Requirements Engineering: Theory Notes

Definition of Requirements

- **Requirements** are statements describing **what a system must do**, **how it should behave**, the **properties** it must exhibit, the **qualities** it must possess, and the **constraints** that both the system and its development must satisfy.
- They serve as the foundation for system design, development, and validation.

Requirements Analysis

- **Requirements analysis** involves:
    - Specifying the **operational characteristics** of the software.
    - Indicating the software's **interface with other system elements**.
    - Establishing **constraints** that the software must meet.

Phases of Requirements Engineering

Phase	Purpose & Key Activities
Inception	- Ask questions to establish: - Basic understanding of the problem - Identify stakeholders - Define the nature of the desired solution - Evaluate the effectiveness of initial communication and collaboration between customer and developer
Elicitation	- Gather requirements from all stakeholders, ensuring comprehensive and accurate capture of needs
Elaboration	- Develop an **analysis model** that identifies: - Data requirements - Functional requirements - Behavioral requirements
Negotiation	- Reach agreement on a **deliverable system** that is realistic and acceptable to both developers an customers
Specification	- Document requirements using one or more of the following: - Written documents

	- Sets of models - Formal mathematical specifications - User scenarios (use cases) - Prototypes
Validation	- Review requirements to identify: - Errors in content or interpretation - Areas needing clarification - Missing or inconsistent information - Conflicting or unrealistic (unachievable) requirements
Requirements Management	- Ongoing process to handle changes, track requirements, and ensure alignment with project goa

Key Points to Remember

- **Requirements engineering** is an iterative and collaborative process involving both stakeholders and developers.
- **Clear, validated, and managed requirements** are critical to the success of any software or system project.
- **Common challenges** include missing, conflicting, or unrealistic requirements, especially in large and complex systems.

Summary Table: Requirements Engineering Activities

Activity	**Description**
Inception	Establish understanding, stakeholders, and solution vision
Elicitation	Gather requirements from all relevant parties
Elaboration	Analyze and model data, functions, and behaviors
Negotiation	Agree on feasible and acceptable requirements
Specification	Document requirements in appropriate formats
Validation	Review and ensure requirements are correct, complete, and consistent

Requirements Management	Track, update, and control requirements throughout the project