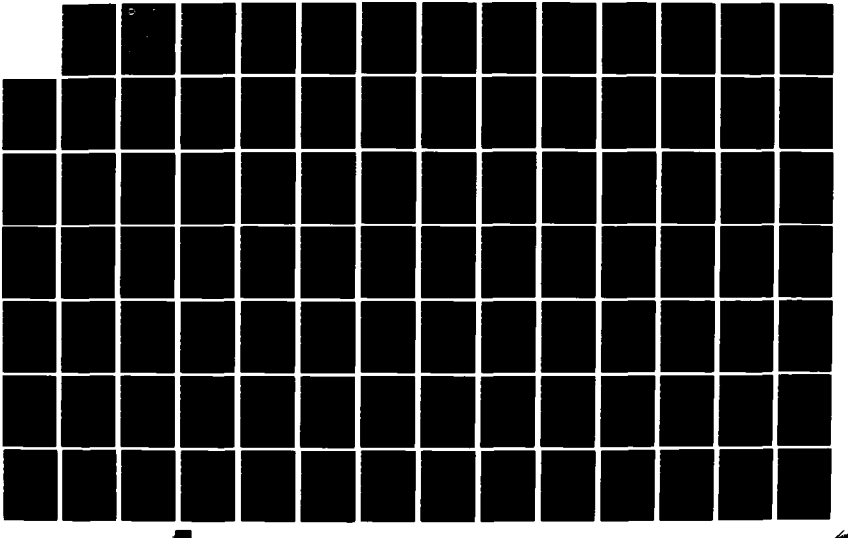
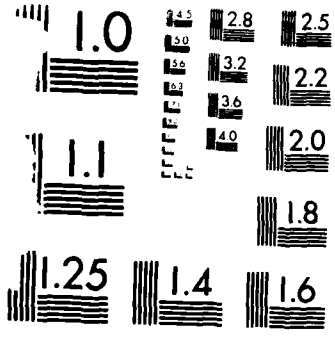
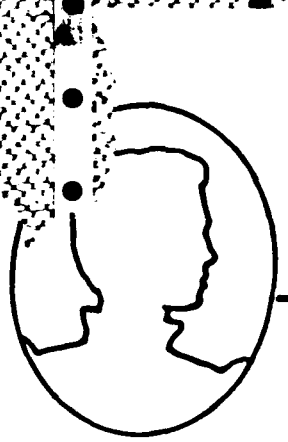
AD-A165 349 ADA (TRADEMARK) TRAINING CURRICULUM INSTRUCTOR'S COURSE 1/4
S500 METHODOLOGY MODULES(U) SOFTECH INC WALTHAM MA
1986 DAAB07-85-C-K506

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Ada® Training Curriculum

1986



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Instructor's Course
S500
Methodology Modules

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U.S. Army Communications-Electronics Command
(CECOM)

Contract DAAB07-85-C-K506

Prepared By:

SOFTECH, INC.
460 Totten Pond Road
Waltham, MA 02154

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SOFTECH

INSTRUCTOR'S COURSE MODULE (S500)

931/E - METHODOLOGY MODULES

VG 931/E

460 Totten Pond Road, Waltham, MA 02254 (617)890-6900 TWX:710-324-6401

This INSTRUCTOR'S COURSE consists of the following parts:

METHODOLOGY MODULES

1. OVERVIEW
2. M102 - INTRODUCTION TO SOFTWARE ENGINEERING
3. M201 - SOFTWARE ENGINEERING METHODOLOGIES, and
4. M203 - PROGRAMMING METHODOLOGY. language ADA programming language training, instruction manuals.

INSTRUCTOR NOTES

- ALLOW 10 MINUTES FOR THIS SECTION

SECTION 1

OVERVIEW

INSTRUCTOR NOTES

OVERVIEW OF M102

- GOALS
  - DEVELOP A CONCEPTUAL UNDERSTANDING OF SOFTWARE ENGINEERING CONCEPTS
  - OVERVIEW UNDERSTANDING OF SOFTWARE ENGINEERING METHODS
  - ESTABLISH A RELATIONSHIP BETWEEN SOFTWARE ENGINEERING AND Ada

- GOALS DO NOT INCLUDE
  - TEACH HOW TO USE ANY SPECIFIC DEVELOPMENT METHODOLOGY OR TOOL

- STUDENT BACKGROUND
  - SOME PROGRAMMING EXPERIENCE

- MODULE OVERVIEW (2 DAYS)
  - THIS MODULE TEACHES THE FUNDAMENTAL CONCEPTS OF SOFTWARE ENGINEERING. IT ALSO ATTEMPTS TO MAKE THE STUDENTS AWARE OF WHY SOFTWARE ENGINEERING CONCEPTS ARE BEING TAUGHT WITH Ada

INSTRUCTOR NOTES

OVERVIEW OF M201

- o GOALS
  - UNDERSTAND GENERAL CONCEPTS BEHIND SEVERAL METHODOLOGIES
  - UNDERSTAND THEIR SCOPE OF APPLICABILITY WITHIN SOFTWARE LIFE-CYCLE
  - UNDERSTAND WHICH METHODS ARE APPROPRIATE IN THE STUDENT'S ORGANIZATION

- o GOALS DO NOT INCLUDE
  - ENDORSEMENT OF A PARTICULAR METHODOLOGY
  - FLUENCY IN EVERY METHODOLOGY
  - EXPOSURE TO EVERY EXISTING METHODOLOGY

- o STUDENT BACKGROUND
  - SOFTWARE ENGINEERING FOR MANAGERS (M101) OR INTRODUCTION TO SOFTWARE ENGINEERING (M102)

- o MODULE OVERVIEW (5 DAYS)
  - THIS MODULE PROVIDES THE STUDENT WITH A THOROUGH UNDERSTANDING OF SOFTWARE METHODOLOGIES AND HOW THEY MAY BE USED WITH Ada

INSTRUCTOR NOTES

OVERVIEW OF M203

- GOALS
  - TEACH MODERN CODING TECHNIQUES APPLICABLE TO Ada
  - PROVIDE TECHNICAL BACKGROUND NECESSARY TO APPLY THE TECHNIQUES

- GOALS DO NOT INCLUDE
  - TEACH THE Ada LANGUAGE

- STUDENT BACKGROUND
  - Ada ORIENTATION FOR MANAGERS (L101) OR Ada TECHNICAL OVERVIEW (L102) OR INTRODUCTION TO Ada - A HIGHER ORDER LANGUAGE (L103)

- MODULE OVERVIEW (1 1/2 DAYS)
  - THIS MODULE TEACHES CODING AND DOCUMENTATION CONVENTIONS, STRUCTURED PROGRAMMING STYLE

INSTRUCTOR NOTES

SECTION 2

INSTRUCTOR NOTES

GO OVER THE OUTLINE QUICKLY TO GIVE A FEEL FOR WHAT THE M102 IS ALL ABOUT.

M102 INTRODUCTION TO SOFTWARE ENGINEERING

SECTION 1 - BACKGROUND AND MOTIVATION

- COURSE OVERVIEW/ORGANIZATION
- DEFINITIONS
- MOTIVATION FOR SOFTWARE ENGINEERING

SECTION 2 - SOFTWARE ENGINEERING GOALS

- SUMMARY OF POTENTIAL SOFTWARE ENGINEERING GOALS
- OBJECTIVES
- CONFLICTS BETWEEN GOALS
- SOFTWARE ENGINEERING PRINCIPLES

INSTRUCTOR NOTES

SECTION 3 - ACHIEVING SOFTWARE ENGINEERING GOALS

- SOFTWARE LIFE CYCLE
- MILITARY STANDARDS AND DOCUMENTATION
- INTRODUCTION TO THE METHODS
- METHODS FOR EACH PHASE OF THE LIFE CYCLE
- SOFTWARE MANAGEMENT METHODS AND TECHNIQUES

SECTION 3A - SOFTWARE LIFE CYCLE

- THE LIFE OF SOFTWARE
- A LIFE CYCLE MODEL (THE TRADITIONAL VIEW)
- SOFTWARE MAINTENANCE ACTIVITIES
- SHORT COMINGS OF THE TRADITIONAL VIEW

SECTION 3B - MILITARY STANDARDS AND DOCUMENTATION

- MIL-STD-SDS AND ITS ROLE IN THE LIFE CYCLE

SECTION 3C - INTRODUCTION TO METHODS AND TOOLS

- OUR SCOPE OF CONTROL
- ATTRIBUTES OF METHODOLOGIES
- WHY LEARN METHODOLOGIES
- REQUIREMENTS FOR AN IDEAL METHODOLOGY

SECTION 3D - ANALYSIS OVERVIEW

- DEFINITIONS
- ROLES OF INDIVIDUALS
- CONSEQUENCES OF WRONG REQUIREMENTS

INSTRUCTOR NOTES

M102 INTRODUCTION TO SOFTWARE ENGINEERING (CONTINUED)

SECTION 3E - ANALYSIS METHODS

- SADT
- SREM
- PSL/PSA
- SSA
- SCRP

SECTION 3F - DESIGN OVERVIEW

- DEFINITIONS
- ROLE OF THE DESIGNER

SECTION 3G - ARCHITECTURAL DESIGN METHODS

- SCRP
- OBJECT ORIENTED DESIGN
- STRUCTURED DESIGN
- JACKSON AND WARNIER ORR
- HIGHER ORDER SOFTWARE

INSTRUCTOR NOTES

SECTION 3H - DETAILED DESIGN METHODS

- PROGRAM DESIGN LANGUAGES
- HIPO
- NSSF

SECTION 3I - IMPLEMENTATION OVERVIEW

- SCOPE OF IMPLEMENTATION PHASE
- IMPLEMENTATION ISSUES

SECTION 3J - IMPLEMENTATION METHODS

- MOTIVATION/PURPOSE OF STRUCTURED DESIGN
- STRUCTURED DESIGN CONCEPTS AND GUIDELINES
- TESTING AS AN ERROR REMOVAL TECHNIQUE
- UNIT TESTING
- INTEGRATION STRATEGIES

SECTION 3K - SOFTWARE MANAGEMENT

- SOFTWARE PLANNING AND TRACKING
- PLANNING TECHNIQUES
- SOFTWARE COST ESTIMATION
- SOFTWARE QUALITY MANAGEMENT
- SOFTWARE CONFIGURATION MANAGEMENT

SECTION 4 - SOFTWARE ENGINEERING AND Ada

- ANALYSIS AND Ada
- DESIGN AND Ada
- STRUCTURED DESIGN AND Ada
- HOW Ada SUPPORTS THE GOALS AND PRINCIPLES

INSTRUCTOR NOTES

MAKE IT CLEAR THAT M102 IS ORIENTED TOWARDS MANAGERS AND TECHNICAL PEOPLE WHO WILL IN SOME CASES NOT HAVE A STRONG COMPUTER ENGINEERING BACKGROUND.

M102 IS A SURVEY COURSE AT BEST SO IT IS CRITICAL TO GAIN A CONSENSUS ON THE GOALS.

M102 INTRODUCTION TO SOFTWARE ENGINEERING

- COURSE GOALS ARE:
  - TO PROVIDE A CONCEPTUAL UNDERSTANDING OF SOFTWARE ENGINEERING CONCEPTS
  - TO PROVIDE AN UNDERSTANDING OF SOFTWARE ENGINEERING METHODS
  - TO ESTABLISH A RELATIONSHIP BETWEEN SOFTWARE ENGINEERING AND Ada

- COURSE GOALS ARE NOT:
  - TO MAKE THE STUDENT AN EXPERT IN ANY OF THE TECHNIQUES

INSTRUCTOR NOTES

THE SOFTWARE CRISIS HAS BEEN WRITTEN ABOUT IN HUNDREDS OF ARTICLES SO THE CLASS SHOULD BE ABLE TO RELATE TO IT.

SECTION 1 - BACKGROUND AND MOTIVATION

SUMMARY OF MAIN POINTS COVERED:

- DEFINE SOFTWARE ENGINEERING FROM SEVERAL DIFFERENT POINTS OF VIEW
- MOTIVATION FOR SOFTWARE ENGINEERING IS THE COSTLY NATURE OF SOFTWARE

MAIN MESSAGES:

- THERE IS MORE THAN ONE DEFINITION OF SOFTWARE ENGINEERING
- SOFTWARE IS COSTLY TO DEVELOP AND MAINTAIN

SUBTOPICS:

- DEFINITIONS
- THE SOFTWARE CRISIS
- THE ENVIRONMENT FACING SOFTWARE ENGINEERING

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT SOFTWARE ENGINEERING IS AN EVOLVING DISCIPLINE
- FOCUS ON THE MAGNITUDE OF THE SOFTWARE CRISIS NOT ON THE DETAILS OF THE NUMBERS PRESENTED
- RELATE ANY RELEVANT PERSONAL EXPERIENCE

INSTRUCTOR NOTES

SECTION 2 - SOFTWARE ENGINEERING GOALS

SUMMARY OF MAIN POINTS COVERED:

- A DISCUSSION OF THE OBJECTIVES AND GOALS OF SOFTWARE ENGINEERING AND THE PRINCIPLES THAT SOFTWARE ENGINEERING IS BUILT ON

MAIN MESSAGES:

- SOFTWARE ENGINEERING GOALS WILL DIFFER BASED ON THE PROJECTS OR ORGANIZATION NEEDS
- WELL DEFINED GOALS AND PRINCIPLES FORM THE FOUNDATION FOR SOFTWARE ENGINEERING

SUBTOPICS:

- SUMMARY OF POTENTIAL SOFTWARE ENGINEERING GOALS
- OBJECTIVES
- CONFLICTS BETWEEN GOALS
- SOFTWARE ENGINEERING PRINCIPLES

SPECIAL CONSIDERATIONS:

- THIS IS A VERY IMPORTANT SECTION MAKE IT AS CLEAR AS POSSIBLE
- THE PRINCIPLES AND GOALS WILL BE REVISITED IN SECTION 3 AS WE DISCUSS METHODS SO SUMMARIZE THE PRINCIPLES AND GOALS AT THE END OF THE SECTION TO PREPARE THE CLASS FOR WHAT IS TO COME

INSTRUCTOR NOTES

INDICATE THAT AN INTRODUCTORY SECTION IS INCLUDED FOR EACH MAJOR PHASE OF THE LIFE CYCLE.

SECTION 3 - ACHIEVING SOFTWARE ENGINEERING GOALS

SUMMARY OF MAIN POINTS COVERED:

- SUMMARY OF THE MAJOR METHODS AND MANAGEMENT TECHNIQUES WE CAN USE TO ACHIEVE ONE'S SOFTWARE ENGINEERING GOALS

MAIN MESSAGES:

- A COMBINATION OF METHODS AND TECHNIQUES ARE NEEDED TO ACHIEVE THESE GOALS
- TECHNICAL AND MANAGEMENT METHODS MUST BE USED IN COMBINATION TO ACHIEVE THESE GOALS

SUBTOPICS:

- SOFTWARE LIFE CYCLE
- MILITARY STANDARDS AND DOCUMENTATION
- INTRODUCTION TO THE METHODS
- METHODS FOR EACH PHASE OF THE LIFE CYCLE
- SOFTWARE MANAGEMENT METHODS AND TECHNIQUES

SPECIAL CONSIDERATIONS:

- KEEP INTRODUCTION SHORT

INSTRUCTOR NOTES

EMPHASIZE THAT THIS IS THE LIFE CYCLE MODEL USED IN THE MILITARY STANDARDS.

SECTION 3A - SOFTWARE LIFE CYCLE

SUMMARY OF MAIN POINTS COVERED:

- REVIEW THE TRADITIONAL SOFTWARE LIFE CYCLE MODEL AND ITS LIMITATIONS

MAIN MESSAGES:

- SOFTWARE DOES HAVE A LIFE THAT IS GREATER THAN JUST CODING
- NO UNIFORM VIEW OF THE LIFE CYCLE CURRENTLY EXISTS

SUBTOPICS:

- THE LIFE OF SOFTWARE
- A LIFE CYCLE MODEL (THE TRADITIONAL VIEW)
- SOFTWARE MAINTENANCE ACTIVITIES
- SHORT COMINGS OF THE TRADITIONAL VIEW

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT THE REMAINDER OF SECTION 3 WILL FOLLOW THIS LIFE CYCLE MODEL

INSTRUCTOR NOTES

SECTION 3B - MILITARY STANDARDS AND DOCUMENTATION

SUMMARY OF MAIN POINTS COVERED:

- SUMMARY OF THE MAJOR CONTROLLING DoD STANDARDS THAT APPLY TO THE DEVELOPMENT OF SOFTWARE

MAIN MESSAGES:

- SOFTWARE DEVELOPMENT IS CONSTRAINED BY THE STANDARDS
- THE NEW DoD STANDARDS PROVIDE A FRAMEWORK FOR THE DEVELOPMENT OF SOFTWARE

SUBTOPICS:

- INTRODUCTION TO DoD-STD-1267
- STDS AND ANALYSIS
- STDS AND DESIGN
- STDS AND IMPLEMENTATION

SPECIAL CONSIDERATIONS:

- THIS SECTION IS IMPORTANT TO A MILITARY OR DoD CONTRACTOR CLASS

INSTRUCTOR NOTES

EXPLAIN THE FORMAT USED IN THE PRESENTATION OF THE METHODS

- INTRODUCTORY GRAPHICS
- UNDERLYING CONCEPTS
- SAMPLE EXAMPLES
- HOW THEY SATISFY THE GOALS AND PRINCIPLES

SECTION 3C - INTRODUCTION TO METHODS AND TOOLS

SUMMARY OF MAIN POINTS COVERED:

- SUMMARIZES THE MAIN CHARACTERISTICS OF METHODOLOGIES THAT ARE USED IN ACHIEVING THE SOFTWARE ENGINEERING GOALS

MAIN MESSAGES:

- GOOD METHODS ARE IMPORTANT IN ACHIEVING THE SOFTWARE ENGINEERING GOALS
- THERE ARE REQUIREMENTS FOR AN IDEAL METHODOLOGY THAT YOU CAN MEASURE OTHER METHODOLOGIES AGAINST

SUBTOPICS:

- OUR SCOPE OF CONTROL
- ATTRIBUTES OF METHODOLOGIES
- WHY LEARN METHODOLOGIES
- REQUIREMENTS FOR AN IDEAL METHODOLOGY

SPECIAL CONSIDERATIONS:

- THESE TOPICS ARE ABSTRACT SO ADD PERSONAL EXPERIENCES TO MAKE THEM REAL

INSTRUCTOR NOTES

SECTION 3D - ANALYSIS OVERVIEW

SUMMARY OF MAIN POINTS:

- CHARACTERIZES THE ANALYSIS PHASE OF THE LIFE CYCLE

MAIN MESSAGES:

- WHAT ANALYSIS IS AND WHERE IT FITS INTO THE LIFE CYCLE

SUBTOPICS:

- DEFINITIONS
- ROLES OF INDIVIDUALS
- CONSEQUENCES OF WRONG REQUIREMENTS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE CONSEQUENCES OF WRONG REQUIREMENTS

INSTRUCTOR NOTES

RELATE TO THE INSTRUCTORS IN TRAINING THAT THEY SHOULD NOT ADVOCATE ANY PARTICULAR METHODOLOGY, THAT ALL OF THEM HAVE A PLACE IN THE DEVELOPMENT OF SOFTWARE.

SECTION 3E - ANALYSIS METHODS

SUMMARY OF MAIN POINTS COVERED:

- SUMMARY OF SOME POPULAR ANALYSIS METHODOLOGIES

MAIN MESSAGES:

- EACH METHOD ADDRESSES THE GOALS AND PRINCIPLES OF SOFTWARE ENGINEERING FROM A DIFFERENT PERSPECTIVE

SUBTOPICS:

- SADT
- SREM
- PSL/PSA
- SSA
- SCRP

SPECIAL CONSIDERATIONS:

- THE OBJECTIVE OF THIS SUBSECTION IS TO PROVIDE THE STUDENT WITH ENOUGH INFORMATION TO IDENTIFY THE METHODS AND TO UNDERSTAND HOW THEY ADDRESS THE GOALS OF SECTION 2
- THE MODE OF PRESENTATION FOR EACH METHOD IS
  - SLIDE SHOWING GRAPHICS OF TEMPLATES USED IN THE METHOD
  - SLIDE THAT SUMMARIZES THE CHARACTERISTICS OF METHOD
  - SLIDES GIVING EXAMPLES OF THE USE OF THE METHOD
  - SLIDE IDENTIFYING THE GOALS AND PRINCIPLES THE METHOD SUPPORTS

INSTRUCTOR NOTES

THIS DESIGN OVERVIEW COVERS BOTH ARCHITECTURAL AND DETAILED DESIGN

SECTION 3F - DESIGN OVERVIEW

SUMMARY OF MAIN POINTS COVERED:

- CHARACTERIZES THE DESIGN PHASE(S) OF THE LIFE CYCLE

MAIN MESSAGES:

- WHAT DESIGN IS AND WHERE IT FITS INTO THE LIFE CYCLE

SUBTOPICS:

- DEFINITIONS
- ROLE OF THE DESIGNER

SPECIAL CONSIDERATIONS:

- GO OVER THIS QUICKLY, GET STARTED ON THE METHODS, THAT IS WHERE THE REAL MEAT OF THE PRESENTATION IS

INSTRUCTOR NOTES

THE SECOND BULLET UNDER SPECIAL CONSIDERATIONS APPEARS FREQUENTLY. DO NOT SPEND DISCUSSION TIME ON IT!

SECTION 3G - ARCHITECTURAL DESIGN METHODS

SUMMARY OF MAIN POINTS COVERED:

- SUMMARY OF SOME POPULAR ARCHITECTURAL DESIGN METHODOLOGIES

MAIN MESSAGES:

- EACH METHOD ADDRESSES THE GOALS AND PRINCIPLES OF SOFTWARE ENGINEERING FROM A DIFFERENT PERSPECTIVE

SUBTOPICS:

- SCRP
- OBJECT ORIENTED DESIGN WITH EXERCISE
- STRUCTURED DESIGN
- JACKSON AND WARNIER ORR
- HIGHER ORDER SOFTWARE

SPECIAL CONSIDERATIONS:

- THE OBJECTIVE OF THIS SUBSECTION IS TO PROVIDE THE STUDENT WITH ENOUGH INFORMATION TO IDENTIFY THE METHODS AND TO UNDERSTAND HOW THEY ADDRESS THE GOALS OF SECTION 2
- THE MODE OF PRESENTATION FOR EACH METHOD IS
  - SLIDE SHOWING GRAPHICS OR TEMPLATES USED IN THE METHOD
  - SLIDE THAT SUMMARIZES THE CHARACTERISTICS OF METHOD
  - SLIDES GIVING EXAMPLES OF THE USE OF THE METHOD
  - SLIDE IDENTIFYING THE GOALS AND PRINCIPLES THE METHOD SUPPORTS
- SUBSECTION ON OBJECT ORIENTED DESIGN HAS A SIMPLE EXERCISE ASSOCIATED WITH IT WHICH WILL REQUIRE A LITTLE MORE DETAIL ON THE PROCEDURE TO BE PRESENTED

INSTRUCTOR NOTES

SECTION 3H - DETAILED DESIGN METHODS

SUMMARY OF MAIN POINTS COVERED:

- SUMMARY OF POPULAR DETAILED DESIGN METHODOLOGIES

MAIN MESSAGES:

- EACH METHOD ADDRESSES THE GOALS AND PRINCIPLES OF SOFTWARE ENGINEERING FROM A DIFFERENT PERSPECTIVE

SUBTOPICS:

- PROGRAM DESIGN LANGUAGES
- HIPO
- NSSF

SPECIAL CONSIDERATIONS:

- THE OBJECTIVE OF THIS SUBSECTION IS TO PROVIDE THE STUDENT WITH ENOUGH INFORMATION TO IDENTIFY THE METHODS AND TO UNDERSTAND HOW THEY ADDRESS THE GOALS OF SECTION 2
- THE MODE OF PRESENTATION FOR EACH METHOD IS
  - SLIDE SHOWING GRAPHICS OR TEMPLATES USED IN THE METHOD
  - SLIDE THAT SUMMARIZES THE CHARACTERISTICS OF METHOD
  - SLIDES GIVING EXAMPLES OF THE USE OF THE METHOD
  - SLIDE IDENTIFYING THE GOALS AND PRINCIPLES THE METHOD SUPPORTS

INSTRUCTOR NOTES

THE POINT ABOUT IMPLEMENTATION BEING MORE THAN CODING IS VERY IMPORTANT SO MAKE IT CLEAR.

SECTION 3I - IMPLEMENTATION OVERVIEW

SUMMARY OF MAIN POINTS COVERED:

- CHARACTERIZES THE IMPLEMENTATION PHASE OF THE LIFE CYCLE

MAIN MESSAGES:

- WHAT IMPLEMENTATION IS AND WHERE IT FITS INTO THE LIFE CYCLE

SUBTOPICS:

- SCOPE OF IMPLEMENTATION PHASE
- IMPLEMENTATION ISSUES

SPECIAL CONSIDERATIONS:

- NONE

INSTRUCTOR NOTES

SECTION 3J - IMPLEMENTATION METHODS

SUMMARY OF MAIN POINTS COVERED:

- SUMMARY OF STRUCTURED DESIGN TECHNIQUES AND TESTING STRATEGIES

MAIN MESSAGES:

- EACH OF THE TECHNIQUES ADDRESS THE GOALS AND PRINCIPLES OF SOFTWARE ENGINEERING FROM A DIFFERENT PERSPECTIVE

SUBTOPICS:

- MOTIVATION/PURPOSE OF STRUCTURED DESIGN
- STRUCTURED DESIGN CONCEPTS AND GUIDELINES
- TESTING AS AN ERROR REMOVAL TECHNIQUE
- INTEGRATION STRATEGIES

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT IMPLEMENTATION IS MORE THAN CODING

INSTRUCTOR NOTES

THIS SECTION HAS THE MOST DETAILED COVERAGE OF A TOPIC AREA OF M102 SO BE PREPARED TO HAVE TO DO MORE PREPARATION FOR IT THAN THE OTHER SECTIONS.

SECTION 3K - SOFTWARE MANAGEMENT

SUMMARY OF MAIN POINTS COVERED:

- SUMMARY OF THE MAJOR ISSUES AND TECHNIQUES ASSOCIATED WITH THE MANAGEMENT OF A SOFTWARE DEVELOPMENT

MAIN MESSAGES:

- SEVERAL TECHNIQUES ARE AVAILABLE TO SUPPORT THE MANAGEMENT OF THE PRODUCTS AND THE PROCESS OF SOFTWARE DEVELOPMENT

SUBTOPICS:

- SOFTWARE PLANNING AND TRACKING
- PLANNING TECHNIQUES
- SOFTWARE COST ESTIMATION
- SOFTWARE QUALITY MANAGEMENT
- SOFTWARE CONFIGURATION MANAGEMENT

SPECIAL CONSIDERATIONS:

- EXPERIENCE OF THE CLASS WILL DETERMINE HOW MUCH DETAIL TO GO INTO HERE

INSTRUCTOR NOTES

SECTION 4 - SOFTWARE ENGINEERING AND Ada

SUMMARY OF MAIN POINTS COVERED:

- HIGHLIGHTS THE RELATIONSHIP OF Ada AND SOFTWARE ENGINEERING

MAIN MESSAGES:

- Ada "THE LANGUAGE" IS BUILT TO ADDRESS THE SOFTWARE ENGINEERING GOALS AND BUILT ON THE FOUNDATION OF SOFTWARE ENGINEERING PRINCIPLES

SUBTOPICS:

- ANALYSIS AND Ada
- DESIGN AND Ada
- STRUCTURED DESIGN AND Ada
- HOW Ada SUPPORTS THE GOALS AND PRINCIPLES

SPECIAL CONSIDERATIONS:

- KEEP THIS DISCUSSION GENERAL AVOID TALKING ABOUT Ada FEATURES DIRECTLY OR YOU WILL LOSE THE CLASS

INSTRUCTOR NOTES

MAIN MESSAGES:

1. THE M201 MODULE PRESENTS A VARIETY OF METHODOLOGIES WITHOUT ENDORSING ANY PARTICULAR METHODOLOGY.
2. M201 INSTRUCTORS MUST REMEMBER THAT IT IS NOT THE INTENTION OF THIS COURSE TO TEACH ANY OF THE METHODOLOGIES IN DEPTH. THE INTENTION IS TO INFORM THE STUDENTS OF WHAT METHODOLOGIES EXIST AND UNDER WHAT CIRCUMSTANCES THEY MIGHT BE USEFUL.
3. THE M201 INSTRUCTOR SHOULD EMPHASIZE THE RELATIONSHIP BETWEEN THE VARIOUS METHODOLOGIES AND Ada.

SPECIAL CONSIDERATIONS:

THIS COURSE REQUIRES INORDINATE BREADTH OF KNOWLEDGE ON THE PART OF THE INSTRUCTOR. THE M201 INSTRUCTOR SHOULD BE CAREFUL NOT TO ENDORSE A PARTICULAR METHODOLOGY. SOME ORGANIZATIONS MIGHT HAVE ALREADY DECIDED WHICH METHODOLOGY TO USE, AND BY ADVOCATING ONE THE INSTRUCTOR RISKS THE POSSIBILITY OF STARTING A "MY METHODOLOGY IS BETTER THAN YOUR METHODOLOGY" CONFLICT IN THE CLASS. EMPHASIZE Ada AT EVERY OPPORTUNITY.

SECTION 3

M201

SOFTWARE ENGINEERING METHODOLOGIES

INSTRUCTOR NOTES

OUTLINE SHOWS BASIC STRUCTURE OF M201.

TOPIC AREAS ASSOCIATED WITH EACH M201 SECTION ARE INDENTED ON THIS OUTLINE.

M201 OUTLINE

INTRODUCTORY SECTIONS

1. INTRODUCTION
   - SECTION OVERVIEW
   - COURSE GOALS
   - COURSE ORGANIZATION
   - CLASS PARTICIPATION

2. SOFTWARE ENGINEERING(SE)
   - SECTION OVERVIEW
   - DEFINITIONS
   - MOTIVATION FOR SOFTWARE ENGINEERING

3. THE SOFTWARE LIFE CYCLE
   - SECTION OVERVIEW
   - THE LIFE OF SOFTWARE

4. SOFTWARE ENGINEERING METHODOLOGIES
   - SECTION OVERVIEW
   - ATTRIBUTES OF METHODOLOGIES
   - WHY LEARN METHODOLOGIES?
   - ASPECTS OF AN IDEAL METHODOLOGY
   - RELATIONSHIP OF Ada AND SE METHODOLOGIES

ANALYSIS SECTIONS

5. ANALYSIS INTRODUCTION
   - SECTION OVERVIEW
   - DEFINITION
   - REQUIREMENTS ANALYSIS
   - DoD-STD-SDS VIEW OF ANALYSIS
   - ANALYSIS PERSPECTIVES AND FORMATS

INSTRUCTOR NOTES

6. SADT METHODOLOGY
   - SECTION OVERVIEW
   - OVERVIEW
   - GRAPHIC NOTATION AND CONCEPTS
   - SAMPLE APPLICATION
   - SADT EXTENSIONS

   EXERCISE 1

7. SREM METHODOLOGY
   - SECTION OVERVIEW
   - KEY CONCEPTS AND OVERVIEW
   - APPLICATION OF SREM METHODS
   - A SREM EXAMPLE

8. ENTITY DIAGRAMMING
   - SECTION OVERVIEW
   - DESCRIPTION OF THE REFERENCE EXAMPLE
   - KEY CONCEPTS WITH EXAMPLES
   - DIAGRAM SYNTAX
   - BACHMAN EXTENSIONS TO BASIC SYNTAX

   EXERCISE 2

9. PSL/PSA
   - SECTION OVERVIEW
   - OVERVIEW AND INTRODUCTION
   - PROBLEM STATEMENT LANGUAGE(PSL)
   - PSA REPORT TYPES

INSTRUCTOR NOTES

10. STRUCTURED SYSTEMS ANALYSIS METHODS
    - SECTION OVERVIEW
    - DATA FLOW DIAGRAMS
    - DATA DICTIONARY

11. SOFTWARE COST REDUCTION IN PROJECT (SCRP) METHODOLOGY
    - SECTION OVERVIEW
    - BACKGROUND
    - BENEFITS
    - UNDERLYING CONCEPTS
    - REQUIREMENTS SPECIFICATION TECHNIQUES

12. ANALYSIS WRAP-UP
    - SECTION OVERVIEW

DESIGN SECTIONS

13. DESIGN INTRODUCTION
    - SECTION OVERVIEW
    - WHAT IS DESIGN
    - ARCHITECTURAL DESIGN TECHNIQUES
    - ARCHITECTURAL DESIGN AND DoD-STD-SDS
    - DETAILED DESIGN
    - DETAILED DESIGN AND DoD-STD-SDS
    - DESIGN METHODOLOGIES PERSPECTIVE AND FORMATS

INSTRUCTOR NOTES

14. SOFTWARE COST REDUCTION PROJECT (SCRP) DESIGN METHODS
    - SECTION OVERVIEW
    - OVERVIEW
    - KEY CONCEPTS
    - SCRP HISTORY AND USAGE
    - SCRP VIEW OF ABSTRACTION, MODULARITY AND HIDING
    - SCRP DESIGN DECOMPOSITION
    - SCRP DESIGN METHOD DOCUMENTATION

15. OBJECT ORIENTED DESIGN
    - SECTION OVERVIEW
    - OBJECT ORIENTED DESIGN AND DATA ABSTRACTION
    - DESIGN CONCEPTS BY EXAMPLE

    EXERCISE 3

16. STRUCTURED DESIGN METHODOLOGY
    - SECTION OVERVIEW
    - KEY CONCEPTS

    EXERCISE 4

17. JACKSON METHODOLOGY
    - SECTION OVERVIEW
    - OVERVIEW
    - JACKSON STRUCTURED PROGRAMMING (JSP)

    EXERCISE 5

INSTRUCTOR NOTES

18. WARNIER-ORR METHOD
    - SECTION OVERVIEW

19. HIGHER ORDER SOFTWARE (HOS) METHOD
    - SECTION OVERVIEW

20. ARCHITECTURAL DESIGN METRICS
    - SECTION OVERVIEW
    - QUALITY FACTORS FOR A DESIGN
    - COUPLING
    - COHESION
    - DESIGN HEURISTICS

21. PROGRAM DESIGN LANGUAGES (PDL)
    - SECTION OVERVIEW
    - ROLE OF A PDL
    - AN Ada PDL USAGE SAMPLER

22. GRAPHICAL DETAILED DESIGN METHODS
    - SECTION OVERVIEW

23. DESIGN WRAP-UP
    - SECTION OVERVIEW

INSTRUCTOR NOTES

IMPLEMENTATION SECTIONS

24. IMPLEMENTATION INTRODUCTION
    - SECTION OVERVIEW
    - SCOPE OF THE IMPLEMENTATION PHASE
    - IMPLEMENTATION ISSUES
    - DoD-STD-SDS VIEW OF IMPLEMENTATION
    - IMPLEMENTATION PERSPECTIVES AND FORMATS

25. STRUCTURED PROGRAMMING
    - SECTION OVERVIEW
    - MOTIVATION/DEFINITION/SCOPE
    - CONTROL STRUCTURING GUIDELINES
    - Ada AND STRUCTURED PROGRAMMING

26. PROGRAM COMPLEXITY MANAGEMENT
    - SECTION OVERVIEW
    - MOTIVATION
    - COMPLEXITY MANAGEMENT TECHNIQUES AND EXAMPLE

    EXERCISE 6

27. PROGRAM CORRECTNESS
    - SECTION OVERVIEW
    - DEFINITION AND MOTIVATION
    - CORRECTNESS CONCEPTS
    - AN EXAMPLE
    - PROGRAM CORRECTNESS FROM DIFFERENT POINTS OF VIEW
    - Ada AND PROGRAM CORRECTNESS

INSTRUCTOR NOTES

28. TESTING APPROACHES
    - SECTION OVERVIEW
    - RELATIONSHIP OF TESTING AND OTHER ERROR REMOVAL TECHNIQUES
    - TESTING AND PROGRAM CHARACTERISTICS RELATIONSHIP
    - UNIT TESTING
    - INTEGRATION STRATEGIES

29. METHODS OF REVIEW
    - SECTION OVERVIEW
    - COMMON QUESTIONS ASKED ABOUT REVIEWS
    - ANSWERS TO THE QUESTIONS

30. IMPLEMENTATION WRAP-UP
    - SECTION OVERVIEW

31. COURSE WRAP-UP
    - SECTION OVERVIEW

INSTRUCTOR NOTES

NOTE THAT THE ORGANIZATION OF THE COURSE IS BASED ON THE SOFTWARE DEVELOPMENT LIFE CYCLE.

THE INSTRUCTORS IN TRAINING SHOULD BE ENCOURAGED TO IDENTIFY AREAS IN THE COURSE THEY DO NOT FEEL COMFORTABLE WITH.

GENERAL STRUCTURE

- THIS FOCUS FOLLOWS THE BASIC STRUCTURE OF M201
  - INTRODUCTORY SECTIONS
  - ANALYSIS SECTIONS
  - DESIGN SECTIONS
  - IMPLEMENTATION SECTIONS
  - WRAP-UP

- FOR EACH SECTION OF M201 WE WILL GIVE
  - AN OVERVIEW OF THE SECTION
  - A TIME ALLOCATION FOR THE SECTION

- FOR MOST MAJOR TOPIC AREAS WITHIN A SECTION WE WILL GIVE
  - A SUMMARY OF THE MAIN POINTS COVERED
  - THE MAIN MESSAGES CONTAINED IN THE TOPIC AREA
  - A LIST OF SUBTOPICS COVERED
  - A DISCUSSION OF TEACHING SUGGESTIONS FOR THAT TOPIC AREA

INSTRUCTOR NOTES

KEY SECTIONS ARE KEY BECAUSE

1. THEY INTRODUCE THE CONCEPTS/PRINCIPLES THAT A GROUP OF METHODOLOGIES HAVE IN COMMON.
2. PROVIDE CRITERIA TO EVALUATE METHODOLOGIES.
3. DEFINE COMMON TERMS.
4. COMPARE METHODOLOGIES.
5. RELATE INDIVIDUAL METHODOLOGIES TO Ada.

KEY SECTIONS OF M201

- THE STUDENTS OF M201 SHOULD BE REMINDED SEVERAL TIMES IN THE PRESENTATION OF THE COURSE OF THE KEY SECTION OF THE COURSE

- THE KEY SECTIONS INCLUDE
  - SECTION 2 - SOFTWARE ENGINEERING
  - SECTION 3 - THE SOFTWARE LIFE CYCLE
  - SECTION 4 - SOFTWARE ENGINEERING METHODOLOGIES
  - SECTION 5 - ANALYSIS INTRODUCTION
  - SECTION 12 - ANALYSIS WRAP-UP
  - SECTION 13 - DESIGN INTRODUCTION
  - SECTION 23 - DESIGN WRAP-UP
  - SECTION 24 - IMPLEMENTATION INTRODUCTION

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

- NO SPECIFIC REFERENCES NEEDED.
- THE CORE OVERVIEW SECTION OF THE INSTRUCTOR'S COURSE MODULE WILL HELP ESTABLISH AN UNDERSTANDING OF THE COURSE GOALS.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 1 - INTRODUCTION (15 MINUTES)

FOCUS OF UNIT:

- A SHORT INTRODUCTION OF THE COURSE AND THE INSTRUCTOR
- ESTABLISH GOALS AND NON-GOALS OF THE COURSE
- REVIEW COURSE ORGANIZATION AND CONTENTS

SUBSECTIONS:

- COURSE GOALS
- COURSE ORGANIZATION
- CLASS PARTICIPATION

INSTRUCTOR NOTES

COURSE GOALS

SUMMARY OF MAIN POINTS COVERED:

- COURSE OVERALL GOALS
- LEVEL OF UNDERSTANDING OF METHODOLOGIES THAT THE STUDENTS WILL HAVE AFTER THE COURSE
- WHAT THE GOALS WILL NOT PROVIDE

MAIN MESSAGES:

- TO PROVIDE A WELL BALANCED SURVEY OF SOFTWARE ENGINEERING METHODOLOGIES

SPECIAL CONSIDERATIONS:

- FOCUS ON WHAT THEY WILL GET OUT OF THE COURSE
- IT IS IMPORTANT TO MAKE IT CLEAR WHAT THE GOALS ARE NOT

INSTRUCTOR NOTES

COURSE ORGANIZATION

SUMMARY OF MAIN POINTS COVERED:

- OUTLINES THE COURSE STRUCTURE AND TOPICS
- ALLOCATES THE MATERIAL TO BE COVERED TO INDIVIDUAL DAYS

MAIN MESSAGES:

- FOLLOWS THE LIFE CYCLE
- EACH PHASE OF THE LIFE CYCLE HAS AN INTRODUCTORY AND WRAP-UP SECTION

SUBTOPICS:

- TOPICAL OUTLINE
- ALLOCATION OF MATERIAL TO INDIVIDUAL DAYS/TIMES

SPECIAL CONSIDERATIONS:

- AVOID GOING INTO THE DETAILS OF THE OUTLINE
- HIGHLIGHT THE STRUCTURE OF THE COURSE

INSTRUCTOR NOTES

CLASS PARTICIPATION

SUMMARY OF POINTS COVERED:

- ATTEMPTS TO BOUND WHAT THE STUDENTS SHOULD BE LOOKING FOR IN EACH METHODOLOGY

MAIN MESSAGES:

- WE EXPECT PARTICIPATION IN THE COURSE

SUBTOPICS:

- FORMS OF PARTICIPATION
  - NOTES
  - EXERCISES
  - DISCUSSIONS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE NEED FOR PARTICIPATION IN THIS TYPE OF COURSE

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE J.D. MUSA PAPER GIVES A GOOD OVERVIEW OF SOFTWARE ENGINEERING. IT INCLUDES MORE THAN JUST ONE PERSON'S VIEW OF WHAT SOFTWARE ENGINEERING IS.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 2 - SOFTWARE ENGINEERING (20 MINUTES)

FOCUS OF SECTION:

- INTRODUCES SOME DEFINITION OF SOFTWARE ENGINEERING
- TRIES TO MOTIVATE WHY SOFTWARE ENGINEERING IS IMPORTANT

SUBSECTIONS:

- DEFINITIONS
- MOTIVATION FOR SOFTWARE ENGINEERING

INSTRUCTOR NOTES

DEFINITIONS

SUMMARY OF MAIN POINTS COVERED:

- THREE RELATED DEFINITIONS, WITH FOCUS ON NON-BUSINESS APPLICATIONS

MAIN MESSAGES:

- SOFTWARE ENGINEERING DOES NOT HAVE JUST ONE DEFINITION

SUBTOPICS:

- DEFINITIONS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT SOFTWARE ENGINEERING IS AN EVOLVING DISCIPLINE THAT HAS NO SINGLE DEFINITION

INSTRUCTOR NOTES

MOTIVATION FOR SOFTWARE ENGINEERING

SUMMARY OF MAIN POINTS COVERED:

- PUT ROLE OF SOFTWARE ENGINEERING IN ITS HISTORICAL PERSPECTIVE

MAIN MESSAGES:

- MOST OF THE MOTIVATION FOR SOFTWARE ENGINEERING CAN BE FOCUSED ON THE COSTLY NATURE OF SOFTWARE TODAY AND IN THE FUTURE

SUBTOPICS:

- THE SOFTWARE CRISIS
- ADDITIONAL PROBLEMS WITH SOFTWARE
- THE ENVIRONMENT FACING SOFTWARE ENGINEERING
- SOFTWARE PRODUCTIVITY
- SOFTWARE COST VS. HARDWARE COST

SPECIAL CONSIDERATIONS:

- FOCUS ON THE MAGNITUDE OF THE PROBLEM NOT ON THE DETAIL NUMBERS
- RELATE ANY PERSONAL EXPERIENCES YOU MAY HAVE WITH THE COSTLY NATURE OF SOFTWARE

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE SEEING REPORT PROVIDES A VERY GOOD OVERVIEW OF THE SOFTWARE LIFE CYCLE AND SOME OF THE LIMITATIONS OF THE TRADITIONAL LIFE CYCLE. THIS REPORT ALSO GIVES A GOOD OVERVIEW OF THE REQUIREMENTS FOR A SOFTWARE ENGINEERING ENVIRONMENT THAT SUPPORTS THE FULL SOFTWARE LIFE CYCLE.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 3 - THE SOFTWARE LIFE CYCLE (20 MINUTES)

FOCUS OF UNIT:

- REVIEWS THE TRADITIONAL SOFTWARE LIFE CYCLE
- IDENTIFIES THE PROBLEMS WITH THIS TRADITIONAL VIEW

SUBSECTION:

- THE LIFE OF SOFTWARE

INSTRUCTOR NOTES

THE LIFE OF SOFTWARE

SUMMARY OF MAIN POINTS COVERED:

- IDENTIFY CRITICAL PHASES OF THE LIFE OF SOFTWARE

MAIN MESSAGES:

- SOFTWARE LIFE CYCLE MODELS ARE NOT STANDARD, EVERY ORGANIZATION USES A SLIGHTLY DIFFERENT VERSION

SUBTOPICS:

- THE DEVELOPMENT LIFE CYCLE MODEL
- SOFTWARE MAINTENANCE ACTIVITIES
- SHORTCOMINGS OF THIS MODEL
- A MODEL THAT ADDRESSES THE SHORTCOMINGS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT THE METHODOLOGIES THAT ARE DESCRIBED IN THE FOLLOWING SECTIONS WILL BE ORGANIZED ACCORDING TO THE TRADITIONAL LIFE CYCLE MODEL PHASES

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE METHODMAN DOCUMENTS PROVIDE A VERY GOOD OVERVIEW OF THE REQUIREMENTS AND STATE-OF-THE-ART IN Ada ORIENTED METHODOLOGY. ENCOURAGE THE CLASS TO READ THIS, SINCE IT IS THE SOURCE FOR MANY OF THE METHODOLOGY EVALUATION CRITERIA USED IN M201.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 4 - SOFTWARE ENGINEERING METHODOLOGIES (40 MINUTES)

FOCUS OF SECTION:

- CHARACTERIZES SOFTWARE ENGINEERING METHODOLOGIES
- MOTIVATES WHY METHODOLOGIES ARE IMPORTANT
- PROVIDES AN OVERVIEW OF THE CHARACTERISTICS OF A FULL LIFE CYCLE ORIENTED METHODOLOGY
- IDENTIFIES SOME OF THE RELATIONSHIPS BETWEEN THE Ada EFFORT AND SOFTWARE ENGINEERING METHODOLOGIES

SUBSECTIONS:

- ATTRIBUTES OF METHODOLOGIES
- WHY LEARN METHODOLOGIES
- ASPECTS OF AN IDEAL METHODOLOGY
- RELATIONSHIP OF Ada AND SOFTWARE ENGINEERING METHODOLOGIES

INSTRUCTOR NOTES

ATTRIBUTES OF METHODOLOGIES

SUMMARY OF MAIN POINTS COVERED:

- CHARACTERIZE METHODOLOGIES
- IDENTIFY THOSE AREAS WE HAVE CONTROL OVER AND THOSE WE DO NOT WHEN DEVELOPING SOFTWARE

MAIN MESSAGES:

- DEFINE THE CHARACTERISTICS OF A GOOD METHODOLOGY

SUBTOPICS:

- ASPECTS OF A METHODOLOGY
  - CREATIVE
  - INTELLECTUAL
  - CLERICAL
  - MECHANICAL
- RELATIONSHIP BETWEEN THE VARIOUS ASPECTS

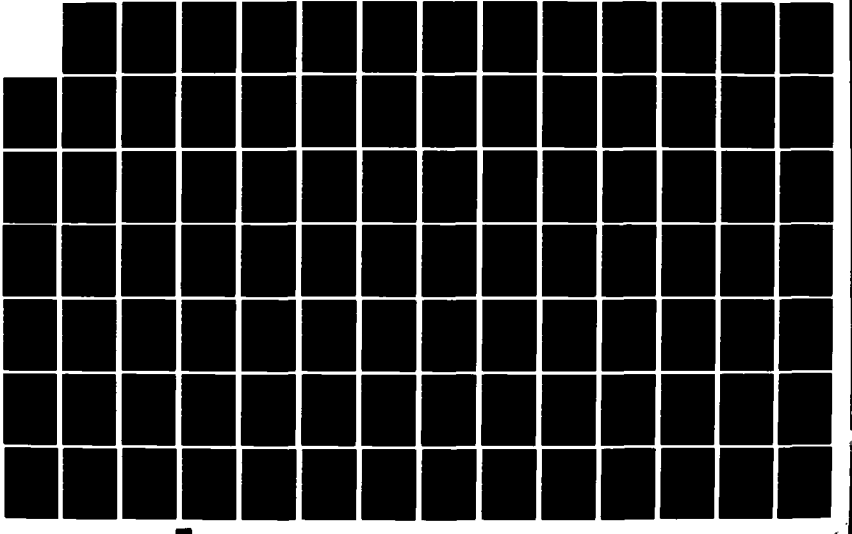
SPECIAL CONSIDERATIONS:

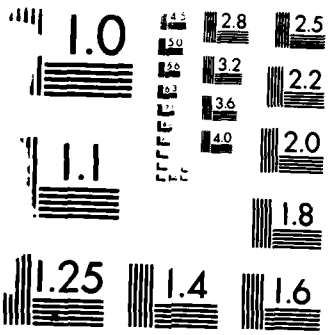
- EMPHASIZE THE VARIOUS ASPECTS HERE BECAUSE IT GIVES THE STUDENTS A WAY OF LOOKING AT METHODOLOGIES THAT IS NOT REDUNDANT WITH WHAT IS PRESENTED IN THE COURSE

INSTRUCTOR NOTES

AD-A165 349 ADA (TRADEMARK) TRAINING CURRICULUM INSTRUCTOR'S COURSE 2/4
S500 METHODOLOGY MODULES(U) SOFTECH INC WALTHAM MA
1986 DAAB07-85-C-K506

UNCLASSIFIED F/G 5/9 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

WHY LEARN METHODOLOGIES?

SUMMARY OF MAIN POINTS COVERED:

- MORE MOTIVATION FOR THE STUDY OF METHODOLOGIES

MAIN MESSAGES:

- SOFTWARE ENGINEERING METHODOLOGIES HAVE AN IMPACT ON THE COST AND MAINTAINABILITY OF SOFTWARE

SUBTOPICS:

- QUALITY VIEWPOINT
- COST VIEWPOINT
- CONSTRAINT VIEWPOINT

SPECIAL CONSIDERATIONS:

- INCLUDE AT THIS POINT ANY PERSONAL EXPERIENCES OF THE INSTRUCTOR THAT SUPPORTS ANY OF THE VIEWPOINTS PRESENTED

INSTRUCTOR NOTES

NO SPECIAL CONSIDERATIONS HERE.

ASPECTS OF AN IDEAL METHODOLOGY

SUMMARY OF MAIN POINTS COVERED:

- PROVIDE A VIEW OF AN "IDEAL" FULL LIFE CYCLE SOFTWARE ENGINEERING METHODOLOGY

MAIN MESSAGES:

- THIS SUBSECTION PROVIDES THE "IDEAL" METHODOLOGY TO GIVE THE STUDENTS SOMETHING AGAINST WHICH TO MEASURE THE INDIVIDUAL METHODOLOGIES INCLUDED IN THE COURSE

SUBTOPICS:

- OVERVIEW
- REQUIREMENTS
- ANALYSIS PHASE CHARACTERISTICS
- DESIGN PHASE CHARACTERISTICS
- MANAGEMENT
- CORRECTNESS ANALYSIS

INSTRUCTOR NOTES

RELATIONSHIP OF Ada AND SE METHODOLOGIES

SUMMARY OF MAIN POINTS COVERED:

- REVIEW OF THE VARIOUS Ada RELATED EFFORTS THAT HAVE METHODOLOGIES AS THEIR FOCUS

MAIN MESSAGES:

- SEVERAL ASPECTS OF THE OVERALL Ada EFFORT ARE FOCUSED ON S.E. METHODOLOGIES

SUBTOPICS:

- THREE ASPECTS OF THE Ada EFFORT
- Ada ORIENTED METHODOLOGY GOALS
- "METHODMAN" GOALS
- "STARS" PROGRAM GOALS

SPECIAL CONSIDERATIONS:

- SINCE WE ARE TRYING TO MOTIVATE THE STUDYING OF METHODOLOGIES, FOCUS ON THE GOALS OF THE EFFORTS MENTIONED, NOT ON THE ORGANIZATIONS OR CURRENT ACTIVITIES ASSOCIATED WITH THESE EFFORTS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

WIENBERG'S BOOK PROVIDES A DIFFERENT VIEWPOINT ON ANALYSIS AND CAN BE READ IN ONE SITTING. DoD-STD-SDS AND RELATED DATA ITEM DESCRIPTION IS A MUSI FOR THE CLASS TO READ. IT WILL SOON BE THE BIBLE BY WHICH WE ALL SHALL LIVE.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 5 - ANALYSIS INTRODUCTION (40 MINUTES)

FOCUS OF SECTION:

- PROVIDES A VIEW OF THE REQUIREMENTS ANALYSIS AND SPECIFICATION PHASE OF THE SOFTWARE LIFE CYCLE
- FOCUS IS ON DoD'S VIEWPOINT HERE, NOT ON BUSINESS OR INDUSTRIAL VIEWPOINTS

SUBSECTIONS:

- DEFINITION
- REQUIREMENTS ANALYSIS
- DoD-STD-SDS VIEW OF ANALYSIS
- ANALYSIS PERSPECTIVE AND FORMATS

INSTRUCTOR NOTES

REQUIREMENTS ANALYSIS

SUMMARY OF MAIN POINTS COVERED:

- INTRODUCTION TO THE WHAT, WHY, AND HOW OF REQUIREMENTS ANALYSIS AND SPECIFICATION

MAIN MESSAGES:

- HOW ANALYSIS FITS INTO THE SOFTWARE DEVELOPMENT PROCESS

SUBTOPICS:

- DEFINITION
- ROLE OF THE ANALYST
- CONSEQUENCE OF WRONG REQUIREMENTS
- RELATIONSHIP OF ANALYSIS AND DESIGN
- ROLE OF THE DESIGNER
- GENERAL GUIDELINES

SPECIAL CONSIDERATIONS:

- FOCUS ON THE GUIDELINES
- USE PERSONAL EXPERIENCES TO HELP MOTIVATE THE CRITICAL NEED FOR ANALYSIS
- THIS SUBSECTION MAY RESULT IN SOME HEATED DISCUSSION FOR THE STUDENTS WHO HAVE BEEN CODING IN ASSEMBLY LANGUAGE FOR YEARS AND HAVE NEVER SEEN ANY THING USEFUL COME OUT OF ANALYSIS

INSTRUCTOR NOTES

DoD-STD-SDS VIEW OF ANALYSIS

SUMMARY OF MAIN POINTS COVERED:

- ILLUSTRATE THE EVOLVING STANDARDS COMING FROM THE DoD RELATIVE TO ANALYSIS

MAIN MESSAGES:

- EVOLVING STANDARDS WILL CONSTRAIN THE WAY WE DEVELOP SOFTWARE

SUBTOPICS:

- ANALYSIS ACTIVITIES
- ANALYSIS PRODUCTS
- ANALYSIS REVIEWS
- SDS DOCUMENT OUTLINES

SPECIAL CONSIDERATIONS:

- FOCUS ON THE PRODUCTS THAT DoD EXPECTS OUT OF ANALYSIS
- WHEN REVIEWING THE OUTLINES OF THE SPECIFICATION, FOCUS ON THE CONTENT NOT THE STRUCTURE OF THE DOCUMENTS

INSTRUCTOR NOTES

ANALYSIS PERSPECTIVES AND FORMATS

SUMMARY OF MAIN POINTS COVERED:

- PROVIDE A SET OF CATEGORIES INTO WHICH WE CAN GROUP ANALYSIS METHODOLOGIES
- IDENTIFY THE VARIOUS FORMATS THAT ARE CURRENTLY IN USE TO EXPRESS THE RESULTS OF ANALYSIS

MAIN MESSAGES:

- MOST ANALYSIS METHODOLOGIES FIT INTO A LIMITED NUMBER OF CATEGORIES

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT THE METHODOLOGIES TO BE COVERED USE DIFFERENT FORMATS AND APPROACH ANALYSIS FROM DIFFERENT PERSPECTIVES AND THAT THEY WILL NOT FIND A SINGLE METHODOLOGY THAT COVERS ALL POSSIBLE ANALYSIS SITUATIONS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE ROSS PAPER IS A VERY GOOD BALANCE BETWEEN AN OVERVIEW AND THE DETAILS OF SADT. THIS PAPER IS SLOW GOING AT SOME POINTS SO ALLOW YOURSELF SOMETIME WHEN GOING OVER IT.

TIME FOR EXERCISE 1 NOT INCLUDED HERE.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 6 - SADT METHODOLOGY (120 MINUTES)

FOCUS OF SECTION:

- OVERVIEW OF ONE THE MORE POPULAR GRAPHICALLY ORIENTED METHODOLOGIES
- REFERENCE 2 PROVIDES A GOOD BASIS TO TEACH FROM IF YOU ARE NOT FAMILIAR WITH THIS METHODOLOGY
- EXERCISE 1 - APPLYING SADT

SUBSECTION:

- GRAPHIC NOTATION AND CONCEPTS
- SAMPLE APPLICATION
- EXERCISE

INSTRUCTOR NOTES

GRAPHIC NOTATION AND CONCEPTS

SUMMARY OF MAIN POINTS COVERED:

- OVERVIEW OF THE VARIOUS GRAPHICAL SYMBOLS AND STRUCTURES USED TO EXPRESS THE RESULTS OF ANALYSIS

MAIN MESSAGES:

- SADT PROVIDES TECHNIQUES TO AID YOU IN THE UNDERSTANDING OF A SYSTEM

SUBTOPICS:

- SADT DIAGRAMS
- ACTIVITIES
- DATA
- LABELS
- ACTIVATIONS
- DECOMPOSITION
- ICOMS
- MODELS
- VIEWPOINTS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE ROLE OF MODELS AND VIEWPOINTS
- TAKE YOUR TIME THROUGH THIS SUBSECTION, SINCE MANY OF THE OTHER GRAPHICALLY ORIENTED METHODOLOGIES SHARE COMMON FEATURES WITH SADT (IT WILL MAKE TEACHING THEM EASIER)

INSTRUCTOR NOTES

SAMPLE APPLICATION

SUMMARY OF MAIN POINTS COVERED:

- PROVIDE A SMALL BUT REAL EXAMPLE OF THE USE OF SADT

MAIN MESSAGES:

- SADT IS USEABLE ON "REAL" PROJECTS

SPECIAL CONSIDERATIONS:

- WALKTHROUGH THE EXAMPLE, POINTING OUT HOW EACH OF THE GRAPHICAL FEATURES INTRODUCED BEFORE CAN BE USED TO ESTABLISH REQUIREMENTS FOR A SYSTEM DURING ANALYSIS
- FOCUS ON THE USE OF FEATURES, NOT ON THE TRIDENT SUBMARINE DEFENSIVE ACTIONS

INSTRUCTOR NOTES

EXERCISE 1

SADT EXERCISE: 90 MINUTES

- SIMPLE PROBLEM TO DEMONSTRATE THE USE OF THE SADT GRAPHICAL TECHNIQUES FOR REQUIREMENTS ANALYSIS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE ALFORD PAPER GIVES A FAIR OVERVIEW OF SREM BUT LACKS SOME OF THE DETAILS. WE HAVE NOT FOUND ANY SINGLE DOCUMENT THAT GIVES A GOOD BALANCED PRESENTATION OF SREM.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 7 - SREM METHODOLOGY (150 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF A METHODOLOGY WHICH WAS EXPLICITLY DEVELOPED TO SUPPORT THE ANALYSIS AND SYSTEM DESIGN OF LARGE EMBEDDED SYSTEMS

SUBSECTIONS:

- KEY CONCEPTS AND OVERVIEW
- APPLICATION OF SREM METHODS
- A SREM EXAMPLE

INSTRUCTOR NOTES

SUMMARY OF MAIN POINTS COVERED:

- REVIEW THE MAJOR ELEMENTS OF THE METHODOLOGY
- OUTLINE THE STEPS THAT ONE GOES THROUGH TO USE THE METHODOLOGY

MAIN MESSAGES:

- SREM IS BUILT ON A COMBINATION OF GRAPHICAL AND "DATABASE" ORIENTED TECHNIQUES

SUBTOPICS:

- REQUIREMENTS STATEMENT LANGUAGE (RSL)
- RESPONSE-NETWORKS
- AUTOMATION OF THE PROCESS
- BENEFITS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT A HIGH DEGREE OF AUTOMATED SUPPORT IS PROVIDED WITH SREM

INSTRUCTOR NOTES

APPLICATION OF SREM METHODS

SUMMARY OF MAIN POINTS COVERED:

- DETAILS OF THE VARIOUS FEATURES OF SREM
- PRESENTATION IS ORGANIZED AROUND THE VARIOUS STEPS IN THE PROCESS OF USING THE METHODOLOGY

MAIN MESSAGES:

- SREM METHODOLOGY HAS AN ALMOST COOKBOOK NATURE

SUBTOPICS:

- OVERVIEW OF THE BASIC PHASES
- PHASE 1: DEFINITION OF SUBSYSTEM ELEMENTS
- PHASE 2: EVALUATION OF THE KERNEL
- PHASE 3: COMPLETION OF THE FUNCTIONAL DEFINITION
- PHASE 4: COMPLETION OF MANAGEMENT AND CONTROL INFORMATION
- PHASE 5: DYNAMIC FUNCTIONAL VALIDATION
- PHASE 6: PERFORMANCE REQUIREMENTS APPROACH
- PHASE 7: ANALYTIC FEASIBILITY DEMONSTRATION

SPECIAL CONSIDERATION:

- THIS SECTION HAS A LOT IN IT, SO COVERING IT IN DETAIL IS NOT A GOOD IDEA
- EMPHASIZE THE STEPS THAT ONE GOES THROUGH IN USING THE METHODOLOGY SINCE THIS IS ONE OF THE FEW METHODOLOGIES THAT BREAKS THE PROCESS DOWN IN ALMOST A COOKBOOK MANNER
- USE THE DIAGRAMS TO DESCRIBE FEATURES OF THE METHODOLOGY AVOIDED, READING THE TEXTUAL REPORTS AND RSL STATEMENTS WHEN EVER YOU CAN
- IN THIS SECTION IT IS VERY EASY TO LOSE THE CLASS, SO KEEP THE COVERAGE OF ANY TOPIC AS LIGHT AS POSSIBLE

INSTRUCTOR NOTES

A SREM EXAMPLE

SUMMARY OF MAIN POINTS COVERED:

- PORTIONS OF THE REPORTS AND GRAPHICS OF SREM FROM A REAL EXAMPLE

MAIN MESSAGES:

- SREM HAS BEEN USED ON "REAL" PROJECTS

SUBTOPICS:

- SAMPLER OF OUTPUTS OF THE 7 PHASES ABOVE

SPECIAL CONSIDERATIONS:

- FOCUS ON THE STRUCTURE OF THE INFORMATION NOT THE CONTENTS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE MARCU, MCGOWAN PAPER IS A GOOD OVERVIEW OF DATA MODELING AND ENTITY - RELATIONSHIP DIAGRAMMING. THE PROBLEM WITH DATA MODELING REFERENCES IN GENERAL IS THAT THEY ALL SEEM TO USE DIFFICULT DIAGRAMMING SYNTAX, SO DON'T GET TIED UP ON THE SYNTAX.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 8 - ENTITY DIAGRAMMING (90 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF INFORMATION OR DATA MODELING WHICH REQUIRES YOU TO LOOK AT A SYSTEM FROM A DIFFERENT PERSPECTIVE DURING ANALYSIS

SUBSECTION:

- DESCRIPTION OF THE REFERENCE EXAMPLE
- KEY CONCEPTS WITH EXAMPLES
- DIAGRAM SYNTAX
- BACHMAN EXTENSIONS TO BASIC SYNTAX
- EXERCISE 2

SPECIAL CONSIDERATIONS:

- THE MATERIAL HERE IS LIGHT AND ENCOURAGES CLASS PARTICIPATION, SO TAKE ADVANTAGE OF IT

INSTRUCTOR NOTES

DESCRIPTION OF THE REFERENCE EXAMPLE

SUMMARY OF MAIN POINTS COVERED:

- DESCRIBES THE EXAMPLE THAT WILL BE USED THROUGHOUT THIS SECTION

MAIN MESSAGES:

- PRESENTATION OF THE REFERENCE EXAMPLE

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE DIFFERENT NATURE OF THIS SECTION IN THAT IT REQUIRES A LOT OF CLASS PARTICIPATION

INSTRUCTOR NOTES

KEY CONCEPTS WITH EXAMPLES

SUMMARY OF MAIN POINTS COVERED:

- ILLUSTRATE THE GRAPHIC ELEMENTS OF THE METHODOLOGY
- USE THE REFERENCE EXAMPLE TO ILLUSTRATE WHAT EACH ELEMENT IS USED FOR

MAIN MESSAGES:

- KEY CONCEPTS OF THE METHODOLOGY ARE
  - ENTITIES
  - RELATIONS

SUBTOPICS:

- ENTITIES
  - CHARACTERISTICS
  - PROPERTIES
  - ATTRIBUTES
- ENTITY CLASS
- RELATIONS
  - CHARACTERISTICS
- RELATION CLASS

SPECIAL CONSIDERATIONS:

- THE KEY CONCEPTS TO GET ACCESS TO THE CLASS ARE
  - ENTITIES
  - RELATIONS

  FOCUS ON THESE INSTEAD OF ATTRIBUTES
- GIVE THE CLASS EXAMPLES OF OTHER ENTITIES AND RELATIONS THAT ARE ORIENTED TOWARD THEIR APPLICATION AREAS
- CLASS IS ASKED TO FILL IN THE BLANKS ON SEVERAL OF THE SLIDES

INSTRUCTOR NOTES

DIAGRAM SYNTAX

SUMMARY OF MAIN POINTS COVERED:

- ILLUSTRATE THE DIAGRAMMING ASPECTS OF THE METHODOLOGY
- DESCRIBE THE VARIOUS WAYS THAT RELATIONS CAN BE EXPRESSED

MAIN MESSAGES:

- EXPOSURE OF THE UNDERLYING DIAGRAMMING TECHNIQUES

SUBTOPICS:

- BASIC SYMBOLS
- POSSIBLE CONNECTIONS
- ENTITY RELATION DIAGRAMS

SPECIAL CONSIDERATIONS:

- USE CLASS-RELEVANT EXAMPLES OF THE VARIOUS TYPES OF RELATIONS WHEN DESCRIBING THE DIAGRAMMING ASPECTS OF THE METHODOLOGY

INSTRUCTOR NOTES

BACHMAN EXTENSIONS TO BASIC SYNTAX

SUMMARY OF MAIN POINTS COVERED:

- PROVIDES AN OVERVIEW OF THE EXTENSIONS TO ENTITY DIAGRAMMING MADE BY BACHMAN

MAIN MESSAGES:

- BACHMAN EXTENSIONS ADDRESS THE RESTRICTIONS PLACED ON THE METHODOLOGY IN DBMS APPLICATIONS

SUBTOPICS:

- RELATION CLASS RATIOS
- RATIO TYPES
- ANNOTATING BASIC DIAGRAMS WITH RATIOS
- UNACCEPTABLE/UNDESIRABLE RELATION CLASS
- CONVERSION TECHNIQUES

SPECIAL CONSIDERATIONS:

- EMPHASIZE TO THE CLASS THAT THIS METHODOLOGY IS THE BASIS FOR SEVERAL OTHER METHODOLOGIES THAT WE WILL TALK ABOUT
  - SREM
  - PSL/PSA

INSTRUCTOR NOTES

EXERCISE 2

ENTITY DIAGRAMMING EXERCISE: 60 MINUTES

- A SIMPLE PROBLEM WHICH DEMONSTRATES THE USE OF ENTITY DIAGRAMMING AND BACHMAN TECHNIQUES

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE TEICHROEW, HERSHET PAPER IS THE BEST OVERVIEW AROUND ON PSL/PSA AND WAS THE SOURCE FOR MOST OF THE M201 MATERIAL.

COMMENT TO THE CLASS THAT THIS IS SIMILAR TO SREM'S RSL.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 9 - PSL/PSA (40 MINUTES)

FOCUS OF SECTION:

- A VERY QUICK OVERVIEW OF A TEXTUALLY ORIENTED ANALYSIS METHODOLOGY THAT EXPRESSES THE RELATIONSHIPS BETWEEN ENTITIES THAT MAKE UP A SYSTEM

SUBSECTIONS:

- PROBLEM STATEMENT LANGUAGE (PSL)
- PSA REPORT TYPES

INSTRUCTOR NOTES

PROBLEM STATEMENT LANGUAGE (PSL)

SUMMARY OF MAIN POINTS COVERED:

- SUMMARIZE THE TYPES OF INFORMATION THAT WILL BE CAPTURED IN A PSL ANALYSIS USING ENTITY DIAGRAMMING

MAIN MESSAGES:

- PSL CAPTURES REQUIREMENTS AS TEXTUAL STATEMENTS THAT CHARACTERIZE THE SYSTEM

SUBTOPICS:

- OBJECTIVES
- KEYWORDS
- BASIS OF PSL SHOW WITH EXAMPLES
  - DATA EXAMPLE
  - PROCESS EXAMPLE
- FORMATTED PSL SAMPLES

SPECIAL CONSIDERATIONS:

- WALK THROUGH THE DIAGRAMS GIVING EXAMPLES OF THE ENTITIES ONE MIGHT CONSIDER IN AN ANALYSIS
- TRY TO RELATE THE ENTITIES TO THOSE OF THE APPLICATIONS THE CLASS IS INVOLVED IN

INSTRUCTOR NOTES

PSA REPORT TYPES

SUMMARY OF MAIN POINTS COVERED:

- ILLUSTRATE THE TYPES OF REPORTS THAT PSA WILL PROVIDE

MAIN MESSAGES:

- PSA PROVIDES A WIDE RANGE OF ANALYSIS CAPABILITIES

SUBTOPICS:

- SAMPLE REPORTS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE TYPES OF INFORMATION IN EACH REPORT, NOT THE SPECIFIC CONTENTS SHOWN ON THE SLIDES

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE DEMARCO BOOK IS AN EXCELLENT REFERENCE ON THE METHODOLOGY AS WELL AS ON ANALYSIS IN GENERAL. THE ONLY POTENTIAL PROBLEM IS THAT THE ORIENTATION IS TOWARDS BUSINESS APPLICATIONS NOT MILITARY SYSTEMS.

- THESE METHODOLOGIES HAVE MANY OF THE CHARACTERISTICS ALREADY COVERED IN THE PREVIOUS SECTIONS.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 10 - STRUCTURED SYSTEMS ANALYSIS METHODS (20 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF TWO "BUSINESS" ORIENTED METHODOLOGIES OF ANALYSIS THAT COULD BE APPLIED TO EMBEDDED SYSTEMS

SUBSECTIONS:

- DATA FLOW DIAGRAMS
- DATA DICTIONARY

INSTRUCTOR NOTES

DATA FLOW DIAGRAMS

SUMMARY OF MAIN POINTS COVERED:

- ILLUSTRATE TWO FORMS OF DATA FLOW DIAGRAMS THAT EXPRESS THE FLOW OF DATA BETWEEN FUNCTIONS

MAIN MESSAGES:

- DATA FLOW DIAGRAMS ARE YET ANOTHER METHOD OF EXPRESSING REQUIREMENTS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE SIMILARITIES OF THE TWO METHODS
- COMPARE THESE METHODS WITH SADT NOTATION AND CONCEPTS

INSTRUCTOR NOTES

DATA DICTIONARY

SUMMARY OF MAIN POINTS COVERED:

- INTRODUCE THE DATA DICTIONARY TECHNIQUES FOR CHARACTERIZING THE DATA IN THE SYSTEM BEING ANALYZED

MAIN MESSAGES:

- DATA DICTIONARY CAPTURES THE CHARACTERISTICS OF THE INTERFACES ON DFDs

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE RELATIONSHIP BETWEEN THE DATA FLOW DIAGRAMS AND THE DATA DICTIONARIES
- ALSO INDICATE THE ROLE THAT DATA STORES PLAY IN MOST SYSTEMS AND HOW THESE METHODS MAKE THEM EXPLICIT

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE HENNINGER PAPER IS THE BEST OVERVIEW OF THE METHODOLOGY. IT GIVES THE MOTIVATION AND HISTORY OF THE A-7E PROJECT AS WELL AS A REVIEW OF METHODS, TEMPLATE ETC. IT IS SUGGESTED READING FOR ALL INSTRUCTORS IN TRAINING.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 11 - SOFTWARE COST REDUCTION PROJECT METHODOLOGY (90 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF A METHODOLOGY THAT WAS DEVELOPED TO ADDRESS REDUCING COSTS OF A REAL TIME MILITARY SYSTEM DURING ITS FULL LIFE CYCLE

SUBSECTIONS:

- BACKGROUND
- BENEFITS
- UNDERLYING CONCEPTS
- REQUIREMENTS SPECIFICATION TECHNIQUES

INSTRUCTOR NOTES

BACKGROUND

SUMMARY OF MAIN POINTS COVERED:

- OVERVIEW OF THE SCR PROJECT, GOALS AND EXPECTED RESULTS

MAIN MESSAGES:

- THIS PROJECT IS THE FIRST ONE OF ITS TYPE THAT IS ACTUALLY TRYING TO MEASURE THE COST SAVINGS ASSOCIATED WITH APPLYING A METHODOLOGY

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE TIMELINESS OF THE PROJECT

INSTRUCTOR NOTES

BENEFITS

SUMMARY OF MAIN POINTS COVERED:

- OUTLINE THE EXPECTED BENEFITS OF THE SCR PROJECT METHODOLOGY

MAIN MESSAGES:

- THE EXPECTED BENEFITS ARE CLOSELY MATCHED TO THE S.E. GOALS IN GENERAL

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE BENEFITS OF THE METHODOLOGY THAT APPLY TO THE INTERESTS OF THE CLASS

INSTRUCTOR NOTES

KEY CONCEPTS

SUMMARY OF MAIN POINTS COVERED:

- OUTLINES THE CONCEPTS OF THE METHODOLOGY THAT WILL BE EXPANDED IN LATER SUBSECTIONS

MAIN MESSAGES:

- THE METHODOLOGY IS BUILT ON MODERN S.E. PRINCIPLES

SUBTOPICS:

- SEPARATION OF CONCERNS
- (ALMOST) FORMAL SPECIFICATIONS
- NOTATION
- ABSTRACT INTERFACES/INFORMATION HIDING
- DOCUMENTATION AS A DESIGN MEDIUM

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT MOST OF THESE CONCEPTS ARE COMMON TO THE CONCEPTS UPON WHICH Ada IS BUILT
- EMPHASIZE THE NEED TO DOCUMENT THE RESULTS OF REQUIREMENTS ANALYSIS

INSTRUCTOR NOTES

REQUIREMENTS SPECIFICATION TECHNIQUES

SUMMARY OF MAIN POINTS COVERED:

- OVERVIEW OF THE VARIOUS TECHNIQUES USED IN THE DEVELOPMENT OF A SOFTWARE REQUIREMENTS SPECIFICATION
- DEFINE TERMINOLOGY USED

MAIN MESSAGES:

- THE SPECIFICATION STRUCTURE IS DRIVEN BY THE NEED TO SATISFY MODERN S.E. PRINCIPLES

SUBTOPICS:

- DOCUMENT CONTENTS
- KEY SPECIFICATION COMPONENTS AND SAMPLES
  - DATA ITEM DESCRIPTIONS
  - TEXT MACROS
  - SOFTWARE FUNCTION DESCRIPTIONS
    - DEFINITION OF A FUNCTION
    - VIRTUAL DEVICES
    - CONDITIONS AND EVENTS
    - MODES
    - EXAMPLES
- PACKAGING AN SCRP SPECIFICATION
- SUMMARY OF THE TECHNIQUES

SPECIAL CONSIDERATIONS:

- POINT OUT THE SOURCE OF MANY OF THE TEMPLATE SAMPLES
  - THE SPECIFICATION FOR THE A-7E (AIRCRAFT) OPERATIONAL FLIGHT PROGRAM DEVELOPED BY THE NAVAL RESEARCH LABORATORY
- FOCUS ON THE TYPES OF INFORMATION IN THE VARIOUS TEMPLATES AND NOT ON THE SPECIFIC INFORMATION FOR THE A-7E AIRCRAFT

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

METHODMAN SHOULD BE READ BY ALL INSTRUCTOR'S IN TRAINING SINCE IT IS THE SOURCE OF MOST OF THE COMPARISON CRITERIA USED HERE AND IN THE DESIGN WRAP-UP SECTION.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 12 - ANALYSIS WRAP-UP (40 MINUTES)

SUMMARY OF MAIN POINTS COVERED:

- THIS SECTION TAKES A LOOK AT EACH OF THE ANALYSIS METHODOLOGIES AND EVALUATES THEM IN ACCORDANCE WITH THE FOLLOWING
  - TECHNICAL CHARACTERISTICS
  - COVERAGE PROVIDED
  - USAGE CHARACTERISTICS
  - MANAGEMENT CHARACTERISTICS
  - RELATIONSHIP TO Ada

SUBTOPICS:

- MAIN POINTS TO CONSIDER
- ANALYSIS PHASE COVERAGE BY METHODOLOGY
- METHODOLOGY EVALUATION CRITERIA
- COMPARISON OF ANALYSIS METHODOLOGIES
  - TECHNICAL CHARACTERISTICS
  - USAGE CHARACTERISTICS
  - MANAGEMENT CHARACTERISTICS
- RELATIONSHIP OF Ada AND ANALYSIS METHODOLOGY FEATURES

SPECIAL CONSIDERATIONS:

- ALL WRAP-UP SECTIONS ARE IMPORTANT SINCE THEY GIVE THE CLASS A SET OF CRITERIA TO EVALUATE EACH OF THE METHODOLOGIES AGAINST
- TRY TO GET THE CLASS TO DISCUSS THE COMPARISONS PROVIDED IN THE TABLES; YOU WANT THEM TO REVIEW WHAT THEY HAVE LEARNED AND TO PUT IT INTO PERSPECTIVE BEFORE GOING ON
- DO NOT CUT THIS SECTION SHORT, ITS IMPORTANT
- GET THE CLASS TO PARITICPATE

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE WEINBERG BOOK PROVIDES A DIFFERENT VIEW OF DESIGN THAN MOST OTHER LITERATURE AND AS SUCH WILL FORCE THE READER TO LOOK AT DESIGN FROM A NON-TRADITIONAL PERSPECTIVE.

DoD-STD-SDS IS A MUST.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 13 - DESIGN INTRODUCTION (50 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN INTRODUCTION TO THE ARCHITECTURAL AND DETAILED DESIGN PHASES OF THE SOFTWARE LIFE CYCLE
- INTRODUCES SOME OF THE KEY CONCEPTS THAT SOFTWARE DESIGN IS BUILT UPON

SUBSECTIONS:

- WHAT IS DESIGN?
- ARCHITECTURAL DESIGN TECHNIQUES
- ARCHITECTURAL DESIGN AND DoD-STD-SDS
- DETAILED DESIGN
- DETAILED METHODOLOGY PERSPECTIVES AND FORMATS
- DETAILED DESIGN AND DoD-STD-SDS

INSTRUCTOR NOTES

WHAT IS DESIGN

SUMMARY OF MAIN POINTS COVERED:

- DEFINES WHAT IS DESIGN AND HOW IT FITS INTO THE SOFTWARE LIFE CYCLE
- DEFINES THE ROLE OF THE DESIGNER IN THE DESIGN PHASE OF THE SOFTWARE LIFE CYCLE

MAIN MESSAGE:

- DESIGNS ROLE IN THE LIFE CYCLE

SPECIAL CONSIDERATIONS:

- MAKE CLEAR TO THE CLASS THAT DESIGN IS THE BRIDGE STEP FROM ANALYSIS TO IMPLEMENTATION
- SOME PEOPLE WILL SAY THAT DESIGN IS THE FORGOTTEN PHASE OF THE LIFE CYCLE, SINCE THEY THINK DESIGNING IS CODING

INSTRUCTOR NOTES

ARCHITECTURAL DESIGN TECHNIQUES

SUMMARY OF MAIN POINTS COVERED:

- OUTLINES SOME OF THE COMMON TECHNIQUES SHARED BY MANY OF THE METHODOLOGIES TO BE COVERED

MAIN MESSAGES:

- ALL ARCHITECTURAL DESIGN TECHNIQUES SHARE A COMMON BASIS

SUBTOPICS:

- ABSTRACTION
- MECHANISMS
- ITERATION
- DECOMPOSITION
- GUIDELINES FOR DESIGN

SPECIAL CONSIDERATIONS:

- MAKE THE DISTINCTION BETWEEN THE VARIOUS TECHNIQUES AS EXPLICIT AS YOU CAN
- USE ANALOGIES TO SUPPORT THE DISCUSSION OF THE VARIOUS TECHNIQUES

INSTRUCTOR NOTES

ARCHITECTURAL DESIGN AND DoD-STD-SDS

SUMMARY OF MAIN POINTS COVERED:

- OUTLINES WHAT THE NEW DoD STANDARDS EXPECT FROM THE DESIGN PHASE IN TERMS OF DOCUMENTS (PRODUCTS) AND REVIEWS
- IDENTIFIES THE ACTIVITIES THAT ARE ALSO EXPECTED

MAIN MESSAGES:

- EVOLVING STANDARDS WILL CONSTRAIN THE WAY WE DEVELOP SOFTWARE

SUBTOPICS:

- DESIGN ACTIVITIES
- DESIGN PRODUCTS
- DESIGN REVIEWS

SPECIAL CONSIDERATIONS:

- FOCUS ON THE ACTIVITIES SINCE THIS WILL HELP PUT THE DESIGN PROCESS IN TO A CONTEXT FOR THE CLASS

INSTRUCTOR NOTES

DETAILED DESIGN

SUMMARY OF MAIN POINTS COVERED:

- DEFINES DETAILED DESIGN
- IDENTIFIES THE RELATIONSHIP BETWEEN DETAILED DESIGN AND ARCHITECTURAL DESIGN AND CODING

MAIN MESSAGES:

- DETAILED DESIGNS ROLE IN THE LIFE CYCLE

SUBTOPICS:

- DEFINITION
- MAKE THE TRANSITION FROM ARCHITECTURAL DESIGN

SPECIAL CONSIDERATIONS:

- MAKE IT CLEAR THAT WE ARE DISCUSSING DESIGN, NOT CODING

INSTRUCTOR NOTES

DETAILED DESIGN AND DoD-STD-SDS

SUMMARY OF MAIN POINTS COVERED:

- OUTLINES WHAT THE NEW DoD STANDARDS EXPECT FROM THE DETAILED DESIGN SUB-PHASE IN TERMS OF DOCUMENTS (PRODUCTS) AND REVIEWS
- IDENTIFIES THE ACTIVITIES THAT ARE ALSO EXPECTED

MAIN MESSAGES:

- STANDARDS WILL CONSTRAIN THE WAY WE DEVELOP SOFTWARE

SUBTOPICS:

- DESIGN ACTIVITIES
- DESIGN PRODUCTS
- DESIGN REVIEWS

SPECIAL CONSIDERATIONS:

- FOCUS ON THE ACTIVITIES SINCE THIS WILL HELP PUT THE DESIGN PROCESS IN A CONTEXT FOR THE CLASS

INSTRUCTOR NOTES

DESIGN METHODOLOGY PERSPECTIVE AND FORMATS

SUMMARY OF MAIN POINTS COVERED:

- CATEGORIZES THE DESIGN METHODOLOGIES TO BE PRESENTED FROM THE PERSPECTIVE THAT THEY TAKE AND THE FORMAT USED TO EXPRESS THE DESIGN

MAIN MESSAGES:

- DESIGN METHODOLOGIES FIT INTO A LIMITED NUMBER OF CATEGORIES

SPECIAL CONSIDERATIONS:

- FOCUS ON THE TABLE THAT SHOWS ALL OF THE METHODOLOGIES TO BE COVERED SO THE CLASS SEES THAT A WIDE RANGE OF APPROACHES ARE AVAILABLE TO SUPPORT DESIGN

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE PARNAS PAPER DEVELOPS THE CONCEPTS FOR THE METHODOLOGY BUT NOT THE DETAILS OF THE SCRP METHODS. THESE DETAILS ARE FOUND ONLY IN THE DESIGN SPECIFICATIONS WRITTEN BY THE SCRP PROJECT TEAM.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 14 - SOFTWARE COST REDUCTION PROJECT DESIGN METHODS (60 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF THE DESIGN ASPECTS OF THE SCRP METHODOLOGY

SUBSECTIONS:

- SCRP DESIGN DECOMPOSITION
- SCRP DESIGN METHOD DOCUMENTATION

INSTRUCTOR NOTES

KEY CONCEPTS

SUMMARY OF MAIN POINTS COVERED:

- EXPAND ON THE DEFINITIONS OF ABSTRACTION, MODULARITY AND INFORMATION HIDING USING ANALOGIES AND EXAMPLES

MAIN MESSAGES:

- THIS METHODOLOGY IS BUILT ON MODERN, S.E. PRINCIPLES

SUBTOPICS:

- ABSTRACTION AS A CONCEPT
  - AN ABSTRACTION EXAMPLE
- MODULARITY AS A CONCEPT
  - A MODULARITY EXAMPLE
- HIDING AS A CONCEPT
  - A HIDING EXAMPLE

SPECIAL CONSIDERATIONS:

- MAKE CLEAR TO THE CLASS THE DISTINCTIONS BETWEEN THE CONCEPTS
- POINT OUT THAT THESE CONCEPTS ARE THE SAME AS THE CONCEPTS UPON WHICH Ada IS BUILT AND THAT METHODOLOGIES THAT DIRECTLY SUPPORT THESE CONCEPTS WILL BE EFFECTIVE Ada METHODOLOGIES

INSTRUCTOR NOTES

SCRP DESIGN DECOMPOSITION

SUMMARY OF MAIN POINTS COVERED:

- SUMMARIZES THE MODULAR STRUCTURE OF AN SCRP DESIGN USING THE METHODOLOGY
- PROVIDES A GENERIC ARCHITECTURE FOR REAL TIME SOFTWARE

MAIN MESSAGES:

- MOST REAL TIME SOFTWARE CAN BE STRUCTURED IN A VERY GENERIC MANNER

SUBTOPICS:

- GOALS
- GENERIC GUIDELINES

SPECIAL CONSIDERATIONS:

- FOCUS ON THE CHARACTERISTICS OF THE MODULES AS WELL AS THE RELATIONSHIP OF THE MODULES
- DRIVE HOME THE CRITERIA USED FOR DETERMINING WHAT GOES IN WHAT MODULE

INSTRUCTOR NOTES

SCRP DESIGN METHOD DOCUMENTATION

SUMMARY OF MAIN POINTS COVERED:

- OUTLINES THE TYPES OF DOCUMENTS THAT RESULT FROM APPLYING THE SCRP METHODOLOGY

MAIN MESSAGES:

- DOCUMENTATION STRUCTURE DIRECTLY SUPPORTS THE KEY CONCEPTS

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT TEMPLATES AND SAMPLES OF THE DOCUMENTS ARE AVAILABLE TO PROVIDE GUIDELINES FOR SOMEONE TRYING TO USE THE METHODOLOGY

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE INTRODUCTORY CHAPTERS OF BOOCH'S BOOK PROVIDE A VERY GOOD OVERVIEW OF THIS METHODOLOGY, THE SOURCE OF THE EXERCISE IS THIS BOOK.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 15 - OBJECT ORIENTED DESIGN (30 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF A DESIGN METHODOLOGY THAT TAKES ADVANTAGE OF MANY OF THE FEATURES OF Ada AND MODERN SOFTWARE ENGINEERING PRINCIPLES

SUBSECTIONS:

- OBJECT ORIENTED DESIGN AND DATA ABSTRACTION
- DESIGN CONCEPTS BY EXAMPLE
- EXERCISE 3

INSTRUCTOR NOTES

OBJECT ORIENTED DESIGN AND DATA ABSTRACTION

SUMMARY OF MAIN POINTS COVERED:

- DESCRIBES THE CONCEPTS ON WHICH THE OBJECT ORIENTED DESIGN METHODOLOGY IS BASED
- OUTLINES THE DESIGN PROCEDURE

MAIN MESSAGES:

- OBJECT ORIENTED DESIGN PROVIDES A PROCEDURE FOR STRUCTURING SOFTWARE

SPECIAL CONSIDERATIONS:

- DRAW THE CONNECTION BETWEEN THE CONCEPTS OF THE SCRP AND OBJECT ORIENTED DESIGN, THEY BOTH ARE BUILT ON THE SAME SET OF CONCEPTS

INSTRUCTOR NOTES

DESIGN CONCEPTS BY EXAMPLE

SUMMARY OF MAIN POINTS COVERED:

- DETAILS THE PROCEDURES OF OBJECT ORIENTED DESIGN USING AN EXAMPLE

MAIN MESSAGES:

- THE PROCEDURES ASSOCIATED WITH THE METHODOLOGY ARE EASY TO APPLY TO SMALL PROBLEMS

SUBTOPICS:

- DEVELOPING AN INFORMAL STRATEGY
- IDENTIFYING THE DATA OBJECTS
- IDENTIFYING THE OPERATIONS ON THE OBJECTS
- ESTABLISHING THE INTERFACES

SPECIAL CONSIDERATIONS:

- WALK THROUGH THE EXAMPLES AS IF YOU WERE DOING THE DESIGN
- SPEND SOME TIME ON THE Ada PDL DESCRIPTION OF THE INTERFACES SINCE THIS SHOWS THE DIRECT CONNECTION OF THE METHODOLOGY AND Ada

INSTRUCTOR NOTES

EXERCISE 3

OBJECT ORIENTED DESIGN EXERCISE: 60 MINUTES

- A SIMPLE DATA STRUCTURE MANIPULATION PROGRAM ARCHITECTURE IS DEVELOPED USING OBJECT ORIENTED DESIGN TECHNIQUES

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

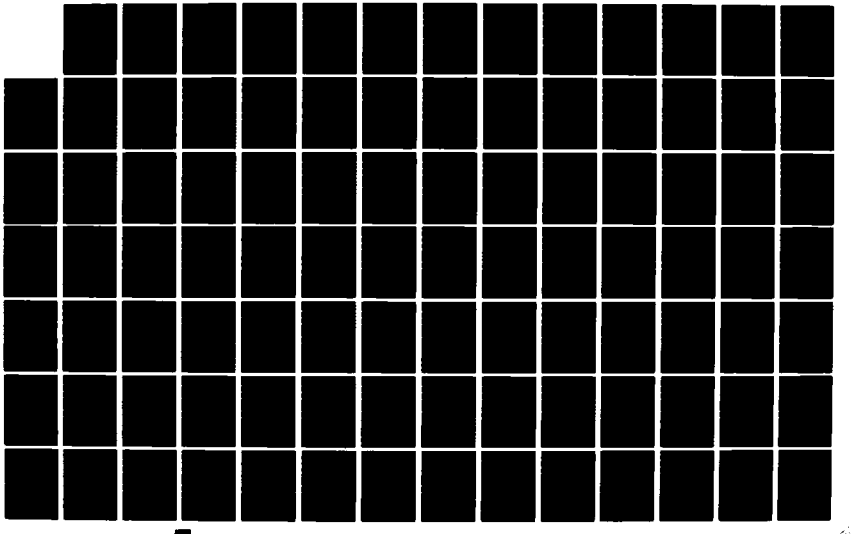
REFERENCE GUIDE

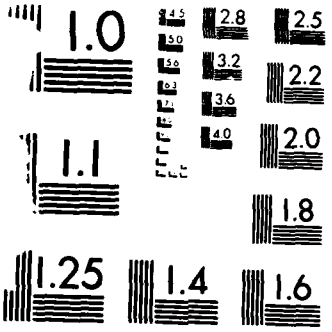
THE CONSTANTINE, YOURDON BOOK IS THE BIBLE FOR STRUCTURED DESIGN. IT HAS OVERVIEW AS WELL AS DETAIL CHAPTERS. MOST OF THE M201 MATERIAL ON STRUCTURED DESIGN AND METRICS COMES FROM THIS BOOK.

TIME - 10 MINUTES

AD-A165 349 ADA (TRADEMARK) TRAINING CURRICULUM INSTRUCTOR'S COURSE S500 METHODOLOGY MODULES(U) SOFTECH INC WALTHAM MA 1986 DAAB07-85-C-K506 3/4

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SECTION OVERVIEW

SECTION 16 - STRUCTURED DESIGN METHODOLOGY (60 MINUTES)

FOCUS OF SECTION:

- REVIEWS THE BASIC CONCEPTS AND TECHNIQUES OF STRUCTURED DESIGN
- IDENTIFIES AND PROVIDES EXAMPLES OF THE PROCEDURES USED TO APPLY THE METHODOLOGY

SUBSECTIONS:

- KEY CONCEPTS
- EXERCISE 4

INSTRUCTOR NOTES

KEY CONCEPTS

SUMMARY OF MAIN POINTS COVERED:

- REVIEW THE VARIOUS ELEMENTS OF THE METHODOLOGY
- PROVIDE SAMPLE USAGE OF EACH ELEMENT
- OUTLINE THE PROCEDURES USED TO DEVELOP A STRUCTURED DESIGN

MAIN MESSAGES:

- STRUCTURED DESIGN PROVIDES A RANGE OF CAPABILITIES TO EXPRESS SOFTWARE STRUCTURE.

SUBTOPICS:

- DATA FLOW GRAPHS
  - SYNTAX
  - DECOMPOSITION
  - CONTINUOUS DATA FLOW
- STRUCTURE CHARTS
  - SYNTAX
  - MODULE CALLING RELATIONSHIPS
  - DATA AND CONTROL FLOW
  - HIERARCHY
  - ANNOTATIONS

INSTRUCTOR NOTES

KEY CONCEPTS (Continued)

SUBTOPICS: (Cont.)

- TRANSLATION PROCESS FROM DATA FLOW GRAPHS TO STRUCTURE CHARTS
  - TRANSFORM-CENTERED DESIGN
    - DESIGN PROCEDURE
    - AN EXAMPLE
  - TRANSACTION-CENTERED DESIGN
    - DESIGN PROCESS
    - AN EXAMPLE
- SUMMARY

SPECIAL CONSIDERATIONS:

- THE EXAMPLES GIVEN HERE ARE FOR BUSINESS APPLICATIONS; TRY TO KEEP THE CLASS FOCUSED ON THE CONCEPTS AND PROCEDURES, NOT ON THE SPECIFIC DESIGNS USED IN THE EXAMPLES
- FOCUS ON THE END PRODUCT OF STRUCTURED DESIGN, A STRUCTURE CHART, SINCE THIS WILL ENHANCE THE NEED FOR A DESIGN PHASE

INSTRUCTOR NOTES

EXERCISE 4

STRUCTURED DESIGN EXERCISE: 45 MINUTES

- THIS EXERCISE USES THE PROBLEM IN EXERCISE 3 AND APPLIES STRUCTURED DESIGN TECHNIQUES TO ITS SOLUTION

- FOCUS ON COMPARING THE RESULTS OF EXERCISES 3 AND 4

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

JACKSON'S "PRINCIPLES OF PROGRAM DESIGN" IS THE REFERENCE FOR THE MAJOR OF THE MATERIAL. IT PROVIDES BOTH AN OVERVIEW AS WELL AS THE DETAILS.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 17 - JACKSON METHODOLOGY (40 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF THE JACKSON STRUCTURED PROGRAMMING METHODOLOGY

SUBSECTIONS:

- JACKSON STRUCTURED PROGRAMMING (JSP)
- EXERCISE 5

SPECIAL CONSIDERATIONS:

- MAKE SURE THE CLASS IS CLEAR ON THE FACT THAT WE ARE ONLY GOING TO COVER JACKSON'S STRUCTURED PROGRAMMING, NOT HIS FULL SET OF METHODOLOGIES

INSTRUCTOR NOTES

JACKSON STRUCTURED PROGRAMMING (JSP)

SUMMARY OF MAIN POINTS COVERED:

- OVERVIEW OF THE BASIC CONCEPTS AND NOTATION OF THE METHODOLOGY
- PROCEDURES USED IN APPLYING THE METHODOLOGY
- PROVIDES A SIMPLE EXAMPLE

MAIN MESSAGES:

- JSP DERIVES SOFTWARE STRUCTURE FROM THE DATA STRUCTURE

SUBTOPICS:

- KEY CONCEPTS AND SYNTAX
  - HIERARCHY (DATA ORIENTED)
  - SEQUENCE
  - SELECTION
  - ITERATION
- JSP PROCEDURE
  - MODELING
  - CONVERTING
  - COMPLETING
  - AN EXAMPLE
  - LIMITATION OF THE ABOVE PROCEDURE
    - BACKTRACKING
    - RESOLVING STRUCTURE CLASHES

SPECIAL CONSIDERATIONS:

- FOCUS ON THE CONCEPTS, NOT ON THE PROBLEM USED IN THE EXAMPLE

INSTRUCTOR NOTES

EXERCISE 5

JACKSON EXERCISE: 30 MINUTES

- PROVIDE AN EXTENSION TO LECTURE EXAMPLE TO ILLUSTRATE HOW TO USE JACKSON'S METHODOLOGY

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

ORR'S BOOK IS THE MAIN REFERENCE ALTHOUGH IT COVERS MORE THAN JUST HIS DESIGN TECHNIQUE.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 18 - WARNIER-ORR (20 MINUTES)

SUMMARY ON MAIN POINTS COVERED:

- OVERVIEW OF WARNIER-ORR NOTATION AND PROCEDURES

MAIN MESSAGES:

- THE WARNIER-ORR METHODOLOGY HAS MANY OF THE CHARACTERISTICS OF THE JACKSON METHODOLOGY

SUBTOPICS:

- OVERVIEW
- WARNIER DIAGRAM SYNTAX
  - CONNECTIVES
    - HIERARCHICAL DECOMPOSITION
    - REPETITION
    - ALTERNATIVES
- DESIGN STRATEGIES
  - USING DECISION TABLES
  - THE PROCEDURE
  - AN EXAMPLE
- COMPLETING THE DESIGN

SPECIAL CONSIDERATIONS:

- FOCUS ON THE DIFFERENCE BETWEEN JACKSON AND WARNIER-ORR
- YOU CAN USE THIS SECTION TO DRIVE HOME SOME OF THE CONCEPTS SHARED BY THIS METHODOLOGY AND OTHERS ALREADY COVERED

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

MARTIN'S BOOK PROVIDES A CONCISE OVERVIEW OF THE HOS METHOD AS WELL AS ITS ROLE IN THE DESIGN PROCESS.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 19 - HIGHER ORDER SOFTWARE (30 MINUTES)

SUMMARY OF MAIN POINTS COVERED:

- PROVIDES AN OVERVIEW OF A METHODOLOGY THAT IS BASED ON DEVELOPING SOFTWARE THAT IS PROVABLY CORRECT

MAIN MESSAGES:

- THERE ARE METHODS FOR DEVELOPING PROVABLY CORRECT SOFTWARE

SUBTOPICS:

- FUNDAMENTAL BASIS FOR HOS
- SYNTAX
  - PRIMITIVE CONTROL STRUCTURES
    - JOIN
    - OR
    - INCLUDE
  - NON-PRIMITIVE CONTROL STRUCTURES
    - CONCUR
    - COOR
    - COJOIN
    - CONCLUDE
  - HOS HIERARCHY
- A SIMPLE EXAMPLE
- A RADAR SYSTEM EXAMPLE
- AUTOMATION OF HOS

SPECIAL CONSIDERATIONS:

- SPEND MORE TIME ON THE FIRST FEW SLIDES INDICATING WHAT IS UNIQUE ABOUT HOS
- COMPARE THE DIAGRAM SYNTAX WITH THAT OF STRUCTURED DESIGN

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE CONSTANTINE, YOURDON BOOK IS THE SOURCE FOR ALL THE MATERIAL IN THIS SECTION OF M201.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 20 - ARCHITECTURAL DESIGN METRICS (60 MINUTES)

FOCUS OF SECTION:

- PROVIDES A SET OF TECHNIQUES THAT ALLOW US TO "MEASURE" THE QUALITY OF AN ARCHITECTURAL DESIGN

SUBSECTIONS:

- QUALITY FACTORS FOR A DESIGN
- COUPLING
- COHESION
- DESIGN HEURISTICS

INSTRUCTOR NOTES

QUALITY FACTORS FOR A DESIGN

SUMMARY OF MAIN POINTS COVERED:

- SUMMARIZE WHAT VARIOUS PEOPLE FEEL ARE QUALITIES OF A DESIGN
- METRICS FOR MEASURING THESE QUALITIES

MAIN MESSAGES:

- DESIGN QUALITY CAN BE MEASURED WITH A FEW COMMON SENSE TECHNIQUES

SPECIAL CONSIDERATIONS:

- GET THE CLASS INVOLVED BY ASKING THEM FOR ADDITIONAL QUALITIES OF A DESIGN
- POINT OUT THAT THE METRICS WE WILL DISCUSS APPLY TO ALL OF THE DESIGN METHODOLOGIES WE HAVE COVERED

INSTRUCTOR NOTES

COUPLING

SUMMARY OF MAIN POINTS COVERED:

- DEFINE THE VARIOUS FORMS OF COUPLING

MAIN MESSAGES:

- SOME GUIDELINES AS TO WHICH FORMS OF COUPLING ARE DESIRABLE AND WHICH ARE NOT

SUBTOPICS:

- DEFINITION
- CLASSES OF COUPLING
  - CONTENT
  - COMMON
  - EXTERNAL
  - CONTROL
  - STAMP
  - DATA
- MULTIPLE LEVELS OF COUPLING
- SUMMARY OF THE USAGE OF COUPLING

SPECIAL CONSIDERATIONS:

- MAKE THE CLASS UNDERSTAND WHICH FORMS ARE DESIRABLE AND WHICH ARE NOT

INSTRUCTOR NOTES

COHESION

SUMMARY OF MAIN POINTS COVERED:

- DEFINE THE VARIOUS FORMS OF COHESION

MAIN MESSAGES:

- SOME GUIDELINES AS TO WHICH FORMS OF COHESION ARE DESIRABLE AND WHICH ARE NOT

SUBTOPICS:

- DEFINITION
- CLASSES OF COHESION
  - COINCIDENTAL
  - LOGICAL
  - CLASSICAL
  - PROCEDURAL
  - COMMUNICATIONAL
  - INFORMATIONAL
  - FUNCTIONAL
- IDENTIFYING CLASSES OF COHESION
  - AN EXAMPLE
- SUMMARY OF THE USAGE OF COHESION

INSTRUCTOR NOTES

DESIGN HEURISTICS

SUMMARY OF MAIN POINTS COVERED:

- OVERVIEW OF THE VARIOUS HEURISTICS USED TO ASSESS THE QUALITY OF A DESIGN

MAIN MESSAGES:

- SOME GUIDELINES FOR APPLYING HEURISTICS

SUBTOPICS:

- FAN-IN
- FAN-OUT
- FAN-IN/OUT EXAMPLE
- SCOPE OF EFFECT
- SCOPE OF CONTROL
  - SCOPE OF EFFECT/CONTROL EXAMPLE
- CONTROL STRUCTURE
  - CONTROL STRUCTURE EXAMPLE
- SUMMARY OF THE USAGE OF DESIGN HEURISTICS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE IEEE GUIDELINES PROVIDE A VERY GOOD OVERVIEW OF THE REQUIREMENTS AND POTENTIAL USEFULNESS OF AN Ada-BASED PDL.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 21 - PROGRAM DESIGN LANGUAGES (PDL) (40 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF THE CHARACTERISTICS AND THE USE OF Ada-BASED PROGRAM DESIGN LANGUAGE FOR REPRESENTING A DETAILED DESIGN

SUBSECTION:

- ROLE OF A PDL
- AN Ada PDL USAGE SAMPLER

INSTRUCTOR NOTES

ROLE OF A PDL

SUMMARY OF MAIN POINTS COVERED:

- RATIONALE FOR A PDL
- REQUIREMENTS FOR A PDL AS SEEN BY THE IEEE AND DoD
- HOW THE PDL REQUIREMENTS MAP INTO Ada FEATURES

MAIN MESSAGES:

- CHARACTERISTICS OF A GOOD PDL

SUBTOPICS:

- RATIONALE FOR A PDL
- PDL REQUIREMENTS
  - QUALITIES OF A DESIGN EXPRESSED IN A PDL
  - CHARACTERISTICS
- MAPPING PDL FEATURES TO DESIGN FEATURES
  - AN Ada PDL SAMPLE
  - ROLE OF COMMENTS IN AN Ada PDL

SPECIAL CONSIDERATIONS:

- FOCUS ON THE FACT THAT Ada, IF USED CORRECTLY, CAN BE USED AS AN EFFECTIVE PDL
- CAUTION THE CLASS THAT WE ARE STILL IN THE DESIGN PHASE; DO NOT TREAT THE USE OF A PDL AS AN EXCUSE TO START CODING BEFORE YOU HAVE A DESIGN

INSTRUCTOR NOTES

AN Ada PDL USAGE SAMPLER

SUMMARY OF MAIN POINTS COVERED:

- PROVIDES SOME RANDOM SAMPLES OF THE USE OF Ada FEATURES TO EXPRESS SOFTWARE DETAILED DESIGNS

MAIN MESSAGES:

- HOW TO EXPRESS ASPECTS OF A DESIGN USING A PDL

SUBTOPICS:

- EXPANDING FROM A DESIGN TO AN IMPLEMENTATION
- STEPWISE REFINEMENT
- CHARACTERIZING DATA
- EXPRESSING FLOW OF CONTROL
- EXPRESSING ALGORITHMS
- EXPRESSING TIMING

SPECIAL CONSIDERATIONS:

- AVOID DESCRIBING THE FULL SYNTAX OF THE Ada CONSTRUCTS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

SINCE THESE ARE COVERED VERY BRIEFLY IN M201, USE THE REFERENCE ONLY IF REALLY NEEDED.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 22 - GRAPHICAL DETAILED DESIGN METHODS (20 MINUTES)

SUMMARY OF MAIN POINTS COVERED:

- PRESENTS A VERY QUICK OVERVIEW OF GRAPHICAL BASED DETAILED DESIGN METHODOLOGIES

MAIN MESSAGES:

- SHOW HOW OTHER GRAPHICAL TECHNIQUES CAN BE USED IN DESIGN

SUBTOPICS:

- HIPO OVERVIEW
  - VISUAL TABLE OF CONTENTS
  - HIPO DIAGRAMS
  - OVERVIEW DIAGRAMS
  - HIPO SAMPLE
- NASSI-SCHNEIDERMAN STRUCTURED FLOWCHARTS
  - REPRESENTING PROGRAM STRUCTURE
  - IDENTIFYING COMPLEXITY
  - SUMMARY

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT THESE ARE METHODS THAT HAVE BEEN USED IN LIMITED CASES

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

READING METHODMAN IS A MUSI.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 23 - DESIGN WRAP-UP (30 MINUTES)

SUMMARY OF MAIN POINTS COVERED:

- THIS SECTION TAKES A LOOK AT EACH OF THE DESIGN METHODOLOGIES AND EVALUATES THEM IN ACCORDANCE WITH THE FOLLOWING
  - TECHNICAL CHARACTERISTICS
  - COVERAGE PROVIDED
  - USAGE CHARACTERISTICS
  - MANAGEMENT CHARACTERISTICS
  - RELATIONSHIP TO Ada

MAIN MESSAGES:

- HOW TO SELECT DESIGN METHODS

SUBTOPICS:

- DESIGN PHASE COVERAGE
- COMPARISONS OF THE DESIGN METHODS
  - TECHNICAL CHARACTERISTICS
  - USAGE CHARACTERISTICS
  - MANAGEMENT CHARACTERISTICS
- SUPPORT OF Ada CONCEPTS AND FEATURES
- REMINDERS

SPECIAL CONSIDERATIONS:

- ALL WRAP-UP SECTIONS ARE IMPORTANT SINCE THEY GIVE THE CLASS A SET OF CRITERIA TO EVALUATE EACH OF THE METHODOLOGIES AGAINST
- TRY TO GET THE CLASS TO DISCUSS THE COMPARISONS PROVIDED IN THE TABLES; YOU WANT THEM TO REVIEW WHAT THEY HAVE LEARNED AND TO PUT IT INTO PERSPECTIVE BEFORE GOING ON
- DO NOT CUT THIS SECTION SHORT, IT'S IMPORTANT
- GET THE CLASS TO PARTICIPATE

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

DoD-STD-SDS A MUSI FOR CLASS TO READ.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 24 - IMPLEMENTATION INTRODUCTION (40 MINUTES)

FOCUS OF SECTION:

- IDENTIFIES THE KEY ISSUES ONE MUST CONSIDER DURING THE IMPLEMENTATION PHASE OF THE LIFE CYCLE

- IDENTIFIES THE SCOPE OF THE IMPLEMENTATION PHASE

SUBSECTIONS:

- IMPLEMENTATION ISSUES
- DoD-STD-SDS VIEW OF IMPLEMENTATION
- IMPLEMENTATION PERSPECTIVES AND FORMATS

INSTRUCTOR NOTES

IMPLEMENTATION ISSUES

SUMMARY OF MAIN POINTS COVERED:

- IDENTIFIES THE KEY ISSUES ONE MUST CONSIDER DURING THE IMPLEMENTATION PHASE

MAIN MESSAGES:

- IMPLEMENTATION REQUIRES US TO CONSIDER MANY ISSUES

SUBTOPICS:

- STEP-WISE REFINEMENT
- PROGRAM FAMILIES
- DATA ABSTRACTIONS AND TYPES
- DATA STRUCTURES
- FUNDAMENTAL ALGORITHMS
- TIME/SPACE TRADEOFFS
- EFFICIENCY
- ACCEPTABILITY VS. CORRECTNESS

SPECIAL CONSIDERATIONS:

- USE EXAMPLES OF THESE ISSUES FROM YOUR PERSONAL EXPERIENCES WHERE YOU CAN

INSTRUCTOR NOTES

DoD-STD-SDS VIEW OF IMPLEMENTATION

SUMMARY OF MAIN POINTS COVERED:

- ACTIVITIES, PRODUCTS AND REVIEWS REQUIRED BY DoD-STD-SDS
- SUMMARY OF THE CODING STANDARDS THAT DoD-STD-SDS WILL IMPOSE

MAIN MESSAGES:

- STANDARDS WILL CONSTRAIN THE WAYS WE DEVELOP SOFTWARE

SUBTOPICS:

- IMPLEMENTATION ACTIVITIES
- IMPLEMENTATION PRODUCTS
- IMPLEMENTATION REVIEWS
- CODING STANDARDS
- UNIT DEVELOPMENT FOLDERS

SPECIAL CONSIDERATIONS:

- FOCUS ON THE ACTIVITIES IDENTIFIED BY SDS
- FOCUS ON THE CODING STANDARDS THAT ARE IMPOSED BY SDS

INSTRUCTOR NOTES

IMPLEMENTATION PERSPECTIVES AND FORMATS

SUMMARY OF MAIN POINTS COVERED:

- PROVIDES A SET OF CATEGORIES INTO WHICH THE FOLLOWING MATERIAL CAN BE PUT

MAIN MESSAGES:

- IMPLEMENTATION METHODOLOGIES FIT INTO SEVERAL CATEGORIES

SPECIAL CONSIDERATIONS:

- TELL THE CLASS THAT WHAT FOLLOWS IS DIFFERENT THAN THE PREVIOUS SECTIONS IN THAT MOST OF THE MATERIAL WILL BE GIVING THEM GUIDELINES INSTEAD OF PROCEDURAL METHODS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES, THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE DAHL, DIJKSTRA, HOARE BOOK IS THE BIBLE FOR STRUCTURED PROGRAMMING BUT SINCE THIS TOPIC IS INTUITIVE WE DON'T SUGGEST ANY ADDITIONAL READING.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 25 - STRUCTURED PROGRAMMING (30 MINUTES)

FOCUS OF SECTION:

- RELATES THE EARLY 70'S CONCEPTS OF STRUCTURED PROGRAMMING TO MODERN REQUIREMENTS AND Ada

SUBSECTIONS:

- MOTIVATION/DEFINITION/SCOPE
- CONTROL STRUCTURING GUIDELINES
- Ada AND STRUCTURED PROGRAMMING

INSTRUCTOR NOTES

MOTIVATION/DEFINITION/SCOPE

SUMMARY OF MAIN POINTS COVERED:

- REVIEW SOME OF THE EARLY RATIONALE FOR STRUCTURED PROGRAMMING

MAIN MESSAGES:

- STRUCTURED PROGRAMMING EVOLVED FROM THE NEED TO CREATE RELIABLE AND COST-EFFECTIVE SOFTWARE

SPECIAL CONSIDERATIONS:

- RELATE THE TOPIC TO THE MOTIVATION FOR Ada SINCE THERE IS A HIGH DEGREE OF COMMONALITY

INSTRUCTOR NOTES

CONTROL STRUCTURING GUIDELINES

SUMMARY OF MAIN POINTS COVERED:

- REVIEW THE FUNDAMENTAL CONTROL STRUCTURING CONCEPTS OF STRUCTURED PROGRAMMING
- PROVIDE DoD-STD-SDSs VIEW OF THESE CONTROL STRUCTURES

MAIN MESSAGES:

- A FEW CONSTRUCTS SERVE AS BASIS FOR STRUCTURED PROGRAMMING

SUBTOPICS:

- SEQUENCE
- SELECTION
- REPETITION

INSTRUCTOR NOTES

Ada AND STRUCTURED PROGRAMMING

SUMMARY OF MAIN POINTS COVERED:

- PROVIDE A LOOK AT HOW Ada SUPPORTS THESE STRUCTURED PROGRAMMING CONSTRUCTS THROUGH A SET OF EXAMPLES
- IDENTIFY AREAS IN WHICH Ada SUPPORTS A MUCH BROADER VIEW OF STRUCTURED PROGRAMMING

MAIN MESSAGES:

- Ada PROVES ALL OF THE STRUCTURED CONSTRUCTS AS WELL AS OTHER STRUCTURING FEATURES

SUBTOPICS:

- SAMPLES OF Ada CONSTRUCTS
- OTHER Ada STRUCTURING FEATURES

SPECIAL CONSIDERATIONS:

- TAKE YOUR TIME TO EXPLAIN THE RELATIONSHIP BETWEEN THE CONSTRUCTS AND THE WAY THAT Ada IMPLEMENTS THEM
- IF THE CLASS DOES NOT HAVE AN Ada BACKGROUND EXPLAIN SOME OF THE STATEMENT TYPES IN BROAD TERMS; AVOID GETTING INTO THE DETAILS OF THE SYNTAX OR SEMANTICS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE TWO REFERENCES LISTED ARE USEFUL IF YOU ARE REALLY INTERESTED IN THE DETAILS, BUT IN GENERAL THE LEVEL OF COVERAGE OF THE TOPIC DOESN'T REQUIRE MUCH IN DEPTH KNOWLEDGE.

TIME - 100 MINUTES

SECTION OVERVIEW

SECTION 26 - PROGRAM COMPLEXITY MANAGEMENT (40 MINUTES)

FOCUS OF SECTION:

- PROVIDES A MIXED BAG OF TECHNIQUES TO MANAGE THE COMPLEXITY ASSOCIATED WITH PROGRAM DEVELOPMENT

SUBSECTIONS:

- MOTIVATION
- COMPLEXITY MANAGEMENT TECHNIQUES AND EXAMPLE
- EXERCISE 6

INSTRUCTOR NOTES

MOTIVATION

SUMMARY OF MAIN POINTS COVERED:

- MOTIVATES THE NEED FOR COMPLEXITY MANAGEMENT FROM THE STANDPOINT OF HUMAN LIMITATIONS ON HANDLING COMPLEXITY

MAIN MESSAGES:

- COMPLEXITY MANAGEMENT IS A MUST

SPECIAL CONSIDERATIONS:

- REMIND THE CLASS THE COMPLEXITY MANAGEMENT IS NOT LIMITED TO THE IMPLEMENTATION PHASE BUT MUST BE CONSIDERED IN ALL PHASES OF THE LIFE CYCLE

INSTRUCTOR NOTES

COMPLEXITY MANAGEMENT TECHNIQUES AND EXAMPLE

SUMMARY OF MAIN POINTS COVERED:

- REVIEW SOME OF THE POPULAR TECHNIQUES FOR MANAGING COMPLEXITY WITH THE FOCUS ON THE IMPLEMENTATION OF SMALL SOFTWARE MODULES

MAIN MESSAGES:

- SEVERAL TECHNIQUES ARE AVAILABLE TO MANAGE COMPLEXITY

SUBTOPICS:

- STEP-WISE REFINEMENT
- DECISION TABLES
- DECISION TREES
- FINITE STATE MAPS

SPECIAL CONSIDERATIONS:

- KEEP THE CLASS FROM GETTING INVOLVED IN THE DETAILS OF THE EXAMPLES, FORCE THEM TO THINK ABOUT THE TECHNIQUES
- ASK THE CLASS FOR EXAMPLES OF WHERE THEY WOULD FIND EACH TECHNIQUE USEFUL

INSTRUCTOR NOTES

EXERCISE 5

FINITE STATE EXAMPLE: 60 MINUTES

- PROVIDES A SIMPLE EXAMPLE OF THE USE OF ONE OF THE PROGRAM COMPLEXITY MANAGEMENT TECHNIQUES

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

DIJKSTRA'S PAPER IS VERY GOOD BUT TOUGH GOING FOR NON-COMPUTER SCIENCE MAJORS. THE MILLS PAPER GIVES AN OVERVIEW OF THE TECHNIQUES. BOTH PAPERS ARE AT LEAST 10 YEARS OLD SO A LOT OF RESEARCH IN THIS AREA HAS GONE ON, SO USE THEM AS A SOURCE OF THE CONCEPTS NOT A MEASURE OF THE STATE-OF-THE-ART.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 27 - PROGRAM CORRECTNESS (40 MINUTES)

FOCUS OF SECTION:

- PRESENTS A PRACTICAL APPROACH TO APPLYING PROGRAM CORRECTNESS TECHNIQUES TO Ada PROGRAM

SUBSECTIONS:

- DEFINITION AND MOTIVATION
- CORRECTNESS CONCEPTS
- AN EXAMPLE
- PROGRAM CORRECTNESS FROM DIFFERENT POINTS OF VIEW
- Ada AND PROGRAM CORRECTNESS
- EXERCISE 7

INSTRUCTOR NOTES

DEFINITION AND MOTIVATION

SUMMARY OF MAIN POINTS COVERED:

- MOTIVATION FOR THE USE OF PROGRAM CORRECTNESS TECHNIQUES

MAIN MESSAGES:

- WHY PROGRAM CORRECTNESS IS USEFUL

SPECIAL CONSIDERATIONS:

- MAKE IT CLEAR TO THE CLASS THAT THIS IS AN EVOLVING FIELD THAT IS BEING RESEARCHED ALL OVER THE WORLD, BUT THAT FEW LARGE SCALE PROGRAMS HAVE USED SUCH TECHNIQUES

INSTRUCTOR NOTES

CORRECTNESS CONCEPTS

SUMMARY OF MAIN POINTS COVERED:

- BASIC CORRECTNESS CONCEPTS, AND WHY THEY ARE NEEDED

MAIN MESSAGES:

- WHAT CONCEPT PROGRAM CORRECTNESS BUILDS ON

SUBTOPICS:

- ASSERTIONS
- INVARIANTS
- GUARDS

INSTRUCTOR NOTES

PROGRAM CORRECTNESS FROM DIFFERENT POINTS OF VIEW

SUMMARY OF MAIN POINTS COVERED:

- PROVIDES THREE SEPARATE VIEWS OF APPLYING PROGRAM CORRECTNESS TODAY
  - PESSIMIST'S
  - OPTIMIST'S
  - PRAGMATIST'S

MAIN MESSAGES:

- APPLYING PROGRAM CORRECTNESS TECHNIQUES TODAY REQUIRES A PRAGMATIST'S ORIENTATION

SPECIAL CONSIDERATIONS:

- FOCUS ON THE PRAGMATIST'S VIEW SINCE THAT IS THE VIEW THAT IS USED IN THE DISCUSSIONS TO FOLLOW

INSTRUCTOR NOTES

AN EXAMPLE

SUMMARY OF MAIN POINTS COVERED:

- ILLUSTRATES EACH CORRECTNESS CONCEPT, USING AN Ada PROGRAM FRAGMENT AS AN EXAMPLE

MAIN MESSAGES:

- PROGRAM CORRECTNESS USAGE

SPECIAL CONSIDERATIONS:

- POINT OUT THE VARIOUS CORRECTNESS CONCEPTS IN THE EXAMPLE BUT DO NOT GO THROUGH THE FULL EXAMPLE IN DETAIL

INSTRUCTOR NOTES

Ada AND PROGRAM CORRECTNESS

SUMMARY OF MAIN POINTS COVERED:

- RELATIONSHIP OF Ada AND PROGRAM CORRECTNESS TECHNIQUES

MAIN MESSAGES:

- HOW TO USE PROGRAM CORRECTNESS ON Ada PROGRAMS TODAY

SUBTOPICS:

- PROVABLE PROPERTIES OF Ada PROGRAMS
  - ABSENCE OF ERRONEOUSNESS
  - ABSENCE OF UNANTICIPATED EXCEPTIONS
  - NARROWLY-DEFINED PROGRAM COMPONENTS
  - DATA ABSTRACTIONS
  - NUMERIC PROPERTIES

SPECIAL CONSIDERATIONS:

- USE SOME EXAMPLES IF THE CLASS DOES NOT SEEM TO BE PICKING UP THE CONCEPTS AND GUIDELINES OR YOU GET A LOT OF QUESTIONS
- AVOID GETTING INTO ANY THEORETICAL DISCUSSIONS ABOUT PROGRAM CORRECTNESS

INSTRUCTOR NOTES

EXERCISE 7

PROGRAM CORRECTNESS EXERCISE: 45 MINUTES

- PROVIDES A SAMPLE OF THE APPLICATION OF THE TECHNIQUES OF PROGRAM CORRECTNESS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE TUTORIAL IS A COLLECTION OF PAPERS ON SOFTWARE TESTING. WE SUGGEST JUST BROWSING THROUGH IT WITH THE INTENT OF GETTING A FEEL FOR THE SCOPE OF SOFTWARE TESTING NOT DETAILS ABOUT ANY PARTICULAR TECHNIQUES.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 28 - TESTING APPROACHES (60 MINUTES)

FOCUS OF SECTION:

- PROVIDES AN OVERVIEW OF THE MAJOR STRATEGIES INVOLVED IN SOFTWARE TESTING

SUBSECTIONS:

- RELATIONSHIP OF TESTING AND OTHER ERROR REMOVAL TECHNIQUES
- UNIT TESTING
- INTEGRATION STRATEGIES

INSTRUCTOR NOTES

RELATIONSHIP OF TESTING AND OTHER ERROR REMOVAL TECHNIQUES

SUMMARY OF MAIN POINTS COVERED:

- ROLE OF TESTING IN THE REMOVAL OF ERRORS FROM A PROGRAM OR SYSTEM
- RELATIONSHIP OF TESTING, PROGRAM CORRECTNESS ANALYSIS, AND REVIEWS AS ERROR REMOVAL TECHNIQUES

MAIN MESSAGES:

- TESTING IS FAR MORE THAN JUST PROGRAM DEBUGGING

SPECIAL CONSIDERATIONS:

- MAKE IT CLEAR TO THE CLASS THAT TESTING SHOULD BE CONSIDERED TO BE ONLY ONE OF THE TECHNIQUES YOU USE TO REMOVE ERRORS FROM A PROGRAM

INSTRUCTOR NOTES

UNIT TESTING

SUMMARY OF MAIN POINTS COVERED:

- IDENTIFY KEY UNIT TESTING STRATEGIES, PRINCIPLES AND TECHNIQUES

MAIN MESSAGES:

- VARIOUS STRATEGIES EXIST FOR UNIT TESTINGS

SUBTOPICS:

- OVERVIEW
- TESTING PRINCIPLES
- TEST CASE DESIGN
  - BLACK BOX TECHNIQUES
    - EQUIVALENCE PARTITIONING
    - BOUNDARY VALUE ANALYSIS
    - CAUSE EFFECT GRAPHING
    - ERROR GUESSING
  - WHITE BOX TECHNIQUES
    - COVERAGE TESTING
- TESTING STRATEGIES

SPECIAL CONSIDERATIONS:

- FOCUS ON TEST CASE DESIGN TECHNIQUES SINCE MOST PEOPLE HAVE NOT FORMALLY SEEN THIS SORT OF THING

INSTRUCTOR NOTES

INTEGRATION STRATEGIES

SUMMARY OF MAIN POINTS COVERED:

- INTRODUCE THE VARIOUS STRATEGIES FOR INTEGRATION TESTING
- SUMMARIZE THE ADVANTAGES AND DISADVANTAGES OF EACH STRATEGY
- COMPARE THE VARIOUS STRATEGIES

MAIN MESSAGES:

- COMBINATION OF STRATEGIES WILL MOST LIKELY BE NEEDED IN A LARGE PROJECT

SUBTOPICS:

- TOP-DOWN
  - ROLE OF STUBS
  - AN EXAMPLE
  - ADVANTAGES AND DISADVANTAGES
- BOTTOM-UP
  - ROLE OF DRIVERS
  - AN EXAMPLE
  - ADVANTAGES AND DISADVANTAGES
- TOP-DOWN VS. BOTTOM-UP

SPECIAL CONSIDERATIONS:

- INDICATE THAT TEST PLANNING IS KEY TO THE SUCCESS OF THE PROJECT, JUST AS ANALYSIS AND DESIGN ARE KEY TO THE SUCCESS OF THE IMPLEMENTATION OF A PROGRAM

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

THE FREEDMAN, WEINBERG BOOK IS THE SOURCE FOR ALL OF THE MATERIAL IN THIS SECTION. IT'S A VERY GOOD REFERENCE EXCEPT SOME INDIVIDUALS WILL FIND THE QUESTION AND ANSWER FORMAT OF THE BOOK DIFFICULT WHEN THEY USE IT AS A REFERENCE.

TIME - 10 MINUTES

SECTION OVERVIEW

SECTION 29 - METHODS OF REVIEW (40 MINUTES)

FOCUS OF SECTION:

- PROVIDES A SET OF GUIDELINES FOR CONDUCTING EFFECTIVE REVIEWS
- FOCUSES ON THE USE OF REVIEWS TO IMPROVE THE QUALITY OF THE VARIOUS PRODUCTS THAT ARE DEVELOPED DURING THE DEVELOPMENT OF SOFTWARE

SUBSECTIONS:

- COMMON QUESTIONS ASKED ABOUT REVIEWS
- ANSWERS TO THE QUESTIONS

INSTRUCTOR NOTES

COMMON QUESTIONS ASKED ABOUT REVIEWS

SUMMARY OF MAIN POINTS COVERED:

- SUMMARIZES THE WHAT, WHY AND HOW OF REVIEWS BY INTRODUCING SOME OF THE KEY QUESTIONS ASKED ABOUT REVIEWS

MAIN MESSAGES:

- TO ACHIEVE HIGH QUALITY SOFTWARE REVIEWS MUST BE WELL PLANNED AND EXECUTED

SPECIAL CONSIDERATIONS:

- THIS SECTION IS DIFFERENT FROM ALL OF THE PREVIOUS SECTIONS SO PREPARE THE CLASS FOR IT

INSTRUCTOR NOTES

ANSWERS TO THE QUESTIONS

SUMMARY OF MAIN POINTS COVERED:

- ANSWERS TO THE QUESTIONS SUMMARIZED ABOVE

MAIN MESSAGES:

- UNDERSTAND THE ROLE OF REVIEWS IN THE DEVELOPMENT OF SOFTWARE IS CRITICAL TO ACHIEVING IMPROVED SOFTWARE QUALITY

SUBTOPICS:

- WHY REVIEW
- WHO PARTICIPATES
- HOW ARE REVIEWS ORGANIZED
- HOW ARE REVIEWS RUN
- SHOULD REVIEWS BE REPEATED
- WHAT KIND OF REVIEWS ARE THERE
- WHAT SHOULD YOU LOOK FOR
  - SAMPLE REVIEW CHECKLISTS

SPECIAL CONSIDERATIONS:

- FOCUS ON THE FOLLOWING QUESTIONS
  - "WHY REVIEW?"
  - "WHAT KIND OF REVIEWS ARE THERE?"
- INDICATE THE CRITICAL NEED FOR CHECKLISTS AND GUIDELINES FOR REVIEWS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

NO REFERENCES.

TIME - 5 MINUTES

SECTION OVERVIEW

SECTION 30 - IMPLEMENTATION WRAP-UP (20 MINUTES)

SUMMARY OF MAIN POINTS COVERED:

- SUMS UP THE IMPLEMENTATION SECTIONS

MAIN MESSAGES:

- THE LINK TO Ada WAS HANDLED IN EACH OF THE SECTIONS WHEN NEEDED

SUBTOPICS:

- PERSONNEL TRAITS
- COMPARISON OF TECHNIQUES
- REMINDERS

INSTRUCTOR NOTES

GO OVER THE TOPIC AREA SLIDES THEN ASK FOR QUESTIONS AND AREAS THEY FIND DIFFICULT.

REFERENCE GUIDE

AT THIS POINT THE INSTRUCTORS IN TRAINING SHOULD BE ASKED FOR FURTHER QUESTIONS. GO OVER THOSE AREAS THEY SEEM TO HAVE DIFFICULTY WITH.

TIME - 30 MINUTES

SECTION OVERVIEW

SECTION 31 - COURSE WRAP-UP (60 MINUTES)

SPECIAL CONSIDERATION:

- REVIEWS THE TOPICS OF THE COURSE
  - USING INTRODUCTORY AND WRAP-UP SECTIONS SLIDES SELECTED FROM SECTIONS 1, 2, 3, 4, 5, 12, 13, 23, 24, 30

- USES A DISCUSSION FORMAT

INSTRUCTOR NOTES

SECTION 4

M203

PROGRAMMING

METHODOLOGY

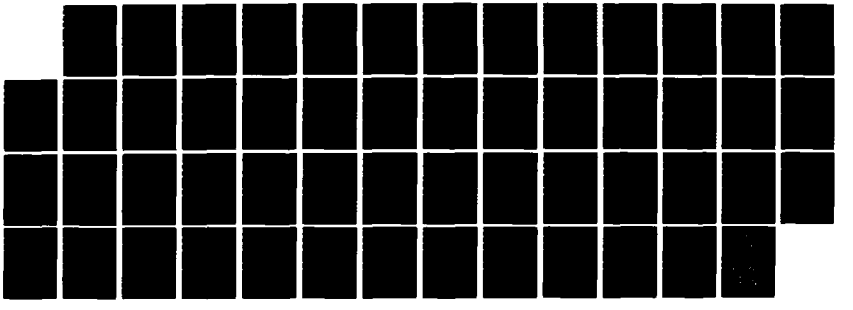
INSTRUCTOR'S COURSE

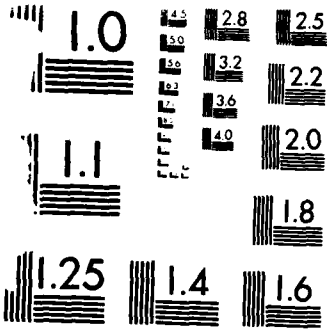
INSTRUCTOR NOTES

- PRIMARY GOAL IS "TO TEACH MODERN CODING TECHNIQUES ..."
- MAKE IT CLEAR TO THE INSTRUCTORS IN TRAINING THAT THEY MUST PRESENT THESE GOALS CLEARLY TO THEIR CLASS
- REVIEW M203 AS YOU PREPARE
- YOU CAN EXPECT THE INSTRUCTOR IN TRAINING TO ASK SOME SPECIFIC QUESTIONS ABOUT M203 MATERIAL

AD-A165 349 ADA (TRADEMARK) TRAINING CURRICULUM INSTRUCTOR'S COURSE 4/4
S500 METHODOLOGY MODULES(U) SOFTECH INC WALTHAM MA
1986 DAAB07-85-C-K506

UNCLASSIFIED F/G 5/9 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

M203 PROGRAMMING METHODOLOGY

- COURSE GOALS ARE:
  - TO TEACH MODERN CODING TECHNIQUES APPLICABLE TO Ada
  - TO TEACH THE RESPONSIBILITY OF THE INDIVIDUAL PROGRAMMER
  - TO PROVIDE A TECHNICAL BACKGROUND IN THE TECHNIQUES AND THEIR APPLICATION

- COURSE GOALS ARE NOT:
  - TO TEACH THE Ada LANGUAGE
  - TO MAKE THE STUDENT AN EXPERT IN ANY OF THE TECHNIQUES

- COURSE IS ONE AND HALF DAYS OF LECTURE WITH LIMITED NUMBER OF IN-CLASS EXERCISES

INSTRUCTOR NOTES

GO OVER THIS BRIEFLY SINCE EACH SECTION WILL HAVE A SLIDE LATER ON THAT WILL SUMMARIZE THE TOPICS.

GIVE INSTRUCTORS IN TRAINING A FEEL FOR THE SCOPE OF THE TOPIC COVERED IN M203.

[TIME] INDICATE THE NOMINAL TIME TO COVER A TOPIC AREA. USE IT AS A GUIDE BUT IT IS MORE IMPORTANT TO SET YOUR OWN PACE.

M203 COURSE OUTLINE

SECTION 1 - INTRODUCTION [90 MINUTES]

- BRIEF DISCUSSION OF OBJECTIVES

SECTION 1A - COURSE OUTLINE

SECTION 1B - REVIEW OF THE SOFTWARE LIFE CYCLE

- CHARACTERISTICS OF THE PROCESS STEPS

SECTION 1C - DESCRIPTION OF THE CODING PHASE

- PROGRAMMING PHASE INPUTS
- PROGRAMMING PHASE OUTPUTS
- PROGRAMMING PHASE ACTIVITIES

SECTION 1D - GOALS OF A PROGRAMMING METHODOLOGY

- GOALS SUMMARY
- PROGRAMMER RESPONSIBILITIES
- METHODS FOR ACHIEVING
  - RELIABILITY
  - UNDERSTANDABILITY
  - SIMPLICITY

INSTRUCTOR NOTES

COURSE OUTLINE (CONTINUED)

SECTION 2 - STRUCTURED PROGRAMMING (INTRODUCTION) [270 MINUTES]

- TRADITIONAL DEFINITION
- AN EXPANDED SET OF DEFINITIONS
- CHARACTERISTICS OF A SUCCESSFUL APPLICATION OF THE TECHNIQUES

SECTION 2A - STRUCTURED PROGRAMMING CONTROL CONSTRUCTS

- BASIC CONTROL STRUCTURES CHARACTERISTICS, SAMPLES AND ADVANTAGES
  - SEQUENCE
  - CONDITIONAL
  - ITERATIVE
- EXTENDED CONTROL STRUCTURES CHARACTERISTICS, SAMPLES AND ADVANTAGES

SECTION 2B - WHY STRUCTURED PROGRAMMING

- HOW STRUCTURED PROGRAMMING CONTRIBUTES TO CODING GOALS
- WHY STRUCTURED PROGRAMMING YIELDS SIMPLER MORE RELIABLE CODE

SECTION 2D - STRUCTURED PROGRAMMING "BAG OF TRICKS"

- LOOP PARADIGMS
- CONDITIONAL PARADIGMS

SECTION 2E - STRUCTURED PROGRAMMING EXERCISE

INSTRUCTOR NOTES

COURSE OUTLINE (CONTINUED)

SECTION 3 - CODING STYLES (INTRODUCTION) [110 MINUTES]

- DEFINITION OF CODING STYLES FROM AN ESTHETIC POINT OF VIEW
- SAMPLES OF GOOD AND BAD STYLES
- HOW CODING CONVENTIONS CAN BE USED AS AID TO GOOD STYLE
- SUMMARY OF THE MAXIMS OF CODING STYLE

SECTION 3A - FORMATTING CONVENTIONS

- SUGGESTED Ada FORMATTING CONVENTIONS

SECTION 3B - COMMENTING CONVENTIONS

- CHARACTERISTICS AND EXAMPLES OF
  - BLOCK COMMENTS
  - HEADER COMMENTS
  - LOOP AND CONDITIONAL COMMENTS
  - OTHER COMMENTS

SECTION 3C - NAMING CONVENTIONS

- NAMING CONVENTIONS FOR
  - PROCEDURES
  - VARIABLES
  - TYPES
- AVOIDING THE USE OF CONFUSING NAMES

INSTRUCTOR NOTES

COURSE OUTLINE (CONTINUED)

SECTION 4 - ENSURING RELIABILITY (INTRODUCTION) [160 MINUTES]

- REVIEW OF WHY CONSIDER RELIABILITY
- REVIEW OF HOW RELIABILITY CAN BE ACHIEVED

SECTION 4A - CODING TECHNIQUES FOR INCREASING RELIABILITY

- HOW WE DEMONSTRATE CORRECTNESS
- TECHNIQUES FOR FORMAL CORRECTNESS DEMONSTRATIONS WITH EXAMPLES

SECTION 4B - PROJECT MANAGEMENT TECHNIQUES

- CODE READING
- EGOLESS PROGRAMMING
- USE OF UNIT DEVELOPMENT FOLDERS

SECTION 4C - MODULE DOCUMENTATION

- ROLE OF SOURCE CODE
- HIGHER LEVEL DOCUMENT CHARACTERISTICS
- DESCRIPTION OF DoD STANDARDS FOR MODULE DOCUMENTS

SECTION 4D - UNIT TESTING

- UNIT TESTING GOALS
- UNIT TESTING PROCEDURES
- TWO STRATEGIES FOR TESTING - TOP-DOWN AND BOTTOM-UP
- EXERCISE

SECTION 5 - REVIEW AND WRAPUP [40 MINUTES]

- QUOTES AND EXAMPLES THAT SUPPORT THE MAIN POINTS OF THE COURSE FROM A DIFFERENT PERSPECTIVE

INSTRUCTOR NOTES

- GO OVER THE FORMAT OF THE SLIDE SINCE THIS WILL BE THE FORMAT USED FROM THIS POINT ON.

- DESCRIBE THE PRESENTATION FORMAT
  - SECTION OVERVIEW
  - SUBSECTIONS

SUMMARY OF MAIN POINTS COVERED:

- INTRODUCTION AND SUMMARY OF THE OBJECTIVES OF THE COURSE

MAIN MESSAGES:

- OBJECTIVES ARE:
  - DESCRIBE PROGRAMMERS RESPONSIBILITIES DURING THE CODING PHASE
  - TEACH MODERN CODING TECHNIQUES
  - GIVE SOME OF THE THEORY THAT SUPPORTS THE TECHNIQUES

SUBTOPICS:

- BRIEF DISCUSSION OF EACH OBJECTIVE

SPECIAL CONSIDERATIONS:

- ALLOW THE CLASS TIME TO ACCEPT THE OBJECTIVES
- SUPPORT THE DISCUSSION WITH RELEVANT PERSONAL EXPERIENCES

INSTRUCTOR NOTES

SECTION 1A - COURSE OUTLINE

SUMMARY OF MAIN POINTS COVERED:

- DESCRIPTION OF THE CONTENTS OF THE COURSE

SPECIAL CONSIDERATIONS:

- GO THROUGH THIS QUICKLY

INSTRUCTOR NOTES

FUNCTIONS ≡ ACTIVITY TYPICALLY PERFORMED BY A PROGRAMMER

PRODUCTS ≡ DELIVERABLES, DOCUMENTS ETC.

SECTION 1B - REVIEW OF THE SOFTWARE LIFE CYCLE

SUMMARY OF MAIN POINTS COVERED:

- AN OVERVIEW OF THE FULL SOFTWARE DEVELOPMENT PROCESS WITH THE INTENT OF SHOWING HOW PROGRAMMING PHASE FITS IN

MAIN MESSAGES:

- PROCESS STEPS THAT MAKE UP THE LIFE CYCLE
- INPUTS AND OUTPUTS OF THE VARIOUS STEPS

SUBTOPICS:

- CHARACTERIZES THE PROCESS STEPS ONLY BRIEFLY COVERING THE NON CODING AND TESTING PHASES

SPECIAL CONSIDERATIONS:

- DISCUSS THE VARIOUS PHASES BY GIVING THE PHASE'S PRIMARY FUNCTIONS AND PRODUCTS

INSTRUCTOR NOTES

JUST LIKE THE M203 CLASS ITSELF THE INSTRUCTOR'S IN TRAINING MAY HAVE A MORE RESTRICTED VIEW OF THE PROGRAMMING PHASE (i.e. CODING $\equiv$ PROGRAMMING). GET THEM TO ACCEPT THE EXPANDED VIEW OF THIS PHASE.

SECTION 1C - DESCRIPTION OF THE CODING PHASE

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE INPUTS, OUTPUTS, AND ACTIVITIES OF THE MAJOR PORTION OF THE PROGRAMMING PHASES

MAIN MESSAGES:

- CODING PHASE STARTS AFTER DETAILED DESIGN AND ENDS WITH THE UNIT TESTING OF THE CODE
- UNIT TESTING IS AN INTEGRAL PART OF THE CODING PROCESS

SUBTOPICS:

- PROGRAMMING PHASE INPUTS
- PROGRAMMING PHASE OUTPUTS
- PROGRAMMING PHASE ACTIVITIES

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE DEPENDENCIES OF PROGRAMMING PHASE ON THE OTHER PHASES OF THE LIFE CYCLE.
- MAKE IT CLEAR THAT SOFTWARE DEVELOPMENT IS NOT JUST CODING

INSTRUCTOR NOTES

GETTING THE STUDENTS OF M203 TO "BUY" THE GOALS OF A PROGRAMMING METHODOLOGY IS VERY IMPORTANT.

SECTION 1D - GOALS OF A PROGRAMMING METHODOLOGY

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE PROGRAMMERS RESPONSIBILITIES IN THE PRODUCTION OF RELIABLE CODE
- SHOWS HOW PROGRAMMING METHODOLOGIES HELP TO ATTAIN GOALS

MAIN MESSAGES:

- CONCEPTS ARE UNIVERSAL AND IN MOST CASES COMMON SENSE
- PROGRAMMER MUST ENSURE PROGRAM RELIABILITY
- TESTING CAN'T ENSURE RELIABILITY - IT DETECTS UNRELIABILITY
- A METHODOLOGY IS CRITICAL IN ACHIEVING THE GOALS

SUBTOPICS:

- GOALS SUMMARY
- PROGRAMMER RESPONSIBILITIES
- METHODS FOR ACHIEVING:
  - RELIABILITY
  - UNDERSTANDABILITY
  - SIMPLICITY

SPECIAL CONSIDERATIONS:

- GET THE STUDENTS TO ACCEPT THESE AS THEIR GOALS OR THE FOLLOWING SECTIONS WILL BE DIFFICULT FOR THEM TO ACCEPT

INSTRUCTOR NOTES

EMPHASIZE THE FACT THAT THE DEFINITIONS IN SECTION 2 ARE EXPANSIONS OF THE TRADITIONAL DEFINITION WHICH MAY OFFEND A STRUCTURED PROGRAMMING PURIST.

SECTION 2 - STRUCTURED PROGRAMMING (INTRODUCTION)

SUMMARY OF MAIN POINTS COVERED:

- THE DEFINITION OF STRUCTURED PROGRAMMING

MAIN MESSAGES:

- DEFINES STRUCTURED PROGRAMMING USING THE TRADITIONAL DEFINITIONS
- EXPANDS THE DEFINITION TO INCLUDE FULL RANGE OF STRUCTURED TECHNIQUES

SUBTOPICS:

- TRADITIONAL DEFINITION
- AN EXPANDED SET OF DEFINITIONS
- CHARACTERISTICS OF A SUCCESSFUL APPLICATION OF THE TECHNIQUES

SPECIAL CONSIDERATIONS:

- USE THE APPLICATION DISCUSSION TO GET THE CLASS TO RELATE ANY EXPERIENCES WITH STRUCTURED TECHNIQUES

INSTRUCTOR NOTES

IN GENERAL THE DIAGRAMS AND CODE FRAGMENTS OF M203 GIVE THE INSTRUCTOR A LOT OF FREEDOM IN METHOD OF PRESENTATION, BUT IT WILL REQUIRE AN INSTRUCTOR TO PREPARE BETTER THAN A READ THE SLIDES PRESENTATION.

SECTION 2A - STRUCTURED PROGRAMMING CONTROL CONSTRUCTS

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE BASIC AND EXTENDED STRUCTURED PROGRAMMING CONTROL STRUCTURES
- MOTIVATION FOR THE USE OF THE METHODS

MAIN MESSAGES:

- THREE BASIC CONTROL STRUCTURES ARE ALL YOU NEED IN ANY PROGRAM
- EXTENDED CONTROL STRUCTURES ARE PROVIDED FOR CONVENIENCE

SUBTOPICS:

- BASIS CONTROL STRUCTURES CHARACTERISTICS, SAMPLES AND ADVANTAGES
  - SEQUENCE
  - CONDITIONAL
  - ITERATIVE
- EXTENDED CONTROL STRUCTURES CHARACTERISTICS, SAMPLES AND ADVANTAGES

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE DIAGRAM SLIDES AND SAMPLES

INSTRUCTOR NOTES

SECTION 2B - WHY STRUCTURED PROGRAMMING

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE ADVANTAGES OF STRUCTURED PROGRAMMING AND SHOW HOW IT HELPS IN ACHIEVING THE SIMPLICITY GOALS

MAIN MESSAGES:

- SINGLE INPUT/OUTPUT NATURE OF CONSTRUCTS ALLOWS ANY PIECE OF CODE TO BE TREATED AS A SINGLE STATEMENT

SUBTOPICS:

- HOW STRUCTURED PROGRAMMING CONTRIBUTES TO CODING GOALS
- WHY STRUCTURED PROGRAMMING YIELDS SIMPLER MORE RELIABLE CODE

SPECIAL CONSIDERATIONS:

- ON THE CODE FRAGMENTS SAMPLES DRAW BOXES AROUND THEM TO RELATE THEM TO THIS SINGLE INPUT/OUTPUT NATURE OF THE CONTROL STRUCTURES THEY ILLUSTRATE

INSTRUCTOR NOTES

STRESS THE POINT ABOUT NOT GETTING BOGGED DOWN ON LANGUAGE DETAILS. ASK THE INSTRUCTORS IN TRAINING HOW THEY WOULD HANDLE THIS.

SECTION 2D - STRUCTURED PROGRAMMING "BAG OF TRICKS"

SUMMARY OF MAIN POINTS COVERED:

- DESCRIPTION OF SOME STANDARD STRUCTURED PROGRAMMING PARADIGMS

MAIN MESSAGES:

- THERE ARE STANDARD PATTERNS FROM WHICH STRUCTURED PROGRAMS CAN BE BUILT

SUBTOPICS:

- LOOP PARADIGMS
- CONDITIONAL PARADIGMS

SPECIAL CONSIDERATIONS:

- PARADIGMS ARE GIVEN USING Ada BUT TELL THE STUDENTS THEY CAN BE EXPRESSED IN ANY LANGUAGE
- DON'T GET BOGGED DOWN ON THE Ada DETAILS OF SYNTAX AND SEMANTICS

INSTRUCTOR NOTES

- EXERCISES CAN BE PRESENTED IN VARIOUS WAYS
  - DISCUSS THE PROBLEM, HAVE CLASS WORK OUT SOLUTION, DISCUSS THE SOLUTION TECHNIQUE THAT WORKS WELL MOST OF THE TIME

- TELL THE INSTRUCTOR IN TRAINING THAT SOME FLEXIBILITY IN PRESENTATION OF EXERCISES MAY BE NEEDED DUE TO CLASS MAKE-UP

SECTION 2E - STRUCTURED PROGRAMMING EXERCISE

SUMMARY OF MAIN POINTS COVERED:

- A SUPERVISED PRACTICE IN USING PROGRAMMING TECHNIQUES

MAIN MESSAGES:

- IT'S EASY TO DO
- YOU DO IT BY THINKING IN A TOP DOWN MANNER

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE NEED TO DO THE EXERCISE
- IF MEMBERS OF THE CLASS ARE NOT PROFICIENT IN Ada LET THEM USE ENGLISH PHRASES TO REPRESENT THE STATEMENT SYNTAX THEY CAN'T GET FROM THE EXAMPLES GIVEN ELSEWHERE IN SECTION 2.

INSTRUCTOR NOTES

SECTION 3 - CODING STYLES (INTRODUCTION)

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE CONTRIBUTION OF CODING STYLE TO READABILITY OF PROGRAMS

MAIN MESSAGES:

- MORE ATTENTION SHOULD BE PLACED ON MAKING PROGRAMS CLEAR AND READABLE
- THE ESTHETICS OF A PROGRAM ARE SECOND ONLY TO FUNCTIONALITY IN IMPORTANCE

SUBTOPICS:

- DEFINITION OF CODING STYLES FROM AN ESTHETIC POINT OF VIEW
- SAMPLES OF GOOD AND BAD STYLES
- HOW CODING CONVENTIONS CAN BE USED AS AID TO GOOD STYLE
- SUMMARY OF THE MAXIMS OF CODING STYLE

SPECIAL CONSIDERATIONS:

- EMPHASIZE THAT CONVENTIONS USED HERE FOR Ada CAN BE ADAPTED EASILY TO OTHER LANGUAGES

INSTRUCTOR NOTES

- POINT OUT THAT BAD/GOOD COMPARISONS HAVE THE DANGER OF OFFENDING STUDENTS IN M203
  - DO NOT BE OVERLY CRITICAL OF THE BAD FORMAT
  - STATE THINGS IN TERMS OF IMPROVEMENTS OF GOOD OVER BAD FORMATS.

SECTION 3A - FORMATTING CONVENTIONS

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF HOW FORMATTING CONVENTIONS ENHANCE READABILITY

MAIN MESSAGES:

- YOU NEED TO ESTABLISH GOOD FORMATTING CONVENTIONS

SUBTOPICS:

- SUGGESTED Ada FORMATTING CONVENTIONS

SPECIAL CONSIDERATIONS:

- USE THE BAD/GOOD FORMATTING SAMPLES TO ARGUE WHY CONVENTIONS ARE USEFUL AND REASONABLE

INSTRUCTOR NOTES

SOME INSTRUCTORS OF M203 MAY FOCUS TOO MUCH ON THE FORMATTING ASPECTS OF COMMENTS AND FORGET TO EMPHASIZE THE FACT THAT COMMENTS MUST BE MEANINGFUL.

SECTION 3B - COMMENTING CONVENTIONS

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF HOW COMMENTING CONVENTIONS ENHANCE READABILITY

MAIN MESSAGES:

- YOU NEED TO ESTABLISH GOOD COMMENTING CONVENTIONS
- STANDARDS AID IN ENHANCING TEAMWORK
- EXCESSIVE COMMENTING CAN BE HARMFUL

SUBTOPICS:

- CHARACTERISTICS AND EXAMPLES OF
  - BLOCK COMMENTS
  - HEADER COMMENTS
  - LOOP AND CONDITIONAL COMMENTS
  - OTHER COMMENTS

SPECIAL CONSIDERATIONS:

- FOCUS ON THE CONTENTS AS WELL AS THE STRUCTURE OF THE COMMENTS

INSTRUCTOR NOTES

- SOME EXAMPLES OF Ada FEATURES THAT SUPPORT CLEAR NAMING ARE:
  - NO EFFECTIVE IDENTIFIER LENGTH LIMITS
  - ABILITY TO USE UNDERSCORES
  - EVERYTHING IN Ada HAS A NAME

SECTION 3C - NAMING CONVENTIONS

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE NEED FOR CLEAR NAMING CONVENTIONS

MAIN MESSAGES:

- GOOD NAMING CONVENTIONS CAN ENHANCE PROGRAM READABILITY

SUBTOPICS:

- NAMING CONVENTIONS FOR
  - PROCEDURES
  - VARIABLES
  - TYPES
- AVOIDING THE USE OF CONFUSING NAMES

SPECIAL CONSIDERATIONS:

- EMPHASIZE THE FEATURES OF Ada THAT SUPPORT CLEAR NAMING

INSTRUCTOR NOTES

SECTION 4 - ENSURING RELIABILITY (INTRODUCTION)

SUMMARY OF MAIN POINTS COVERED:

- REVISTS THE RESPONSIBILITIES OF THE PROGRAMMER

MAIN MESSAGES:

- EFFICIENCY AND SIZE DOESN'T MATTER IF THE PROGRAM DOESN'T DO THE RIGHT THING

SUBTOPICS:

- REVIEW OF WHY CONSIDER RELIABILITY
- REVIEW OF HOW RELIABILITY CAN BE ACHIEVED

SPECIAL CONSIDERATIONS:

- NONE

INSTRUCTOR NOTES

THE CONCEPTS DISCUSSED HERE ARE MORE FORMAL PROOF OF CORRECTNESS TECHNIQUES, YOU MAY GET A STRONG NEGATIVE REACTION FROM SOME OF THE INSTRUCTORS IN TRAINING AND THE M203 CLASS. AVOID ANY ARGUMENTS IF POSSIBLE; THEY ARE COUNTER-PRODUCTIVE.

SECTION 4A - CODING TECHNIQUES FOR INCREASING RELIABILITY

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF HOW A PROGRAM CAN BE DEMONSTRATED TO BE CORRECT

MAIN MESSAGES:

- WE ALL DEMONSTRATE TO OURSELVES AT LEAST THAT OUR PROGRAMS ARE CORRECT
- FORMAL TECHNIQUES CAN AID IN DEMONSTRATING CORRECTNESS
- KNOWLEDGE OF THE FORMAL TECHNIQUES GIVES US A GOOD BACKGROUND IN ENSURING RELIABILITY EVEN IF WE DO NOT APPLY THEM DIRECTLY

SUBTOPICS:

- HOW WE DEMONSTRATE CORRECTNESS
- TECHNIQUES FOR FORMAL CORRECTNESS DEMONSTRATIONS WITH EXAMPLES

SPECIAL CONSIDERATIONS:

- FOCUS ON THE BENEFITS AND SIMPLER ASPECTS OF THE FORMAL TECHNIQUES NOT ON THE MORE THEORY ORIENTED ASPECTS

INSTRUCTOR NOTES

EMPHASIZE THAT THIS SUBSECTION TAKES A VERY RESTRICTED VIEW OF PROJECT MANAGEMENT. IT ONLY FOCUSES ON THOSE TECHNIQUES THAT AID IN ENSURING RELIABILITY.

SECTION 4B - PROJECT MANAGEMENT TECHNIQUES

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF SOME OF THE MANAGEMENT ASPECTS THAT CONTRIBUTE TO RELIABLE PROGRAMMING

MAIN MESSAGES:

- SOME COMMON SENSE TECHNIQUES CAN BE USED TO INSURE PROGRAM RELIABILITY

SUBTOPICS:

- CODE READING
- EGOLESS PROGRAMMING
- USE OF UNIT DEVELOPMENT FOLDERS

SPECIAL CONSIDERATIONS:

- EMPHASIZE CODE READING AND REVIEW AS HIGH PAY-OFF TECHNIQUES

INSTRUCTOR NOTES

SECTION 4C - MODULE DOCUMENTATION

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE ROLE OF MODULE DOCUMENTATION

MAIN MESSAGES:

- BEST DOCUMENTATION IS A CLEARLY WRITTEN SOURCE CODE LEVEL PROGRAM THAT USES THE TECHNIQUES OUTLINED IN THIS COURSE
- DOCUMENTATION STANDARDS ARE NORMALLY MANDATED TO US

SUBTOPICS:

- ROLE OF SOURCE CODE
- HIGHER LEVEL DOCUMENT CHARACTERISTICS
- DESCRIPTION OF DoD STANDARDS FOR MODULE DOCUMENTS

SPECIAL CONSIDERATIONS:

- NONE

INSTRUCTOR NOTES

SECTION 4D - UNIT TESTING

SUMMARY OF MAIN POINTS COVERED:

- DISCUSSION OF THE ROLE OF UNIT TESTING IN THE OVERALL DEVELOPMENT PROCESS

MAIN MESSAGES:

- UNIT TESTING IS THE RESPONSIBILITY OF THE PROGRAMMER
- A MIXED STRATEGY OF TOP-DOWN AND BOTTOM-UP TESTING IS NEEDED FOR SUCCESSFUL UNIT TESTING

SUBTOPICS:

- UNIT TESTING GOALS
- UNIT TESTING PROCEDURES
- TWO STRATEGIES FOR TESTING - TOP-DOWN AND BOTTOM-UP
- EXERCISE

SPECIAL CONSIDERATIONS:

- USE DISCUSSION OF THE EXERCISE SOLUTIONS TO HELP THE CLASS UNDERSTAND THE NEED FOR A MIXED TOP-DOWN AND BOTTOM-UP STRATEGY

INSTRUCTOR NOTES

AT THIS POINT ASK FOR QUESTIONS.

SECTION 5 - REVIEW AND WRAPUP

SUMMARY OF MAIN POINTS COVERED:

- REVIEW OF THE IMPORTANT POINTS MADE IN THE COURSE

MAIN MESSAGES:

- GET THE STUDENTS TO THINK ABOUT WHAT THEY LEARNED

SUBTOPICS:

- QUOTES AND EXAMPLES THAT SUPPORT THE MAIN POINTS OF THE COURSE FROM A DIFFERENT PERSPECTIVE

SPECIAL CONSIDERATIONS:

- YOU MAY WANT TO TAKE THE COURSE OUTLINE AND FURTHER SUMMARIZE THE COURSE

Material: Instructor's Course S500 Methodology Modules

We would appreciate your comments on this material and would like you to complete this brief questionaire. The completed questionaire should be forwarded to the address on the back of this page. Thank you in advance for your time and effort.

1. Your name, company or affiliation, address and phone number.

2. Was the material accurate and technically correct?

   Yes ☐ No ☐

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3. Were there any typographical errors?

   Yes ☐ No ☐

   If yes, on what pages?

4. Was the material organized and presented appropriately for your applications?

   Yes ☐ No ☐

   Comments:

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place
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