2110423: Software Engineering

First Semester, 2004

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Grading:

- Team Project Work - 50%
- Midterm Exam - 25% **(August 5, 2004)**
- Final Exam - 25% **(September 23, 2004)**

Text Book:

Roger S. Pressman, Software Engineering: A Practitioner's Approach Fifthe Edition, McGraw Hill, 2001.

References:

1. Leszek A. Maciaszek, Requirements Analysis and System Design: Developing Information Systems with UML, Addison-Wesley, 2001.
2. Shari L. Pfleeger, Software Engineering Theory and Practice Second Edition, Prentice-Hall, 2001
3. Bernd Bruegge and Allen H. Dutoit, Object-Oriented Software Engineering: Conquering Complex and Changing Systems, Prentice Hall, 2000.
4. Stephen R. Schach, Classical and Object-Oriented Software Engineering With UML and Java, McGraw-Hill ,1999

Outline of Topics:

1. The Product
    - What is Software?
    - The Evolving Role of Software
    - Software Applications

2. The Process
    - What is Software Engineering
    - Participants in Developing a Project
    - Software Engineering – A layered Technology
    - A Common Process Framework
    - Software Process Models
        - Waterfall Model
        - V-Model
        - Prototyping Model
        - Phased Development Model
            - Incremental Model
            - Iterative Model
        - Spiral Model

3. Software Project Planning

4. Software Quality Assurance (SQA)

5. Software Configuration Management (SCM)

6. Analysis Concepts and Principles
    - Requirements Analysis
    - Communication Techniques (FAST Guidelines)
    - Analysis Principles

7. Analysis Modeling
    - The Element of Analysis Modeling
        - Data Model (ERD)
        - Functional Model (DFD)
        - Control Model (STD)
        - Data Dictionary (DD)

8. Design Concept and Principles
    - Translating the Analysis Model into a Software Design
    - Design Principles
    - Design Concepts
    - Effective Modular Design
    - Design Heuristics

9. Design Methods
    - Data Design
    - Architectural Design

- Interface Design
- Procedural Design

10. Software Testing Techniques
    - Definitions
    - Testing Techniques: Black-Box, White-Box
    - Level of Testing: Unit, Integration, System, and Acceptance

11. Object-Oriented Concepts and Principles
    - The Object-Oriented Process Model
    - Key Concepts: Classes, Objects, Methods, and Messages

12. Domain Analysis
    - OOA – A Generic View
    - Use Cases
    - Selecting Classes
    - CRC Modeling
    - Defining Structures and Hierarchies
    - Object-Relationship Model
    - Object-Behavior Model
    - Event Flow

13. Object-Oriented Design
    - OOA and OOD
    - Design Issues
    - Generic Components for OOD
    - Object Design

2110423 : Team Project
First Semester, 2004

The objective of the team project is to familiarize students with the major phases of the software development life cycle. The students will learn how to work as part of a software development team. Each team has to work through every phase of the software development life cycle. The teams will consist of 8 to 9 members. The entire team is responsible for producing the "deliverables", which consist of the following items:

- Problem Statement – 2% **(July 1, 2004)**
- Requirements Specification Document – 13% **(July 22, 2004)**
- Design Document - 10% **(August 26, 2004)**
- Testing Plans and User Manual - 15% **(September 16, 2004)**
- Demonstration - 10% **(September 16 , 2004)**

A detailed description of the deliverables and due dates will be given. All the documents must be typed. Each team must include percentage's contribution of team members to each deliverable.

For each phase of the software development, each team has to choose a team leader. The team leaders are responsible for defining and setting goals, organizing the group, delegating responsibilities, monitoring progress, as well as performing technical tasks. You will probably meet with your team members at least once a week.

2110423: Project Description
First Semester, 2004
Mail Order System

A mail order company: **Accu-Mail** needs to computerize its mail-ordering system. The clients who can place orders must be credit card' members of a Bank. There are 2 types credit cards: VISA and MASTER. Both types of credit card' members can place the orders. Normally the company sends customers a catalog each month. The catalog shows merchandises; catalog prices, special prices plus bonus scores, and bonus scores needed; order form; and how to place orders.

The automation of the ordering process is envisioned as follows. The order clerks check if a customer is a credit card's member of the Bank. In case that the customer is a member, the customer's information will be retrieved. But if the customer is not the member, the customer couldn't place any order. The order clerk will look up the item number of the merchandises that the customer needs to see if they are in stock. If the items are in stock, the order clerk completes the order form and send a copy of the order form to the warehouse. If not, the order clerk will fills out the back order form to be mailed out to the supplier.

A packing clerk takes a copy of the order form and packs the items along with the packing slip listing the contents of the package and the total price and/or the bonus scores needed. After that, the package and the packing slip are delivered to the customer.

2110423: Phase 1 Deliverable
The Problem Statement
Due Date: July 1, 2004

In this phase each team will play a role of a system analyst. After interviewing a client, each team has to write the problem statement document which clearly defines how the system is currently handled by the client and how the problem will be solved by the software system.

Each team needs to state the objectives and specific goals that the client has in mind for the system. For examples: what will be input the system, who will be the users and how will they interact with the system, and what will the system produce? Finally, the problem statement should include any constraints on the system, hardware, software, personnel, budget limitations, and time limitations, etc. The problem statement must include a cover page consisting of

- title of the project
- a list of the authors names (indicate the leader)
- contribution of each team member to the document

the date

2110423: Phase 2 Deliverables
The Requirements Specification Document
Document and Presentation Due Date: July 22, 2004

1. Cover Page
   - title of the project
   - a list of the authors names (indicate the leader)
   - contribution of each team member to the document
   - the date

2. Introduction
   - Introductory paragraphs describing the project

3. Functional Requirements
   - a list of functional requirements and brief description of each
   - classes of inputs
   - classes of outputs
   - error messages
   - description of reports
   - Data Flow Diagrams
   - Data Dictionary
   - PSPEC: describe each process in the final level of the data flow diagram

4. Qualitative Requirements
   - Security: mention problems and plans
   - Constraints: scheduling and resource constraints such as hardware, software, staff, budget, and development deadlines
   - Benefits: describe tangible and intangible benefits of the purposed system
   - Reliability:
     - how should the system behave when user input's errors occur, hardware crash, and security is breached
     - what are the acceptable consequences of the failure?

5. Documentation: what kinds of documents are supplied to the client

6. Human Factors:
   - what is the level of the users?
   - what is the expected training period?

7. Acceptance Criteria
   - what kinds of tests will be run?
   - what will be tested to ensure an acceptable solution?

2110423: Phase 3 Deliverables
The Design Document
Document and Presentation Due Date: August 26, 2004

1. Cover Page
    - title of the project
    - a list of the authors names (indicate the leader)
    - contribution of each team member to the document
    - the date
2. Sample screens for the user interfaces and discussion of the reasons for your user interface design approach
3. A structure chart representing the hierarchy of the entire system
4. A list of data structures
5. All procedural abstractions in the following format:
    - module id
    - purpose
    - procedure name (input parameters)
    - returns (output parameters)
    - modifies (list of local and global parameters that this module modifies)
    - is-called-by (list of procedures that call the module)
    - calls (list of procedures called by the module)
    - algorithm or pseudo code

2110423: Final Deliverables
The Test Plan and User Manual
Due Date: Sep 16, 2004

1. Cover Page
   - title of the project
   - a list of the authors names (indicate the leader)
   - contribution of each team member to the document
   - the date
2. Test Plan
   - Input Equivalence Classes for system test
   - Test cases for system test
3. A hard copy of user manual of your system
4. Report any limitations of your implementation, functions that you are not able to code or which have extensive errors, and any deviations from your design document.
5. Include a copy of all documents that you have already submitted.