Shree H. V. P. Mandal's

Degree College of Physical Education

Autonomous College, Amravati

Course Structure for Diploma in Data Analytics (Sports Performance Analysis)

1. **Course Name in Complete**: Diploma in Data Analytics (Specialization in Sports Performance Analysis)
2. **Course Name in Short**: DSPA
3. **Programme Code:**DSPA2020
4. **Nature of the course:** Diploma NSQF Level 5
5. **Programme Educational Objective:**

    - To learn sports performance analysis, its parameters and importance.
    - To study the different sports training and coaching methods which impact sports performance.
    - To study the application of advanced tools and techniques for sports performance analysis.
    - To study research approaches and methods to evaluate sports performance analysis.
    - To learn complex data analysis and visualizations methods.

6. **Duration of the Course:** One Year; Full Time
7. **Examination Pattern (Annual/Semester):** Semester
8. **If Semester pattern then Number of Semesters:** Two Semester
9. **Marking Scheme (Percentage/Credit):** Credit Based
10. **Eligibility:**
    Bachelor degree from recognized university/Institute in any branch of study, Interest/ Participation in Sports / Games and basic knowledge of computer application.
    Desirable qualification
    - Bachelor degree in Computer Science/ application with Interest/participation in sports is desirable.
    - Bachelor degree in Physical Education and basic knowledge of Computer operation is desirable.

11. **Total working days:** Per Annual session : 200 days
    Per Semester: 100 days

12. **Teaching and Examination Scheme:** As prescribed in the curriculum design by the Subject Board and approved by Academic Board time to time.
13. **Admission rules/conditions for every year/semester**.

Sr. No	Course and Level	Type of Admission	Eligibility	Remark
1	DSPA First Year Sem. I	Direct Admission	As prescribed	
2	DSPA First Year Sem. II	Natural Growth/ Direct	Natural Growth to student passed ½ of the total passing heads of semester 1. Direct admission to students successfully	

		Admission	completed ‘Certificate in Data Analytics’ OR ’Certificate in Sports Performance Analysis’ OR Certificate in sports coaching from recognized University/ Institute.	

- Programme is multi-entry and multi-exit. After completion of first semester a ‘Certificate in Data Analytics (Specialization in Sports Performance Analysis)’ shall be awarded. And, after completing second semester a ‘Diploma in Data Analytics (Specialization in Sports Performance Analysis)’ shall be awarded.

13.**Outcome of the course:**
After successful completion of this programme, students shall…

- Get detail understanding of sports performance analysis
- Support players to enhance sports performance
- Assist coaches to provide better coaching for to enhanced sports performance.
- Flexibly apply &evaluate advanced tools and techniques.
- Have ability of critical thinking and acquire problem-solving skills.
- Undertake complex data analysis and visualizations problems.

Curriculum Scheme for Diploma in Data Analytics (Specialization in Sports Performance Analysis)

Sr. No	Course Category	Subject Code No.	Subject	Credit	Teaching Scheme				Examination Scheme									
									Theory					Practical				
					Lectures	Tutorials	Practicals	Hours / Week	Duration of Paper (Hrs)	Max Marks Theory Papers	Max Marks Sessional	Total	Min Pass Marks	Duration of Exam (Hrs)	External Marks	Sessional Marks	Total	Min Pass Marks
Semester-I																		
1	Core Course	DSPA 20101	Sports Training & Coaching	4	4		-	4	3	70	30	100	40	-	-	-	-	-
2	Core Course	DSPA 20102	Sports Performance Analysis	4	4		-	4	3	70	30	100	40	-	-	-	-	-
3	Core Course	DSPA 20103	Biomechanical & Movement Analysis	4	4		-	4	3	70	30	100	40	-	-	-	-	-
4	Skill Course	DSPA 20104	Lab-1: Sports Performance Record Keeping	6	-	2	2	6	-	-	-	-	-	3	25	25	50	25
5	Skill Course	DSPA 20105	Lab-2: Performance Analysis methods	6	-	2	2	6	-	-	-	-	-	3	25	25	50	25
6	Skill Course	DSPA 20106	Lab-3: Biomechanical & Movement Analysis Tools	6		2	2	6	-	-	-	-	-	3	25	25	50	25
			Total	**30**	**12**	**6**	**6**	**30**		**210**	**90**	**300**			**75**	**75**	**150**	
Semester-II																		
1	Core Course	DSPA 20107	Research Method for Performance Analysis	5	5			5	3	70	30	100						
2	Core Course	DSPA 20108	Data analytical techniques used in performance analysis	5	5			5	3	70	30	100						
3	Skill Course	DSPA 20109	Lab-1: Research methods for Performance analysis	6		2	2	6						3	25	25	50	25
4	Skill Course	DSPA 20110	Lab-2: Advanced Tools and Techniques for performance analysis	6	-	2	2	6	-	-	-	-	-	3	25	25	50	25
5	Skill Course	DSPA 20111	Seminar/Presentation	2		2		2						3	25	25	50	25
6	Skill Course	DSPA 20112	Project	6	-	2	2	6	-	-	-	-	-	3	50	50	100	50
			Total	**30**	**10**	**8**	**6**	**30**		**140**	**60**	**200**			**125**	**125**	**250**	

*** Each Practical is of two hours**

Course Code	**DSPA20101**	**Programme Code**	**DSPA2020**
Course Name	**Sports Training & Coaching**		
Credits	**4**	**Course Type:** Core Course	
Course Objectives	1. To introduce training as performance based science 2. To explain different means and methods of various training 3. To teach preparing training schedule for various sports and games 4. To learn parameters and factors for performance enhancement.		
Mapping of Programme Outcome (PO/PSO)	1. Support players to enhance sports performance. 2. Assist coaches to provide better coaching for to enhanced sports performance.		
Prerequisites	Basic Knowledge of any specific Sport or game		
Course Outcomes (CO)	• Understand concept of Sports Training & Coaching • Analyze the concepts and issues pertaining to Sports Training & Coaching		

Unit No	Contents	Total Hrs
1	**Introduction to Sports Training & Coaching** Aims, Objectives and Specifications of Coaching and Sports Training, Sports Skills and Techniques, Meaning, Definitions, of Sports Training and Coaching. Characteristics of Sports Training, Principles of Sports Training and Coaching, Different methods of Coaching, Principles of Coaching, Stages of Skill Teaching, Preparation for Coaching Sports, Qualities and qualifications of good coach. **Mapping of COs: Understand concept of Sports Training & Coaching.**	12
2	**Technique:** Meaning of technique, skill and style, significance of technique training in different sports. Factors affecting technique training, phases of technique training and their implications. **Sports Coaching**: Planning, Facilities, Equipment and Assistants in Coaching, Planning of Coaching - Long-Term, Short-Term plans, Conditioning Exercises and Lead up-games, The Training Room, Trainer's equipment, Stock Room, Practice area, Prerequisites of Team and Squad selection. **Mapping of COs: Understand concept of Sports Training & Coaching.**	12
3	**Training Load and Recovery:** Factors of training load: quality of movement, types of exercise, load volume, load intensity, Principles of Loading. Over Load: meaning, causes, symptoms and tackling. Adaptation process- factors affecting recovery, means of faster recovery. Meaning, forms, factors determining and training methods of a) Strength, b) Speed c) Endurance d) Flexibility e) Coordinative abilities **Mapping of COs:** 1. To learn sports performance analysis, its parameters and importance. **2.** To study the different sports training and coaching methods which impact sports performance.	12
4	**Tactical Training**: Meaning of strategy and tactics, difference between strategy and tactics, significance of tactics, tactical training means. Environmental factors and Sports Training. Psychological and sociological factors in training competition. **Mapping of COs:** 1. To learn sports performance analysis, its parameters and importance.	12

	2. To study the different sports training and coaching methods which impact sports performance.	
5	**Periodization** - Meaning and types of periodization, contents of training and coaching for different periods. Planning- Meaning, principles and types of training plans. Monitoring of the training schedule. **Coaching Aids and Devices:** Principles of the Selection and use of A.V. Aids in Coaching Sports Skills. Charts, Models, Filmstrips, Posters, Motion films, Gadgets, Flannel graph, Slide Projector, Overhead Projector, L.C. D. Projector	12
	Mapping of COs: 1. To learn sports performance analysis, its parameters and importance. 2. To study the different sports training and coaching methods which impact sports performance.	
	Text Books: • Dick Franek W. " Sports Training Principles" Istedition 1980: Henry Kimpton Publishers Ltd. Leigon Road London NWS2QL • Herre Dictrich , "Principles of Sports Training", 1982 Sports verlag, Germany.	
	Reference Books: • Matyeyer L.P. , "Fundamentals of sports training", 2nd Edition 1981, Published by Progress Publishers Mosco, Russia • Singh Hardyal;"Science of Sports Training" (New Delhi, Dvs Publications) 1997, Kirti Nagar, Kalkaji, New Delhi. • Uppal A.K. Principles of Sports Training (Delhi : Friends Publications) 2001 • Uppal A.K. Science of Sports Training (Delhi : Friends Publications) 2009. • Lawther John D. Psychology of Coaching (Prentice Hall, Inc. Engle wood Cliffs) • Scientific Principles of Coaching, John Bunn • The Mechanics of Athletics, Geoffrey Dyson • Psychology of Coaching, Lawther J.D • How to be a Successful Coach, Bounder, J.B • Physical Education Lessons, J.P. Thomas • Methods in Physical education, Kozman, Gassidy Jackson • Method of Coaching, Prof. A. K. Karmarkar	

Course Code	**DSPA20102**	**Programme Code**	**DSPA2020**
Course Name			
Credits	**4**	**Course Type:** Core/Skill/Ability Enhancement/Generic	
Course Objectives (CO)	**1.** To introduce Meaning and definition of sports performance analysis. **2.** To learn important Factors in sports performance analysis. **3.** To teach Role of Sports Performance Analyst. **4.** To learn Used of Notational analysis in sports. **5.** To learn Video based, GPS Based, LPS Based Analysis. **6.** To learn Study of technical difficulties in sports performance analysis and overcome difficulties.		
Mapping of Programme Outcome (PO/PSO)	1. Get detail understanding of sports performance analysis 2. Shall flexibly able to apply &evaluate advance tools and techniques. 3. Students shall develop critical thinking and problem solving skills.		

	4. Undertake complex data analysis and visualizations problems.
Prerequisites	Interest in sports.
Course Outcomes	• To developed basic principle of behind sport performance analysis and its wide scope in sport industry. • Understand different type of analysis used in sports performance.

Unit No	**Contents**	**Total Hrs.**
1	**Introduction to Module:** Meaning and definition. History, Use and Development (past and future)	10
	Mapping of COs: Get detail understanding of sports performance analysis.	
2	**Importance of Sport Performance Analysis:** Factors in sports performance. Skill required for sports performance analyst. Role of sports performance Analyst.	10
	Mapping of COs: 1. To learn important Factors in sports performance analysis. 2. Role of sports performance Analyst.	
3	**Notational Analysis:** Notational Analysis in sports. Notational Analysis process. Hand notational Analysis. Role of feedback in coaching process.	14
	Mapping of COs: To learn Used of Notational analysis in sports performance.	
4	**Different System used in Sports Performance Analysis:** Used of performance Indicator in sports. Video based, GPS Based, LPS Based Analysis.	14
	Mapping of COs: To learn Video based, GPS Based, LPS Based Analysis	
5	**Contemporary issue in sports performance analysis:** Study of technical difficulties and overcome difficulties. Strategies and Tactics in sports.	12
	Mapping of COs: To learn Study of technical difficulties in sports performance analysis and overcome difficulties.	
	Text Books: • The Essential of performance Analysis an Introduction. Hughes M and Frank I 2008. • Notational Analysis of sports. Frank I 2008. • Basics of performance Analysis. Hughes M,D. 2008 • Used of performance indicator in performance analysis. Hughes M., Brattle R. 2002.	
	Reference Books: • Team Performance indicator in performance analysis. Jones N.M.P., James N. • Handbook of soccer match analysis. Carling C, Williams A.M and Reilly t., 2005.	

Course Code	**DSPA20103**	**Programme Code**	**DSPA2020**
Course Name	**Biomechanical & Movement Analysis**		
Credits	**4**	**Course Type:** Core/Skill/Ability Enhancement/Generic	
Course Objectives (CO)	• To identify biomechanical, health, physiological, and psychological limitations to and interventions for improving sports performance. • To analyze and explain the mechanisms underlying biomechanical, physiological, and psychological changes that occur during after acute and chronic exercise. • To develop physical conditioning programs based on scientific principles		

	designed to develop physical fitness and improve athletic performance • To learn effectiveness of human movement using mechanical principles.
Mapping of Programme Outcome (PO/PSO)	1) Undertake complex data analysis and visualizations problems. 2) Shall flexibly able to apply &evaluate advance tools and techniques.
Prerequisites	
Course Outcomes	• Understand concept of Biomechanical & Movement Analysis • Analyze the concepts and issues pertaining to Biomechanical & Movement Analysis

Unit No	**Contents**	**Total Hrs**
1	**Introduction** Meaning, Importance and scope of kinesiology and Sports Biomechanics. Meaning of Axis and Planes, Static and Dynamics, Kinematics, Kinetics, Centre of gravity -Line of gravity Vectors and Scalars.	12
	Mapping of COs: To identify biomechanical, health, physiological and psychological limitations to and interventions for improving sports performance.	
2	**Muscle and Joints Action** Muscle- Origin, Insertion and action of muscles: Pectoralis major and minor, Deltoid, Biceps, Triceps (Anterior and Posterior), Trapezius, serratus, Sartorius, Rectus femoris, Abdominis, Quadriceps, Hamstring, Gastrocnemius. Joints – Types, Structure, Movements	12
	Mapping of COs: Analyze and explain the mechanisms underlying biomechanical, physiological, changes that occur during after acute and chronic exercise	
3	**Motion and Force** Meaning and definition of Motion. Types of Motion: Linear motion, angular motion, uniform and non-uniform motion. Principles of Newton law of Motion - Law of Inertia, Law of acceleration, and Law of action and reaction. Meaning and definition of force- Sources of force -Force components, Centripetal force - Centrifugal force. Force applied at an angle - pressure -friction -Buoyancy, Spin -.	12
	Mapping of COs: 1. Develop physical conditioning programs based on scientific principles designedto develop physical fitness and improve athletic performance	
4	**Projectile and Lever** Freely falling bodies -Projectiles -Equation of projectiles, equilibrium - Factors influencing equilibrium - Guiding principles for equilibrium -static and dynamic equilibrium. Meaning of work, power, energy, kinetic energy and potential energy. Leverage -classes of lever - practical application. Aerodynamics: Water resistance - Air resistance	12
	Mapping of COs: 1. Understand mechanical principles can be applied to the analysis of human movement to assess and improve performance and reduce risk of injury	
5	**Movement Analysis** Analysis of Movement: Types of analysis: Kinesiological, Biomechanical, and Muscular Analysis. Cinematographic. Methods of analysis – Qualitative, Quantitative, Predictive, **Note: Laboratory practical should be designed and arranged for**	12

	students internally. 3 skills of track and field events (Cinematographic)	
	Mapping of Cos: 1. Analyze and explain the mechanisms underlying and psychological, changes that occur during exercise. • Know effectiveness of human movement using mechanical principles.	
	Text Books: • Hoffman S.J. Introduction to Kinesiology (Human Kinesiology publication In.2005. • Steven Roy, & Richard Irvin. (1983). Sports Medicine. New Jersery: Prentice hall	
	Reference Books: • Thomas. (2001). Manual of structural Kinesiology, New York: Mc Graw Hill. • Uppal A.K. Lawrence Mamta MP Kinesiology(Friends Publication India 2004) • Uppal, A (2004), Kinesiology in Physical Education and Exercise Science, Delhi Friends publications. • Williams M (1982) Biomechanics of Human Motion, Philadelphia	

Course Code	**DSPA20107**	**Programme Code**	**DSPA2020**
Course Name	**Research Method for Performance Analysis**		
Credits	**4**	**Course Type:** Core/Skill/Ability Enhancement/Generic	
Course Objectives (CO)	1. To define the terms and concepts of research. Identify needs and scope of research in the field of sports performance analysis. 2. To define research problems. 3. To locate and list sources of literature review including operational definitions and conceptual framework 4. To learn different approaches and research designs sports performance analysis. 5. To learn sample and sampling technique. 6. To develop tool for data collection. 7. To conduct pilot study to confirm reliability and validity of tool before data collection 8. To enumerate steps of data analysis and present data summary 9. To learn descriptive and co- relational statistics in data analysis. 10. Conduct group project and write report.		
Mapping of Programme Outcome (PO/PSO)	1. Students shall develop critical thinking and problem solving skills. 2. Undertake complex data analysis and visualizations problems.		
Prerequisites	This course requires that you are familiar with high-school level linear algebra, and calculus. Knowledge of probability theory, statistics is desirable		
Course Outcomes	• Understand concept of Research Methods for Performance Analysis.		

UnitNo	Contents	Total Hrs
1	**UNIT I – Introduction to Research** Meaning and Definition of Research – Need, Nature and Scope of research in the field of sports performance analysis. Classification of Research, Location of Research Problem, Criteria for selection of a problem, Qualities of a good researcher. **Mapping of COs:** 1. Describe the concept of research, terms, need and areas of research in the field of sports performance analysis. 2. Explain the steps of research process.	12
2	**UNIT II -- Methods of Research** Research Problem/Question, Identification of problem area. &Problem statement., Stating objectives of the research problem. Descriptive Methods of Research; Survey Study, Case study, Data: Primary Data and Secondary Data, Criticism: Internal Criticism and External Criticism. Philosophical research: meaning, steps, pitfalls and data synthesis. **Mapping of COs:** 1. Identify and state the research problem and objectives 2. Explain the descriptive methods of research.	12
3	**UNIT III – Research approaches and designs** Historical, survey and experimental, Qualitative and Quantitative designs Experimental Research – Meaning, Nature and Importance, Meaning of Variable, Types of Variables. Experimental Design - Single Group Design, Reverse Group Design, Repeated Measure Design, Static Group Comparison Design, Equated Group Design, Factorial Design. **Mapping of COs:** **1.** To describe the research approaches and designs.	12
4	**UNIT IV – Sampling** **Sampling and data collection** Definition of Population, Sample, Sampling criteria, factors influencing sampling process, types of sampling techniques, Data collection Methods: and instruments 1) Questionnaire, interview, records & reports and other techniques 2) Validity & Reliability of the instrument 3) Pilot Study **Research Proposal and Report-** Method of Writing Research proposal, Thesis / Dissertation **Mapping of COs:** **1.** To explain the sampling process **2.** To describe the methods of data collection **3.** To developing and standardizing an instrument	12
5	**UNIT V –** **Introduction to statistics:** Definition, use of statistics, scales of measurement • Frequency distribution and graphical presentation of data • Mean, Median, Mode, standard deviation • Normal probability and tests of significance • Coefficient of correlation • Inferential statistics and types • Statistical packages and its application **Analysis of Data**: Compilation, Tabulation • Classification, summarization, presentation, interpretation of data **Mapping of COs:** **1.** To explain the use of statistics, scales of measurement and graphical presentation of data **2.** To describe the measures of central tendency and variability and methods of correlation **3.** To analyze, interpret and summarize the research date	12

	Text Books: • Best J. W (1971) Research in Education, New Jersey; Prentice Hall, Inc • Clarke David. H & Clarke H, Harrison (1984) Research processes in Physical Education, New Jersey; Prentice Hall Inc. • Craig Williams and Chris Wragg (2006) Data Analysis and Research for Sport and Exercise Science, LondonlRoutledge Press • Jerry R Thomas & Jack K Nelson (2000) Research Methods in Physical Activities; Illonosis; Human Kinetics;	
	Reference Books: a) Best and Kahn, Research Methodology, PHI Limited. b) Kothari, C.R. Research Methodology (Methods and Techniques), New Age Publisher. c) Kerlinger, Foundation of Research. d) Fundamentals of modern statistical methods by Rand R.wilcox e) Power Analysis for Experimental research A Practical Guide for the Biological, Medical and social Sciences by R. Barker Bausell, Yi-Fang Li Cambridge University Press. f) Design of Experience: Statistical Principles of Research Design and Analysis, by Robert O. Kuehl Brooks/cole. g) Hogg.V. and Craig A.T.: Introduction of Mathematical Statistics.	

Course Code	**DSPA20108**	**Programme Code**	**DSPA2020**
Course Name	**Data analytical techniques used in performance analysis**		
Credits	**4**	**Course Type:** Core/Skill/Ability Enhancement/Generic	
Course Objectives (CO)	1. Advance tools for analyzing sports performance. 2. Video Capturing, editing methods as well as equipment required. 3. Video Analysis software's. 4. Gathering and Measurement of data. 5. Different analysis method for analyzing sports performance. 6. Presenting critical data for enhancing performance of athlete.		
Mapping of Programme Outcome (PO/PSO)	1. Understand data and its importance in sports performance. 2. Shall learn Video analysis. 3. Shall flexibly able to apply &evaluate advance tools and Techniques. 4. Develop Technical, tactical and match analysis. 5. Develop skill to learn opposition analysis. 6. Data presentation for high performance analysis.		
Prerequisites	Basic Computer Knowledge is important		
Course Outcomes	Student will develop skills of collection of data, analysis of data and presentation of data which is used high performance sports analysis in individual and Team sports.		

Unit No	**Contents**	**Total Hrs.**
1	**Technology used in sports performance analysis:** Historical overview, Video Based analysis tools. GPS, LPS based tools. Sports Tracking Equipment & Devices. Heart Rate Monitors.Sleep Trackers. Mapping of Cos: - To learn advance tool used in sport performance analysis.	12
2	**Video Analysis:** Capturing Video method. Editing & Trimming of Capture Videos. Equipment required.	12

	Mapping of COs:- 1. To learn video analysis. 2. Equipment required for video analysis	
3	**Data analytical tools and techniques:** Data. Gathering and Measuring of data. Creating database tools. Data used in Individual and Team games sports.	12
	Mapping of Cos:- 1. To learn importance of data. 2. To learn gathering and measuring of data.	
4	**Analyzing Performance:**Technical Analysis. Tactical Analysis. Match Analysis. Opposition Analysis.	12
	Mapping of COs: - 1. To learn Technical analysis. 2. To learn Tactical analysis. 3. To learn match analysis. 4. To learn oppositions analysis.	
5	**Presentation of Analysis:**Presenting Effective data for Coaches and Players. Statistical data presentation. Creating motivational Film for Individual or Team sports. Data Visualization.	12
	Mapping of COs:- 1. To learn presentation of data. 2. To learn visualization of data.	
	Text Books: • Advance application of information technology to sports performance. Hughes M, Frank I, Lieberman D.G., McClement J, Katz L. • Role of motion analysis in elite sports. Carlin,C.Bloomfield,J. Nelsen,L. • Advance technological development in sports performance. Lieberman D.G., McClement J, Katz L	
	Reference Books: The Efficiency and different ergonomics of different data entry system in real time and lapsed time computer notational system. Hughes M, James N, Murray S.	