Overall Schedule - Laboratory

Week	Laboratory Presentation	Laboratory Evaluation
1	Lab Resources Assignment 1 presentation Laboratory work 1.1: 3 – tier REST services	
2	Laboratory work 1.2: Micro-services Development	
3	Laboratory work 1.3: React App Development	
4	Q&A	
5	Assignment 2 presentation Laboratory work 2.1: Indirect Communication Using Queues	Assignment 1 – full application
6	Laboratory work 2.2: Indirect Communication Using Topics	
7		
8	Q&A	
9	Assignment 3 presentation Laboratory work: Web Sockets and Security	Assignment 2 – full application
10		
11	Q&A	
12		Assignment 3 – full application
13		Late assignment evaluation
14		Late assignment evaluation

Detailed Description - Laboratory and Project

Lab Resources

Key Technical Skills	Setup Software Stack Version Control (Git and Gitlab) CI/CD Tutorial Deployment on cloud (any cloud provider account is accepted) for 1 bonus point at the exam

Assignment 1 – tier REST services and React App

Basic DS Concepts	Client - Server Architecture Request-Reply Communication Paradigm HTTP Protocol and Methods HTTP state management mechanisms URI-based resource access (REST Services)
Key Technical Skills	HTTP state management mechanisms on Client Side (Session storage, Cookies) Authorization and Authentication Process (Roles) Custom Queries for fast DB access (eager vs lazy load) Deployment of web application in Tomcat Server and Node server
Conceptual Architecture	Client application - 3-tier REST Server-side services
Technologies	React (Angular) + Spring REST Hibernate + Mysql/PostgreSQL
Useful Links	https://biblioteca.utcluj.ro/files/carti-online-cu-coperta/329-5.pdf

Assignment 2 - Indirect Communication Using Queues and Web sockets.

Basic DS Concepts	Message Oriented Middleware
Key Technical Skills	Using Queues as Message Buffers for Client-Server communication Using Web Sockets for Asynchronous Client-Server Communication Deployment of client, server and middleware applications
Conceptual Architecture	Queue-based Message Oriented Middleware Bi-directional, full-duplex, real-time client/server communications
Technologies	RabbitMQ JSR 356 or the Java API for WebSocket
Useful Links	https://www.baeldung.com/java-websockets https://biblioteca.utcluj.ro/files/carti-online-cu-coperta/329-5.pdf

Assignment 3 – Web sockets and security

Basic DS Concepts	Web sockets and security
Key Technical Skills	Securing Communication using SSL Converting server side to REST services Web sockets-based communication Spring security Deployment of server and client applications as individual executables
Conceptual Architecture	Authentication and authorization component integration, chat microservice with WebSocket communication
Technologies	Web sockets and security
Useful Links	https://spring.io/projects/spring-security https://spring.io/guides/gs/messaging-stomp-websocket/