Introduction

- **Program and Software**
  - Program
    - A set of instructions for computer to execute in order to get a specific result
  - Software
    - Slides: A set of programs that make up a complete product. The development of a software include consideration such as usability, dependability, availability and maintainability
    - Textbook: A product that compasses computer programs and associated documents that execute within a computer of any size and architecture.
- **Software Systems**
  - Abstract and intangible
  - Challenges
    - Complex and dynamic requirements
    - Cross domains
    - Managing teams
    - Limited resources
    - Client’s high expectation
- **Software Failure & Sucess**
  - Software engineering is always inadequate: the plan never catch up with change
  - Software Failure
    - Increasing demands
    - Low expectations
- **Professional Software Development**
  - Ameteur <-> Professional
  - Includes program specification, design, validation and evolution
  - Properties
    - Maintainability
      - Evolves to meet the changing demands. CRITICAL because software change is an inevitable requirement of a changing business environment
    - Dependability and Security
      - Reliability, security and safety
      - Avoid physical or economic damage
    - Efficiency
      - Responsiveness, processing time, memory utilization...
      - Not waste system resources like memory and processor cycles
    - Acceptability
      - Acceptable to the type of users for which it is designed
      - Understandable, usable and compatible with other systems that they use. (Interface)
- **Software Products**
  - Software requirements
    - The services or functions that the uses want from the software
  - 1 Generic

- Produced by a development organization
- Sold on open market to any customer who is able to buy them. (MS OFFICE)
- Software that fulfills the general requirements

2. Customized
   - A software contractor develops the software especially for a customer
   - Software that cater special requirements (No software in the market fulfill these requirements)

Difference

- 1. Generic: owned by the software company. The company has the right to determine what features the software should have.
- 2. Customized: owned by the factory (contractor) so the factory has the right to determine what features to include in their customized software.

Software Deterioration

- Doesn't "wear out" but deteriorate
- Time - Failure rate Curve (ref to slides)
- Objective: to reduce the spike

Software Engineering

Definition

- Software engineering is an engineering displine that is concerned with all aspects of software production from the early stages of system specification through to maintaining the system after it has gone into use.

Approaches

- Software specification
- Software development
- Software validation
- Software evolution

Constraints

- Tight deadline
- Budget
- Technical
- Political

Importance

- Increasing demand of advanced software systems (Producing reliable and trustworthy systems economically and quickly)
- Cheaper in the long run (cost of changing)

Diversity

Systematic approach

- Practical cost
- Schedule
- Depenability issues
- The needs of customers and producers

Performance Variety

- Developer
- Type of software
- People involved

Two major approaches

- Sequential

- Iterative

- **Ethics**
  - A social and legal framework
  - Behave in an ethical and morally responsible way
  - Tenuous notion
    - Confidentiality
      - Protecting data against unintentional, unlawful or unauthorized access, disclosure or theft
    - Competence
    - Intellectual property rights
    - Computer misuse

- **Risk**
  - Building the wrong software
    - MUST fully understand and validate requirement
  - Adding technical insights and suggestions
    - Client satisfaction is the primary measurement
  - Minimization
    - Feasibility Studies
    - Separation of requirement from design
    - Milestones and releases
    - Acceptance and uses testing