DEPARTMENT OF TECHNOLGY EDUCATION,IER
UNIVERSITY OF THE PUNJAB, LAHORE-PAKISTAN
Course Outline

Programme	BS Technology Education	**Course Code**	**BSTE314**	**Credit Hours**	3
Course Title	Internet of Things (IoT) Software Development				

Course Introduction

This course provides a basic introduction to the principles and practices of software development for the Internet of Things (IoT). Students will learn about IoT architecture, programming, communication protocols, and data management. The course includes hands-on experience in developing simple IoT applications.

Learning Outcomes

On the completion of the course, the students will:

1. Understand the basic concepts and architecture of IoT.
2. Develop software for IoT devices using appropriate programming languages.
3. Implement basic communication protocols for IoT.
4. Collect, manage, and analyze data from IoT devices.
5. Integrate IoT devices with simple cloud services.
6. Develop, test, and deploy basic IoT software solutions.

Course Content		**Assignments/Readings**
Week 1	**Introduction to IoT** **Unit 1.1**: Overview of IoT	Reflective essay on the impact of IoT on daily life
	Unit 1.2: IoT Architecture and Components	
Week 2	**IoT Development Platforms** **Unit 2.1**: Introduction to IoT Development Platforms	Compare different IoT development platforms (e.g., Arduino, Raspberry Pi)
	Unit 2.2: Setting Up Development Environment	
Week 3	**Programming for IoT** **Unit 3.1**: Basics of Embedded Programming	Write a simple program to read sensor data on an IoT device
	Unit 3.2: Programming Languages for IoT	
Week 4	**Communication Protocols** **Unit 4.1**: Overview of IoT Communication Protocols	Research and present on various IoT communication protocols (e.g., MQTT,

	Unit 4.2: Implementing Communication Protocols	CoAP)
Week 5	**Data Management in IoT** **Unit 5.1**: Data Collection and Storage	Collect and store data from IoT sensors in a local database
	Unit 5.2: Data Processing and Analysis	
Week 6	**IoT and Cloud Integration** **Unit 6.1**: Introduction to Cloud Services for IoT	Research and present on popular cloud services for IoT (e.g., AWS IoT, Azure IoT Hub)
	Unit 6.2: Connecting IoT Devices to the Cloud	
Week 7	**Security in IoT** **Unit 7.1**: Security Challenges in IoT	Write a report on common security challenges in IoT
	Unit 7.2: Implementing Basic Security Measures	
Week 8	**IoT Application Development** **Unit 8.1**: Developing Simple IoT Applications	Develop a simple IoT application that uses sensor data
	Unit 8.2: Testing and Debugging IoT Applications	
Week 9	**Real-Time Operating Systems (RTOS) for IoT** **Unit 9.1**: Introduction to RTOS	Research and present on the benefits of using RTOS in IoT devices
	Unit 9.2: Implementing Basic RTOS Applications	
Week 10	**Edge Computing in IoT** **Unit 10.1**: Introduction to Edge Computing	Research and present on the role of edge computing in IoT
	Unit 10.2: Developing Basic Edge Computing Solutions	
Week 11	**IoT Protocols and Standards** **Unit 11.1**: Overview of IoT Protocols and Standards	Research and present on IoT protocols and standards (e.g., Zigbee, Z-Wave)
	Unit 11.2: Implementing Basic IoT Protocols	
Week 12	**Advanced Topics in IoT Software Development** **Unit 12.1**: Introduction to Machine Learning for IoT	Research and present on the use of machine learning in IoT
	Unit 12.2: Developing Basic Machine Learning Models for IoT	
Week 13	**Case Studies in IoT** **Unit 13.1**: Analysis of Successful IoT Projects	Analyze a case study of a successful IoT project
	Unit 13.2: Lessons Learned from IoT Projects	

Week 14	**Prototyping and Testing IoT Solutions** **Unit 14.1**: IoT Prototyping Techniques	Develop a prototype for an IoT application
	Unit 14.2: Testing and Debugging IoT Solutions	
Week 15	**Final Project Development** **Unit 15.1**: Project Planning and Design	Develop a comprehensive project proposal for an IoT application
	Unit 15.2: Project Implementation	
Week 16	**Course Review and Final Assessment** **Unit 16.1**: Review of Key Concepts and Themes	Group presentation summarizing key learnings from the course
	Unit 16.2: Comprehensive Final Exam	

Textbooks and Reading Material

1. Textbooks.

- Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry by Maciej Kranz

2. Suggested Readings

- Programming the Internet of Things: An Introduction to Building Integrated, Device-to-Cloud IoT Solutions by Andy King

Teaching Learning Strategies

1. **Lectures:** To introduce and explain key concepts and theories.
2. **Hands-on Labs:** To provide practical experience with robotics components and programming.
3. **Assignments and Projects:** To reinforce learning and encourage application of concepts in real-world scenarios.

Assessment

Sr. No.	Elements	Weight age	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.

3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.