University of Kerala

Discipline	**PHYSICS**				
Course Code	**UK2MDCPHY100**				
Course Title	**ARCHAEOPHYSICS**				
Type of Course	**MDC**				
Semester	**II**				
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	The course provides a comprehensive overview of archaeology's core elements and its relationship with physics. Students will gain insights into the nature of archaeological data and develop proficiency in various methods for analysing and interpreting this data. Furthermore, the course explores the principles governing digital tools in archaeology and their practical applications. By the end of the course, students will develop a comprehensive knowledge about archaeology, from its theoretical foundations to its real-world computational applications, facilitating a deeper appreciation of the discipline's interconnections to various other disciplines.				

BOOKS FOR STUDY:

1. Archaeology: Principles and methods K Rajan; Manoo Pathippakam (2002)
2. https://www.archaeological.org/pdfs/education/Arch101.2.pdf
3. Digital Geoarchaeology New Techniques for Interdisciplinary Human-Environmental Research; Christoph Siart, Markus Forbriger, Olaf Bubenzer (eds.); Springer (2018)

4. Modern Physics; R Murugeshan, Kiruthiga Sivaprasath, 17th Edition, S Chand & Company (2014)

BOOKS FOR REFERENCE:

1. Introducing Archaeology, Robert James Muckle and Stacey L. Camp; University of Toronto Press ,Third Edition (2021)
2. Archaeology in Practice (A Student Guide to Archaeological Analyses), Balme, Jane and Alistair Paterson ;John Wiley and Sons Inc.(2014)
3. Modern Physics, R.A. Serway, C. J. Moses, C. A. Moyer; 3rd edition, Thomson (2005)

DETAILED SYLLABUS: THEORY

Module	Unit	Content	Hrs	CO No
I		**Introduction to Archaeology (Book 1: Chapter1; Book 2; Book 3: Chapter 1)**	**9**	
	1	Archaeology: Definition and Scope; Goals of Archaeology; Archaeology and Physics	2	1
	2	Types of Archaeology	1	1
	3	The Process of Archaeology (Excavation, Data Collection and Recording, Laboratory and Conservation, Interpretation, Publication)	2	1
	4	Techniques and Tools (Excavation, Survey and Mapping)	2	1
	5	Introducing the Concept of Digital Geoarchaeology	2	1
II		**Basics of Radioactivity (Book 4, Chapter 27, 31)**	**9**	
	6	Introduction to the Nucleus	1	2
	7	Natural Radioactivity-Alpha, Beta and Gamma Rays-Properties of Alpha, Beta and Gamma Rays	2	2
	8	Soddy Fajan's Displacement Law- Natural Radioactive Series	1	2
	9	Law of Radioactive Disintegration-Half-Life	2	2
	10	Units of Radioactivity	1	2
	11	Radioactive Dating	2	2

III	**Radioactive Dating Techniques (Book 1: Chapter 13)**		**9**	
	12	Dating Methods in Archaeology, Dating System, Relative Dating and Absolute Dating Techniques	2	3
	13	Radiocarbon Dating-Principle, Sample, Collection of Sample, Limitations	3	3
	14	Thermo-Luminescence Dating	1	3
	15	Potassium-Argon Dating; Uranium Series Dating; Fission Track Dating	2	3
	16	Archaeomagnetism, Dendrochronology	1	3
IV	**Digital Archaeology (Book 3: Chapter 11, 14)**		**9**	
	17	LiDAR Basics	1	4
	18	LiDAR in Geo-Archaeology - Principles of Capturing 3D Geo-Data with LiDAR- Advantages and Drawbacks- Typical Workflow for LiDAR, Data Capturing and Processing	3	4
	19	Geophysical Methods	1	4
	20	Ground Penetrating Radar, Electromagnetic Induction Methods, Electrical Resistance Techniques, Magnetic Methods, Acoustic Procedures	4	4
V*	**Activities (Any five)**		9	
	21	Museum visits & reports	9	5
	22	Handling of artefacts		5
	23	Registration and documentation of artefacts		5
	24	Presentation and discussions by students		5
	25	Estimate the energy loss of different ions in water and carbon, using SRIM/TRIM etc simulation		5
	26	Simulation study (using SRIM/TRIM or any other software) of radiation depth in materials		5
	27	Comparison of interaction of H like ions in given medium (Carbon/Water) using simulation software (SRIM etc).		5

	28	Estimate the energy loss of different ions in water and carbon, using SRIM/TRIM etc simulation		
	29	Simulation study (using SRIM/TRIM or any other software) of radiation depth in materials		
	30	Comparison of interaction of H like ions in given medium (Carbon/Water) using simulation software (SRIM etc).		

COURSE OUTCOMES

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the basic concepts of Archaeology, the sources, the methodology and its relations with Physics	R,U	PSO-1,4
CO-2	Understand basics of radioactivity	R,U	PSO-1
CO-3	Understand and identify various methods of dating	U	PSO-1,2,4,7
CO-4	Understand the principles of digital tools for archaeology	U	PSO-2,4,7
CO-5	Understand about the Museums and the Artefacts and Utilize the computational tools to estimate energy loss of ions in different media.	U,Ap	PSO-2,4,7

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

Name of the Course: ARCHAEOPHYSICS

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

CO No.	CO	PO / PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
CO-1	Introduction to basic concepts of Archaeology, the sources, the methodology and its relations with Physics	PO 1/ PSO 1,4	R,U	F,C	L	-
CO-2	Understand basics of	PO 1/ PSO	R,U	F	L	-

	radioactivity	1				
CO-3	Understand and identify various methods of dating	PO 1,6/ PSO 1,2,4,7	U	F,C	L	-
CO-4	Understand the principles of digital tools for archaeology	PO 6/ PSO 2,4,7	U	C	L	-
CO-5	Understand about the Museums and the Artefacts. Familiarize with computational tools to estimate energy loss of ions in different media.	PO 1,2,3,4,6,8 / PSO 2,4,7	U, Ap	F,P	-	P

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	-	-	2	-	-	-	1	-	-	-		-		-
CO-2	1	-	-	-	-		-	1	-	-	-		-		-
CO-3	1	2	-	1	-	-	2	1	-	-	-		2		-
CO-4	-	1	-	1	-	-	1	-	-	-	-		1		-
CO-5	-	2	-	2	-	-	2	1	2	1	1		3		1

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	✓	-	-	✓
CO-5	✓	✓	-	-