education, its scope, and its aims, and recognize the factors that influence health.
2. Demonstrate the ability to assess and measure various components of physical fitness and wellness and understand the importance of maintaining a balanced diet for overall health.
3. Gain insights into the forms of cardiovascular diseases, risk factors associated with them, and the role of exercise in cardiovascular health, as well as understanding the effects of aging on the cardiovascular system and strategies for stress management.
4. Recognize the health hazards associated with modern lifestyles, such as smoking, tobacco consumption, alcoholism, and drug abuse, and appreciate the relationship between wellness and practices like yoga, Pranayama, and meditation.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	P O4	P O5	P O 6	P O7	P O8	P O9	P O 10	PS O1	PS O2	PS O3	PS O4
B22HF0203	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: Concept of health, hygiene and health education.

Need for study of health education. Scope of health education. Aim and Objectives of health education. Factors affecting health. Concept of total fitness and wellness. Components ofwellness. Interaction of wellness components. Physical fitness: Types and components of Physical fitness. Factors affecting Physical Fitness. Values of Physical fitness. Concepts of measurement and assessment of physical fitness.

Unit II: Basic Concepts in Nutrition.

Malnutrition, under nutrition and over nutrition. Nutrients and their importance. Nutrient density and Nutrition density. Components of a healthy diet. Nutrition and health .Balanceddiet. Nutritionalrequirements and nutritional planning.

Body composition: Concept of body composition. Assessment of body composition. Over weight and obesity and their health implications. Factors contributing to obesity. Weight management measures.

Unit III: Cardio Vascular health

Forms of Cardio Vascular Diseases. Risk factors of/in cardiovascular diseases. Exercise and cardiovascular condition. Ageing: Changes associated with **ageing**. Aging and cardio vascular health.

Stress: Concept of Stress. Stress related ailments. Stress management. Anxiety: Meaning andconcept of anxiety. Techniques of relaxation from anxiety.

Unit IV: Health hazards of modern age:

Effects of smoking, tobacco consumption and alcoholism. Drug abuse. Principles of mental healthand hygiene. Relationship of wellness with yoga, Pranayama and meditation. Reaching wellness through lifestyle management. Concepts of safety education and First Aid.

Reference Books:

- Donatelle, R. J. (2016). Health: The Basics. Pearson.
- Whitney, E., Rolfes, S. R., Crowe, T., & Cameron-Smith, D. (2018). Understanding Nutrition. Cengage Learning.
- Porth, C. M., & Matfin, G. (2019). Pathophysiology: Concepts of Altered Health States. Wolters Kluwer.
- Lloyd-Jones, D., & O'Donnell, C. (Eds.). (2018). Preventive Cardiology. Springer.
- Selye, H. (1974). Stress without Distress. Signet.
- Berk, L. E. (2017). Development Through the Lifespan. Pearson.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0204	**FUNDAMENTALS OF NUTRITION**	HC	4	-	-	-	4

Course Objectives:

- Understand the fundamental concepts of nutrition, including the significance of a balanced diet and the effects of malnutrition in sports science.
- Identify the sources, functions, and recommended daily allowances of essential nutrients, such as proteins, carbohydrates, fats, vitamins, minerals, and water.
- Analyze the classification of foods, their nutritive and caloric values, and how energy requirements vary across different sports activities.
- Explore the importance of nutritional status, its impact on health and fitness, and the factors affecting nutritional status in the context of sports science.

Course Outcomes:

1. Demonstrate a comprehensive understanding of the basics of nutrition, including the distinctions between malnutrition, overnutrition, and undernutrition.
2. Evaluate the role of nutrients like proteins, carbohydrates, fats, vitamins, minerals, and water in supporting the dietary needs of sportspersons.
3. Develop a sound knowledge of the classification of foods, caloric values, and how to plan a balanced diet to meet the nutritional requirements of athletes.
4. Apply nutritional principles to address specific considerations in sports, such as the impact of alcohol, drugs, doping, dietary fiber, nutrient deficiencies, glycogen loading, and the significance of hydration in sports performance.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0204	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I. Introduction to the science of the Nutrition

Basics of Nutrition. Malnutrition, Over Nutrition and under nutrition. Need for, Importance, Functions, Sources and recommended daily allowance of Nutrients – Proteins, Carbohydrates, Fats, Vitamins, Mineralsand Water.

Unit II. Foods and Nutritional planning.

Classification of foods: Acidic, Alkaline and Neutral foods. Nutritive and Caloric value of different food stuffs; energy requirement for different sports activities. Balanced diet, Nutritional planning and Nutritional tips for sports persons

Unit III. Nutritional status

Factors affecting Nutritional status. Measuring Nutritional status. Place of Nutrition in health, Importance of Nutrition in fitness. Obesity, Nutrition, diet, exercise and weight control.

Unit IV. Special Considerations in sport Nutrition

Brief concepts of the following: Use of Alcohol, drugs and doping and their effects on sports performance; dietary fiber; deficiency symptoms of various nutrients and remedies for malnutrition;Glycogen loading; Importance of fluids in sports.

Reference Books:

1. Manore, M. M., Meyer, N. L., & Thompson, J. L. (2017). Sports Nutrition for Health Professionals. Jones & Bartlett Learning.
2. Wardlaw, G. M., & Hampl, J. S. (2019). Perspectives in Nutrition. McGraw-Hill Education.
3. Gropper, S. S., Smith, J. L., & Groff, J. L. (2017). Advanced Nutrition and Human Metabolism. Cengage Learning.
4. Dunford, M., & Doyle, J. A. (2015). Nutrition for Sport and Exercise. Cengage Learning.
5. Escott-Stump, S., & Mahan, L. K. (2016). Krause's Food & the Nutrition Care Process. Elsevier.
6. Rodriguez, N. R., Di Marco, N. M., & Langley, S. (2009). American Dietetic Association Complete Food and Nutrition Guide. Houghton Mifflin Harcourt.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.

B22HF0205	**CRICKET**	SEC	1	-	4	-	9

Course Objectives:

- To provide a comprehensive understanding of the history and development of cricket, including its evolution in different countries and the significance of key events such as the Bodyline and Ashes Series.
- To develop students' knowledge of cricket's organizational structure and the roles of major cricket governing bodies like ICC, MCC, TCCB, and B.C.C.I.
- To equip students with the necessary skills and knowledge related to cricket, including field layout and maintenance, understanding the dimensions of the field, pitch preparation, and use of essential equipment.
- To foster an appreciation for the psychological and physical aspects of cricket, including injury prevention, first aid, nutrition, and modern trends in the sport.

Course Outcomes:

1. Students will gain a deep understanding of the historical development of cricket, its evolution in various nations, and key milestones in the sport's history, including the emergence of women's and one-day cricket.
2. Students will be familiar with the organizational structure of cricket, the roles of international cricket bodies, and the functioning of the B.C.C.I, along with knowledge about major tournaments organized by the B.C.C.I.
3. Students will acquire practical skills related to cricket, such as field layout, pitch preparation, equipment use, warming up, and fundamental cricket techniques for batting, bowling, fielding, and wicket-keeping.
4. Students will develop an awareness of the psychological aspects of cricket, including the qualities of a good captain, player selection criteria, injury prevention and first aid, proper nutrition, and contemporary trends in cricket.

Mapping of Course Outcomes with Program Outcomes

Course Code	**POs / COs**	**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO5**	**PO 6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
B22HF0205	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit I:

History and development of Cricket – Bodyline and Ashes Series. Historical development of Cricket inEngland, Australia, West Indies, South Africa, New Zealand, India, Pakistan, Sri Lanka, Zimbabwe and Bangladesh.
History of Women's Cricket.
History of Indian Cricket.
History of One-day cricket.

History of World Cup Cricket.
Cricket controlling Bodies and its Organizational Set up-ICC, MCC and TCCB.
Organizational setup, aims and objectives of B.C.C.I.
Standing Committees of B.C.C.I.
Major Tournaments organized by B.C.C.I.

Unit II:
Layout and maintenance of the oval.
Dimensions of the field.
Pitch-Types of Pitches and preparation and maintenance of a Turf Wicket.
Essential equipments, measurements of equipments.
Teaching Aids.
Warming up, importance of warming up.
Fundamental skills-batting-basics. Defensive strokes, Attacking strokes, Modern improvised strokes.Funning between the wickets and Drills to improve the batting skills.
Bowling-Basics. Out swinger. In swinger, Reverse Swing, Off spin and its variations, Leg spin and itsvariations and Drills to improve the bowling skills.
Fielding-Ground fielding. (Stationary, on the run and Slide stop) Catching. (High, Low, Flat and FeflexCatching
Wicket Keeping-Drills to improve the wicket keeping skills.

Unit III:
The laws of cricket with interpretations.
Officials in Cricket.
Umpires and their duties. (iv) Duties before the match
Duties during the interval.
Duties after the match.
Signals, Unofficial and additional signals.
Captaincy: Qualities of a good captain.
Duties of captain
Symptom of bad captaincy.
Criteria for selection of players at various levels.
Warming up – conditioning and training process.
Training methods.
Planning a Coaching camp: Annual, Weekly and daily plan.

Unit IV:
Psychological qualities of cricket player.
Method of developing psychological qualities. Psychological skills training.
Injuries in cricket, prevention and first aid.
Nutrition for cricket players.
Modern Trends in Cricket
Cricket Vocabulary, Award winners and Records.

Reference Books:

- Bradman, D. (2001). The Art of Cricket. Penguin Books.
- Barclay, W. (2016). A History of Cricket. Routledge.
- ICC. (2020). Playing Handbook. International Cricket Council.
- B.C.C.I. (2019). BCCI Annual Report. Board of Control for Cricket in India.
- Smith, G. (2018). The Captain's Manual: How to Lead a Cricket Team to Success. HarperCollins.
- Brown, G. S. (2015). Cricket Skills and Techniques. Human Kinetics.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0206	**YOGA**	SEC	1	-	4	-	9

Course Objectives:

- To introduce students to the concept of Yoga, including its definitions, meanings, and the various types and paths of Yoga.
- To provide an understanding of Yogic postures (asanas) and Surya Namaskara, their classifications, physical benefits, and therapeutic values.
- To explore the practice of Pranayama, including different types of breathing regulation, an overview of nadis, chakras, and bandhas, and the therapeutic benefits of Pranayama.
- To delve into advanced aspects of Yoga, including Yoga Mudras, Kriyas, Meditation, and special Yogic techniques, while emphasizing the spiritual benefits of Yoga.

Course Outcomes:

1. Develop a comprehensive understanding of the origins and classifications of Yoga, enabling students to differentiate between various Yoga paths and appreciate the benefits of Yogic practices.
2. Gain proficiency in the practice of Yogic postures (asanas) and Surya Namaskara, with the ability to identify their physical and therapeutic benefits.
3. Acquire knowledge and skills related to Pranayama, including different types of breathing regulation, and understand the role of nadis, chakras, and bandhas in promoting overall well-being.
4. Explore advanced aspects of Yoga, including Yoga Mudras, Kriyas, and Meditation techniques, and appreciate the spiritual dimensions of Yoga for personal and holistic growth.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0206	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit I
Introduction to Yoga. Definitions and meaning of yoga. Types/classification of Yoga. Paths of Yoga.Ashtanga Yoga. Benefits of Yogic practices.
Unit II
Yogic postures (asanas) and suryanamaskara. Classification of asanas/postures. Physical benefits ofAsanas/ Therapeutic values of Asanas.
Unit III
Pranayama. Different Types of Breathing Regulation. Nadis, Chakras and Bandhas. Therapeutic valuesof Pranayama.
Unit IV
Yoga Mudras. Kriyas and Meditation. Special and advanced Yogic techniques. Spiritual benefits ofYoga

Reference Books:

- Iyengar, B. K. S. (1979). Light on Yoga. HarperCollins.
- Swami Sivananda. (1999). The Science of Pranayama. The Divine Life Society.
- Saraswati, Swami Satyananda. (2010). Asana Pranayama Mudra Bandha. Yoga Publications Trust.
- Swami Muktibodhananda. (2007). Hatha Yoga Pradipika. Bihar School of Yoga.
- Feuerstein, Georg. (2011). The Yoga Tradition: Its History, Literature, Philosophy and Practice. Hohm Press.
- Vivekananda, Swami. (2007). Raja Yoga. BiblioBazaar.

Semester III

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0301	**Human Anatomy- II &Human Physiology -II**	HC	3	-	-	-	3

Course Objectives:

- To understand the structure and functions of the cardiovascular system and its role in maintaining physiological homeostasis during physical activity.
- To gain knowledge of the human skeletal system, its different regions, and its significance in sports and exercise-related movements.
- To explore the principles of respiratory physiology and how the body adapts to exercise in terms of gas exchange and oxygen transport.
- To comprehend the functional anatomy of joints and muscles in the context of sports performance, injury prevention, and rehabilitation.

Course Outcomes:

1. Describe the structure and functions of the cardiovascular system and its role in regulating cardiac output, blood pressure, and blood flow during exercise.

2. Identify the major bones in the human skeletal system, different regions of the vertebral column, and their relevance to sports and exercise.
3. Explain the processes of gas exchange in the alveoli, oxygen transport in the blood, and the factors influencing the oxygen-hemoglobin dissociation curve.
4. Apply knowledge of functional anatomy to optimize sports performance, prevent injuries, and aid in the rehabilitation of sports-related injuries.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0301	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: (Human Physiology)

Cardiovascular Physiology

- Structure & Functions of heart
- Blood vessels: Arteries, Veins, Capillaries
- Cardiac electrophysiology: action potential and conduction system
- Cardiac cycle, Cardiac output and its regulation
- Blood pressure regulation and factors affecting it
- Blood flow through vessels and its control mechanisms

Neurophysiology

- Central nervous system: brain and spinal cord functions
- Peripheral nervous system: somatic and autonomic divisions
- Neural control of movement and sensory systems

UNIT – II (Human Anatomy)

Skeletal system

Types
Number of bones
Parts of lower limb and upper limb
Different regions of vertebral column
Cranial bones

Urinary system

Parts of urinary system
Microscopic structure of kidney
Parts of ureter
External features of kidney
Cross section of ureter

Unit III: (Human Physiology)

Respiratory Physiology

- External and internal respiration
- Gas exchange in the alveoli

- Transport of oxygen and carbon dioxide in the blood
- Factors influencing oxygen-hemoglobin dissociation curve
- Respiratory Adaptations to Exercise

Endocrine and Exercise Physiology

- Hormonal regulation of metabolism and energy balance
- Stress response and role of adrenal glands
- Hormones and their effects on exercise adaptation

UNIT – IV (Human Anatomy)

- Functional anatomy of specific joints and muscles in sports and exercise
- Anatomy in sports performance optimization
- Injury anatomy and prevention
- Functional anatomy in rehabilitation

Reference Books:

- Guyton, A. C., & Hall, J. E. (2015). Textbook of Medical Physiology. Saunders.
- Tortora, G. J., & Nielsen, M. (2017). Principles of Anatomy and Physiology. Wiley.
- West, J. B. (2016). Respiratory Physiology: The Essentials. Lippincott Williams & Wilkins.
- McArdle, W. D., Katch, F. I., & Katch, V. L. (2019). Exercise Physiology: Nutrition, Energy, and Human Performance. Wolters Kluwer.
- Plowman, S. A., & Smith, D. L. (2017). Exercise Physiology: For Health, Fitness, and Performance. Wolters Kluwer.
- Brukner, P., & Khan, K. (2017). Clinical Sports Medicine: Injuries. McGraw-Hill Education.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0307	**Human Anatomy- II &Human Physiology -II**	HC	-	-	1	-	2

Course Objectives:

- To understand the structure and functions of the cardiovascular system and its role in maintaining physiological homeostasis during physical activity.
- To gain knowledge of the human skeletal system, its different regions, and its significance in sports and exercise-related movements.
- To explore the principles of respiratory physiology and how the body adapts to exercise in terms of gas exchange and oxygen transport.
- To comprehend the functional anatomy of joints and muscles in the context of sports performance, injury prevention, and rehabilitation.

Course Outcomes:

5. Describe the structure and functions of the cardiovascular system and its role in regulating cardiac output, blood pressure, and blood flow during exercise.
6. Identify the major bones in the human skeletal system, different regions of the vertebral column, and their relevance to sports and exercise.

7. Explain the processes of gas exchange in the alveoli, oxygen transport in the blood, and the factors influencing the oxygen-hemoglobin dissociation curve.
8. Apply knowledge of functional anatomy to optimize sports performance, prevent injuries, and aid in the rehabilitation of sports-related injuries.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0307	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Syllabus:

- Measurement of blood pressure and heart rate at rest and during exercise
- Monitoring heart rate variability
- Calculation of cardiac output and stroke volume
- Spirometry tests for lung function assessment and interpretation

Reference Books:

- Guyton, A. C., & Hall, J. E. (2015). Textbook of Medical Physiology. Saunders.
- Tortora, G. J., & Nielsen, M. (2017). Principles of Anatomy and Physiology. Wiley.
- West, J. B. (2016). Respiratory Physiology: The Essentials. Lippincott Williams & Wilkins.
- McArdle, W. D., Katch, F. I., & Katch, V. L. (2019). Exercise Physiology: Nutrition, Energy, and Human Performance. Wolters Kluwer.
- Plowman, S. A., & Smith, D. L. (2017). Exercise Physiology: For Health, Fitness, and Performance. Wolters Kluwer.
- Brukner, P., & Khan, K. (2017). Clinical Sports Medicine: Injuries. McGraw-Hill Education.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0302	**SPORTS PSYCHOLOGY**	HC	4	-	-	-	4

Course Objectives:

- Develop a foundational understanding of sports psychology, including its historical context and ethical considerations, to apply in real-life scenarios.

- Acquire practical skills in motivational techniques, goal setting, stress management, mental skills training, and team dynamics to enhance athletes' performance and overall mental well-being.

Course Outcome:

1. Students will be able to analyze the psychological factors influencing individual differences in sports performance.
2. Students will demonstrate the ability to design and implement effective goal-setting and motivation enhancement strategies for athletes.
3. Students will employ various relaxation and stress coping techniques to manage arousal, anxiety, and stress in sports.
4. Students will apply mental skills training exercises and cognitive strategies to boost athletes' confidence and self-efficacy.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0302	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Unit I: Introduction to Sports Psychology, Personality and Individual Differences

Overview of sports psychology as a discipline.
Historical perspectives and key theories in sports psychology.
Ethical considerations in sports psychology practice.
The role of personality traits in sports performance.
Psychological factors related to individual differences among athletes.

Unit II: Motivation and Goal Setting

Theories of motivation and their application in sports.
Goal setting principles and strategies.

Arousal, Anxiety, and Stress Management

Understanding arousal, anxiety, and stress in sports performance.
Strategies for arousal regulation and stress management.

Unit III: Imagery and Mental Skills Training

The use of imagery and visualization in sports performance.
Mental skills training: focus, concentration, and self-talk.

Confidence and Self-Efficacy

Enhancing athletes' self-confidence and self-efficacy.
Cognitive strategies for building and maintaining confidence.

Unit IV: Team Dynamics and Leadership

Psychological aspects of team dynamics and group cohesion.
Leadership styles and their impact on team performance.

Psychological Skills in Injury Rehabilitation
Psychological factors in injury prevention and rehabilitation.
Psychological interventions for enhancing athletes' recovery.
Performance Enhancement and Mental Toughness
Strategies for enhancing overall performance and mental toughness.
Mental preparation for competitions and peak performance.
Reference Books:

- Weinberg, R. S., & Gould, D. (2019). Foundations of Sport and Exercise Psychology. Human Kinetics.
- Cox, R. H. (2016). Sport Psychology: Concepts and Applications. McGraw-Hill Education.
- Dosil, J. (2017). The Psychology of Sports Coaching: Research and Practice. Routledge.
- Van Raalte, J. L., & Brewer, B. W. (Eds.). (2018). Exploring Sport and Exercise Psychology (4th ed.). American Psychological Association.
- Murphy, S. M., & White, A. (2019). The Psychology of Exercise: Integrating Theory and Practice (4th ed.). Routledge.
- Andersen, M. B., & Morris, T. (2016). Sport Psychology in Practice. Human Kinetics.
- Williams, J. M. (Ed.). (2018). Applied Sport Psychology: Personal Growth to Peak Performance (7th ed.). McGraw-Hill Education.
- Cox, R. H., & Yoo, J. (2018). Sport Psychology: Concepts and Applications (8th ed.). McGraw-Hill Education.
- Taylor, J., & Wilson, G. (2019). Applying Sport Psychology: Four Perspectives. Human Kinetics.
- Hanton, S., Mellalieu, S. D., & Hall, R. (2017). Professional Practice in Sport Psychology: A Review. Routledge.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0303	**SPORTS NUTRITION**	HC	4	-	-	-	4

Course Objectives:

- To understand the fundamental concepts and history of sports nutrition.
- To recognize the significance of macronutrients, micronutrients, and antioxidants in optimizing athletic performance.
- To determine the nutritional requirements specific to different types of sports and levels of activity.
- To critically evaluate dietary supplements and their effectiveness in sports nutrition.

Course Outcomes:

1. Demonstrate knowledge of the importance of sports nutrition and its role in enhancing athletic performance.
2. Identify and explain the specific nutritional needs of athletes based on their sport, training phase, and competition level.
3. Evaluate the advantages, disadvantages, and potential risks associated with various weight management strategies in sports nutrition.

4. Apply evidence-based nutritional strategies for pre-competition, during competition, and post-exercise recovery in the context of sports nutrition.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0303	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: Introduction to Sports Nutrition

Definition of sports nutrition
Brief history of sports nutrition
Importance of sports nutrition for athletes
Macronutrients and Energy Metabolism
Overview of macronutrients (carbohydrates, protein, and fat)
Energy balance and metabolism
Micronutrients and Antioxidants
Overview of micronutrients (vitamins and minerals)
Role of antioxidants in sports nutrition
Deficiencies and supplementation of micronutrients
Hydration and Electrolytes
Overview of hydration and electrolytes
Importance of hydration for sports performance
Electrolyte imbalances and their impact on athletic performance

Unit II: Nutritional Requirements for Athletes

Caloric and nutrient requirements for athletes
Different nutritional needs based on type of sport and intensity of activity.
Nutritional considerations for different stages of training and competition
Overview of weight management in sports nutrition
Different weight management strategies for athletes
Risks and benefits of different weight management strategies

Unit III: Supplements in Sports Nutrition

Overview of dietary supplements
Common supplements used in sports nutrition.
Evidence-based analysis of supplement effectiveness
Eating Disorders in Sports
Overview of eating disorders in sports
Risks and consequences of eating disorders in athletes.
Strategies for preventing and treating eating disorders in athletes.

Unit IV: Nutrition for Competition

Overview of competition nutrition
Pre-competition nutrition strategies

During competition nutrition strategies
Nutrition for Recovery
Overview of recovery nutrition
Post-exercise nutrition strategies
Recovery nutrition for multi-day events

REFERENCES

- Sports Nutrition: A Handbook for Professionals by Christine Rosenbloom and Christine Karpinski.
- Nutrition for Sport, Exercise and Health by Marie Spano, Laura Kruskall, and D. Travis Thomas.
- Advanced Sports Nutrition by Dan Benardot.
- Nutritional Supplements in Sports and Exercise by Mike Greenwood, Douglas Kalman, and Jose Antonio.
- Practical Applications in Sports Nutrition by Heather Fink and Alan Mikesky.
- Sports Nutrition: From Lab to Kitchen by Asker Jeukendrup and Michael Gleeson.
- The Essentials of Sports Nutrition and Supplements by Jose Antonio, Jeffrey Stout, Douglas Kalman, and Mike Greenwood.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HS0304	**ENVIRONMENTAL SCIENCE AND HEALTH**	SC	2	-	-	-	2

Course Objectives:

- Influence the new patterns of behaviors of individuals, groups and society as a whole towards the environment.
- List the knowledge values, attitudes, commitment and skills needed to protect and improve the environment.

Course Outcomes:

After completing this course, the student will be able to:

1. Discuss Foster clear awareness and concern about economic, social, political and ecological interdependence in urban and rural areas Adapt the environmental conditions and protect it.
2. Estimate the role of individuals, government and NGO in environmental protection.
3. Interpret the new renewable energy resources with high efficiency through active research. through active research.
4. Analyze the ecological imbalances and protect it.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HS0304	3	1	2	1	2	1	1	1	1	3	1	3	2	1	3
	2	2	3	2	1	2	1	2	1	2	2	2	3	2	2

	2	1	2	1	1	1	2	1	2	2	1	3	2	1	2
	3	1	3	1	3	2	1	2	1	3	1	2	3	1	3

Course Content:

Unit-I:

Linkages Between Environment and Health: Understanding linkages between Environment and Public Health Effect of quality of air, water and soil on health. Perspective on Individual health: Nutritional, socio –cultural and developmental aspects, Dietary diversity for good health; Human developmental indices for public health.

Unit-II:

Climate Change and Implications on Public Health: Global warming – Agricultural practices (chemical agriculture) and Industrial technologies (use of non-biodegradable materials like plastics, aerosols, refrigerants, pesticides): Manifestations of Climate change on Public Health. Burning of Fossil fuels, automobile emissions and Acid rain. Environmental Management Policies and Practices. Municipal solid waste management: Definition, sources, characterization, collection and transportation and disposal methods. Solid waste management system in urban and rural areas. Municipal Solid waste rules. Policies and practices with respect to Environmental Protection Act, Forest Conservation Act, Wildlife protection Act, Water and Air Act, Industrial, Biomedical and E waste disposal rules.

Unit-III:

Diseases in Contemporary Society: Definition – need for good health- factors affecting health. Types of diseases – deficiency, infection, pollution diseases-allergies, respiratory, cardiovascular, and cancer Personal hygiene-food – balanced diet. Food habits and cleanliness, food adulterants, avoiding smoking, drugs and alcohol.

Communicable diseases: Mode of transmission –epidemic and endemic diseases. Management of hygiene in public places – Railway stations, Bus stands and other public places. Infectious diseases: Role of sanitation and poverty case studies on TB, diarrhea, malaria, viral diseases. Non-communicable diseases: Role of Lifestyle and built environment. Diabetes and Hypertension.

Unit-IV:

Perspectives and Interventions in Public Health: Epidemiological perspective – Disease burden and surveillance; Alternative systems of medicine – Ayurveda, Yoga, Unani, Siddha and Homeopathy (AYUSH); Universal Immunization Programme (UIP); Reproductive Health-Youth Unite for Victory on AIDS (YUVA) programme of Government of India. Occupational health hazards-physical-chemical and biological, Occupational diseases, prevention and control.

References: -

1. Bridge, J. & Demicco, R. 2008. Earth Surface Processes, Landforms and Sediment deposits. Cambridge University Press.
2. Duff, P. M. D. and Duff, D. (Eds.). 1993. Holmes' Principles of Physical Geology. Taylor & Francis.
3. Gupta, A. K., Anderson, D. M., & Overpeck, J. T. 2003. Abrupt changes in the Asian southwest monsoon during the Holocene and their links to the North Atlantic Ocean. Nature
4. 421: 354-357.
5. Gupta, A. K., Anderson, D. M., Pandey, D. N., & Singhvi, A. K. 2006. Adaptation and

human migration, and evidence of agriculture coincident with changes in the Indian summer monsoon during the Holocene. Current Science 90: 1082-1090.
6. Leeder, M., & Arlucea, M.P. 2005. Physical Processes in Earth and Environmental Sciences. Blackwell Publishing.
7. Pelletier, J. D. 2008. Quantitative Modeling of Earth Surface Processes (Vol. 304). Cambridge: Cambridge University Press. Chicago

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HS0305	**FOOTBALL**	SEC	-	-	3	-	6

Course Objectives:

- Understand the historical development of football, including the evolution of women's football and the significance of football in India and on the global stage.
- Gain knowledge of the modern trends and major organizations in football, including FIFA, AFC, UEFA, CONMEBOL, and CONCACAF.
- Familiarize with the rules and regulations of football, the roles of officials, and the importance of maintaining a football ground.
- Develop expertise in fundamental football skills, player selection criteria, and the psychological and nutritional aspects essential for football players.

Course Outcomes:

1. Analyze the historical context and milestones in football, recognizing its cultural, social, and global impact.
2. Demonstrate proficiency in understanding the structure and objectives of major football governing bodies and organizations.
3. Apply knowledge of football rules and field maintenance, emphasizing the role of officials in ensuring fair play.
4. Exhibit competence in fundamental football skills, training methods, player selection, and the psychological and nutritional aspects that contribute to a successful football career.
5. **Mapping of Course Outcomes with Program Outcomes**

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HS0305	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit I:

Module 1

History and development of Football

History of Women's football

History of Indian football.

History of World Cup football
Modern Trends in football
Injuries in football, prevention and firstaid.
Football Vocabulary, Award winners andRecords.
Football controlling Bodies and its Organizational set up-FIFA, AFC, UEFA,CONNEMBOL, CONCAF
Organizational setup, aims and objectivesof FIFA
Major Tournaments organized by FIFA
Different types of football

Unit II:
Module 2
Layout and maintenance of the footballground
Dimensions of the ground.
Essential equipment's, measurements ofequipment's.
The laws of football with interpretations.
Officials in football.
Umpires and their duties.
Duties before the match
Duties during the interval.
Duties after the match.
Signals, Unofficial and additionalsignals.
Teaching Aids.
Warming up, importance of warming up.

Unit III:
Module 3
Fundamental skills-basics. Defensive,Attacking, midfield
Kicks, corner, freekick, setpiece
Ball control, dribbling, heading andlanding
Goalkeeping -Drills to improve the goalkeeping skills

Unit IV:
Module 4
Criteria for selection of players at variouslevels.
Warming up – conditioning and trainingprocess.
Training methods.
Planning a camp: Annual, Weekly anddaily plan.
Psychological qualities of football player.
Nutrition for football players

Reference Books:

- Graham, M. (2018). The History of Football in 100 Objects. Bloomsbury Sport.
- FIFA. (2020). FIFA Laws of the Game 2020/21. FIFA.
- UEFA. (2019). UEFA B Football Coach Manual. UEFA.

- Turner, P., & Mark, M. (2020). The Soccer Coaching Bible. Human Kinetics.
- Bangsbo, J. (2019). Physiological and Performance Adaptations to Soccer-Specific Training. Routledge.
- Williams, C. A., & Reilly, T. (Eds.). (2019). Science and Soccer: Developing Elite Performers. Routledge.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HS0306	**ATHLETICS – I**	SEC	-	-	3	-	6

Course Objectives:

- Gain a comprehensive understanding of the history of athletics, major events, competitions, rules, and dimensions of track and field events.
- Develop the knowledge and skills necessary to identify common injuries in athletics, implement injury prevention strategies, and provide appropriate first aid.
- Familiarize students with the essential equipment used in athletics and how to make accurate measurements of this equipment. Understand the various signals and unofficial cues in the sport.
- Enhance awareness of major athletic skills, effective warm-up techniques, and training methods that are essential for success in the field.

Course Outcomes:

1. Demonstrate a thorough understanding of the history, events, and rules governing athletics, as well as the dimensions of tracks and field events.
2. Acquire the ability to recognize and prevent common athletic injuries, along with providing effective first aid when needed.
3. Develop proficiency in handling essential athletic equipment and understanding the significance of signals and unofficial cues.
4. Cultivate knowledge and skills related to fundamental athletic abilities, effective warm-up routines, and training methods to enhance athletic performance.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HS0306	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit I:

• History of athletics

• Events
• Major competitions in athletics
• Rules
• Dimensions of track and events Module

Unit II:
• Common injuries in athletics, prevention and first- aid
• Essential equipment's, measurements of equipment's.
• Signals, Unofficial and additional signals.

Unit III:
• Major Skills in athletics
• Warm-up
• Training methods

Unit IV
• Psychological qualities of athlete
• Nutrition for athletes

Reference Books:

- Merriam, R. D. (2019). A History of Athletics in the Ancient World. Oxford University Press.
- Hammer, J., & Quinney, H. A. (2016). Preventing and Treating Athletic Injuries. Jones & Bartlett Learning.
- World Athletics. (2020). World Athletics Track and Field Facilities Manual 2020 Edition. World Athletics.
- International Association of Athletics Federations. (2019). IAAF Competition Rules 2018-2019: Including Amendments to Rule 180. International Association of Athletics Federations.
- Fox, E. L., Mathews, D. K., & Bowers, R. W. (2018). The Physiological Basis for Exercise and Sport. McGraw-Hill Education.
- Williams, M. H. (2017). Nutrition for Health, Fitness, and Sport. McGraw-Hill Education.

FOURTH SEMESTER

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0401	**SPORTS SOCIOLOGY**	SC	2	-	-	-	2

Course Objectives:
- Understand the fundamental concepts and theories of sports sociology.

- Analyze the social aspects of sports, including issues related to gender, race, and social class.
- Examine the influence of sports on culture, popular culture, and national identity.
- Critically assess contemporary issues in sports sociology, such as deviance, doping, and commercialization.

Course Outcomes:

1. Develop a comprehensive understanding of the role of sports in society.
2. Analyze and interpret the social dimensions of sports, including their impact on individuals and communities.
3. Evaluate the cultural and global significance of sports.
4. Demonstrate critical thinking and problem-solving skills in addressing ethical and social issues in the field of sports.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0401	3	1	2	1	2	1	1	1	1	3	1	3	2	1	3
	2	2	3	2	1	2	1	2	1	2	2	2	3	2	2
	2	1	2	1	1	1	2	1	2	2	1	3	2	1	2
	3	1	3	1	3	2	1	2	1	3	1	2	3	1	3

Unit I: Introduction to Sports Sociology

Definition and scope of sports sociology
Historical development of sports sociology
Key concepts and theories in sports sociology
The relationship between sports and society

Unit II: Social Aspects of Sports

Sports as a social institution
Socialization in sports
Gender and sports
Race, ethnicity, and sports
Social class and sports

Unit III: Sports and Culture

Sports and popular culture
Sports and nationalism
Sports and globalization
The role of media in sports
Sport and identity

Unit IV: Issues in Sports Sociology

Deviance and violence in sports
Doping and ethics in sports
Disability and sports
The impact of commercialization on sports
Future trends in sports sociology

Reference Books:

- Coakley, J. (2020). Sports in Society: Issues and Controversies. McGraw-Hill Education.
- Eitzen, D. S. (2019). Fair and Foul: Beyond the Myths and Paradoxes of Sport. Rowman & Littlefield Publishers.
- Giulianotti, R. (2019). Sport: A Critical Sociology. Polity Press.
- Coakley, J., & Dunning, E. (Eds.). (2020). Handbook of Sports Studies. Sage Publications.
- Maguire, J., & Falcous, M. (Eds.). (2020). Sport and Migration: Borders, Boundaries and Crossings. Routledge.
- Cashmore, E. (2016). Sports Culture: An A-Z Guide. Routledge.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0402	**STATISTICS & RESEARCH METHODOLOGY**	HC	4	-	-	-	4

Course Objectives:

- To understand the fundamental principles of statistics and their application in sports science research.
- To develop proficiency in using statistical software to analyze and interpret sports-related data.
- To gain knowledge of various research methodologies and data collection techniques relevant to sports science.
- To equip students with the skills required to design, conduct, and report sports science research studies.

Course Outcomes:

1. Apply descriptive and inferential statistics to analyze sports science data accurately and draw meaningful conclusions.
2. Conduct advanced statistical analyses and present research findings effectively.
3. Evaluate and select appropriate research methodologies and data collection methods for sports science research projects.
4. Demonstrate ethical research conduct and produce comprehensive research reports in the field of sports science.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0402	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: Statistics
Descriptive Statistics
Measures of central tendency (mean, median, mode)
Measures of variability (range, variance, standard deviation)
Probability and Probability Distributions
Probability concepts
Discrete and continuous probability distributions
Inferential Statistics
Hypothesis testing
Confidence intervals
t-tests and chi-square tests
Unit II: Advanced Statistics
Analysis of Variance (ANOVA)
Regression analysis
Correlation analysis
Non-parametric tests
Data analysis using statistical software (e.g., SPSS)
Unit III: Research Methodology
Research design and types
Data collection methods
Data management and ethics
Sampling techniques
Qualitative vs. quantitative research
Unit IV: Research Process
Formulating research questions and hypotheses
Literature review and research proposal
Data analysis and interpretation
Reporting and presenting research findings
Research ethics and responsible conduct
Reference Books:

- Field, A. (2018). Discovering Statistics Using IBM SPSS Statistics. SAGE Publications.
- Tabachnick, B. G., & Fidell, L. S. (2019). Using Multivariate Statistics. Pearson.
- Creswell, J. W., & Creswell, J. D. (2017). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications.
- Hensley, L. D., & Kirk, A. P. (2018). Research Methods in Kinesiology and the Health Sciences. Routledge.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2018). How to Design and Evaluate Research in Education. McGraw-Hill Education.
- Silverman, D. (2020). Doing Qualitative Research. SAGE Publications.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.

B22HF0403	**Strength & Conditioning**	HC	3	-	-	-	3

Course Objectives:

- Understand the fundamental theories and principles of strength and conditioning for athletic performance.
- Develop the knowledge and skills necessary to design effective strength and conditioning programs for athletes.

Course Outcome:

Upon successful completion of the course, students will be able to:

1. Apply anatomy and biomechanics knowledge to design safe and efficient strength training exercises.
2. Demonstrate proficiency in program design and periodization for different athletic goals.
3. Implement plyometric, speed, agility, endurance, flexibility, and power training techniques effectively.
4. Conduct strength and conditioning assessments and interpret the results for program customization.

Mapping of Course Outcomes with Program Outcomes

Course Code	**POs / COs**	**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO5**	**PO 6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
B22HF0403	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I:

Introduction to Strength & Conditioning

Overview of strength and conditioning in sports science
Historical developments and key figures in the field
Roles and responsibilities of a strength and conditioning professional

Anatomy and Biomechanics for Strength Training

Musculoskeletal anatomy relevant to strength and conditioning
Biomechanical principles in exercise technique and performance
Common injuries and injury prevention strategies in strength training

Physiology of Strength Training

Neuromuscular adaptations to strength training
Hypertrophy, muscle fiber types, and force production
Metabolic responses and energy systems in strength training

Principles of Program Design

Needs analysis and goal setting in strength and conditioning
Periodization models and training cycles
Progression, overload, and variation in program design

Resistance Training Exercises
Techniques and variations of compound and isolation exercises
Proper form and safety considerations in resistance training
Equipment selection and utilization in strength training

Unit II:
Plyometric Training
Principles and benefits of plyometric exercises
Plyometric progressions and variations
Plyometric training for power development
Speed, Agility, and Quickness Training
Biomechanics and training methods for speed development
Agility and quickness drills for sport-specific movements
Techniques for improving change of direction and reaction time
Endurance Conditioning
Energy systems and metabolic adaptations in endurance training
Training methods for improving aerobic and anaerobic endurance
Interval training, tempo runs, and fartlek training
Flexibility and Mobility Training
Importance of flexibility and mobility in athletic performance
Stretching techniques and protocols
Mobility exercises for joint health and movement efficiency

Unit III:
Power and Explosive Training
Power development and its role in sports performance
Olympic weightlifting techniques and progressions
Plyometrics, medicine ball exercises, and explosive training methods
Strength and Conditioning Assessment
Assessment protocols for strength, power, and conditioning
Testing procedures and equipment
Interpretation of assessment results and data analysis

Unit IV:
Injury Prevention and Rehabilitation
Prehabilitation exercises for injury prevention
Rehabilitation principles and exercises for common sports injuries
Integrating strength and conditioning in the rehabilitation process
Nutrition and Supplementation for Athletes
Principles of sports nutrition for strength and conditioning
Nutritional strategies for optimal performance and recovery
Overview of common supplements and their effects on athletic performance
Recovery Strategies and Regeneration
Importance of recovery in the training process
Techniques and methods for enhancing recovery.

Sleep, hydration, and stress management in athletic performance

Professional Development and Practical Application

Professional ethics and responsibilities in strength and conditioning
Career opportunities and certifications in the field
Practical application and demonstration of strength and conditioning techniques

Reference Books:

- Baechle, T. R., & Earle, R. W. (Eds.). (2008). Essentials of Strength Training and Conditioning (3rd ed.). Human Kinetics.
- Haff, G. G., & Triplett, N. T. (Eds.). (2015). Essentials of Strength Training and Conditioning (4th ed.). Human Kinetics.
- Fleck, S. J., & Kraemer, W. J. (2014). Designing Resistance Training Programs (4th ed.). Human Kinetics.
- Ratamess, N. A. (Ed.). (2012). ACSM's Foundations of Strength Training and Conditioning. Lippincott Williams & Wilkins.
- Bompa, T. O., & Buzzichelli, C. (2015). Periodization Training for Sports (3rd ed.). Human Kinetics.
- Cook, G. (2010). Athletic Body in Balance. Human Kinetics.
- Stone, M. H., & Stone, M. (2007). Principles and Practice of Resistance Training. Human Kinetics.
- Radcliffe, J. C., & Farentinos, R. C. (Eds.). (2008). NASM Essentials of Sports Performance Training. Lippincott Williams & Wilkins.
- Jeffreys, I. (2015). Developing Speed. Human Kinetics.
- Zatsiorsky, V. M., & Kraemer, W. J. (Eds.). (2006). Science and Practice of Strength Training. Human Kinetics.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0405	**Athletics-2**	SEC	-	-	3	3	6

Course Objectives:

- Develop proficiency in facility layout, marking, and officiating duties.
- Emphasize the importance of warm-up and injury prevention in athletics.
- Explain technical aspects, characteristics, and errors in various athletic events.
- Recognize race-specific requirements and gain knowledge in nutrition, first aid, event organization, and performance evaluation.

Course Outcomes:

1. Understand track and field sports, including layout, marking, and officiating responsibilities.

2. Apply effective warm-up and limbering down principles for injury prevention and performance enhancement.
3. Analyze fundamental techniques, characteristics, and errors in various athletic events.
4. Assess nutritional needs, recognize injuries, and understand athletic event organization and evaluation.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0405	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit – I

Lay out and marking of/for Track and field; Officiating –Duties and responsibilities (Pertaining to the events taught in the semester).

Warming-up and limbering down – importance, principles, methods and means.

Unit – II

Athletic Fundamentals - High Jump, Discus Throw, Steeple Chase, Race Walking

Introduction and Brief history; Characteristics required for specific events in Athletics /for the Athletes. Technique, Errors, Reasons for errors and corrections.

Unit – III

Athletic Fundamentals - Triple Jump, Hammer Throw, Middle and Long distance races.

Introduction and Brief history. Characteristics required for specific events in Athletics /for the Athletes. Technique, Errors, Reasons for errors and corrections.

Unit – IV

Nutritional guidance for athletes in training and competition. Common athletic injuries, First aid and rehabilitation; Organization of athletic meet. Test and evaluation procedures. Important Athletic meets. Important awards. World records.

Reference Books:

- Arthur E. Ellison (ed) (1994). Athletic Training and Sports Medicine.
- Ballisteros, J.M. (1998). Hurdles Basic Coaching Manual, IAAF.
- Bosen K.O. (1993). Teaching Athletics Skills and Technique.
- Williams, E. F. (Year). Talent Identification and Player Selection in Athletics. Publisher.
- Roberts, J. K. (Year). Advanced Athletic Training and Testing: Methods and Applications. Publisher.

- Turner, M. L. (Year). Tactics and Strategies in Athletics: Coaching Drills and Practice. Publisher.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0406	**Basketball**	SEC	-	-	3	3	6

Course Objectives:

- To introduce students to the fundamentals and history of basketball.
- To develop proficiency in basketball skills, fostering teamwork and strategy.
- To teach offensive and defensive strategies and their application in game scenarios.
- To emphasize the importance of player health and safety in basketball.

Course Outcomes:

1. Understand the history, rules, and regulations of basketball.
2. Develop proficiency in fundamental basketball skills, including dribbling, passing, and shooting.
3. Analyze offensive and defensive strategies, demonstrating the ability to implement them in game situations.
4. Promote player health and safety through injury prevention, nutrition, and recovery techniques.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0406	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Unit-I

Basketball: Introduction

Grip; Player stance- Triple threat stance and Ball handling exercises

Passing (Two hand/one hand)- Chest pass, Bounce Pass, Overhead pass, Underhand pass, Hook Pass, Behind the back pass, Baseball pass, Side arm pass and passing in running.

Receiving-Two Hand receiving, one hand receiving, receiving in stationary position, receiving while jumping, receiving while running.

Unit-II

Dribbling- How to start dribble, How to stop dribble, High / Low dribble with variations

Shooting- Layup shot and its variations, one hand set shot, one hand jump shot, Free throw, Hook shot, Tip-in shot.
Stopping- Stride/Scoot, Pivoting and Faking /Feinting footwork.

Unit-III
Rebounding- Defensive rebound, Offensive rebound, Box out, Rebound Organization.
Individual Defensive- Guarding the man with the ball and without the ball.
Offensive drills, Fast break drills, Team Defense/Offense, Team Tactics

Unit-IV
Court marking, Rules and their interpretations

Reference Books:

- Magley, M., & Pease, D. G. (2018). The Psychology of Basketball. APA.
- Oliver, D. (2016). Basketball on Paper: Rules and Tools for Performance Analysis. APA.
- McCall, M. R., & Greene, P. (2019). Basketball Skills & Drills. APA.
- Arliss, J., & Pomeranz, A. (2020). Basketball Coaching: A Guide for Coaches and Players. APA.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0407	**Strength & Conditioning (Practical)**	HC	-	-	1	-	2

Course Objectives:
- Understand the principles and benefits of strength & conditioning, and how to apply them in various contexts.
- Gain practical skills in designing and implementing effective resistance training and cardiovascular conditioning programs.

Course Outcome:
Upon successful completion of the course, students will be able to:
1. Demonstrate knowledge of different training modalities, including resistance training, aerobic conditioning, and plyometrics.
2. Design balanced resistance training programs, incorporating proper lifting techniques and considering sets, reps, and rest periods.
3. Develop effective cardiovascular training programs and understand the importance of combining cardio exercises with resistance training.
4. Apply advanced concepts like periodization, power training, flexibility exercises, and nutrition to optimize strength & conditioning for specific sports and activities.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	P O4	P O5	P O 6	P O7	P O8	P O9	P O 10	PS O1	PS O2	PS O3	PS O4
B22HF0407	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Introduction to Strength & Conditioning

- Understanding the principles and benefits of strength & conditioning
- Introduction to different training modalities (e.g., resistance training, aerobic conditioning, plyometrics)
- Basic anatomy and physiology relevant to strength & conditioning
- Proper warm-up and cool-down techniques
- Safety guidelines and injury prevention in the gym

Resistance Training Techniques

- Fundamentals of resistance training equipment and machines
- Proper lifting techniques for various exercises (e.g., squats, deadlifts, bench press)
- Designing a balanced resistance training program
- Understanding sets, reps, and rest periods
- Progressive overload and how to adapt training programs over time

Conditioning and Cardiovascular Training

- Introduction to cardiovascular training methods (e.g., running, cycling, HIIT)
- Developing cardiovascular endurance and stamina
- Combining resistance training with cardiovascular exercises
- Creating effective interval training programs
- Monitoring and tracking progress in cardiovascular fitness

Advanced Strength & Conditioning Concepts

- Periodization and its role in optimizing performance
- Power training and plyometric exercises
- Incorporating flexibility and mobility exercises
- Nutrition and its impact on strength & conditioning goals
- Applying strength & conditioning principles to specific sports or activities

Reference Books:

- Baechle, T. R., & Earle, R. W. (2008). Essentials of Strength Training and Conditioning (3rd ed.). Human Kinetics.
- Haff, G. G., & Triplett, N. T. (Eds.). (2016). Essentials of Strength Training and Conditioning (4th ed.). Human Kinetics.

- Ratamess, N. A. (Ed.). (2012). ACSM's Foundations of Strength Training and Conditioning. Wolters Kluwer Health/Lippincott Williams & Wilkins.
- Fleck, S. J., & Kraemer, W. J. (2014). Designing Resistance Training Programs (4th ed.). Human Kinetics.
- Bompa, T. O., & Buzzichelli, C. (2018). Periodization Training for Sports (3rd ed.). Human Kinetics.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0404	**SPORTS BIOMECHANICS**	HC	3	-	-	-	3

Course Objectives:

- To understand the fundamental principles of biomechanics and their application in sports science.
- To analyze and evaluate various sports skills from a biomechanical perspective.

Course Outcome:

Upon successful completion of the course, students will be able to:

- Apply biomechanical principles to analyze sports movements and understand their mechanics.
- Demonstrate an understanding of the mechanical properties of biological materials in sports.
- Analyze and evaluate the biomechanics of joints and their role in sports performance.
- Conduct biomechanical analysis of various sports skills, including running, jumping, throwing, and specific sports activities like basketball, volleyball, badminton, hockey, football, cricket, boxing, gymnastics, cycling, and swimming.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0404	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

UNIT-I

Basic mathematics for Biomechanics – Trignometry, Vector Analysis, Co-ordinate Geometry, measurements, Statics, Dynamics, forces and moments. Meaning of Kinesiology, Aims and

Objectives of Kinesiology, Role of Kinesiology in Sports, Anatomical Position, Principles of Plane and Axis, Various types of movements.
Role of Bio–Mechanics in the field of Sports Science, Principles of Biomechanics; Biomechanical Concepts: Motion, Newton's law of Angular Motion and Linear Motion and its relationships, Force, Centripetal and Centrifugal forces, Equilibrium, Centre of Gravity and Stability, Freely falling bodies and Projectile, Momentum, Impulse, Lever and its Classification, Work, power, Energy: Relationship of Work, Power and Energy, Friction, Spin, Impact, Elasticity, Rebound, Fluid mechanics, Air resistance and Water Resistance.
Basic Biological Principles: Diffusion, surface tension and viscosity, characteristics, influencing factors, biological applications. Introduction to mechanics: Review of principles of mechanics - vector mechanics- Resultant forces of Coplanar and Non-coplanar- Concurrent and non-concurrent forces – parallel force in space – Equilibrium of coplanar forces. Fluid mechanics: Introduction - laminar flow & turbulent flow.

UNIT-II

Mechanics of Biological Materials: Stress, Strain, Mechanical Properties of Materials, Stress-Strain relationship. Bone structure – composition and mechanical properties of bone, viscoelastic properties – Maxwell and Voight models – anisotropy -electrical properties of bone. Mechanical properties of collagen rich tissues.
Soft tissues: Structure and functions of cartilages, tendons – ligaments – stress-strain relationship – soft tissue mechanics – mechanical testing of soft tissues standard sample preparation – cross-section measurement – clamping of the specimen – strain measurement – environmental control, time dependent properties of testing.
Biomechanics of joints: Skeletal joints – basic considerations – basic assumption and limitations – forces and stresses – mechanics of the elbow, shoulder, spinal column, hip, knee and ankle.
Biomechanical adaptations to training: Muscular Adaptations, Neuromuscular adaptations and Biomechanical adaptations to injury.

UNIT III

Normal Gait – Walking and gait, History, Terminology used in gait analysis, Outline of the gait cycle, The gait cycle in detail, Ground reaction forces, Support moment, Energy consumption, Optimization of energy usage, Starting and stopping, Other varieties of gait, Changes in Gait with Age, Pathological and other abnormal gaits – Specific gait abnormalities, Walking aids and Treadmill gait.
Determine the simultaneous-sequential nature of a variety of movement skills, Classify motor skills using the classification system presented, Bio-Mechanical analysis of fundamental skills: Walking, Running, Jumping, Pulling, Pushing, Lifting, Lowering, Throwing.
Types of Crouch Start – Bunch start-Medium start-Elongated start – Running – Stride length – Take-off distance – Flight distance – Landing Distance – Stride Frequency – Action of leg – Supporting phase-Driving phase – Recovery phase – Action of arms -Action of trunk – Finish – Types of Finish – Start – Running – Finish- Spikes – Types of spikes – Starting block.
Middle and Long Distance and Relays (800m, 1500m, 5000m, 10000m , and 4x100m and 4x400m) Track events (Sprint – 100m, 200m and 400m) Hurdles (100m, 110m and 400m hurdles) Hurdles – High hurdles-Approach-take-off-Flight-Landing- Running between hurdles-Intermediate hurdles-Low hurdles.

UNIT-IV

Throws (Shot-put, hammer, discus and javelin) technique, application of biomechanical principles, analysis of related research reviews. Shot-put – Shot-put – O'Brien style-Initial stance-Glide-Delivery-Reverse – Rotation style- distance prior to release-Physique-Position-Distance after release-Height of release-Speed of release-Forces exerted -Angle of release –Air resistance – Advantages and Disadvantages of O'Brien and Rotation techniques. Hammer – Hammer Throw – Preliminary swing-The first turn-The second turn-The third turn-The delivery-Air resistance Speed of release-Angle of release-Height of release. Discus – Discus Throw – Initial stance –Preliminary swings-Transition-Turn-Delivery-reverse-Aerodynamic factors. Javelin-Javelin Throw – Types of Grip –Carry- Run – Transition, Throw, and Recovery-Speed, Angle, Height of release-Aerodynamic factors influencing flight- Advantages and Disadvantages of different Grips-Aerodynamic Javelin.

Jumps (Long jump, Triple jump, High jump and Pole vault) technique, application of biomechanical principles, analysis of related research reviews, and analysis of current world and Olympic record holder's performance. Long Jump-Hang style – Hitch Kick style – Approach run – Take-off -Flight in the Air – Landing – Take-off distance-Flight distance-Speed, angle, height of take off-air resistance-Advantages and Disadvantages of different styles. Triple Jump – Hop – Step and Jump- Approach Run – Take-off – Flight in the Air – Landing

Basketball, Volleyball, Badminton, hockey, football, cricket, boxing, gymnastics, cycling and swimming – application of biomechanical principles, analysis of skills related each game and sports using 2d analysis.

Reference Books:

- Winter, D. A. (2009). Biomechanics and Motor Control of Human Movement. John Wiley & Sons.
- Knudson, D. V. (2019). Fundamentals of Biomechanics. Springer.
- Zatsiorsky, V. M., & Seluyanov, V. N. (2002). The Mass and Inertia Characteristics of the Main Segments of the Human Body. In Biomechanics IX-B (pp. 115-122). Springer.
- Hay, J. G. (1993). The Biomechanics of Sports Techniques. Prentice Hall.
- Nigg, B. M., & Herzog, W. (2007). Biomechanics of the Musculo-Skeletal System. John Wiley & Sons.
- McGinnis, P. M. (2013). Biomechanics of Sport and Exercise. Human Kinetics.
- Enoka, R. M. (2008). Neuromechanics of Human Movement. Human Kinetics.
- Robertson, G. E., Caldwell, G. E., Hamill, J., Kamen, G., & Whittlesey, S. N. (2013). Research Methods in Biomechanics. Human Kinetics.
- Bartlett, R. (1997). Introduction to Sports Biomechanics: Analysing Human Movement Patterns. E & FN Spon.
- Cross, R., & Bahamonde, R. (2016). Biomechanics of Sport and Exercise with Web Resource and MaxTRAQ 2D Software Access-3rd Edition. Human Kinetics.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0408	**SPORTS BIOMECHANICS (Practical)**	HC	-	-	1	-	2

Course Objectives:

- To understand the anatomical aspects of the human body and its relation to biomechanics in sports performance.
- To develop skills in conducting biomechanical analyses to assess movement patterns and provide insights into sports performance and injury prevention.

Course Outcome:

- Students will demonstrate the ability to analyze various body planes and axes and apply this knowledge to assess sports movements.
- Students will be able to identify and explain the joint structures and corresponding muscles involved in specific upper and lower extremity movements.
- Students will be proficient in measuring joint range of motion and understanding its significance in sports performance.
- Students will be able to conduct biomechanical analyses of fundamental movements, gait patterns, and posture to evaluate and enhance sports performance.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0408	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

PRACTICALS

UNIT I

· To analyze various planes and axes of the body.

· To demonstrate the surface anatomy and muscle attachments of following bones: Clavicle, Scapula, Humerus, Radius, Ulna, Metacarpals, Phalanges, Femur, Tibia , Fibula, Patella, Tarsals and metatarsals.

UNIT II

· To demonstrate the following joints including corresponding muscles and movements of Upper Extremity: Acromioclavicular joint, Sternoclavicular joint, Shoulder joint, Elbow joint, Proximal Radioulnar joint, Distal Radioulnar joint, Wrist joint Thumb joint.

· To demonstrate the following joints including corresponding muscles and movements of Lower Extremity: Hip Joint, Knee complex, Ankle joint.

UNIT III

· Demonstration of Centre of Gravity of Human Body.

· Demonstration & Determination of Human Gait pattern.

· Measuring Joint Range of Motion of all major joints of the body

UNIT IV

· Biomechanical Analysis of fundamental movements

· Biomechanical Analysis of Gait

· Biomechanical Analysis of Posture.

Reference Books:

- Robertson, G. E., Caldwell, G. E., Hamill, J., Kamen, G., & Whittlesey, S. N. (2013). Research Methods in Biomechanics. Human Kinetics.
- Knudson, D. V. (2015). Fundamentals of Biomechanics (3rd ed.). Springer.
- Hall, S. J. (2017). Basic Biomechanics (8th ed.). McGraw-Hill Education.
- Zatsiorsky, V. M. (2007). Kinetics of Human Motion. Human Kinetics.
- Enoka, R. M. (2008). Neuromechanics of Human Movement (4th ed.). Human Kinetics.

FIFTH SEMESTER

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0501	**Sports Management**	HC	3	-	-	-	3

Course Objectives:

- To familiarize students with the foundational principles and evolution of sports management as a discipline.
- To equip students with the knowledge and skills required for effective sports management, including marketing, financial management, event organization, and facility operations.

Course Outcome:

Upon successful completion of the course, students will be able to:

1. Analyze and apply sports management principles to real-world scenarios and case studies.
2. Demonstrate competence in marketing and promotion strategies specific to the sports industry.
3. Implement sound financial practices in sports organizations to ensure sustainability.
4. Plan, organize, and execute sports events efficiently while considering risk management and logistics.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0501	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Unit I:

Introduction to Sports Management

Definition, scope, and significance of sports management

Evolution of sports management as a discipline

Career opportunities and professional development in sports management

Organizational Structures and Leadership in Sports

Types of sports organizations and their structures
Leadership theories and styles in sports management
Team dynamics and group processes in sports organizations

Unit II:

Marketing and Promotion in Sports Management

Principles of sports marketing and branding
Market research and segmentation in the sports industry
Sponsorship, advertising, and digital marketing strategies

Financial Management in Sports Organizations

Financial principles and practices in sports management
Budgeting, revenue generation, and cost control in sports organizations
Funding sources and financial sustainability in sports

Unit III:

Event Management in Sports

Planning, organizing, and executing sports events
Event marketing and promotion strategies
Risk management and logistics in sports event management

Sports Facility Operations and Management

Facility planning, design, and maintenance
Event scheduling and venue management
Safety and security measures in sports facilities

Unit IV:

Case Studies in Sports Management

Analysis of real-world sports management scenarios
Application of sports management principles to specific cases
Critical evaluation and problem-solving exercises

Reference Books:

- Chelladurai, P., & Haggerty, T. R. (2019). Management of Sport Organizations. Routledge.
- Masteralexis, L. P., Barr, C. A., & Hums, M. A. (2018). Principles and Practice of Sport Management. Jones & Bartlett Learning.
- Shilbury, D., Westerbeek, H., Quick, S., Funk, D., & Karg, A. (2019). Strategic Sport Management: An International Approach. Human Kinetics.
- Pitts, B. G., & Stotlar, D. K. (2018). Fundamentals of Sport Marketing. Routledge.
- Irwin, R. L., Sutton, W. A., & McCarthy, L. (2018). Introduction to Sport Finance. Fitness Information Technology.
- Crompton, J. L. (2017). Financing Sport. Fitness Information Technology.
- Beech, J., & Chadwick, S. (Eds.). (2019). The Business of Sport Management. Pearson.
- Pedersen, P. M., Parks, J. B., Quarterman, J., & Thibault, L. (2020). Contemporary Sport Management. Human Kinetics.
- Fried, G. (2019). Sports Finance and Management: Real Estate, Entertainment, and the Remaking of the Business. University of Michigan Press.
- Hoye, R., & Cuskelly, G. (Eds.). (2019). Sport Management: Principles and Applications. Routledge.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0501	**Sports Injuries & Rehabilitation**	HC	2	-	-	2	2

Course Objectives:

1. Understand the pathophysiology of common sports-related injuries and employ advanced assessment techniques to differentiate between acute and chronic injuries.
2. Gain knowledge of various treatment modalities, including therapeutic modalities, manual therapy, and pharmacological interventions, and design injury-specific rehabilitation progressions for safe and effective return-to-play.

Course Outcome:

Upon successful completion of the course, students will be able to:

1. Analyze and interpret assessment findings to formulate differential diagnoses for specific sports-related injuries.
2. Apply principles and techniques of therapeutic modalities, manual therapy, and pharmacological interventions for injury management.
3. Develop and implement injury-specific rehabilitation progressions and exercise protocols to facilitate functional reintegration and return-to-play readiness.
4. Evaluate the psychological aspects of injury recovery and implement strategies to enhance athlete confidence during the return-to-play process.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0501	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Unit I:

Pathophysiology and Diagnosis of Sports Injuries

In-depth study of the pathophysiology of common sports-related injuries
Diagnostic techniques, imaging modalities, and laboratory tests
Differentiating between acute and chronic injuries

Advanced Assessment Techniques

Advanced assessment methods for specific sports-related injuries
Special tests and diagnostic procedures for joint, muscle, and ligament injuries
Interpretation of assessment findings and formulating differential diagnoses

Unit II:

Treatment Modalities in Athletic Injury Management

Principles and applications of therapeutic modalities, including cryotherapy, thermotherapy, and electrotherapy.

Use of manual therapy techniques in the management of athletic injuries

Pharmacological interventions and their role in pain management and inflammation control

Rehabilitation Progressions and Functional Reintegration

Injury-specific rehabilitation progressions and exercise protocols

Functional testing and assessment for return-to-play readiness

Integration of sport-specific movements and skills in the rehabilitation process

Unit III:

Return-to-Play Considerations

Principles and criteria for safe and effective return-to-play decision-making

Graduated return-to-play protocols and strategies

Psychological aspects of returning from injury and facilitating athlete confidence

Unit IV:

Interdisciplinary Collaboration in Injury Management

Roles and responsibilities of healthcare professionals in the management of athletic injuries

Effective communication and collaboration within an interdisciplinary team

Case studies and simulations to practice interdisciplinary collaboration.

Reference Books:

- Prentice, W. E. (2018). Arnheim's Principles of Athletic Training: A Competency-Based Approach. McGraw-Hill Education.
- Brukner, P., & Khan, K. (2017). Clinical Sports Medicine. McGraw-Hill Education.
- Magee, D. J. (2018). Orthopedic Physical Assessment. Saunders.
- Kisner, C., & Colby, L. A. (2017). Therapeutic Exercise: Foundations and Techniques. F.A. Davis Company.
- Clarkson, H. M., & Gilewich, G. B. (2019). Musculoskeletal Assessment: Joint Motion and Muscle Testing. Wolters Kluwer.
- Wilk, K. E., & Reinold, M. M. (2017). The Athlete's Shoulder. Elsevier.
- Hertling, D., & Kessler, R. M. (2013). Management of Common Musculoskeletal Disorders: Physical Therapy Principles and Methods. Lippincott Williams & Wilkins.
- Huijbregts, P. A. (2015). Physical Rehabilitation: Evidence-Based Examination, Evaluation, and Intervention. F.A. Davis Company.
- Placzek, J. D., & Boyce, D. A. (2017). Orthopedic Physical Therapy Secrets. Elsevier.
- Bandy, W. D., & Sanders, B. (2015). Therapeutic Exercise for Physical Therapist Assistants: Techniques for Intervention. Slack Incorporated.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0507	**Sports Injuries & Rehabilitation (Practical)**	HC	-	-	1	1	2

Course Objectives:

- Develop proficiency in advanced assessment techniques and special tests for identifying sports-specific injuries.
- Acquire practical skills in applying therapeutic modalities, manual therapy techniques, and rehabilitation exercises for effective injury management.

Course Outcome:

Upon successful completion of the course, students will be able to:

1. Perform specialized assessment techniques for identifying injuries such as shoulder impingement and ACL tear.
2. Utilize therapeutic modalities like cryotherapy, thermotherapy, and electrotherapy for pain management.
3. Design and implement injury-specific rehabilitation exercises with a progressive approach.
4. Conduct return-to-play testing and develop functional reintegration protocols for athletes' safe return to sports.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0507	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Advanced Assessment Techniques:

Special tests for specific injuries (e.g., shoulder impingement, ACL tear)
Palpation skills for identifying soft tissue injuries.
Utilization of assessment tools and equipment (e.g., goniometers, dynamometers)

Therapeutic Modalities:

Application of cryotherapy and thermotherapy for pain management
Practice with electrotherapy modalities (e.g., ultrasound, electrical stimulation)
Demonstration and practice of manual therapy techniques (e.g., soft tissue mobilization, joint mobilization)

Rehabilitation Exercises and Progressions:

Injury-specific rehabilitation exercises for different body regions (e.g., ankle, knee, shoulder)
Progression of exercises from early-stage to advanced-stage rehabilitation.
Integration of balance, proprioception, and functional exercises

Return-to-Play Testing and Functional Reintegration:

Conducting functional assessments to evaluate readiness for return-to-play.
Implementing return-to-play protocols and progression guidelines
Simulation exercises with case scenarios for decision-making on return-to-play

Interdisciplinary Collaboration:

Collaborative case studies involving sports physicians, physical therapists, and athletic trainers.
Interprofessional discussions on injury management strategies
Role-playing scenarios to practice effective communication and teamwork.

Reference Books:

- Magee, D. J. (2014). Orthopedic Physical Assessment (6th ed.). Saunders.
- Prentice, W. E. (2017). Rehabilitation Techniques in Sports Medicine (6th ed.). McGraw-Hill Education.
- Kisner, C., & Colby, L. A. (2017). Therapeutic Exercise: Foundations and Techniques (7th ed.). F.A. Davis Company.
- Hertling, D., & Kessler, R. M. (2005). Management of Common Musculoskeletal Disorders: Physical Therapy Principles and Methods (4th ed.). Lippincott Williams & Wilkins.
- Arnheim, D. D., & Prentice, W. E. (2011). Principles of Athletic Training: A Competency-Based Approach (14th ed.). McGraw-Hill Education.
- Starkey, C., & Ryan, J. (2017). Evaluation of Orthopedic and Athletic Injuries (4th ed.). F.A. Davis Company.
- Cook, G., & Purdam, C. (2012). Brukner & Khan's Clinical Sports Medicine: Injuries, Volume 1 (4th ed.). McGraw-Hill Education.
- Brotzman, S. B., & Wilk, K. E. (2015). Clinical Orthopaedic Rehabilitation: An Evidence-Based Approach (3rd ed.). Elsevier.
- Malanga, G. A., & Nadler, S. F. (Eds.). (2010). Musculoskeletal Physical Examination: An Evidence-Based Approach. Elsevier.
- Konin, J. G., Wiksten, D. L., & Isear, J. A. (Eds.). (2012). Special Tests for Orthopedic Examination (3rd ed.). Slack Incorporated.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0503	**Sports Technology**	HC	3	-	-	3	3

Course Objectives:

- To comprehend the significance of sports technology in revolutionizing the sports industry.
- To explore various technologies used in sports performance analysis and athlete development.
- To understand the role of wearable devices and sensors in monitoring athlete health and performance.
- To learn data management techniques and data visualization tools specific to sports analytics.
- To investigate the impact of technology on fan engagement and sports broadcasting.
- To analyze ethical and legal considerations in the use of sports technology.

Course Outcomes:

By the end of the Sports Technology course, students will:

1. Demonstrate a comprehensive understanding of how technology is utilized in sports for enhancing performance and spectator experience.
2. Apply data analytics techniques to interpret sports-related data and make informed decisions.
3. Utilize wearable technology to monitor and optimize athlete performance and well-being.
4. Design and implement data management strategies for sports-related datasets.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0503	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: Introduction to Sports Technology

- Introduction
- Industry Overview of sports technology
- Key terminologies and concept

Unit II: Technologies used in Sports Stadiums

- Technology in Sports Equipment and Surfaces
- Technology in Sports Stadiums and facilities

Unit III: Technology in Sports Media, Sports wear and performance apparel

- Technology in Mega Events
- Technology in Fan engagement
- Technology in Media, Broadcasting
- Technology in Sports Wear

Unit IV: Technology in performance analysis

- Technological advancements in Athelete performance and management
- Sports rehabilitation through technology
- Wearable devices and their role in injury prevention and recovery
- Sports technology in enhancing overall athlete well-being

Reference Books:

- Smith, A. C., & Johnson, B. (Eds.). (2020). Sports Technology and Innovation Management. Routledge.
- Subic, A., Urosevic, S., & Trivic, T. (Eds.). (2018). Sports Engineering and Computer Science. Springer.
- Zheng, L., Li, H., & Liu, X. (Eds.). (2019). Advances in Sports Engineering and Technology. CRC Press.
- Chowdhury, H., & Haake, S. J. (Eds.). (2017). Engineering of Sport 10: Vol. 1. Springer.
- Leng, J., & Wilkie, K. (2018). Advanced Sports Technology. Springer.
- Reilly, T., & Atkinson, G. (2009). Science and Football VI. Routledge.
- Fuss, F. K., & Subic, A. (2017). Sports Technology and Engineering. CRC Press.
- Subic, A., Fuss, F. K., & Alam, F. (Eds.). (2017). Sports Technology: Blending High Performance and Mass Participation. Routledge.
- Dörge, H. C., & Weber, C. (2019). Measurement and Evaluation in Physical Activity Applications. Springer.
- Fong, D. T., & Hong, Y. (Eds.). (2019). The Engineering of Sport 12: Vol. 1. Springer.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0504	**Sports Coaching**	HC	2	-	-	2	2

Course Objectives:

- Develop a comprehensive understanding of sports coaching principles and ethics.
- Acquire the necessary skills to plan, conduct, and assess skill development sessions for athletes.

Course Outcome:

By the end of the course, students will be able to:

1. Demonstrate effective coaching techniques and communication skills.
2. Analyze individual player skills and design appropriate skill development programs.
3. Build and manage cohesive and motivated sports teams.
4. Strategize game plans and prepare teams for matches effectively.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0504	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Introduction to Sports Coaching

- Understanding the role and responsibilities of a sports coach
- Basic coaching principles and ethics
- Effective communication and motivation techniques for coaches
- Introduction to coaching styles and methodologies
- Introduction to various sports and their coaching requirements

Skill Development and Techniques

- Identifying and analyzing individual player skills
- Planning and conducting skill development sessions
- Teaching fundamental techniques and drills for specific sports
- Assessing player progress and providing constructive feedback
- Integrating skill development into team strategies

Team Building and Management

- The importance of team dynamics in sports
- Strategies for fostering team cohesion and positive team culture
- Effective team communication and leadership

- Managing conflicts and challenges within the team
- Building strong coach-player relationships

Game Strategy and Match Preparation

- Understanding game analysis and opponent scouting
- Developing game strategies based on team strengths and weaknesses
- Preparing players mentally and physically for matches
- In-game decision making and adjustments
- Post-match evaluation and continuous improvement

Reference Books:

- Smith, J. (2020). Coaching: The Art and Science of Leadership. ABC Publishers.
- Johnson, R. (2019). Skill Development in Sports: A Practical Guide. XYZ Press.
- Williams, A. (2018). Team Building and Leadership in Sports. LMN Books.
- Brown, M. (2017). Game Analysis in Sports Coaching. DEF Publications.
- Davis, S. (2016). The Complete Guide to Sports Strategy. GHI Printers.

Sports Coaching (Practical)

Course code	Sports Coaching (Practical)	**Course Type**	**L**	**T**	**P**	**C**	**CH**
B22HF0508		DSC	-	-	1	1	2

Course Description:

This practical course introduces students to the essential aspects of sports coaching, including the role and responsibilities of coaches, coaching principles, effective communication and motivation techniques, coaching styles, skill development, team building, game strategy, and match preparation. The course emphasizes hands-on learning and application of coaching techniques in various sports settings.

Pedagogy:

The course will employ a combination of practical sessions, interactive workshops, case studies, role-plays, and video analysis to enhance students' coaching skills. Students will also have the opportunity to observe and assist experienced coaches during real coaching sessions.

Course Objectives:

- Develop a comprehensive understanding of sports coaching principles and ethics.
- Acquire the necessary skills to plan, conduct, and assess skill development sessions for athletes.

Course Outcome:

By the end of the course, students will be able to:

5. Demonstrate effective coaching techniques and communication skills.
6. Analyze individual player skills and design appropriate skill development programs.
7. Build and manage cohesive and motivated sports teams.
8. Strategize game plans and prepare teams for matches effectively.

Course Code	Pos/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO2	PSO 3	PSO 4
B23HF0309	CO1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	CO2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	CO3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	CO4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Introduction to Sports Coaching

- Understanding the role and responsibilities of a sports coach
- Basic coaching principles and ethics
- Effective communication and motivation techniques for coaches
- Introduction to coaching styles and methodologies
- Introduction to various sports and their coaching requirements

Skill Development and Techniques

- Identifying and analyzing individual player skills
- Planning and conducting skill development sessions
- Teaching fundamental techniques and drills for specific sports
- Assessing player progress and providing constructive feedback
- Integrating skill development into team strategies

Team Building and Management

- The importance of team dynamics in sports

- Strategies for fostering team cohesion and positive team culture
- Effective team communication and leadership
- Managing conflicts and challenges within the team
- Building strong coach-player relationships

Game Strategy and Match Preparation

- Understanding game analysis and opponent scouting
- Developing game strategies based on team strengths and weaknesses
- Preparing players mentally and physically for matches
- In-game decision making and adjustments
- Post-match evaluation and continuous improvement

Reference Books:

- Smith, J. (2020). Coaching: The Art and Science of Leadership. ABC Publishers.
- Johnson, R. (2019). Skill Development in Sports: A Practical Guide. XYZ Press.
- Williams, A. (2018). Team Building and Leadership in Sports. LMN Books.
- Brown, M. (2017). Game Analysis in Sports Coaching. DEF Publications.
- Davis, S. (2016). The Complete Guide to Sports Strategy. GHI Printers.

Sports Specialisation -1
(Athletics/Badminton/Football)

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0505	**Athletics/Badminton/Football**	SEC	-	-	3	3	6

Course Outcomes:

- Develop a comprehensive understanding of athletics history, trends, coaching methods, and technical skills.
- Attain proficiency in officiating athletics, understanding terminology, rules, and competition mechanics.
- Acquire skills in organizing tournaments, including facility management and equipment handling.
- Demonstrate talent identification, fitness knowledge, and advanced training techniques for effective team management in athletics competitions.

Course Objectives:

- To provide students with a historical context of athletics in India, Asia, and the world, enabling them to analyze and present development trends and coaching techniques.
- To equip students with the knowledge and skills required for officiating athletics events, including a thorough understanding of terminologies, rules, and officiating mechanics.
- To educate students on the organization of athletics tournaments and competitions, emphasizing the preparation and maintenance of sports facilities and equipment.
- To enable students to identify and select talented athletes, design specific and competitive fitness training programs, and conduct advanced skill tests and measurements.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0505	1	2	3	1	2	1	2	1	1	3	1	3	2	1	3
	2	3	2	2	3	2	1	2	1	2	2	2	3	2	2
	3	2	2	1	2	1	1	1	2	2	1	3	2	1	3
	4	1	3	1	3	1	3	2	1	3	1	2	3	1	2

Athletics/Badminton/Football

Unit I: Historical Background – India, Asia, World
- Present development trends, awards, teaching, training, coaching of technical skills
- Basic and advanced techniques
- Tactics and strategies - Coaching drills
- Coaching practice

Unit II: Officiating
- Terminologies
- Rules, Regulations and Interpretation
- Mechanics of officiating

Unit III: Organization of tournaments / Competitions
- Preparation, Marking and maintenance of courts / grounds /Arena.
- Equipment and facilities.

Unit IV: Talent identification / Selection of players / Handling the team/Players during competition
- Fitness
– Specific and competitive
- Developing motor qualities with various forms of training
- Tests and measurements

– Advanced, skill tests

Reference Books:

- Duduka, P. (Year). Athletics Coaching: From Fundamentals to Championship Strategies. Publisher.
- Johnson, A. B. (Year). Officiating in Athletics: Rules, Techniques, and Best Practices. Publisher.
- Smith, C. D. (Year). Tournament Management and Facilities Maintenance in Athletics. Publisher.
- Williams, E. F. (Year). Talent Identification and Player Selection in Athletics. Publisher.
- Roberts, J. K. (Year). Advanced Athletic Training and Testing: Methods and Applications. Publisher.
- Turner, M. L. (Year). Tactics and Strategies in Athletics: Coaching Drills and Practice. Publisher.

SIXTH SEMESTER

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0601	**EXERCISE PHYSIOLOGY**	HC	3	-	-	3	3

Course Objective:
Develop a thorough understanding of exercise physiology principles and their application in sports science and health promotion.

Course Outcome:

1. Understand the physiological principles governing energy production and metabolism during exercise.
2. Evaluate cardiovascular and respiratory responses to exercise, including fitness assessment.
3. Analyze neuromuscular adaptations to exercise and its impact on musculoskeletal health.
4. Discuss the influence of genetics, aging, gender, and different environments on exercise performance.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0601	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I:

Introduction to Exercise Physiology

Overview of exercise physiology and its significance in sports science
Historical perspectives and key milestones in exercise physiology research
Principles of homeostasis and adaptation in response to exercise

Energy Systems and Metabolism

Energy production and metabolism during exercise
Anaerobic and aerobic energy systems
Substrate utilization and fuel selection during different exercise intensities

Cardiovascular Responses to Exercise

Cardiac function and cardiovascular adaptations to exercise
Regulation of blood flow and oxygen delivery to working muscles
Assessment of cardiovascular fitness and exercise capacity

Respiratory Responses to Exercise

Pulmonary ventilation and gas exchange during exercise
Respiratory adaptations to endurance training
Assessment of respiratory parameters during exercise

Unit II:

Neuromuscular Function and Motor Control

Structure and function of skeletal muscle
Neural control of muscle contraction and motor unit recruitment
Muscular adaptations to strength training and endurance exercise

Musculoskeletal Adaptations to Exercise

Bone remodeling and adaptation to mechanical stress
Connective tissue responses to exercise
Impact of exercise on muscle strength, power, and hypertrophy

Endocrine and Immune Responses to Exercise

Hormonal regulation during exercise and recovery
Exercise-induced changes in immune function
Influence of exercise on stress hormone responses

Metabolic Responses to Exercise

Regulation of blood glucose and insulin during exercise
Exercise and fat metabolism
Exercise-induced metabolic adaptations

Unit III:

Environmental Considerations in Exercise Physiology

Effects of heat, cold, altitude, and humidity on exercise performance
Physiological adaptations to environmental stressors
Strategies for optimizing performance in different environments.

Genetics and Exercise Physiology

Genetic factors influencing exercise performance and response to training.
Role of genetic markers in personalized exercise prescription
Genetic determinants of athletic performance

Aging and Exercise Physiology

Physiological changes associated with aging.
Effects of exercise on aging-related declines in physical function
Exercise interventions for older adults

Gender and Exercise Physiology

Gender differences in exercise performance and physiological responses
Female athlete triad and menstrual cycle considerations
Gender-specific exercise considerations and guidelines

Unit IV:

Exercise Physiology in Special Populations

Exercise considerations for individuals with chronic diseases and disabilities
Exercise prescription for pregnant women and children
Physiological responses to exercise in different populations

Research Methods in Exercise Physiology

Research design and methodology in exercise physiology
Data collection and analysis techniques
Critically evaluating scientific literature

Application of Exercise Physiology Principles

Designing exercise programs based on physiological principles.
Monitoring and assessing exercise interventions.
Integration of exercise physiology in sports performance and health promotion

Reference Books:

- McArdle, W. D., Katch, F. I., & Katch, V. L. (2020). Exercise Physiology: Nutrition, Energy, and Human Performance. Wolters Kluwer.
- Powers, S. K., & Howley, E. T. (2018). Exercise Physiology: Theory and Application to Fitness and Performance. McGraw-Hill Education.
- Wilmore, J. H., & Costill, D. L. (2018). Physiology of Sport and Exercise. Human Kinetics.
- Brooks, G. A., Fahey, T. D., & Baldwin, K. M. (2005). Exercise Physiology: Human Bioenergetics and Its Applications. McGraw-Hill Education.
- Coyle, E. F., & Holloszy, J. O. (2015). Adaptations of Skeletal Muscle to Endurance Exercise and Their Metabolic Consequences. J. Appl. Physiol.
- Armstrong, R. B., & Phelps, R. O. (1984). Muscle fiber type composition and performance in endurance athletes with an emphasis on the effects of intense training. Sports Med.
- Berg, J. M., Tymoczko, J. L., & Gatto, G. J. (2002). Stryer, L. Biochemistry. W. H. Freeman and Company.
- Pollock, M. L., & Wilmore, J. H. (1990). Exercise in health and disease: evaluation and prescription for prevention and rehabilitation. Saunders.
- Wilmore, J. H., & Buskirk, E. R. (1971). Energy cost of running and walking in young women. Am. J. Clin. Nutr.
- Bouchard, C., & Rankinen, T. (2012). Individual differences in response to regular physical activity. Medicine & Science in Sports & Exercise.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.

B22HF0607	**Exercise Physiology (Practical)**	HC	-	-	1	1	2

Course Objectives:

- To develop practical skills in measuring and assessing physiological responses to exercise.
- To equip students with the ability to design exercise programs tailored to specific populations and fitness goals.

Course Outcome:

1. Students will proficiently measure and interpret resting physiological parameters, such as heart rate, blood pressure, and body composition.
2. Students will demonstrate competence in assessing cardiovascular and respiratory function during exercise, including understanding VO2max and its significance in evaluating aerobic fitness.
3. Students will apply EMG techniques to assess neuromuscular responses to exercise and evaluate muscular strength, power, and endurance.
4. Students will be able to design exercise modifications suitable for special populations based on individual needs and specific environmental conditions.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0607	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Introduction to Exercise Physiology

- Resting measurements: Heart rate, blood pressure, body composition assessment.
- Assessment of aerobic capacity through submaximal exercise testing.
- Introduction to strength and flexibility measurements.
- Basic exercise prescription principles.

Cardiovascular and Respiratory Responses to Exercise

- Cardiorespiratory system and its role during exercise.
- Assessment of cardiovascular function during exercise.
- Measuring pulmonary function and gas exchange.
- Practical application of cardiovascular training methods.
- Understanding VO2max and its importance in assessing aerobic fitness.
- Interpretation of cardiovascular and respiratory data.
- Practical session on aerobic exercise programming.

Neuromuscular Aspects of Exercise

- Neuromuscular system and its response to exercise.

- Electromyography (EMG) and its applications in exercise physiology.
- Assessment of muscular strength, power, and endurance.
- Practical application of resistance training techniques.

Exercise, Environment, and Special Populations

- Effects of exercise in different environments (e.g., altitude, heat, cold).
- Exercise considerations for special populations (e.g., elderly, pregnant women, individuals with chronic conditions).
- Practical session on exercise modifications for special populations.

Reference Books:

- McArdle, W. D., Katch, F. I., & Katch, V. L. (2015). Exercise Physiology: Nutrition, Energy, and Human Performance. Wolters Kluwer.
- Brooks, G. A., Fahey, T. D., & Baldwin, K. M. (2018). Exercise Physiology: Human Bioenergetics and Its Applications. McGraw-Hill Education.
- Powers, S. K., & Howley, E. T. (2018). Exercise Physiology: Theory and Application to Fitness and Performance. McGraw-Hill Education.
- Wilmore, J. H., & Costill, D. L. (2018). Physiology of Sport and Exercise. Human Kinetics.
- Plowman, S. A., & Smith, D. L. (2017). Exercise Physiology for Health, Fitness, and Performance. Wolters Kluwer.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0602	**Advanced Sports Biomechanics**	HC	3	-	-	3	3

Course Objectives:

- Understand the principles of biostatistics and research methodology in the context of sports biomechanics.
- Gain proficiency in applying various measurement techniques to analyze sports movements and biomechanical variables.

Course Outcome:

Upon successful completion of the course, students will be able to:

1. Analyze gait patterns and spatial-temporal parameters during sports movements.
2. Evaluate muscle mechanics and electromyographic data to understand muscle activity during sports performance.
3. Perform kinetic and kinematic analyses to assess forces, moments, and energy expenditure in sports movements.
4. Utilize advanced techniques for three-dimensional kinematic and kinetic analysis of sports skills.

Course Code	Pos/COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
B22HF0602	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

UNIT-I

Methods of gait analysis - Visual gait analysis, Temporal and Spatial Parameters during Gait Measurement of Temporal and Spatial Parameters during Gait, Camera Based Motion Analysis, Active marker systems. Measuring Force and Pressure beneath the foot Measuring Muscle Activity Measuring Energy Expenditure Combined kinetic/kinematic systems.

UNIT-II

Mechanical Analysis of Sports Skills: Athletics (Running, Jumping and Throwing), Swimming, Football, Basketball, Volleyball, Cricket. Technological Use and Advances in Biomechanics: Techniques and Tools for Measurement of Biomechanical Variables.

Muscle Mechanics – Introduction, Force-Length Characteristics of Muscles, Force-Velocity Characteristics, Muscle Modeling; Kinesiological Electromyography – Introduction, Electrophysiology of Muscle Contraction, Recording of the Electromyogram, Processing of the Electromyogram, Relationship between Electromyogram and Biomechanical Variables.

Biomechanical Movement Synergies – Introduction, the Support Moment Synergy, Medial/Lateral and Anterior/Posterior Balance in Standing, Dynamic Balance during Walking.

UNIT - III

Kinematics, Kinematic Conventions, Direct Measurement Techniques, Imaging Measurement Techniques, Processing of Raw, Kinematic Data, Calculation of Other Kinematic Variables, Problems Based on Kinematic Data; Kinetics: Forces and Moments of Force, Biomechanical Models, Basic Link-Segment Equations—the Free-Body Diagram, Force Transducers and Force Plates, Bone-on-Bone Forces During Dynamic Conditions, Problems Based on Kinetic and Kinematic Data.

UNIT-IV

Mechanical Work, Energy, and Power – Introduction, Efficiency, Forms of Energy Storage, Calculation of Internal and External Work, Power Balances at Joints and Within Segments, Problems Based on Kinetic and Kinematic Data.

Three-Dimensional Kinematics and Kinetics – Introduction, Axes Systems, Marker and Anatomical Axes Systems, Determination of Segment Angular Velocities and Accelerations, Kinetic Analysis of Reaction Forces and Moments.

Reference Books:

- Robertson, G. E., Caldwell, G. E., Hamill, J., Kamen, G., & Whittlesey, S. N. (2004). Research Methods in Biomechanics. Human Kinetics.
- Winter, D. A. (2009). Biomechanics and Motor Control of Human Movement. John Wiley & Sons.
- Knudson, D. V. (2017). Qualitative Diagnosis of Human Movement: Improving Performance in Sport and Exercise. Human Kinetics.
- Zatsiorsky, V. M., & Seluyanov, V. N. (1985). The Mass and Inertia Characteristics of the Main Segments of the Human Body. Biomechanics VIII-B, 1159-1164.
- Hamill, J., & Knutzen, K. M. (2009). Biomechanical Basis of Human Movement. Lippincott Williams & Wilkins.
- Enoka, R. M. (2008). Neuromechanics of Human Movement. Human Kinetics.
- Cavanagh, P. R., & Lafortune, M. A. (1980). Ground Reaction Forces in Distance Running. Journal of Biomechanics, 13(5), 397-406.

- Bartlett, R. M. (2007). Introduction to Sports Biomechanics: Analysing Human Movement Patterns. Routledge.
- Lees, A. (2001). Science and the Major Racket Sports: A Review. Journal of Sports Sciences, 19(9), 731-736.
- Nigg, B. M. (1992). Biomechanics of Running Shoes. Human Kinetics.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0608	**Advanced Sports Biomechanics (Practical)**	HC	-	-	1	1	2

Course Objectives:

- To provide students with an in-depth understanding of advanced methods of gait analysis and their application in sports performance evaluation.
- To equip students with the knowledge and skills to conduct mechanical analysis of various sports skills using motion analysis and force plate data.

Course Outcome:

Upon successful completion of the course, students will be able to:

1. Analyze gait patterns and temporal-spatial parameters to assess and enhance athletes' performance.
2. Apply biomechanical principles to analyze track and field events and fundamental skills in basketball, volleyball, football, hockey, gymnastics, and cricket.
3. Utilize dynamometer data for evaluating athletes' muscular strength and performance.
4. Assess sports skills and techniques using a combination of force plate data and 2D/3D motion analysis.

Course Code	Pos/COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO1	PSO2	PSO3	PSO4
B22HF0608	CO1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	CO2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	CO3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	CO4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

UNIT I

Methods of gait analysis - Visual gait analysis, Temporal and Spatial Parameters during Gait Measurement of Temporal and Spatial Parameters during Gait, Camera Based Motion Analysis, Active marker systems, Accelerometers, Gyroscopes, Magnetic Fields and Motion Capture Suits, Measuring Force and Pressure beneath the foot Measuring Muscle Activity Measuring Energy Expenditure Combined kinetic/kinematic systems using 3d analysis and force plate.

UNIT II

· Mechanical Analysis of Track and Field Events: Start, Running, Hurdling, Jumps and Throws
· Mechanical Analysis of fundamental skills of following games: Basketball, Volleyball, Football, Hockey, Gymnastics and Cricket

· Practical to perform the test and to collect data on Force Plate

UNIT III

· Practical to perform the test and to collect data on dynamometer for athletes and non-athletes.

· Practical to use Motion Analysis Software for Sports Analysis

UNIT IV

· Assessment of Sports Skills or techniques using Force plate, 2d analysis & 3D Analysis

Reference Books:

- Robertson, G. E., Caldwell, G. E., Hamill, J., Kamen, G., & Whittlesey, S. N. (2013). Research Methods in Biomechanics. Human Kinetics.
- Knudson, D. V. (2015). Fundamentals of Biomechanics. Springer.
- Hay, J. G., & Reid, J. G. (2014). Anatomy, Biomechanics, and Physiology of the Aerobic and Anaerobic Locomotion of the Cricket Batting Stroke. Springer.
- Leardini, A., & Nardini, E. (Eds.). (2018). The Human Ankle in Sports Medicine and Biomechanics. Springer.
- Chow, J. W., & Carlton, L. G. (2000). Biomechanics of Human Movement. Williams & Wilkins.
- Bartlett, R. M., & Bussey, M. D. (2012). Sports Biomechanics: Reducing Injury and Improving Performance. Routledge.
- Zatsiorsky, V. M., & Kraemer, W. J. (2016). Science and Practice of Strength Training. Human Kinetics.
- Cappozzo, A. (Ed.). (2012). Biomechanics of Human Movement: Applications in Rehabilitation, Sports and Ergonomics. Springer Science & Business Media.
- Van den Bogert, A. J., Neptune, R. R., & Herzog, W. (Eds.). (2013). Biomechanics of the Musculoskeletal System. John Wiley & Sons.
- Knudson, D. V. (2017). Qualitative Diagnosis of Human Movement: Improving Performance in Sport and Exercise. Human Kinetics.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0603	**RESEARCH IN SPORTS & PHYSICAL ACTIVITY**	HC	3	-	-	3	3

Course Objectives:

- To understand the significance of research in sports science and its role in advancing knowledge in the field.
- To develop the skills necessary to design research studies, including formulating research questions and selecting appropriate methodologies.
- To gain proficiency in data collection, analysis, and interpretation in the context of sports and physical activity research.
- To learn how to effectively communicate research findings through presentations and publications and to adhere to ethical standards in research.

Course Outcomes:

1. Students will be able to evaluate the importance of research in sports science and its applications in the field.
2. Students will be capable of designing research studies, including formulating research questions and selecting appropriate methodologies.
3. Students will acquire the skills to collect, analyze, and interpret data in the context of sports and physical activity research.
4. Students will be able to prepare research reports, presentations, and manuscripts for publication, adhering to ethical and professional standards.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0603	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: Introduction to Research in Sports Science

The importance of research in sports science
Research methodologies and approaches in sports science
Ethical considerations in sports research
Formulating research questions and hypotheses
Literature review and the research process

Unit II: Research Design and Data Collection

Experimental and non-experimental research designs
Sampling techniques and sample size determination
Data collection methods in sports research
Questionnaires, surveys, and interviews
Observations and measurements

Unit III: Data Analysis and Interpretation

Descriptive statistics in sports research
Inferential statistics and hypothesis testing
Data visualization techniques
Qualitative data analysis in sports research
Interpreting research findings and drawing conclusions

Unit IV: Research Presentation and Publication

Preparing research reports and presentations
Effective data visualization and graphical representation
Manuscript preparation for publication
Ethical considerations in publishing sports research
Peer review and the publication process

Reference Books:

Hutzler, Y., & Fransen, J. (Eds.). (2018). Handbook of Sport Psychology and Exercise Psychology. American Psychological Association.

Field, A. (2017). Discovering Statistics Using IBM SPSS Statistics. Sage Publications.

Sullivan, G. M., & Feinn, R. (2012). Using Effect Size—or Why the P Value Is Not Enough. Journal of Graduate Medical Education, 4(3), 279-282.

Silverman, S. J., & Subramaniam, P. (2014). Organizing Your Social Sciences Research Paper: The Research Problem/Question. University of Southern California Libraries.

Creswell, J. W., & Creswell, J. D. (2017). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Sage Publications.

American Psychological Association. (2020). Publication Manual of the American Psychological Association (7th ed.). American Psychological Association.

Course Code	Course Title	Course Type	L	T	P	C	Hrs./ Wk.
B22HF0609	**RESEARCH IN SPORTS & PHYSICAL ACTIVITY (PRACTICAL)**	HC	-	-	1	1	2

Course Objectives:

- Develop a foundational understanding of the research process in sports science.
- Learn to formulate research questions, conduct literature reviews, and develop hypotheses.
- Gain practical experience in data collection, analysis, and interpretation in sports and physical activity research.
- Improve research presentation and reporting skills, including ethical considerations.

Course Outcomes:

1. Demonstrate the ability to design a research study in the field of sports and physical activity.
2. Conduct data collection, analyze research data, and interpret findings effectively.

3. Present research findings in a clear and organized manner, both orally and in writing.
4. Apply ethical principles to all stages of the research process in sports science.

Mapping of Course Outcomes with Program Outcomes

Course Code	POs / COs	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO7	PO8	PO9	PO 10	PSO1	PSO2	PSO3	PSO4
B22HF0609	1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Unit I: Research Design and Planning
Understanding the research process in sports science
Research question formulation
Literature review and hypothesis development
Selection of research methods and tools

Unit II: Data Collection and Analysis
Data collection techniques in sports and physical activity research
Use of technology and equipment for data acquisition
Basic statistical analysis in sports research
Data interpretation and presentation

Unit III: Practical Field Research
Conducting field-based research in sports and physical activity
Data gathering, including measurements and observations
Data recording and preliminary analysis
Identifying challenges and solutions

Unit IV: Research Presentation and Report
Preparing research findings for presentation
Effective data visualization
Oral and written presentation skills
Ethical considerations in research reporting

Reference Books:

- Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2015). Research Methods in Physical Activity. Human Kinetics.
- Hutzler, Y., & Sherrill, C. (Eds.). (2018). Inclusion and Exclusion Through Adapted Physical Activity: A Critical Discussion. Routledge.
- Hopkins, W. G. (2019). A New View of Statistics. Oxford University Press.
- Creswell, J. W., & Creswell, J. D. (2017). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Sage Publications.

- Cohen, J. (2013). Statistical Power Analysis for the Behavioral Sciences. Academic Press.
- American Psychological Association. (2020). Publication Manual of the American Psychological Association (7th ed.). American Psychological Association.

Advanced Strength & Conditioning

Course code	Advanced Strength & Conditioning	Course Type	L	T	P	C	CH
B22HF0604		**DSC**	**3**	**-**	**-**	**3**	**3**

Course Description:

This course in the B.Sc. Sports Science curriculum focuses on advanced principles and practices of strength and conditioning. It covers topics such as advanced strength training, power development, plyometric training, nutrition, supplementation, and advanced conditioning methods to optimize athletic performance.

Pedagogy:

The course will include lectures, practical demonstrations, laboratory work, case studies, and group discussions. Students will engage in hands-on training, data analysis, and program design using advanced strength and conditioning concepts.

Course Objectives:

- Understand and apply advanced principles of resistance training, periodization, and exercise selection for hypertrophy and strength development.
- Analyze and design advanced power development and plyometric training programs for sport-specific applications.

Course Outcome:

Upon successful completion of the course, students will be able to:

- Develop advanced strength training programs and implement periodization models for athletes in various sports.
- Design and implement integrated power training and plyometric programs to enhance athletic performance.

- Evaluate nutritional requirements and apply appropriate strategies for strength and power development in athletes.
- Create sport-specific conditioning programs focusing on high-intensity interval training, speed, and agility development.

Course Code	Pos/COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
B22HF0604	CO1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	CO2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	CO3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	CO4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Unit I: Principles of Advanced Strength Training

Advanced principles of resistance training

Periodization models and advanced program design

Strategies for hypertrophy and strength development

Advanced exercise selection and technique refinement

Unit II: Advanced Power Development and Plyometric Training

Power training principles and concepts

Advanced plyometric training techniques

Olympic weightlifting for power development

Integrated power training for sport-specific applications

Unit III: Nutrition and Supplementation for Strength & Conditioning

Nutritional requirements for advanced athletes

Nutritional strategies for strength and power development

Dietary supplements and ergogenic aids in strength and conditioning

Hydration and recovery strategies

Unit IV: Advanced Conditioning Methods

Energy systems and metabolic demands in sports

High-intensity interval training (HIIT) protocols

Sport-specific conditioning programs

Speed and agility development for advanced athletes

Reference Books:

- Baechle, T. R., & Earle, R. W. (2008). Essentials of Strength Training and Conditioning (3rd ed.). Human Kinetics.
- Haff, G. G., & Triplett, N. T. (Eds.). (2016). Essentials of Strength Training and Conditioning (4th ed.). Human Kinetics.
- Stone, M. H., Stone, M., Sands, W. A., & Sands, W. A. (2007). Principles and Practice of Resistance Training. Human Kinetics.
- Fleck, S. J., & Kraemer, W. J. (2014). Designing Resistance Training Programs (4th ed.). Human Kinetics.
- Zatsiorsky, V. M., & Kraemer, W. J. (Eds.). (2006). Science and Practice of Strength Training (2nd ed.). Human Kinetics.
- Comfort, P. (2017). Strength and Conditioning for Sports Performance. Routledge.
- Cormie, P., McGuigan, M. R., & Newton, R. U. (Eds.). (2011). Developing Power. Human Kinetics.
- Baker, D., & Nance, S. (Eds.). (2006). The Essence of Plyometric Training. Human Kinetics.
- Greenwood, M., & Kalman, D. (Eds.). (2018). Nutritional Supplements in Sports and Exercise. Springer.
- Jeukendrup, A., & Gleeson, M. (Eds.). (2019). Sport Nutrition: An Introduction to Energy Production and Performance. Human Kinetics.

Advanced Strength & Conditioning (Practical)

Course code	Advanced Strength & Conditioning (Practical)	**Course Type**	**L**	**T**	**P**	**C**	**CH**
B22HF0610		**DSC**	**-**	**-**	**1**	**1**	**2**

Course Description:

This practical course within the B.Sc. Sports Science curriculum provides hands-on experience in advanced strength training techniques, plyometric training, Olympic weightlifting skill development, conditioning drills, circuit training, and performance assessment through data collection.

Pedagogy:

The course will consist of hands-on training sessions, demonstrations, lab work, and supervised practice in advanced strength training and conditioning methods. Students will work with athletes and analyze performance data to design effective training programs.

Course Objectives:

- Develop proficiency in advanced strength training techniques and their application in sports performance.
- Gain practical skills in conducting plyometric training, Olympic weightlifting, conditioning drills, and data-driven performance assessments.

Course Outcome:

Upon successful completion of the course, students will be able to:

- Demonstrate competency in applying advanced strength training methods to enhance athletic performance.
- Design and implement plyometric training programs to improve power and explosiveness in athletes.
- Execute Olympic weightlifting techniques with proper form and safety measures.
- Plan and conduct effective conditioning drills and circuit training for specific sports and athlete needs.

Course Code	Pos/COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
B22HF0610	CO1	3	3	2	2	1	2	1	1	3	1	3	2	1	2
	CO2	2	2	3	3	2	1	2	1	2	2	2	3	1	2
	CO3	3	3	3	2	1	1	1	2	2	1	3	2	1	3
	CO4	2	2	2	3	1	3	2	1	3	1	2	3	1	2

Course Content:

Hands-on practice in advanced strength training techniques

Plyometric training sessions

Olympic weightlifting skill development

Conditioning drills and circuit training

Performance assessment and data collection

Reference Books:

- Fleck, S. J., & Kraemer, W. J. (2014). Designing Resistance Training Programs (4th ed.). Human Kinetics.
- Stone, M. H., O'Bryant, H. S., & Garhammer, J. (Eds.). (2012). Exercise and Sport Science. Lippincott Williams & Wilkins.
- Zatsiorsky, V. M., & Kraemer, W. J. (Eds.). (2006). Science and Practice of Strength Training. Human Kinetics.
- Chu, D. (1996). Jumping Into Plyometrics. Human Kinetics.
- Everett, G. J. (2016). Olympic Weightlifting: A Complete Guide for Athletes & Coaches. Catalyst Athletics.
- Baechle, T. R., & Earle, R. W. (Eds.). (2008). Essentials of Strength Training and Conditioning (3rd ed.). Human Kinetics.
- Baker, D., & Nance, S. (Eds.). (2006). The Essence of Multivariate Thinking: Basic Themes and Methods. Routledge.

- Haff, G. G., & Triplett, N. T. (Eds.). (2016). Essentials of Strength Training and Conditioning (4th ed.). Human Kinetics.
- Cardinale, M., Newton, R. U., & Nosaka, K. (Eds.). (2011). Strength and Conditioning: Biological Principles and Practical Applications. Wiley-Blackwell.
- Lloyd, R. S., Oliver, J. L., & Faigenbaum, A. D. (Eds.). (2015). Long-Term Athletic Development: Trainability in Childhood and Adolescence. Routledge.

Careers in Sports Science

Sports Science is one of the fastest growing and evolving health professions. Completing a B.Sc. in Sports Science can lead to various career opportunities in the sports and fitness industry. Here are some potential career paths:

1. Sports Scientist
2. Exercise Physiologist
3. Fitness & Wellness in Corporate, Hospital and University
4. Strength/Conditioning Coach
5. Performance analyst
6. Sports Administrator
7. Sports Talent identification officer
8. Many choose academic progression and pursue Masters of sports science in a specific field of specialization which they are passionate about, following which they can pursue doctoral research- PhD.
9. Others choose research, education, administration as career path.
10. There are many opportunities to work or study in foreign countries.
11. Many choose academic progression and pursue Masters of sports science in a specific

field of specialization which they are passionate about, following which they can pursue doctoral research- PhD.

12. Others choose research, education, administration as career path.
13. There are many opportunities to work or study in foreign countries.

List of Faculty Members

S.No	Name of faculty	Designation	Subject	Contact details& mail id
1.	Dr.S.Srividhya	HOD & Associate Professor	Sports Biochemistry	8892923811 Srividhya.s@reva.edu.in
2.	Mr.Manikandan K	Assistant professor	Biomechanics, Anatomy	8610953364 manikandan.kannan@reva.edu.in
3.	Mr.Sudip Ghatak	Teaching Associate	Physiology	8653030022 sudip.ghatak@reva.edu.in
4.	Mr.Sharath Arun Maney	Assistant Professor	Strength & Conditioning	9980844748 sharatharun.maney@reva.edu.in
5.	Dr.Deepak C S	Director of Physical Education & Sports	Sports and Games	9980985677 deepakcs@reva.edu.in
6.	Mrs.SeemaSharat	Aerobic and yoga expert	Aerobic and yoga	9845181418 seema.sharat@reva.edu.in