BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
AUGS/ AGSR Division

SECOND SEMESTER 2021-2022

Course Handout Part II

Date: 18/01/2021

In addition to part -I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

LPTU	**:**	**3003**
Course No.	**:**	**ME F340**
Course Title	***:***	***Introduction to Sports Engineering***
Instructor-in-Charge	**:**	**M. S. Dasgupta**
Team of Instructors	**:**	Pintu Modak, Rajesh P Mishra, Dr. Achint Nigam, K P Venkatesh,

1. **Course Description:** The course essentially prepares engineering students to utilize their existing technical knowhow for sports applications. Specific focus is on Mechanics, Materials, Design principles and data analysis. The course introduces students to sports biomechanics, analysis of human movement in sports, Force and motion analysis using various standard techniques, sensors, data analysis and performance measure. Sports equipment and surface property affecting performance and injury.

2. **Scope & Objective:** This is an introductory course to impart knowledge and skill set related to working with human in sports engineering application. Understanding human movement pattern and performance measurement. Understand, assess and analyze effect of equipment, sports surfaces and environment on sports performance. Use of ergonomic concepts, image processing, smart sensors and data analysis in sports engineering. Standard techniques of evaluation and testing of sports equipment and sports surfaces and appreciation of business around sports industry.

3. **Learning outcome:** On successful completion of this course, students will be able to:

    a) Explain what is sports engineering application domain.
    b) Demonstrate how to frame a sports engineering related problem and apply suitable engineering solution.
    c) Assess effect of sports surfaces and equipment on sports performance.
    d) Demonstrate use of information technology tools for performance analysis.

4. **Text Books:**
    (T1) Sport and exercise biomechanics - P. Grimshaw, New York: Taylor & Francis, 2007
    (T2) Introduction to Sports Biomechanics: Analysing Human Movement Patterns,2nd edition byRoger Bartlett, Routledge Publishing, 2007

5. **Reference Books:**
    (R1) Materials in sports equipment – Mike Jenkins, Woodhead Publishing 2003 UK
    (R2) Kinesiology: Scientific basic of human motions, By Katharina F Wel's and Kathryn Luttgens, 6th Edition, Philadelphia

(R3) The Science and Engineering of Sport Surfaces Edited by Sharon Dixon, Paul Fleming, Iain James, Matt Carré
(R4) Database systems: a practical approach to design, implementation and management (5th edition), Connolly, Thomas M. and Carolyn E. Begg, Addison-Wesley 6th Edition, 2015
(R5) The Routledge Handbook of Ergonomics in Sport and Exercise Youlian Hong, 2014 Routledge

6. **Course Plan:**

Sl. No.	Module	Lecture session duration hour	Chapter, Section (Book)	Learning outcome of module
1	**Sports and Technology** Introduction to Sports engineering and sustainability Objectives and scopes of sports engineering Connecting engineering with sports development.	**5**	**T1 Ch:1,2 R4 Sec:1,2**	Learning fundamental skills that Engineering students require to understand sports movements. Technology and sports ethics.
2	**Human Movement Patterns** Defining human movements Some fundamental movements and Movement patterns, qualitative and quantitative methods	**8**	**T2 Sec:1,2,3,4**	Learning human movement patterns and their analysis
3	**Ergonomics and Anthropometry** Introduction to ergonomics, system design and task analysis Introduction to anthropometry and its application in sports. Anthropometry measures and anthropometric techniques	**8**	**R5 Sec:1,2,5 T1 Sec:2,3**	Learning basic human factors in engineering design
4	**Performance Analysis of Sports Movements** What is Performance Analysis of Sport? Quantitative and Qualitative Analysis, Sports Performance Data and Information Computer application in sports Computerized Performance Analysis Systems and AI	**6**	**T1 Sec: 1,2,4,6**	Learning modern computing technology and its use in sports performance analysis
5	**Business around Sports** Introduction to sports as a product and a service. Pricing and promotion strategies in sports marketing.	**2**	**Reading material will be supplied**	Learning about marketing opportunities of sporting events and business around sports.
6	**Sports Infrastructure and Surfaces** Basics of sports Infrastructure. Planning design and management of sports infrastructure. History and development of sports Surfaces, surface Classification and characterization, surface test methods. Sports Surfaces	**3**	**R3 Sec:1,2,3 R5 Sec:6**	Learning key aspect of sports infrastructure surface development, testing and effect on performance

	and Performance. Chemistry of Sports Surface.			
7	**Equipment Case Studies:** Materials and design of sports products – balls, tennis rackets, cricket bats, bicycles, running shoes, pole vaults, surfaces and training equipment case studies and measurements	**8**	**R1 Sec:8**	Visualize situations that engineers need to analyze and appreciate in Sports engineering problem and scope of business around sports

4. Evaluation Scheme:

Evaluation Component	Weightage (%)	Duration (Minutes)	Date of Evaluation
Mid Semester Test	30	60	As announced in the Timetable
Take home assignments	35	-	
Comprehensive Examination	35	120	As announced in the Timetable

Chamber Consultation Hour: To be announced in the class.

Notices: Notification in Nalanda.

Make-up policy: Make-up for Midsem, Compre, only to take care of exigencies.