Project-based learning for Computer Networks course – Handbook

The course under research is the introductory-level subject of Computer Networks and Distributed Systems. It has been designed to be taken in the senior year of the college. It requires students to be equipped with basic knowledge of Data Structures and Algorithm, and Probability and Statistics.

The material covered are foundational topics such network architectures (ISO/OSI, TCP/IP, ATM), communication hardware (transmission media, network adaptors, switches), encoding, framing, error detection and correction, reliable transmission, data link control and LAN technology, internetworking, routing/congestion control, network design/management [1].

Under our research, A hands-on course project had been introduced. It required students to practically work on the developing a protocol for a smart lock utilizing the conceptual knowledge introduced during the lectures.

The project was partially guided and is divided into five sections. Each checkpoint corresponds to these five sections. It provides students with the requirement and rubrics.

The in-depth mapping of the course content to the project and the required assignments are provided in a tabular format in the course syllabus under the heading "*Tentative Course Outline and Schedule*"

Project timeline to the checkpoint mapping:

Week	Project Activity	Checkpoint
1	Set up testbed	1
2		
3	Develop HTTP server	2
4		
5	Explore IoT protocols	3
6		
7		
8	Smart-Lock System Design	4
9		
10		
11	Implementation & final presentation	5-1
12		
13		

This repository contains the following:
1. Course Syllabus
2. Course project description document
3. Presentation on Smart Lock market, design, and expectation
4. The five checkpoints.
   a. **Check point 1:** Introduction to virtual machine, XAMPP server, and wireshark.
      Aim: To get students to exchange data between multiple machines and capture it.
   b. **Check point 2:** Introduction to HTTP server.
      Aim: To understand the http request-response cycle and its use case.
   c. **Check point 3:** Introduction to IoT protocols {MQTT, CoAP, WebSocket}.
      Aim: To learn IoT protocols.
      To compare the functions and performance from one another.
   d. **Check point 4:** System Design for a smart lock.
      Aim: Knowledge from the subsequent checkpoints and course inputs to be
      utilized to design an efficient system that houses the protocol for a smart lock.
   e. **Checkpoint 5-1:** Presentation
      Aim: Video presentation of the smart lock implemented during the course.

[1] "Computer & Information Science (CIS)." *Computer & Information Science (CIS) University of Michigan-Dearborn*, http://catalog.umd.umich.edu/undergraduate/coursesaz/cis/.