

**Chapter 1: History of Analysis and Design**

Client Specific Performance Objectives and Examples ..... 1-2  
 Modern Structured Analysis ..... 3-4  
 Ed Yourdon ..... 5  
 Goals of Analysis and Design ..... 6  
 What are Analysis and Design ..... 7  
 Course Overview ..... 8  
 Overview - Analysis ..... 9  
 Overview - Design ..... 10  
 Why is Resource Requirements Gathering Hard? ..... 11  
 Evolution of Structured Techniques ..... 12  
 Structured Systems Analysis/Structured Design ..... 13  
 Classic Texts: History of Structured Techniques ..... 14  
 Business Process Design - 1990s ..... 15  
 Object-Oriented Analysis and Design - 1990's ..... 16  
 Agile Methods ..... 17  
 Discussion ..... 18

**Chapter 2: Systems Analysis**

Client Specific Performance Objectives and Examples ..... 1-2  
 Systems Analysis: Job ..... 3  
 Systems Designer ..... 4  
 Players in the Systems Game ..... 5  
 Players - User Side ..... 6  
 Players - Systems Side ..... 7  
 Systems Analyst Job ..... 8  
 Maslow's Hierarchy of Needs ..... 9-10  
 The Actors ..... 11  
 Shakespeare's Stages ..... 12  
 Behavioral Styles ..... 13  
 Working with Different Styles ..... 14  
 Do's of Systems Analysis ..... 15  
 Don'ts of Systems Analysis ..... 16  
 Question for Discussion ..... 17-18

**Chapter 3: Tools of Structured Analysis and Design**

Client Specific Performance Objectives and Examples ..... 1-2  
 Dataflow Diagram ..... 3-4  
 Data Dictionary ..... 5  
 Data Dictionary Example ..... 6  
 ER: Entity-Relational Models ..... 7  
 Entity-Relational Model Example ..... 8  
 Process Specification Mini-Specs ..... 9  
 Structured English ..... 10  
 Decision Tree ..... 11  
 State Transition Diagram ..... 12  
 Pre and Post Conditions ..... 13  
 The Structure Chart ..... 14  
 Question for Discussion ..... 15

**Chapter 6: DFD: Dataflow Diagram**

Client Specific Performance Objectives and Examples ..... 1-2  
 Typical Dataflow Diagram ..... 3  
 Parts of a DFD ..... 4  
 DFD - Process ..... 5  
 DFD - Flows ..... 6  
 DFD - Dialogue Flow ..... 7  
 DFD - Divergent Flows ..... 8  
 DFD - Data Store ..... 9  
 DFD - Implementation Store ..... 10  
 Terminator ..... 11  
 DFD - Error Reporting ..... 12-13  
 DFD - Guidelines ..... 14  
 Logical Consistent ..... 15  
 Limitations of DFD ..... 16  
 Questions for Discussion ..... 17  
 What is this Bubble Called? ..... 18  
 Context Diagram ..... 19  
 Context Diagram - Example ..... 20  
 DFD - Leveling - Why ? ..... 21  
 DFD - Leveling ..... 22-23  
 DFD - Leveling - Figure Names ..... 24  
 DFD - Leveling Consistency ..... 25-27  
 Does this DFD Make Sense? ..... 28  
 Can You Tell if These are Correct? ..... 29

**Chapter 7: Data Dictionary**

Client Specific Performance Objectives and Examples ..... 1-2  
 Defining Data Dictionary ..... 3-4  
 DD Notation ..... 5  
 DD Example ..... 6  
 DD Elements ..... 7  
 Alternate Naming Styles ..... 8  
 Showing the Data Dictionary to the User? ..... 9  
 Correctness of the DD ..... 10  
 Normalization - 1<sup>st</sup> Normal Form ..... 11  
 Repeating Groups: Examples ..... 12  
 Normalization - 1<sup>st</sup> Normal Form ..... 13  
 Normalization - 2<sup>nd</sup> Normal Form ..... 14  
 Dependency: Examples ..... 15  
 Normalization - 2<sup>nd</sup> Normal Form ..... 16  
 Normalization - 3<sup>rd</sup> Normal Form ..... 17-19  
 Problem with Denormalized Data ..... 20  
 Normalization: Example ..... 21  
 Denormalization Can be Good! ..... 22  
 DD External Interfaces ..... 23  
 Flat File Interface: Example ..... 24  
 XML Schema: Examples ..... 25  
 A Few Ways that XML is Used Normalization: Example ..... 26  
 Sample XML ..... 27

**Chapter 4: The Project Life Cycle**

Client Specific Performance Objectives and Examples ..... 1-2  
 What is a Project Life Cycle? ..... 3  
 Why a Project Life Cycle? ..... 4  
 Classical Project Life Cycle ..... 5  
 The Waterfall Model ..... 4-6  
 Problem with the Classical Project Life Cycle ..... 4-7  
 Semistructured Life Cycle ..... 8-9  
 Structured Project Life Cycle ..... 10-11  
 Prototyping Life Cycle ..... 12  
 Microsoft's DNA Lifecycle ..... 13  
 What Resources Must be Estimated ..... 14  
 Project Management Tools - PERT ..... 15  
 Project Management Tools - Ganit ..... 16  
 Estimated Dangers ..... 17  
 Estimation versus Negotiation ..... 18  
 Estimation versus Negotiation 2 ..... 18  
 Estimation versus Negotiation 3 ..... 18  
 Wide Variation in Technical Skill ..... 21  
 Danger in Estimating Your Own Work ..... 22  
 Lack of an Estimating Database ..... 23  
 Management's Insistence on Premature Estimates ..... 24  
 Typical Ranges ..... 25  
 Industry-Wide Difficulty of Measuring the Unit of Work ..... 26  
 Estimates Based on Unpaid Time ..... 27  
 Estimating Guidelines ..... 28  
 Estimating Formulas ..... 29  
 How Calendar Time is Needed? ..... 30  
 Question for Discussion ..... 31-33

**Chapter 5: Interviewing and Data Gathering Techniques**

Client Specific Performance Objectives and Examples ..... 1-2  
 Why Conduct Interviews? ..... 3  
 Types of Interviews ..... 4  
 Problems with Interviews ..... 5  
 Guidelines for Conducting Interviews ..... 6  
 Develop an Overall Plan ..... 7  
 Data Gathering ..... 8  
 Make Sure You Have Approval to Talk with the Users ..... 9  
 Plan Your Interviews ..... 10  
 Questions? ..... 11  
 Resistance ..... 12  
 Automated Tools ..... 13  
 Keep Records of the Interview and Exhibits ..... 14  
 Record of Exhibits ..... 15  
 Questions for Discussion ..... 16

**Chapter 8: Process Specification and Structured English**

Modified XML ..... 28  
 XML Elements: Example ..... 29  
 XML for Interfaces ..... 30  
 DD: Example ..... 31-32  
 XML Interfaces: Pros and Cons ..... 33

Client Specific Performance Objectives and Examples ..... 1-2  
 Process Specification ..... 3  
 Structured English Example ..... 4  
 Pseudo-code Example ..... 5  
 Decision Trees/Tables ..... 6  
 State Transition Diagram ..... 7  
 Narrative ..... 8  
 Structured English ..... 9  
 Structured English: Example 1 ..... 10  
 Structured English: Example 2 ..... 11  
 Structured English Sentences ..... 12  
 Structured English Verbs ..... 13  
 Structured English Objects ..... 14  
 Structured English Flow of Control ..... 15  
 Structured English - Rules ..... 16  
 Structured English - Uses ..... 17  
 Structured English Pros/Cons ..... 18  
 Other Process Specifications ..... 19  
 Flowcharts ..... 20  
 Nassi-Shneiderman Diagrams ..... 21  
 Pre and Post Conditions ..... 22

**Chapter 9: Decision Trees and Tables**

Client Specific Performance Objectives and Examples ..... 1-2  
 Example: Decision Tree ..... 3  
 Example Decision Table ..... 5  
 Decision Tables ..... 6

**Chapter 10 State Transition Diagrams**

Client Specific Performance Objectives and Examples ..... 1-2  
 STD for Web Site ..... 3  
 Components of a STD ..... 4  
 STD Definitions - State ..... 5  
 STD Definitions - Event ..... 6  
 STD Definitions - Transition ..... 7  
 STD Definitions - Final State ..... 8  
 State Transition Diagram: Example ..... 9  
 Corresponding State Table ..... 10  
 Pseudo-Code for Numeric Parsing ..... 11  
 Conditions and Actions ..... 13

Leveled STDs ..... 14  
 Building STDs ..... 15  
 STD Consistency Check ..... 16  
 Relationship to DFD ..... 17  
 Questions for Discussion ..... 18-19  
 Which Sound like States? ..... 20  
 Process Specification Summary ..... 21

**Chapter 11: Entity Relationship Diagrams**

Client Specific Performance Objectives and Examples ..... 1-2  
 ERD: Entity-Relationship Diagrams ..... 3  
 Processor Model ..... 4-5  
 Entity/Object Types ..... 6-7  
 Entity Names ..... 8  
 Entity Definition ..... 9  
 Example Entity Definition ..... 10  
 Data Elements ..... 11  
 Keys ..... 12  
 Relationships ..... 13  
 Multiple Relationships ..... 14  
 Multiple Relationships Between Multiple Entities ..... 15  
 Alternative Notations for Relationships ..... 16  
 Additional Notations ..... 17  
 Associate Object Type ..... 18-19  
 Subtype/Supertype Indicators ..... 20  
 Subtype Names and Definition ..... 21  
 ERD Process ..... 22  
 Create Subtype/Supertypes ..... 23  
 Create Associative Relationships ..... 24  
 Remove Extra Object Types ..... 25  
 Remove Entities that are only Identifiers ..... 26  
 Extension to the DD for ERD ..... 27-28  
 Review Questions ..... 29  
 ERD Components ..... 30

**Chapter 12: Structured Design**

Client Specific Performance Objectives and Examples ..... 1-2  
 Where are we in the Life Cycle ..... 2-3  
 DFD Structured Design ..... 4  
 Modeling Tools ..... 5  
 Good Modeling Tools Should be ..... 6  
 Show Communication Links ..... 7  
 Data Stores Must Also be Allocated ..... 8  
 Processor/Task Model ..... 9  
 Degree of Parallel Processing ..... 10-12  
 Task Model ..... 13  
 May Show Intertask Communications ..... 14  
 Structure Chart ..... 15  
 Structure Chart Example ..... 16

**Chapter 14: Behavioral Models**

Client Specific Performance Objectives and Examples ..... 1-2  
 Where are we in the Life Cycle? ..... 3  
 Typical Top Down Approach ..... 4  
 Problem with Top-Down Approach ..... 5  
 Event Partitioning Approach ..... 6  
 Event List from a STD ..... 7  
 Example Event List ..... 8  
 Preliminary Behavioral Model ..... 9  
 Creating the 1<sup>st</sup> Cut ..... 10  
 Behavioral Model - Event DFD ..... 11-14  
 Web Site Context Diagram ..... 15  
 Our Web Site STD ..... 16  
 Example DFD for an Event ..... 17  
 Completing the Behavioral Model ..... 18  
 Combined Example ..... 19  
 Completing the Behavioral Model ..... 20

**Chapter 15: System Implementation and Maintenance**

Client Specific Performance Objectives and Examples ..... 1-2  
 SDLC ..... 3  
 Where are we in the Life Cycle ..... 4  
 System Implementation and Maintenance ..... 5-6  
 Structured Project Life Cycle ..... 7  
 The Process of Coding, Testing, and Installation ..... 8  
 Deliverables of Coding, Testing and Installation ..... 9  
 Software Application Testing ..... 10  
 Software Application Testing: Types of Testing ..... 11-13  
 Software Application Testing: The Testing Process ..... 14  
 Software Application Testing: Acceptance Testing by Users ..... 15-17  
 Installation ..... 18-19  
 Documentation and User Support ..... 20-21  
 Documenting the System ..... 22-23  
 User Documentation Example ..... 24  
 User Doc Example ..... 25  
 Training Information System Users ..... 26-27  
 Supporting Information System Users ..... 28  
 Supporting Information System Users: Information Center ..... 29  
 Supporting Information System Users: Help Desk ..... 30  
 Project Close Down ..... 31  
 Maintaining Information Systems ..... 32  
 Conducting System Maintenance ..... 33  
 Conducting System Maintenance: The Cost of Maintenance ..... 34  
 Conducting System Maintenance: Measure of Effectiveness ..... 35  
 Maintaining the Specification ..... 36  
 How to Keep Up ..... 37  
 What is a Walkthrough ..... 38  
 What can you Walkthrough ..... 39  
 Questions for Discussion ..... 40

Components of Structure Chart ..... 17-18  
 Structure Chart Module ..... 19  
 Black Boxes ..... 20  
 Structure Chart Coupling ..... 21  
 Structure Chart Iterations ..... 22  
 Structure Chart Selection ..... 23  
 Structure Chart Nested Iterations ..... 24  
 Module Specification ..... 25  
 Improving Structure Charts ..... 26  
 Structured Design ..... 27  
 Architectural Design ..... 28-30  
 Detailed Design ..... 31  
 Modular Design ..... 32  
 Transformational Strategy ..... 33  
 Modular Design ..... 34  
 Design Packaging ..... 35  
 Design Packaging Guidelines ..... 36  
 Minimize Coupling ..... 37  
 Preserve Cohesion ..... 38  
 Discussion ..... 39

**Chapter 13: The Essential Model**

Client Specific Performance Objectives and Examples ..... 1-2  
 Classical Approach ..... 3  
 Problems with Classical Approach ..... 4  
 Should You Do the Current Models ..... 5  
 Essential Model ..... 6  
 There Can be a Gray Area ..... 8  
 Reasons for Gray? ..... 9  
 Environmental Model ..... 10-11  
 Statement of Purpose ..... 12-13  
 Context Diagram ..... 14  
 Alternative Names for the "System" ..... 15  
 Context Diagram Terminators Don't Communicate ..... 16  
 Draw Terminators More than Once ..... 17  
 Draw Terminators More than Once - 2 ..... 18  
 Use Roles ..... 19  
 Show Source of Data ..... 20  
 Show Source Not Handler ..... 21  
 Simplify ..... 22-23  
 Event List ..... 24  
 Types of Events ..... 25  
 Building the Event List ..... 26  
 Optional Additions to the Environmental Model ..... 27  
 Potential Problems with the Essential Model ..... 28  
 When the Environmental Model is Done ..... 29  
 Relationship of ERD to Context Diagram ..... 30  
 Environmental Model Question ..... 31-32  
 Question for Discussion ..... 33