University of Kerala

Discipline	**PHYSICS**				
Course Code	**UK1MDCPHY103**				
Course Title	**PHYSICS IN ARTS AND SPORTS**				
Type of Course	**MDC**				
Semester	**I**				
Academic Level	**100- 199**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 Hrs	-	-	3 Hrs
Pre-requisites					
Course Summary	Focusses on the physical principles behind arts and sports, with the purpose of enabling the student to develop and optimize ideas on arts/music/photography and sports				

BOOKS FOR STUDY:

1. Physics in the Arts P. U. P. A. Gilbert and W. Haeberli (Elsevier) Revised Edition
2. The Physics of Sports A Textbook by David R. Heskett
3. Concepts in physics by H C Verma

BOOKS FOR REFERENCE:

1. Phyllotaxis, anthotaxis and semataxis Acta Biotheoretica Vol 14, 1961, pages 1-28. (Fibonacci series)
2. https://www.mathnasium.com/blog/14-interesting-examples-of-the-golden-ratio-in-nature (Fibonacci series)
3. https://science.howstuffworks.com/engineering/architecture/brunelleschis-dome.htm

DETAILED SYLLABUS: THEORY

Module	Unit	Content	Hrs	CO No
I		**INTRODUCTION (Book 1 Chapter 1, 2, 4) (Ref 1 & 2)**	**9**	
	1	Electromagnetic Spectrum, Refraction and Total Internal Reflection in Diamonds, Polarization	2	1
	2	Geometry in Architecture, Developments from Brunelleschi to Leonardo	2	2
	3	Light and Shadow in Nature, Fibonacci Series, Golden Ratio and Symmetry in Nature.	4	
	4	Human Visual System	1	2
II		**PHYSICS OF PAINTING & PHOTOGRAPHY (Book 1 Chapter 6, 7, 8 & 9)**	**9**	
	5	Primary Colours, Colour Triangle, Colour Sensitivity of the Eye	3	1
	6	Colour: Saturation, Brightness in Painting and Photography. Additive Color Mixing in Painting, Subtractive Primary Colors	3	1
	7	Camera - Focusing the Camera	1	3
	8	Parameters Affecting Quality of Photos: Exposure Time, Aperture, Depth of Field, *f* Number, Rule of Third	2	3
III		**PHYSICS OF MUSIC (Book 1 Chapter 10, 11 & 13)**	**9**	
	9	Periodic Oscillations, Simple Harmonic Motion, Damped Oscillations (qualitative) and Resonance.	3	1
	10	Build-up and Decay of Musical Tones, Resonators in Musical Instruments	2	2
	11	Beats and Harmony, Principle of Superposition, Sound Perception: Pitch, Loudness and Timbre, Loudness and Amplitude, Loudness and Frequency	4	3

IV	**PHYSICS IN SPORTS – I (Book 2 Chapter 1, 2 & 3)**		9	
	12	Newton's Laws of Motion, Concept of Velocity, Momentum, Force, Action and Reaction, Conservation of Momentum and Energy, Torque	4	1
	13	Damping, Friction, Rotation, Circular Motion, Gravitation, Projectile, Range of Projectile	3	2
	14	Catches, Throws, Thrust, Pressure	2	2
V*	**PHYSICS IN SPORTS - II (Book 2 Chapter 8, 9 & 10)**		**9**	
	15	Science Behind Various Sports -Basketball, Football, Javelin, Discus, Cricket Batting, Kicking of Football, Badminton, Swimming	2	4
	16	Science Behind the Design of Bats - Table Tennis, Cricket, Tennis	1	4
	17	Cricket Bowling- Magnus Effect, Spin Motion, Reverse Swing	2	4
	18	Throw- Shot Put Throw, Discus Throw and Javelin Throw	1	4
	19	Athletics - Physics of Running, Long jump, High Jump & Gymnastics	3	4

COURSE OUTCOMES

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Discuss beauty and interconnectedness of the natural world and human understanding.	U, R	PSO-2,4
CO-2	Administer a solid foundation in the principles of light, color, for creative expression through photography and painting.	A, U, R	PSO-1, 2,4
CO-3	Explain the oscillatory phenomena and their relevance to	U, R	PSO-1, 2,4

	the production, transmission, and perception of sound.		
CO-4	Describe the application of physics principles to sports and athletics, enabling them to understand and enhance performance, design better equipment, and make informed decisions in coaching, training, and sports medicine.	U, R	PSO-1, 2,4

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: PHYSICS IN ARTS AND SPORTS

Credits: 3:0:0 (Lecture: Tutorial: Practical)

CO No.	**CO**	**PO / PSO**	**Cognitive Level**	**Knowledge Category**	**Lecture (L)/ Tutorial (T)**	**Practical (P)**
CO-1	Discuss beauty and interconnectedness of the natural world and human understanding.	PO-3,6/ PSO-2,4	U	F, C	L	-
CO-2	Administer a solid foundation in the principles of light, color, for creative expression through photography and painting.	PO-3,6/ PSO-1, 2,4	U	F, C	L	-
CO-3	Explain the oscillatory phenomena and their relevance to the production, transmission, and perception of sound.	PO-3,6/ PSO-1, 2,4	U, R	F, C	L	-
CO-4	Describe the application of physics	PO-3,6/ PSO-1,	U, R	F, C	L, T	-

	principles to sports and athletics, enabling them to understand and enhance performance, design better equipment, and make informed decisions in coaching, training, and sports medicine.	2,4				

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	-	1	-	3	-	-	-	-	-	1	-	-	1	-	-
CO-2	3	1	-	3	-	-	-	-	-	1	-	-	1	-	-
CO-3	3	1	-	3	-	-	-	-	-	2	-	-	1	-	-
CO-4	3	1	-	3	-	-	-	-	-	1	-	-	2	-	-

Correlation Levels:

Level	-	1	2	3
Correlation	Nil	Slightly / Low	Moderate / Medium	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics:

CO No	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO-1	-	-	-	✓
CO-2	-	-	-	✓
CO-3	✓	✓	-	✓
CO-4	✓	✓	-	-