SYLLABUS FOR BOARD OF STUDIES ADOPTION — generated from the live catalogue record

System Design Fundamentals

S-01B · 3 days (configurable 1–5 days) · Informatics · Software Engineering · Years: 2nd, 3rd, PG

CONTENTS

Catalogue S-01B · version 1 · generated 2026-08-24

OVERVIEW

Load balancing, caching, databases and queues — students design and defend a scalable system.

System-design rounds now appear even in fresher interviews; students who can reason about scale and defend a design stand out immediately.

HOURS AND CREDIT POSITION

Contact hours: 24 Guided project: 6 Self-study: 0 Notional total: 30

Credit claim: 1
30 notional hours ÷ 30 hours per credit (NSQF track, UGC Micro-credentials Guidelines §5.3.3) = 1 credits.

COURSE OUTCOMES

CO1. Explain the trade-offs between latency, throughput and consistency in a distributed system (K2)
CO2. Apply load balancing, caching and replication to scale a service (K3)
CO3. Select a data store appropriate to a stated access pattern (K4)
CO4. Design a queue-based flow for an asynchronous workload (K3)
CO5. Justify a system design against stated scale and reliability requirements (K5)

COURSE CONTENT — MODULES

Hours shown are the recommended format; module time scales proportionally when the engagement runs 1–5 days.

Module 1 — Design fundamentals (4h recommended)
Theory: Requirements, back-of-envelope estimation, latency vs throughput, trade-offs
Lab: Estimate the load for a named product
Output: Estimation worksheet

Module 2 — Scaling and load balancing (4h recommended)
Theory: Horizontal scaling, load balancers, statelessness
Lab: Redesign a single-server app to scale out
Output: Scaled architecture sketch

Module 3 — Caching and databases (4h recommended)
Theory: Cache strategies, SQL vs NoSQL, indexing, replication
Lab: Choose and justify a data store for a scenario
Output: Data-store decision note

Module 4 — Messaging and queues (4h recommended)
Theory: Asynchronous processing, message queues, decoupling
Lab: Design a queue-based flow for a spike workload
Output: Async flow diagram

Module 5 — Reliability (4h recommended)
Theory: Redundancy, failover, rate limiting, monitoring
Lab: Add reliability to the running design
Output: Reliability checklist applied

Module 6 — Design workshop and defence (4h recommended)
Theory: End-to-end system design, presenting and defending trade-offs
Lab: Teams design a scalable system and present it
Output: System design + defence

ASSESSMENT SCHEME (100 MARKS)

Continuous lab exercises — 40 marks
Capstone project & demonstration — 40 marks
Quiz & viva voce — 20 marks

CO–PO MAPPING

CO1 !' PO2 (strength 2)
Reasoning about trade-offs is problem analysis.

CO2 !’ PO3 (strength 2)
Applying scaling techniques is solution design.
CO3 !’ PO3 (strength 2)
Selecting a store for an access pattern is a design decision.
CO4 !’ PO3 (strength 2)
Designing an asynchronous flow is solution design.
CO5 !’ PO10 (strength 2)
Defending a design is technical communication.

EVERY PARTICIPANT RECEIVES

- Certificate of completion
- Course material
- LMS access
- Interview question bank
- Mock interview & viva practice
- Optional nasscom NSQF assessment (priced per candidate on your quotation)

FEE

[1]1,800 per student, incl. GST
Excludes the optional nasscom assessment where offered. Final pricing on your college's quotation.

DESIGNED BY

Venkat Kurela — Founder & Director, Kurela Cognisive Private Limited