THE MAHATMA GANDHI UNIVERSITY

UNDERGRADUATE PROGRAMMES (HONOURS)

SYLLABUS

MGU-UGP (Honours)

(2024 Admission Onwards)

Faculty: Technology and Applied Sciences

Expert Committee: Electronics

Subject: Mobile Systems

Mahatma Gandhi University
Priyadarshini Hills
Kottayam – 686560, Kerala, India

Syllabus Index

Name of the Minor: **Mobile Systems**

Semester 1

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG1DSCMOS100	PC Hardware and Smartphone Troubleshooting	DSC B	4	5	3		2	

Semester: 2

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG2DSCMOS100	Foundations of Mobile development systems	DSC B	4	5	3		2	

MGU UGP (HONOURS)
Syllabus

Semester: 3

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG3DSCMOS200	IoT for Electronics	DSC B	4	5	3		2	

Semester: 4

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG4DSCMOS200	Wireless Communication Technology	DSC C	4	5	3		2	

MGU-UGP (HONOURS)
Syllabus

Mahatma Gandhi University Kottayam

Programme						
Course Name	PC Hardware and Smartphone Troubleshooting					
Type of Course	**DSC B**					
Course Code	MG1DSCMOS100					
Course Level	**100-199**					
Course Summary and Justification	This course is designed to equip participants with the knowledge and skills necessary for effectively troubleshooting common issues encountered in both personal computers (PCs) and smartphones.					
Semester	1	**Credits**			4	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		1		75
Pre-requisites						

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domains *	PO No:
1	Demonstrate of the internal components and architecture of a personal computer	U	1,2
2	Develop strong fault diagnostic skills with hands-on training, spending 15 hours on practical problem-solving scenarios	A	1,2
3	Acquire practical skills in identifying and resolving hardware and software issues in a PC	A	1,2,10
4	Develop introductory skills in troubleshooting common issues with smartphones through 15 hours of dedicated hands-on practice.	C	1,2,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Unit	Course description	Hours	CO No:
1	1.1	PC - Functional block diagram, Inside a PC Box	3	1
	1.2	Motherboard components - slot, socket, expansion slots, front and back panel connectors, jumper settings	4	1
	1.3	Identification of voltage regulators, BIOS ROM,CMOS battery, Identification of RAM type	4	1

	1.4	SMPS and its wiring color code, Testing of SMPS, UPS - Online UPS and offline UPS	4	1
2	2.1	Introduction to troubleshooting methodologies, flow chart	3	2
	2.2	Common problems in SMPS, Testing of SMPS voltage levels with multimeter	4	2
	2.3	Visual inspection of PCB, Loose connections, dry solder joints, memory slot problems	4	2
	2.4	BIOS setup, boot loader and OS loading problems, Power on self-test (POST) and its functions, POST Indications - visual and audio indications	4	2
3	3.1	Smart phone – typical functional diagram, Identification of smart phone motherboard parts	3	2
	3.2	CPU, GPU, RF Section identification, Battery and power management section, LCD touch driver unit	4	3
	3.3	Smart phone sensors – proximity sensor, acetometer and gyroscope, temperature sensor, compass and GPS	4	2
	3.4	Boot mode configuration for smartphone , Factory restore settings	4	2
	4.1	Tools & equipment used for repairing – micro screw driver set, smd tweezer, multimeter, power supply unit	5	4
	4.2	Safety precautions in smartphone servicing, ESD protection, Introduction to SMD rework station	6	4
	4.3	Diagnosing and fixing common hardware problems (e.g., battery issues, display problems, charging port failures), cleaning of water immersed phones	7	4
	4.4	Replacement of damaged components (e.g., screen, battery, speaker camera module , USB ports)	12	4
5		Teacher Specific Content		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Leverage a blended learning approach with a mix of lectures, interactive discussions, and hands-on lab sessions
Assessment Types	**MODE OF ASSESSMENT (Internal Evaluation)** **A. Continuous Comprehensive Assessment (CCA)** **1. Theory: - 25 Marks** Internal Test – One MCQ based and one extended answer type Seminar Presentation – a real time application of emerging technology to be identified and present it as seminar **2. Practical: 15 Marks** Components for assessment (suggestions): A combination of quizzes, assignments, Performance, Case Study.
	B. End Semester Examination 1. Written Test (50 marks)- 1 Hour 30 Minutes (Duration of Examination) a. MCQ - 10 Marks (Answer all - 10x1=10 Marks)

	b. Short answer questions (4 out of 6 questions)-4x5=20 marks c. Essay questions -2 out of 4 - 2x10=20 marks 2. Practical Exam (35 marks) – 2 Hour (Duration of Examination) a. Viva b. Lab report c. Demonstration

References

1. Mueller, Scott. Upgrading and repairing PCs. Que Publishing, 2004.
2. O'Grady, Jason D. The Droid Pocket Guide. Peachpit Press, 2010.

Suggested Readings

1. Andrews, Jean. A+ Guide to IT Technical Support-Hardware and Software. Course Technology Press, 2016.
2. Norton, Peter, and Scott H. Clark. Peter Norton's new inside the PC. Sams Publishing, 2002.
3. Ceruzzi, Paul E. Computing: a concise history. MIT press, 2012.
4. Thompson, Robert Bruce, and Barbara Fritchman Thompson. PC hardware in a nutshell: a desktop quick reference. "O'Reilly Media, Inc.", 2003.
5. Smartphone Troubleshooting and Repair" by Victor Emeka
6. The Complete Guide to Smartphone Repair" by Jason D. O'Grad

MGU-UGP (HONOURS)

Syllabus

Mahatma Gandhi University
Kottayam

Programme						
Course Name	Foundations of Mobile development systems					
Type of Course	**DSC B**					
Course Code	MG2DSCMOS100					
Course Level	**100-199**					
Course Summary and Justification	This course equips learners with essential skills in DART, Flutter, and data storage, fostering critical thinking, problem-solving and effective communication in the rapidly evolving field of mobile app development					
Semester	2	**Credits**			4	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Workshop from expert**	**Practical**	**Others**	
		3		1		75
Pre-requisites						

COURSE OUTCOMES (CO)

CO No:	Expected Course Outcome	Learning Domain*	PO No:
1	Demonstrate DART Programming Language	U	1,2
2	Illustrate the knowledge of Different Mobile Applications	U	1,2
3	Utilize Flutter architecture and data storage	A	1,2
4	Develop Mobile App using Flutter	C	1,2,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Unit	Course description	Hours	CO No:
1	1.1	Data types-Numbers, Strings, orleans, Lists, Maps, Sets, Runes, Null, Comments	3	1
	1.2	Operators - Arithmetic, Increment and Decrement, Assignment and Logical operators	3	1
	1.3	Control-flow statements - Conditions, Switch case, Loops, Break and continue, Ternary operator Functions, Exception handling, Collections - List, Map, Set	4	1

	1.4	Object oriented programming (OOP) - Classes, Objects, Encapsulation, Inheritance, Polymorphism, and Abstraction	5	1
2	2.1	Basics of visual studio code or android studio - Installation and setup	3	2
	2.2	Flutter concepts-Project creation, project folder ideas, Assets and font implementation, Package implementation ,Android and iOS folder ideas, Flutter app running and apk building methods	4	2
	2.3	Class concepts - Stateless and stateful widgets,Material and Cupertino widgets,User interface (UI) Designs,Version control systems - Git ,Github, gitlab, gitkraken	5	2
	2.4	Flutter storage - SqL Lite, Shared preference, State management – setstate	3	2
3	3.1	Overview of data storage options	3	3
	3.2	Firebase-Authentication, real time Storage, Firestore	4	3
	3.3	Restful APIs-Post ,get, put, delete, update methods	4	3
	3.4	Flutter architecture	4	3
4	4.1 4.2 4.3 4.4	Practical (any 2) Screen designs API call Firebase authentication/ data storage and retrieval Connections Build a simple Flutter application using simple widgets and layouts	30	4
5		Teacher Specific Content		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Utilize a combination of lectures and hands-on training to facilitate a comprehensive learning experience.
Assessment Types	**MODE OF ASSESSMENT (Internal)** **A. Continuous Comprehensive Assessment (CCA)** **1. Theory: - 25 Marks** Internal Test – One MCQ based and one extended answer type Seminar Presentation – a real time application of emerging technology to be identified and present it as seminar **2. Practical: 15 Marks** Components for assessment (suggestions): A combination of quizzes, assignments, Performance, Case Study.
	A. End Semester Examination 1. Written Test (50 marks)- 1 Hour 30 Minutes (Duration of Examination) a. MCQ - 10 Marks (Answer all - 10x1=10 Marks) b. Short answer questions (4 out of 6 questions)-4x5=20 marks c. Essay questions -2 out of 4 - 2x10=20 marks

	2. Practical Exam (35 marks) – 2 Hour (Duration of Examination) a. Viva b. Lab report c. Demonstration

References

1. Michael Katz, Kevin David Moore, Vincent Ngo & Vincenzo Guzzi Flutter Apprentice Second edition
2. Zammetti, Frank. Practical Flutter. Berkeley, CA: Ap

Suggested readings

1. Chopra, Deepti, and Roopal Khurana. Flutter and Dart: Up and Running: Build native apps for both iOS and Android using a single codebase (English Edition). BPB Publications, 2023.

MGU-UGP (HONOURS)

Syllabus

Mahatma Gandhi University Kottayam

Programme						
Course Name	IoT for Electronics					
Type of Course	DSC B					
Course Code	MG3DSCMOS200					
Course Level	**200-299**					
Course Summary and Justification	This course provides learners with a solid foundation in IoT, specifically focusing on ESP32. Through hands-on experience, learners will understand, apply, and analyze IoT concepts, creating prototypes and enhancing their programming skills.					
Semester	3	**Credits**			4	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		**1**		**75**
Pre-requisites						

COURSE OUTCOME(CO)

CO No:	Expected Course Outcome	Learning Domain*	PO No:
1	Illustrate basics of IoT, ESP32 and programing concepts	U	1,2
2	Develop the knowledge in I/O devices and their Interfacing Techniques	C	1,2
3	Analysis of IoT system Interaction and creation of IoT prototypes with ESP32	An	1,2
4	Build up skill enhancement using IoT programing	C	1,2,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Unit	Course description	Hours	CO No.
1	1.1	Overview of Internet of Things (IoT) and its key components, Basic IoT block diagram, Characteristics of IoT devices	3	1
	1.2	Relevance of IoT in Modern society, Challenges and problems faced with IoT	3	1
	1.3	Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications	4	1
	1.4	Overview of Governance, Privacy and Security Issues	5	1
2	2.1	IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols	4	2
	2.2	IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design Principles	4	2

	2.3	IoT Devices and deployment models- IoTivity : An Open source IoT stack , Overview- IoTivity stack architecture- Resource model and Abstraction	4	2
	2.4	Introduction to Web of Things, Web of Things versus Internet of Things, IoT Applications in industry	3	2
3	3.1	Understanding the Arduino Programming Language for ESP32, GPIO Pins and Digital Input/ Output examples with LED.	3	3
	3.2	Serial communication -UART, serial print, serial Read with examples, Analog read and Analog write	4	3
	3.3	Sensors - Temperature sensor (DHT11), LDR Sensor, PIR sensor, rain sensor, Gas sensors , Ultrasonic sensor	3	3
	3.4	Output devices - Buzzer, LCD, Actuators - Relays, DC Gear motor, servo motors and Solenoids	5	3
4		**Programming skill Development (*Any 4*)** 1. Read a button state with digital input using the ESP32 Arduino 2. Dim an LED with PWM using the ESP32 Arduino 3. Control a traffic light using ESP32 4. Basic Burglar alarm security system with the help of PIR sensor and buzzer. 5. Temperature sensor (DHT11) interfacing 6. Bluetooth Interfacing 7. Motor driver Interfacing 8. Create a simple web server in the ESP32 9. Use ESP32 with ultrasonic sensor HC-SR04 to control servo motor 10. Control LED matrix sign board via web interfacing using ESP32	30	4
5		Teacher specific content		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Leverage a blended learning approach with a mix of lectures, interactive discussions, and hands-on lab sessions
Assessment Types	**MODE OF ASSESSMENT (Internal Evaluation)** **A. Continuous Comprehensive Assessment (CCA)** **1. Theory: - 25 Marks** Internal Test – One MCQ based and one extended answer type Seminar Presentation – a real time application of emerging technology to be identified and present it as seminar **2. Practical: 15 Marks** Components for assessment (suggestions): A combination of quizzes, assignments , Performance ,Case Study.

	B. Semester End examination 1.Written Test (50 marks)- 1 Hour 30 minutes(Duration of Examination) a. MCQ - 10 Marks (Answer all - 10x1=10 Marks) b. Short answer questions (4 out of 6 questions)-4x5=20 marks c. Essay questions -2 out of 4 - 2x10=20 marks 2. Practical Exam (35 marks)- 2 Hour (Duration of Examination) a. Viva b. Lab report c. Demonstration

References

1. Hakima Chaouchi, ― The Internet of Things Connecting Objects to the Web, Wiley Publications
2. Jose, Jeeva. Internet of things. Khanna Publishing House, 2018.
3. Jain, Satish, Shashi Singh, and M. Geetha. BPB COMPUTER COURSE-WIN 10/OFFICE 2016. BPB Publications, 2018.

Suggested Readings

1. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.
2. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
3. Bahga, Arshdeep, and Vijay Madisetti. Internet of Things: A hands-on approach. Vpt, 2014.
4. Internet of Things- Shriram K Vasudevan, Abhishek Nagarajan, RMD Sundaram, Wiley India
5. IoT and its Applications- Prof. Satish Jain, Shashi Singh, BPB publications
6. Erwin Ouyang, Hands-On IoT: Wi-Fi and Embedded Web Development, Developing with ESP32, Arduino, C/C++, HTML, CSS, and JavaScript by Examples
7. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRCPress, 2012.
8. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.
9. David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, Cambridge University Press, 2010.
10. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012.

Mahatma Gandhi University Kottayam

Programme						
Course Name	Wireless Communication Technology					
Type of Course	DSC C					
Course Code	MG4DSCMOS200					
Course Level	200-299					
Course Summary and Justification	This course introduces learners to wireless communication principles, provides hands-on experience with RF systems, and culminates in a project to apply acquired knowledge. The course aims to foster critical thinking, problem-solving skills, and creativity, preparing learners for advanced studies in modern RF system design..					
Semester	4	**Credits**			4	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		1		75
Pre-requisites	Foundational knowledge in electronics					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains*	PO No.
1	Explain the Concept of Wireless Communication	U	1,2
2	Illustrate knowledge in RF Systems and Communication Standards	U	1,2
3	Analyze and Implement Software Defined Radio (SDR)	An	1,2,10
4	Discuss the Integration of Theory and Practical Application	C	1,2,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Unit	Course description	Hours	CO No.
1	1.1	Fundamentals of wireless communication. Wireless communication spectrum, Signals and Systems	3	1
	1.2	Introduction to modulation, Needs for modulation	4	1
	1.3	Block level study of AM, FM	4	1
	1.4	Digital Modulation ASK, FSK and PSK	4	1
2	2.1	Basic Building Blocks of Communication Systems.	5	2
	2.2	Concept of multiple access : CDMA (Detail study not required)	4	2
	2.3	A Qualitative Study on Wireless Communication Standards and Technologies-Bluetooth, Wi-Fi, GPS	2	2
	2.4	Block level study of Cellular Networks (2 G architecture)	4	2

MGU-UGP (HONOURS) Syllabus

3	3.1	**Theoretical aspects of SDR**-Introduction to SDR, Need for Software-Defined Radio (SDR), Components and Architecture of SDR.	4	3
	3.2	SDR Hardware Platform, Applications and recent developments in SDR	4	3
	3.3	Introduction to HAM (Amateur Radio) -Introduction to GNU Radio	3	3
	3.4	Connecting Hardware with GNU Radio, An Overview about GNU software.	4	3
4		**Practicals (**Any 3) 1. Bluetooth (HC-05) interfacing with Arduino/ESP32 2. WiFi (ESP8266) interfacing with Arduino/ESP32 3. NFC (PN532) based card reader using Arduino/ESP32 4. GPS (NEO 6M GPS) based position tracking implemented using Arduino/ESP32 5. 5.4G (A7672S) network access using Arduino/ESP32	30	4
5		Teacher specific content		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Leverage a blended learning approach with a mix of lectures, interactive discussions, and hands-on lab sessions
Assessment Types	**MODE OF ASSESSMENT (Internal)** **A. Continuous Comprehensive Assessment (CCA)** Theory: - 25 Marks 1. Internal Test – One MCQ based and one extended answer type- 15 Marks 2. Seminar Presentation – a real time application of emerging technology to be identified and present it as seminar - 10 Marks Practical : 8 Marks 1.lab: A combination of quizzes, assignments - 2 Marks 2.Performance - 3 Marks Case Study - 3 Marks
	B. Semester End examination 1.Written Test (50 marks) a. MCQ - 10 Marks b. Short answer questions (4 out of 6 questions)-4x5=20 marks c. Essay questions -2 out of 4 - 2x10=20 marks 2. Practical Exam (17 marks) (Internal) a. Viva - 9 marks b. Lab report - 3 marks c. Demonstration - 5 marks

References

1. J. G. Proakis and M. Salehi, "Communication Systems Engineering," Pearson, 2013.
2. T. S. Rappaport, "Wireless Communications: Principles and Practice," Prentice Hall, 2001.

Suggested Reading

1. D. M. Pozar, "Microwave Engineering," Wiley, 2012.
2. R. E. Collin, "Foundations for Microwave Engineering," McGraw-Hill Education, 2001.

3. A. Molisch, "Wireless Communications," Wiley, 2011.
4. A. S. Huang and L. Rudolph, "Bluetooth Essentials for Programmers," Cambridge University Press, 2007.
5. R. Heydon, "Bluetooth Low Energy: The Developer's Handbook," Prentice Hall, 2012.
6. F. Ohrtman, "Wi-Fi Handbook: Building 802.11b Wireless Networks," McGraw-Hill, 2000.
7. S. S. Miller, "Wi-Fi Security," McGraw-Hill, 2003.
8. S. Farahani, "ZigBee Wireless Networks and Transceivers," Newnes, 2008.
9. Zigbee Alliance, "ZigBee-2007 Specification."
10. V. Coskun, K. Ok, B. Ozdenizci, "Near Field Communication (NFC): From Theory to Practice," Wiley, 2012.
11. E. D. Kaplan and C. Hegarty, "Understanding GPS: Principles and Applications," Artech House, 2006.
12. P. Misra and P. Enge, "Global Positioning System: Signals, Measurements, and Performance," Ganga-Jamuna Press, 2006.
13. W. Stallings, "Wireless Communications and Networks," Prentice Hall, 2004.
14. L. Korowajczuk, "LTE, WiMAX and WLAN Network Design, Optimization and
15. Performance Analysis," Wiley, 2011

MGU-UGP (HONOURS)

Syllabus