

	MAHATMA GANDHI UNIVERSITY Kottayam, Kerala Undergraduate Programmes (HONOURS) 2024 Admission Onwards
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SYLLABUS												
SIGNATURE COURSE												
Name of the College	UC College, Aluva											
Faculty/ Discipline	Physics											
Programme	BSc (Hons) Physics											
Course Coordinator	Reshmi R											
Contributors												
Course Name	Applied Electronics & Optical Technologies											
Type of Course	SEC											
Specialization title	This Signature Course does not have a specialization.											
Course Code	MG6SECPHYA00											
Course Level	300											
Course Summary	This Skill Enhancement Course introduces physics majors to practical applications of physics through advanced optics, household electrical systems, and the Internet of Things (IoT). The course emphasizes experiential learning through laboratory experiments, and problem-based activities that integrate theoretical physics concepts with modern technological applications. Students will develop hands-on skills in experimental design, instrumentation, measurement techniques, safety practices, and digital monitoring systems.											
Semester	6	Credits	3									
Course Details	<table><tr><td>Learning Approach</td><td>Lecture</td><td>Practical/Lab-P</td><td>Total Hours</td></tr><tr><td>Credits</td><td>2</td><td>1</td><td>60</td></tr></table>				Learning Approach	Lecture	Practical/Lab-P	Total Hours	Credits	2	1	60
	Learning Approach	Lecture	Practical/Lab-P	Total Hours								
Credits	2	1	60									
Pre-requisites, if any	Basic knowledge of general physics, electricity and magnetism, optics, and elementary electronics. Familiarity with laboratory measurements and use of simple instruments such as multimeters is desirable but not mandatory.											

Course Outcomes (CO)

Number of COs		4	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain laser and fiber optic principles with practical applications	U, An	PO1, PO2, PO3, PO6, PO8, PO9, PO10
2	Understand domestic wiring systems and electrical safety with practical applications	U, An	PO1, PO2, PO3, PO5, PO6, PO9, PO10
3	Interface sensors and build IoT-based physics experiments	An	PO1, PO2, PO3, PO5, PO6, PO9, PO10
4	Simple demonstration of design for practical applications in household wiring	A	PO1, PO2, PO3, PO5, PO6, PO9, PO10

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	3	2	-	-	1	-	1	2	1
CO 2	3	3	3	-	1	1	-	-	2	3
CO 3	3	3	3	-	1	2	-	-	2	3
CO 4	3	3	3	-	1	2	-	-	2	3

'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).

Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1	Advanced Optics: Lasers & Fiber Optics			
	1.1	Laser fundamentals, stimulated emission, population inversion, laser properties.	5	["1"]
	1.2	Practical Alignment and safe handling of laser sources. Laser diffraction/interference experiment, Beam divergence measurement, Laser intensity vs distance experiment.	6	["1"]
	1.3	Introduction to optical fiber, TIR, fiber optics structure, numerical aperture.	5	["1"]
	1.4	Practical Numerical aperture determination, Beam divergence measurement, Fiber optic communication demonstration.	5	["1"]
2	Household Electrical Systems, Safety and Energy Use			
	2.1	Basics of AC supply, electrical power, Electrical accessories: switches, plugs, sockets, holders. Household wiring systems.	6	["2"]
	2.2	Practical Outline the basic requirements for electrical wiring in residential building (Demo)	4	["4"]
	2.3	Electrical Energy definition-basic and commercial units. Energy efficiency.	4	["2"]
	2.4	Practical Calculation of monthly electricity bill, LED vs incandescent efficiency comparison.	3	["2"]
	2.5	Safety devices: fuse, MCB, ELCB, earthing. Electrical hazards and safety precautions	5	["2"]
	2.6	Practical Demonstration of safety devices.	2	["4"]

Module	Units	Course Description	Hrs	CO No.
3	Introduction to IoT			
	3.1	IoT architecture, sensors, microcontrollers, Arduino basics, cloud data platforms.	5	["3"]
	3.2	Practical Arduino familiarization, LED control, Temperature monitoring experiment.	5	["3"]
	3.3	Practical LDR light intensity experiment, Ultrasonic distance measurement, Demo or Simulation of Smart Environmental Physics Monitoring System.(demo)	5	["3"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Leverage a blended learning approach with a mix of lectures and practical sessions.
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Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Both
	A. Continuous Comprehensive Assessment (CCA) • Theory - 15 Marks Quiz Assignments Seminar Tutorial work, MCQ exams • Practical - 15 Marks Skill assessment :Demonstration/designing/viva
	B. End Semester Evaluation (ESE) • Theory - 35 Marks Assessment Methods - Theory Exam Duration of Examination - 1.50 Hrs Pattern of examination for Theory - MCQ Different parts of written examination - Part - A Answer Type: ◦ PART - A ◦ MCQ - (35 out of 35) - $35 \times 1 = 35$ • Practical - 35 Marks Assessment Methods - Lab exam and Record Duration of Examination - 2.00 Hrs

References

- Brijlal and Subhramaniam - A text book of Optics B.L. Theraja & A.K. Theraja - A Textbook of Electrical Technology
- Arshdeep Bahga - Internet of Things: A Hands-On Approach Arduino Official Documentation

Suggested Readings

- Optical Fiber Communication - Gerd Keiser Theraja B.L. - Electrical Technology S.O. Kasap - Optoelectronics and Photonics
- V.K. Mehta Basic Electrical Engineering Simon Monk Practical Arduino Projects

Affidavit

- We, UC College, Aluva and Reshmi R, agree to permit the use of our proposed course syllabus by other faculty members within the same discipline for course delivery at their respective institutions.
- We, UC College, Aluva, agree to appoint a new course coordinator for the proposed Applied Electronics & Optical

Technologies in the event of the unavailability of the currently nominated coordinator. This appointment will ensure the continued coordination of course delivery, assessments, and all related academic responsibilities necessary for the successful implementation of the signature course, for as long as the college offers this programme.

- We, UC College, Aluva and Reshmi R, declare that no part of this signature course submitted here for approval has been taken from the course content developed by, or from any of the course titles prepared by, the BoS/expert committee in the same discipline under our University.



MGU-UGP (HONOURS)

Syllabus