RP-ED-76-33

ADA083455

COURSE SPECIFICATIONS

Final Task 3 Completion Report

EPA Contract # 68-01-3357
"Development of an ADP Training Program to
Serve the EPA Data Processing Community"

Submitted to

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ADVANCED COBOL

TARGET AUDIENCE

To train experienced COBOL programmers in the specific skills required
for them to write more efficient programs. The course will introduce the
COBOL programmer to the latest enhancements in the ASCII compiler.

PREREQUISITE SKILLS AND KNOWLEDGE

Completion of a basic COBOL course or general COBOL programming experience.

OBJECTIVES OF CURRICULUM

● Provide information with respect to the origins and objectives
of the COBOL language.

● Review the concepts and facilities of the basic COBOL language.

● Provide technical information relating to the divisions of a COBOL
program.

● Introduce the student to the most recent enhancements to the ANSI
COBOL compiler.

● Discuss record structuring techniques.

● Provide an introduction to TABLE processing techniques.

● Introduce index sequential and random access file professing techniques.

● Discuss the VALUE clause, the corresponding option of the MOVE
statement, and other important COBOL features.

COURSE ABSTRACT

This course presents selected elements of the ANSI COBOL language not
normally taught in introductory level courses. Topics include: record
structuring; tape file processing; value clauses; the corresponding option of
the MOVE statement; divide, compute, perform and alter statements; data
representation and conversion; table processing; and indexed sequential and
random access file processing. The course workshop will include the testing
of coded exercises and problems on a computer system.

CLASS SIZE: Individualized

METHODS/CONDUCT OF COURSE

This course should be a textbook course (PI) with extensive class
participation and with an associated workshop.

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ADVANCED COBOL (cont'd)

RESOURCE MATERIAL/HANDOUTS

Each student will require a course text, a flowcharting template, coding and flowcharting worksheets.

FREQUENCY OF COURSE OFFERING:  As required by individual demand.

TOPICAL OUTLINE OF COURSE

- Course overview

- Review of elemental COBOL

- Identification and environment division entries, procedure division entries (working storage section, 77-level entries, picture), etc.

- Structuring a record with level numbers, data division entries for card and printer files, environment division entries (select, assign) I/O statements, MOVE and GO TO statements.

- Value clause, corresponding option of MOVE statement, printer spacing and skipping, special names, paragraph, copy statement

- The string, unstring, transform, monitor and inspect verbs.

- Tape file processing, move versus locate mode of processing, add and multiply statements.

- Subtract and If statements, test conditions (class, sign, relation, condition name), compound conditions.

- Divide, compute, perform, and alter statements, depending on clause of the GO TO statement.

- Data representation and conversion, usage clause, examine and transform statements.

- Table processing, subscripted data names, occurs clause, table handing features (get, search).

- Indexed sequential files (creating, sequential retrieval and additions).

- Random processing of an IS file.  (Retrieval, additions, updating and entries)

- Boundry alignment

- Debugging programs

- Subroutine linkage (calling and called programs)
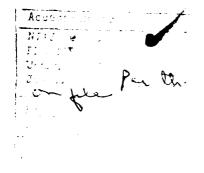
ADVANCED COBOL (cont'd)

- Sorts

- Segmentation

FOLLOW-ON COURSE: None

COURSE DELIVERY STRATEGY: Commercial course

# STRUCTURED PROGRAMMING TECHNIQUES

## TARGET AUDIENCE

Any person with a technical programming background who requires knowledge of structured programming concepts and techniques. (Recommended for Project Managers.)

## PREREQUISITE SKILLS AND KNOWLEDGE

The student should have a working knowledge of COBOL preferably, or FORTRAN.

## OBJECTIVES OF CURRICULUM

Upon completion of this course the student should be able to:

- Describe some of the problems typically associated with conventional programming and how structured programming minimizes them.

- Describe the elements of structured programming.

- Draw data flow graphs and structure charts for programs.

- Describe the advantages and problems of project team program walk-thrus.

- List the major objectives of a development support library and HIPO documentation.

## COURSE ABSTRACT

In this course the student will learn the fundamentals of structured programming and the advantages of the team approach to program development.

CLASS SIZE: 5 - 10

COURSE OFFERING LOCATION: Major EPA installations

COURSE DURATION: 10 hours

## METHODS/CONDUCT OF COURSE

Lectures with individual student exercises and group sessions simulating team approach program critiques.

## RESOURCE MATERIAL/HANDOUT

Each student will require materials for flowcharting and program coding.

STRUCTURED PROGRAMMING TECHNIQUES (cont'd)


FREQUENCY OF COURSE OFFERING:  Twice yearly

TOPICAL OUTLINE OF COURSE:  Each session should require about 2 hours

Session 1.

- Present the reasons for the emergence of structured programming and related disciplines as desirable improved programming technologies.

- Discuss such principles as consistency, clarity, naturalness, structure, precision, decomposition, formatting and programming style.

- Describe the goals of the team as a whole and the roles of the various team members during the structured walk-thru.

Session 2.

- Show how to use fundamental nodes to build the basic structure figures for sequences, decision-making and looping operations.

- Describe how a traditional flowchart is transcribed into a structured flowchart.

- Present student exercise requiring use of flowcharting skills just covered.

- Student performs exercise.

Session 3.

- Review solution to class exercise.

- Discuss the proper techniques for developing a structured program.

- The student should now perform an exercise which requires  the development of a simple program including both its flowcharting and coding.

Session 4.

- Review solution to exercise.

- Describe the use of development, support libraries, coupling and cohesion in effective structured systems design.

- Define and describe the use of HIPO (Hierarchy Plus Input Process and Output) documentation and its role in designs developed in a top-down manner.

- Define class exercise requiring each student to play a role in the design and evaluation of a hypothetical system using the structured approach.

STRUCTURED PROGRAMMING TECHNIQUES (cont'd)

Session 5.

- The class performs the exercise.

- Review the recommended solution to the exercise and critique each student's participation in the exercise.

FOLLOW-ON COURSE:   None

COURSE DELIVERY STRATEGY

To be effective, an instructor who can respond to individual questions and comments is essential to this course due to the large amount of material presented in such a short time.

INTRODUCTION TO FORTRAN


TARGET AUDIENCE

Progammers and individuals in technical positions who require a basic knowledge of FORTRAN.

PREREQUISITE SKILLS AND KNOWLEDGE

Knowledge of basic algebra; some familiarization with computer concepts will be helpful.

OBJECTIVES OF CURRICULUM

After completing this course, the student should have developed a working knowledge of:

- General structural characteristics and programming concepts of FORTRAN Programs.

- Techniques for handling input and output, including the use of the following statements: READ, WRITE, and FORMAT.

- Branching, looping and decision making, including: IF, GO TO and DO.

- Establishing arrays and data definitions, including: DIMENSION, COMMON and TYPE.

- Use of subprograms, including: FUNCTION and SUBROUTINE.

COURSE ABSTRACT

This course is designed to introduce programmers and technical persons (engineers, mathematicians, and scientists) to the fundamentals of FORTRAN. As FORTRAN statements are presented, coding exercises will reinforce the student's knowledge of their uses. In a combination of lecture and workshop sessions, the students will proceed through writing, testing, and debugging complete programs.

CLASS SIZE: 10 - 20

COURSE OFFERING LOCATION: Any EPA office

METHODS/CONDUCT OF COURSE: Lecture and workshop

RESOURCE MATERIAL/HANDOUT: Fundamentals of FORTRAN manual and coding sheets.

FREQUENCY OF COURSE OFFERING: Approximately twice each year or as employee requirements demand.

INTRODUCTION TO FORTRAN (cont'd)

TOPICAL OUTLINE OF COURSE

- Fundamentals of data processing

- Structure of FORTRAN

- Arithmetic and logical FORTRAN expressions

- Input/output statements

- Control statements

- Arrays, subscripts and DO loops

- Specification statements

- Subprograms

- Debugging methodology

FOLLOW-ON COURSE:  Advanced FORTRAN

COURSE DELIVERY STRATEGY:  Recommend use of commercially available course.

WYLBUR FOR SECRETARIES/ADMINISTRATORS

TARGET AUDIENCE

Secretaries, administrative and other non-technical staff members who will be responsible for entering textual material into the computer using WYLBUR.

PREREQUISITE SKILLS AND KNOWLEDGE:  Introduction to EDP and facilities familiarization.

OBJECTIVES OF CURRICULUM

The course is intended to teach the potential user:

- To thoroughly understand the concepts of data processing as applied to typewriter terminal applications.

- The functional aspects of using a typewriter terminal.

- Correct Sign On/Sign Off procedures.

- How to CREATE, EDIT, SAVE and RETRIEVE text or data sets.

- To select and use the appropriate WYLBUR commands.

- How to handle abnormal conditions.

COURSE ABSTRACT

This course is intended to provide the secretary or other non-technical administrative person with all the necessary skills and information required to be able to effectively utilize the facilities of WYLBUR.

CLASS SIZE:  5 - 10

COURSE OFFERING LOCATION:  Major EPA installations

COURSE DURATION:  6 hours

METHODS/CONDUCT OF COURSE

Instructor for small groups with individual additional assistance if required by student.  Includes as much actual terminal usage as possible.

RESOURCE MATERIAL/HANDOUT:  Access to terminal and use of computer time.

FREQUENCY OF COURSE OFFERING:  As required by demand

TOPICAL OUTLINE OF COURSE:  Each session requires 4 hours.

Session 1.

- Review of data processing concepts applicable to this course.

- Introduction to and history of WYLBUR.

- Typewriter terminal operation procedures.

- Short demonstration of terminal use.

- Discussion of various WYLBUR modes and types of commands.

- Describe data set creation commands using a very simple example.

- Present short exercise which student will then perform using material already covered.

- Review exercise.

- Describe and detail the various housekeeping commands.

- Describe and detail the various editing commands.

Session 2.

- Review material from Session 1.

- Present an exercise requiring use of that material and have student perform the exercise.

- Review exercise.

- Describe procedures and commands used to save a data set.

- Describe procedures for using data sets (Print, Punch, etc.) and other misecllaneous commands.

- Present several short exercises which would demonstrate the usage of the various commands.

- Student will perform the exercises.

- Review solutions to exercises.

- Review material covered.

FOLLOW-ON COURSES:  WORD/ONE, IRS, Introduction to JCL.

INTRODUCTION TO DATA COMMUNICATIONS TECHNOLOGY

TARGET AUDIENCE

Any programmer, engineer or manager who will design, analyze or use applications involving data communications.

PREREQUISITE SKILLS

Student should have a good broad background in data processing.

OBJECTIVES OF CURRICULUM

Upon completion of this course the student should be able to:

- Define the major types of applications possible with data communications systems and their benefits.

- Explain the functions of the components in a data communications system and their effects on the system.

- Explain the various common carrier arrangements.

- Define many commonly used terms and phrases unique to data communications.

- Appreciate the kinds of terminals and modems available and their approximate cost.

COURSE ABSTRACT

This course will provide the technically oriented user with a broad coverage of the data communications field, including communications terminology, performance features, connection methods and modes of transmissions. This course is intended primarily for the direct user of communications facilities.

CLASS SIZE:  10 - 20

COURSE OFFERING LOCATION:  Major EPA installations

COURSE DURATION:  8 hours

METHODS/CONDUCT OF COURSE:  Lecture or video presentation

RESOURCE MATERIAL/HANDOUTS:  None

FREQUENCY OF COURSE OFFERING:  Twice each year

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INTRODUCTION TO DATA COMMUNICATIONS TECHNOLOGY (cont'd)

TOPICAL OUTLINE OF COURSE:  Each session requires approximately 2 hours

Session 1.

- Communications system elements

- Application examples

- Analog and digital

- Common carriers

Session 2.

- Terminals and modems

Session 3.

- Digital data communications
    Uses
    Errors
    Noise

- Asynchronous vs. synchronous transmission

- Line speeds

Session 4.

- Digital communication codes and formats
    BAUDOT
    ASCII
    HOLLERITH
    BCD/EBCDIC

- Typical message formats
    Simplex
    Full/Half Duplex

- Future directions of data communications

FOLLOW-ON COURSES:  None

# TIME-SHARING OPTION (TSO)

## TARGET AUDIENCE

Programmers, engineers and scientists who use the computer as a tool for their profession.

## PREREQUISITE SKILLS AND KNOWLEDGE

The student should be well versed in data processing concepts and should have experience with the terminal device to be used. A working knowledge of at least one programming language is desirable.

## OBJECTIVES OF CURRICULUM

Upon completion of the course the student should be able to:

- Describe how TSO relates to the operating system.

- LOGON and LOGOFF the system.

- Use TSO to enter, modify, list and save data sets or programs under TSO.

- Use TSO to program, test and debug application programs.

## COURSE ABSTRACT

This course will provide the student with the necessary information concerning the concepts, facilities and usage of the Time-Sharing Option (TSO).

CLASS SIZE: Individualized or in small groups.

COURSE OFFERING LOCATION: Any EPA installation as required.

COURSE DURATION: 12 hours

## METHODS/CONDUCT OF COURSE

Due to the critical nature of this material to the performance of an individual's job, it must be readily available for study. Therefore, it is recommended that the course be presented via video tape or some similar media.

RESOURCE MATERIAL/HANDOUTS: None

FREQUENCY OF COURSE OFFERING: According to individual demand

TIME-SHARING OPTION (TSO) (cont'd)


TOPICAL OUTLINE OF COURSE:   Each session is approximately 2 hours in duration

## Session 1.

- Introduction to TSO and its relation to the operating system.

- Discuss the use of user aids, passwords, account numbers, access
  procedures (LOGON/LOGOFF) and TSO disk space.

- Describe TSO command syntax.

## Session 2.

- Describe the construction of data set names used by TSO.

- Describe the TSO commands used for program development:
  | | |
  |---|---|
  | EDIT | ASM, COBOL, FORT, PL1 |
  | LINK | ALLOCATE, FREE |
  | ATTRIB | CALL |
  | CALL | LOAD |
  | CLIST facility (PROC, WHEN, END, EXEC) | |

## Session 3.

- Present student exercise requiring use of material covered.

- Student performs exercise.

## Session 4.

- Review the solution to exercise.

- Describe commands used for RJE
  | | |
  |---|---|
  | LIST | COPY |
  | FORMAT | MERGE |
  | LISTCAT | SCRATCH |
  | LISTBS | PROTECT |

- Describe miscellaneous TSO commands

  LISTALC
  TERMINAL
  SEND
  PROFILE

## Session 5.

- Define practical exercise involving the creation or modification of a
  simple program and its subsequent compilation and execution.

- Student should perform exercise .

- Review solution to exercise.

TIME-SHARING OPTION (TSO) (cont'd)

Session 6.

- Describe the COBOL Interactive Debug Facility of TSO.

- Review all material covered.

FOLLOW-ON COURSES:  None

COURSE DELIVERY STRATEGY

Recommend use of commercially available course.

INQUIRY ... ...ING SYSTEM (IRS)

TARGET AUDIENCE

Clerical or other personnel requiring use of IRS.

PREREQUISITE SKILLS AND KNOWLEDGE

Introduction to EDP and Facilities Familiarization or equivalent ADP experience. Student should also be knowledgeable in the use of the specific terminal to be used.

OBJECTIVES OF CURRICULUM

At the completion of this course the student should:

- Understand the basic concept of IRS and how it produces the requested reports.

- Know how to properly ... the Record Retrieval and Sort forms.

- Understand the usage of the ...ation and Data Transfer form.

- Be thoroughly familiar with the Output Specifications form.

- Be able to effectively ... the system in the given user environment.

COURSE ABSTRACT

This course is designed ... the necessary information to effectively utilize the facilities of the ... Reporting System (IRS). It is intended primarily for non-technical ... but is applicable for anyone who wishes to use this system.

CLASS SIZE: 5 - 10

COURSE OFFERING LOCATION: M... locations or as required by student demand.

COURSE DURATION: 12 hours

METHOD/CONDUCT OF COURSE

Lecture presentation with ... assistance as required during exercises.

RESOURCE MATERIAL/HANDOUTS

... coding forms and materials ... required to complete the required exercises.

INQUIRY AND REPORTING SYSTEM (IRS) (cont'd)


FREQUENCY OF COURSE OFFERING:  Twice each year or as required by demand.

TOPICAL OUTLINE OF COURSE:  Each session is approximately 4 hours

Session 1.

- Brief discussion of Information Management System concepts.

- Non-technical discussion of the hardware/software requirements of IRS.

- Describe the capabilities if IRS and its functional usage:
    Primary and auxiliary file definition
    Assignment of file names
    Data references
    Chaining to auxiliary files

- Describe IRS system flow.

- Describe the proper completion of the SORT and SELECT cards
    Primary file descriptions
    Sort keys
    Control Fields

- Present an exercise which emphasizes use of format cards.

- Review solution to exercise.

- Describe indexing feature.

- Present details of system implementation without being overly technical.

- Summarize material covered.

FOLLOW-ON COURSE:  Introduction to JCL

COURSE DELIVERY STRATEGY:  Vendor produced course

WORD/ONE USAGE

## TARGET AUDIENCE

Any person requiring knowledge of the use of Word/One facilities.

## PREREQUISITE SKILLS AND KNOWLEDGE

Student should have some knowledge of data processing as from Introduction to EDP, participation in facilities familiarization and should know how to use the appropriate terminal. For administrative personnel, participation in a WYLBUR course is desirable.

## OBJECTIVES OF CURRICULUM

Upon completion of this course the student should:

- Know when use of Word/One is desirable for a particular application.

- Know how a document is properly entered using Word/One.

- Know how to modify a Word/One document.

- Know how to obtain both terminal and high-speed printer listings of Word/One documents.

## COURSE ABSTRACT

This course is intended primarily for non-technical administrative personnel but can be taken by anyone requiring a working knowledge of the proper usage procedures of the Word/One package.

CLASS SIZE:  5 - 10

COURSE OFFERING LOCATION:  Major EPA installations

COURSE DURATION:  4 hours

## METHODS/CONDUCT OF COURSE

Lecture presentation with individual assistance as required during exercise.

FREQUENCY OF COURSE OFFERING:  As required by user demand.

## TOPICAL OUTLINE OF COURSE

- Introduction to Word/One

- Brief demonstration of how to enter a command and producing a list of a short textual passage.

WORD/ONE USAGE (cont'd)

- Discuss security features and how to sign on.
    Passwords
    Security screen
    Usage distribution code

- Procedures for setting tabs
    Width
    Depth
    Clearing tabs

- Describe the use of the Terminal Status Report

- Describe procedures for entering a document
    Mode selection
    Proper usage of formatted mode
    Underlines and hyphens

- Describe usage of storage areas
    Working storage
    Permanent storage

- Describe how to print documents

- Describe the various editing and correction features

- Describe format control commands

- Describe procedure for routing output to high-speed printer

- Define short class exercise and have each student perform it

- Review solution to exercise and all material covered.

FOLLOW-ON COURSES:  IRS, Introduction to JCL

EFFECTIVE ADP DOCUMENTATION

TARGET AUDIENCE

Programmers and analysts responsible for program and system development.

PREREQUISITE SKILLS

Knowledge of data processing as in Introduction to EDP.

OBJECTIVES OF CURRICULUM

Upon completion of the course the student should be aware of:

- What constitutes good program and system documentation.

- The importance of accurate and complete documentation.

- The particular documentation standards of EPA.

COURSE ABSTRACT

This course will provide the analyst or programmer with the details of effective program and system documentation as required by EPA standards.

CLASS SIZE:  10 - 20

COURSE OFFERING LOCATION:  Any EPA installation

COURSE DURATION:  4 hours

METHODS/CONDUCT OF COURSE

A generalized video presentation of EDP documentation coupled with in-person or video summary which includes presentation of EPA standards

RESOURCE MATERIAL/HANDOUTS:  None

FREQUENCY OF COURSE OFFERING:  2 times yearly at major installations

TOPICAL OUTLINE OF COURSE:  This course is divided into two parts, 2 hours each

Session 1.

- System Documentation
    Background material on requirements for the system
    Functional specifications
    Analyses of alternative designs
    Detailed system design including input and output documents
        and programming specifications
    Modifications to final design
    Implementation documentation including final program and
        operations documentation

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EFFECTIVE EDP DOCUMENTATION (cont'd)


- Program Documentation
      Program functions and organization
      Logic diagrams and flowcharts
      Operating instructions
      Modifications log
      Listings

- Describe EPA documentation standards and review material covered

FOLLOW-ON COURSES:   None

COURSE DELIVERY STRATEGY

   Utilize commercial course supplemented by customized segment on EPA standards.

# COMPUTER PROGRAMMING CONCEPTS

TARGET AUDIENCE

Application programmer trainees or technical analysts who require a basic understanding of programming techniques.

PREREQUISITE SKILLS AND KNOWLEDGE

Basic knowledge of EDP concepts as obtained in Introduction to EDP.

OBJECTIVES OF CURRICULUM

Upon successful completion of this course, the student will be able to:

- Describe the programming task in terms of input, processing, and output.

- Identify and use the elements of problem solving.

- Distinguish between instructions and data within a program.

- Analyze the truth or falsity of simple and compound statements using symbolic logic.

- Graphically represent statements and logical operators by means of truth tables and Venn diagrams.

- Develop concise decision tables taking into consideration all significant conditions and actions.

- Create program flowcharts to solve "real" applications problems--incorporating such basics as looping, switches, last card routines, error checking, and sequence checking.

- Code a program from a flowchart using a synthetic programming language.

- Create program flowcharts to solve advanced applications such as file merges, file updates, sorting, table building, and table searching.

- Describe how a sequence of instructions is executed within a computer to solve a problem.

- Create sufficient test data to validate a program.

COURSE ABSTRACT

This course will provide the student with language--independent programming skills in formalized problem solving and procedures documentation by application of techniques such as decision tables and flowcharts.

COMPUTER PROGRAMMING CONCEPTS (cont'd)


CLASS SIZE:  Individualized

COURSE OFFERING LOCATION:  Any EPA installation

COURSE DURATION:  12 hours

METHODS/CONDUCT OF COURSE

    This course can be either a straight textbook (PI) course or video taped
presentation.  Student participation through exercises and exams should be
stressed.

RESOURCE MATERIAL/HANDOUTS

    Each student will need a course text, a flowcharting template and coding
and flowcharting sheets.

FREQUENCY OF COURSE OFFERING:  As required by individual demand

TOPICAL OUTLINE OF COURSE:  Each session should require approximately 2 hours

Session 1.

- Describe the role of the programmer within the DP organization.

- Describe the problem solving process.

- Discuss the use of flowcharting symbols to depict systems elements.

- Describe the internal view of a program in terms of instruction
  format and internal and external data.

- Review concepts of file and record layouts and control operations for
  external storage and unit record devices.

Session 2.

- Describe the use of truth tables, Boolean logic and Venn diagrams.

- Describe the use of decision tables for programming.

- Present the standard program flowcharting symbols and conventions
  for their use.

- Student performs various exercises covering previous material.

COMPUTER PROGRAMMING CONCEPTS (cont'd)

## Session 3.

- Develop programming and flowcharting operations such as housekeeping, initialization, I/O operations, processing, last record test, looping and use of counters, totals and switches.

- Describe requirements and concepts of processing records with different formats, editing, sequence checking and report headings.

- Student performs an exercise using material covered in this session.

## Session 4.

- o Explain statement format and conventions for coding in a pseudo-language designed for this course.

- o Detail file and data definition statements.

- o Explain the various processing statements of the pseudo-language.

- o Student should perform an exercise using the language elements presented.

## Session 5.

- Discuss in detail the operations involved in a two file merge.

- Describe concept of arrays and their use.

- Describe use of control breaks and multiple levels of totals.

- Student should perform an exercise covering this session's material.

- Describe various techniques for sorting and detail an example of a simple exchange sort.

## Session 6.

- Define the functions of the following operating system components:
  Job Management                Translator (Assembler Compiler)
  Task Management               Linkage Editor
  Data Management               Loader
  Storage Management

- Define the primary uses of each of the following programming languages and present examples of each:
  Assembly Language
  COBOL
  PL/1
  BASIC

COMPUTER PROGRAMMING CONCEPTS (cont'd)

- Define and compare the purposes of:
  Processor Instructions
  Machine Instructions
  MACRO Instructions

- Define and contrast:
  Source Program
  Object Module
  Load Module

- Review material covered in course.

FOLLOW-ON COURSES

Facilities familiarization and appropriate language courses.

COURSE DELIVERY STRATEGY:   Commercial course

# INTRODUCTION TO THE BMD STATISTICAL PROGRAM PACKAGE

## TARGET AUDIENCE

Programmer trainees and scientists, engineers and administrators who use statistical analysis in performing their jobs.

## PREREQUISITE SKILLS AND KNOWLEDGE

Basic descriptive and inferential statistics including some familiarity with the Analysis of Variance.

## OBJECTIVES OF CURRICULUM

After completing this course, the student should have developed a working knowledge of:

- Structural components and programming concepts of BMD programs.

- Preparation of data input.

- Preparation of program control cards.

- Several basic statistical programs within the package.

- General requirements of computer systems for accessing BMD programs.

## COURSE ABSTRACT

This course is designed to introduce programmers, administrators, and technical persons (engineers, mathematicians, and scientists) to the basic operations required for accessing a BMD program, submitting data to the program, and directing the program to operate on the data. By means of lecture and workshop applications of simple programs, the students will acquire hands-on experience with running the BMD package and interpreting output.

CLASS SIZE:  10 - 15

## COURSE OFFERING LOCATION

Any EPA office or lab with access to a computing facility which runs the BMD package.

COURSE DURATION:  Two to three days

METHODS/CONDUCT OF COURSE:  Lecture and workshop

RESOURCE MATERIAL/HANDOUTS:  BMD manual and coding sheets

INTRODUCTION TO THE BMD STATISTICAL PROGRAM PACKAGE (cont'd)

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

TOPICAL OUTLINE OF COURSE

- Components of a BMD "job."

- Use of the manual.

- Preparation of Data Input
     Standard data input
     Tape input
     Coding and keypunching
     Use of code sheets

- Preparation of Program Control Cards
     Problem card
     Label cards
     Transgeneration cards
     Input Variable Format Cards

          A-type
          F-type

- System Control Statements

- Debugging Program Control Commands

- Practice Programs
     Simple Data Description (BMD01D)
     Correlation with Transgeneration (BMD02D)
     Description of Strata with Histograms (BMD07D)

FOLLOW-ON COURSE:  Advanced BMD

COURSE DELIVERY STRATEGY:  May be presented by staff or by commercially
     available course.

## SELECTING STATISTICAL TECHNIQUES FOR ANALYZING DATA

TARGET AUDIENCE

Programmers, scientists and engineers who employ statistical analysis methods in performing their jobs.

PREREQUISITE SKILLS AND KNOWLEDGE

Familiarity with univariate parametric and non-parametric statistical measures and tests; some understanding of multi-variate methods will be helpful.

OBJECTIVES OF CURRICULUM

Students who complete this course should be able to:

- Describe the features of observational or experimental variables, the scaling and statistical characteristics of data, and the types of research questions which influence the selection of statistical measures and tests.

- Determine the statistical method(s) appropriate to the analysis of a set of data or to answering the questions posed in a research study by a decision process which systematically considers study goals, variables, and data types.

COURSE ABSTRACT

This course is designed to provide technical persons with a procedure for selecting statistical methods that will be appropriate for the purposes and conditions of a particular analysis. Lectures will familiarize students with the factors influencing the selection; workshops will provide intensive practice in applying the decision process to a variety of data and problem types.

CLASS SIZE:  10 - 20

COURSE OFFERING LOCATION:  Any EPA office or lab.

COURSE DURATION:  Two days

METHODS/CONDUCT OF COURSE:  Lecture and Workshop

RESOURCE MATERIAL/HANDOUT:  Decision Tree Outline

FREQUENCY OF COURSE OFFERING

Two to three times each year or as employee requirements demand.

SELECTING STATISTICAL TECHNIQUES FOR ANALYZING DATA (cont'd)


TOPICAL OUTLINE OF COURSE

- Variables
     Number
     Scale (Nominal, Ordinal, Interval)
     Relationship

          Dependency
          Functional (linear, non-linear)

- Data Distribution
     Central tendency
     Dispersion
     Frequencies
     Preakedness
     Symmetry/Skewness

- Measurement
     Agreement
     Covariation

- Applying the Decision Process
     Steps in considering selection factors

- Practice on a variety of data and problem types

FOLLOW-ON COURSES:  None

COURSE DELIVERY STRATEGY:  May be presented by staff or by commercially available course.

# INTRODUCTION TO SYSTEMS ANALYSIS

## TARGET AUDIENCE

Non-data processing oriented managers and staff members who need an introduction to the field of systems analysis.

PREREQUISITE SKILLS AND KNOWLEDGE:  No specific requirements

## OBJECTIVES OF CURRICULUM

Upon the completion of this course, the student should have developed a working knowledge of:

- The systems approach to problem solving and information flow.

- Problem definition concepts.  The methods for removing extraneous details to clarify the definition of a particular problem.

- The many aspects of gathering both written and verbal data.

- Interviewing techniques for the collection of verbal and non-documented data.

- Qualitative data analysis techniques.

- Presentation techniques for clear, concise management presentations.

- Manual and mechanical controls for information systems.

- Operational controls for information systems.

- Documentation techniques and standards

## COURSE ABSTRACT

This course is specifically designed for training entry level systems analysts and for those with extensive experience 'n related fields, but who need an introduction to the methods of systems analysis.  The course will begin with an introduction to the systems approach for problem solving and proceed through the three principle areas of problem definition, data gathering, and qualitative data analysis.  In addition, the class will explore interviewing techniques, for the collection of verbal data, and techniques for displaying the data in concise, informative presentations.  Project implementation methods, operational controls, and documentation standards will also be explored.

CLASS SIZE:    10 - 20

COURSE OFFERING LOCATION:    Any EPA office

COURSE DURATION:    One week

METHODS/CONDUCT OF COURSE:    Lecture and workshop

INTRODUCTION TO SYSTEMS ANALYSIS (cont'd)

RESOURCE/MATERIAL HANDOUT

Daily handouts will be supplied containing an outline of the material
to be discussed.

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

TOPICAL COURSE OUTLINE

- Systems approach to problem solving
- Problem definition concepts
- Data gathering techniques
- Interviewing techniques
- Qualitative data analysis
- Presentation techniques
- Manual and mechanical controls for system
- Operational controls for information systems
- Documentation standards and techniques

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:   Recommend use of commercially available course.

# PL/1 PROGRAMMING

## TARGET AUDIENCE

Systems, Application and Maintenance programmers responsible for design, programming, testing, and maintaining PL/1 systems.

## PREREQUISITE SKILLS

Programming experience in a high level language (COBOL or FORTRAN) is a prerequisite, but no knowledge of PL/1 is assumed.

## OBJECTIVES OF CURRICULUM

Upon successful completion of this course, the student should be able to:

- Write programs that involve the use of all PL/1 features

- Understand physical and logical relationships of input/output files

- Understand all PL/1 language facilities including options for source lists, cross reference lists, data maps, and core storage maps.

- Apply the language features in order to achieve efficient program performance

- Program input/output routines for all available storage techniques for appropriate operating system(s).

- Utilize the available program test facilities for source level debugging.

- Understand and program both internal and external subroutine features.

- Understand and use the various compilers available including check-out compilers, optimizing compilers, and the basic language compiler.

- Interact with appropriate operating system(s) for compilation, linkage, and execution of PL/1 programs.

## COURSE ABSTRACT

This course is intended to teach the PL/1 language to programmers and analysts responsible for the implementation and/or maintenance of application systems. The course will cover all aspects of the PL/1 language from scientific to commercial problem solution. The functional capabilities will be described including the basic language instructions, as well as the subroutine logic, string manipulation, concatenation, bit processing, pointers, and based variables. Advanced coding techniques will be covered especially where they apply to improved program efficiency. The course will include topics on program testing, including compiler test facilities, and methods of program debugging at the program source level.

PL/1 PROGRAMMING (cont'd)


CLASS SIZE:

Class size will be limited to a maximum of 30 students to ensure effective instructor interface with each student.

COURSE OFFERING LOCATION

EPA Headquarters or where adequate access to the computer is available.

COURSE DURATION:   5 days

METHODS/CONDUCT OF COURSE:

The course will be taught through the use of lecture, program examples, and student programming problems.  Lectures will be organized by specific topics. Several programming problems will be assigned for which the students will be expected to develop and code a complete PL/1 program.  Where time and facilities allow, the student programs will be compiled and returned to the students.  The instructor will use student programming errors to reinforce the subject as well as good programming techniques.

RESOURCE MATERIAL/HANDOUTS

Each student will be provided with a language reference manual and a programmers guide.  Handouts will be provided related to lecture topics that will include program samples, compiler outputs, and sample tests.

FREQUENCY OF COURSE OFFERING

The course will be conducted on a regular scheduled basis, twice yearly. Special schedules will be provided when demand warrants.

TOPICAL OUTLINE OF COURSE

Topics covered during the course will include:

- The structure of a PL/1 program; use of the PROCEDURE and END statements
- The use of the DECLARE statement for files and data
- Implicit declaration of variable data fields
- Coding both record and stream input and output
- The structure and processing of tables and matrices
- The scope of a variable or data name as it relates to subroutines
- Coding, compiling, and linking internal and external subroutines
- The use of pointers and based variables for transfer of data
- The control and use of interrupt operations
- Effective coding techniques for multi-tasking a PL/1 program

PL/1 PROGRAMMING (cont'd)


COURSE DELIVERY STRATEGY

Courses will be customized when situation demands. Outline will be
based on existing commercial packages and closely supervised by instructor
and Civil Service Commission.

BASIC

TARGET AUDIENCE:

Any individual who must solve mathematical, engineering, or scientific problems on a computer that uses BASIC.

PREREQUISITE SKILLS AND KNOWLEDGE

A basic knowledge of algebra.

OBJECTIVES OF CURRICULUM

Upon completion of this course the student should have a working knowledge of:

- The elements of the BASIC programming language
- The mathematical symbols used in BASIC
- The correct sequence of mathematical operations
- An ability to accurately enter and process BASIC programs.

COURSE ABSTRACT

This course is designed to convey a functional knowledge of BASIC to both programmers and non-computer personnel. Proper coding techniques are introduced in the context of a lecture and workshop combination. During the workshop sessions the students will reinforce their conceptual instruction with teletype exercises, entering and executing BASIC programs to solve actual problems.

CLASS SIZE:   10 - 20

COURSE OFFERING LOCATION:   Any EPA office

COURSE DURATION:   One week

METHODS/CONDUCT OF COURSE:   Lecture and workshop

RESOURCE MATERIAL HANDOUT

The material supplied to the student should include a BASIC programming manual and coding sheets.

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

BASIC (cont'd)

TOPICAL OUTLINE OF COURSE

- Brief outline of programming in general and a more detailed treatment of BASIC

- All BASIC source statements in the context of sample programs illustrating their application

- Subroutines

- Table handling

- Data handling features

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:  Recommended use of commercially available course

# DATA BASE MANAGEMENT SYSTEM

## TARGET AUDIENCE

Data processing managers and systems analysts who need an introduction to the concepts of data base management.

## PREREQUISITE SKILLS

A general knowledge of data processing concepts.

## OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- The concepts and designs of selected data base systems

- The functions which may be fulfilled by a data base system

- Evaluation techniques for data base systems

- Design and implementation techniques for user programs in a data management environment

## COURSE ABSTRACT

In this course the student will learn the concepts and objectives of data base systems. In addition, criteria will be presented which will enable the student to evaluate the facilities of the various data base products available in the market place. Hardware, software and human elements in a data base system are also covered. The role of the data base administrator is discussed as are the functions of the data base programmer and systems analyst.

CLASS SIZE:  10 - 20

COURSE OFFERING LOCATION:  Any EPA Office

COURSE DURATION:  One week

METHODS/CONDUCT OF COURSE:  Lecture with handouts

RESOURCE/MATERIAL HANDOUT:  Daily handouts will be supplied

## FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

DATA BASE MANAGEMENT SYSTEM (cont'd)


TOPICAL COURSE OUTLINE

- Data base concepts

- Data base theory

- Data base capabilities

- Data management functions

- File organization

- File design criteria

- Data types

- Record formats

- Data Compression

- Queries

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:    Recommend use of commercially available course.

CONVERSION OF IBM FORTRAN IV TO UNIVAC FORTRAN V

TARGET AUDIENCE

Programmers who are experienced with the IBM FORTRAN IV (G or H) language and who need an understanding of the level of effort required to convert IBM FORTRAN IV (G or H) programs to the UNIVAC FORTRAN V language.

PREREQUISITE SKILLS: A working knowledge of FORTRAN IV

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- Machine dependent FORTRAN language features which differ between IBM and UNIVAC.

- The modifications required to convert an IBM FORTRAN IV (G or H) program to the UNIVAC FORTRAN V environment.

- UNIVAC FORTRAN V extension highlights.

- Conversion from IBM JCL to UNIVAC ECL.

- Data file conversion from IBM 370 to UNIVAC 1100 series machines.

COURSE ABSTRACT

This course is intended to provide the experienced programmer with the information required to convert from an IBM 360/370 FORTRAN environment to a UNIVAC 1100 FORTRAN environment. The course will begin with a discussion of machine dependent features of the two systems and progress to a comprehensive discussion of the language differences between IBM FORTRAN IV and UNIVAC FORTRAN V. The differences between IBM JCL and UNIVAC ECL control languages will be presented and discussed. In addition, methods of data file and general conversion hints will be presented.

CLASS SIZE: 10 - 20

COURSE OFFERING LOCATION: Any EPA office

COURSE DURATION: One week

METHODS/CONDUCT OF COURSE: Lecture and workshop

RESOURCE/MATERIAL HANDOUT

Daily handouts documenting each day's material will be distributed.

CONVERSION OF IBM FORTRAN IV TO UNIVAC FORTRAN V (cont'd)


FREQUENCY OF COURSE OFFERING:  As employee requirements demand.

TOPICAL OUTLINE OF COURSE

- Machine dependent features and differences

- IBM FORTRAN IV (G and H) and UNIVAC FORTRAN V language differences:
    - Statement elements
    - Functions and subroutines
    - Control statements
    - Input/output
    - Specification statements
    - Compiler statement

- Other machine differences

- UNIVAC FORTRAN V extension highlights

- IBM JCL - UNIVAC ECL

- Fortran program conversion from IBM 370 to UNIVAC 1100

- Data file conversion from IBM 370 to UNIVAC 1100

- Conversion hints

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:  Recommend use of commercially available course.

PROGRAMMING TECHNIQUES FOR THE UNIVAC SYSTEM

TARGET AUDIENCE

Systems analysts who are responsible for fine-tuning UNIVAC 1100 systems

PREREQUISITE SKILLS AND KNOWLEDGE

1100 Executive Control Language or equivalent work experience

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- Detailed hardware architecture of 1100 systems

- Internal highlights of the 1100 Operating System

- Modular programming methods

- File structures

- I/O efficiencies

COURSE ABSTRACT

This course is designed to introduce systems analysts to detailed operating system concepts and consideration which affect system-wide optimization as well as application efficiency in a UNIVAC 1100 environment. The course material is presented in a series of lectures and is reinforced by workshop exercises stressing analytic techniques.

CLASS SIZE:    5 - 10

COURSE OFFERING LOCATION:    Any EPA office

COURSE DURATION:    2 weeks

METHODS/CONDUCT OF COURSE:    Lecture and workshop

RESOURCE/MATERIAL HANDOUT

The material supplied to the student should include an 1100 Optimization Guide and accompanying workbook.

FREQUENCEY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

OPTIMIZATION TECHNIQUES FOR THE UNIVAC SYSTEM (cont'd)


TOPICAL OUTLINE OF COURSE

- Review of 1100 hardware architecture

- Review of 1100 Operating System concepts

- Facilities assignment

- Input/Output device handlers

- File-Control System

- Diagnostic messages and debugging techniques

- Utility programs

- Sort methods

- Libraries

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:   Recommend use of commercially available course.

# DISTRIBUTED PROCESSING SYSTEMS

## TARGET AUDIENCE

Programmers and systems managers who need an introduction to minicomputers and the distributed processing concept.

## PREREQUISITE SKILLS AND KNOWLEDGE

An introductory knowledge of computers and basic data transmission concepts.

## OBJECTIVES OF THE CURRICULUM

Upon completion of the course, the student should possess a working knowledge of:

- Minicomputers, as they can be adapted to distributed processing systems.

- Data transmission concepts for communication among the mode points of a distributed processing system

- Types of distributed processing systems and the benefits and detriments of each.

- Costs and performance trade-offs for different types of distributed processing systems.

- Types of applications which may benefit from the distributed processing concept.

## COURSE ABSTRACT

This course is designed to introduce the student to the technique of distributed processing. The course will begin with a discussion of mini-computers and data transmission techniques for communication between mini-computers. With this basic knowledge, the student is introduced to the concept of distributed processing. The various types of distributed pro-cessing systems are presented and each is discussed in light of its benefits and detriments for distinct application environments.

CLASS SIZE:   10 - 20

COURSE OFFERING LOCATION:   Any EPA office

COURSE DURATION:   One week

METHODS/CONDUCT OF COURSE:   Lecture with emphasis on class participation

DISTRIBUTED PROCESSING SYSTEMS (cont'd)


RESOURCE MATERIAL HANDOUT

Daily handouts summarizing the topics to be discussed.

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

TOPICAL COURSE OUTLINE

- Overview of minicomputers and minicomputer applications

- Introduction to computer networks

- Data transmission concepts for computer networks

- Introduction to distributed processing

- Parallel or Ring structured distributed processing systems

- Hierarchical distributed processing system

- Cost and performance trade-offs in distributed processing systems

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:   Recommend use of commercially available course.

# CONVERSION OF IBM COBOL TO UNIVAC COBOL

TARGET AUDIENCE

Programmers who are experienced with the IBM COBOL language and who need an understanding of the level of effort required to convert IBM COBOL programs to the UNIVAC COBOL language.

PREREQUISITE SKILLS: A working knowledge of IBM COBOL

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- Conversion of IBM COBOL programs to the UNIVAC COBOL language

- Inter-language communication within the UNIVAC/COBOL environment

- Compiling techniques for UNIVAC COBOL

- IBM to UNIVAC file conversion techniques

- UNIVAC ECL control lnaguage

- Updating and editing source files in a UNIVAC environment

COURSE ABSTRACT

This IBM COBOL to UNIVAC COBOL conversion class is intended to teach programmers how to convert COBOL programs from IBM/OS systems to UNIVAC/1100 systems. While this class is not all-inclusive, most of the more common problem areas have been covered. It is assumed that the student is familiar with IBM COBOL.

CLASS SIZE: 10 - 20

COURSE OFFERING LOCATION: Any EPA office

COURSE DURATION: One week

METHODS/CONDUCT OF COURSE: Lecture and workshop

RESOURCE/MATERIAL HANDOUT

Handouts will be provided covering the topics for daily discussion

CONVERSION OF IBM COBOL TO UNIVAC COBOL (cont'd)

FREQUENCY OF COURSE OFFERING

Approximately twice each year of as employee requirements demand.

TOPICAL OUTLINE OF COURSE:

- Job Control Language - UNIVAC ECL

- Conversion Problems

- Required conversion changes and differences

- Inter-Language Communications

- Compiling Run Streams with UNIVAC equipment

- File Conversion Techniques

- UNIVAC error processing

- UNIVAC control statement formats

- Reading IBM tapes with UNIVAC ASCII COBOL

- Debugging aids

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:    Recommended use of commercially available course.

# 1100 EXECUTIVE CONTROL LANGUAGE

TARGET AUDIENCE

Programmers and analysts who must implement applications on an 1100 Series processor

PREREQUISITE SKILLS AND KNOWLEDGE

1100 Series System Concepts or equivalent experience

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- EXEC control statements and their interrelationships

- Methods for constructing jobstreams for most applications

- Operating philosophy behind EXEC

COURSE ABSTRACT

This course is designed to provide programmers and analysts with a working knowledge of 1100 Executive Control Language (ECL) and operating system concepts. In addition, the student should be able to effectively use any 1100 system. Lecture presentations are complemented by workshop exercises highlighting significant concepts and details.

CLASS SIZE:    10-20

COURSE OFFERING LOCATION:    Any FPA office

COURSE DURATION:    30 hours

METHODS/CONDUCT OF COURSE:    Lecture and workshop

RECOURSE/MATERIAL HANDOUT

The material supplied to the student should include an 1100 ECL manual

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand

1100 EXECUTIVE CONTROL LANGUAGE (cont'd)


TOPICAL OUTLINE OF COURSE

- Hardware overview of 1100 systems

- Introduction to 1100 system philosophy and design

- EXEC control statements concerning:
    - facilities assignments
    - systems processors
    - file structures
    - miscellaneous systems operations

- File structures

- Collector and FURPUR processors

- Canned Jobstreams

FOLLOW-ON COURSE:  Optimization Techniques for the UNIVAC System

COURSE DELIVERY STRATEGY:  Recommend use of commercially available course.

TARGET AUDIENCE

Programmers and analysts who will be responsible for implementing applications systems that access a System 2000 data base.

PREREQUISITE SKILLS AND KNOWLEDGE

Programming experience in COBOL or FORTRAN.

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- Data classification

- Building data structures

- Creating data base definitions

- Concept of program - data independence

- Finding data in a structure

- Qualification and selection of records

- The Journal File

- Automatic return code processing

- Linked storage areas

- PLI pre-compiler

COURSE ABSTRACT

This course is intended for COBOL or FORTRAN programmers who need a detailed knowledge of the implementation of System 2000 through their host language and an in-depth coverage of its internal workings. The class will consist of lectures complemented by workshop sessions during which students will code and execute actual application casebook exercises.

CLASS SIZE:   10-20

COURSE OFFERING LOCATION:   Any FPA office

COURSE DURATION:   10 days

SYSTEM 2000 LANGUAGE AND REPORTS

METHODS/CONDUCT OF COURSE:   Lecture and Workshop

RESOURCE/MATERIAL HANDOUT:

The material supplied to the student should include a System 2000 PLl student manual.

FREQUENCY OF COURSE OFFERING

Approximately twice per year or as employee requirements demand.

TOPICAL OUTLINE OF COURSE

- Data Base and Data Base Management concepts

- Essential concepts of BASIC System 2000

- Introduction to Procedural Language Interface (PLI)

- Data Declaration Statements:  COMMBLOCK AND SCHEMA

- Precompiler control statements

- Other control statements

- Concepts of Position and Qualificstion

- PLI retrieval commands

- Update commands:  immediate mode and queued mode

- Multi-position and multi-location

FOLLOW-ON COURSE:   System 2000 Design

COURSE DELIVERY STRATEGY:   Recommend use of commercially available course.

TARGET AUDIENCE

Programmer trainees, programmers, analysts, and other individuals who need to work to some degree with COBOL.

PREREQUISITE SKILLS AND KNOWLEDGE

None, although a familiarity with computer concepts will be helpful.

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have a working knowledge of:

- Rules for forming COBOL names

- All required and optional entries for the Identification Division

- Correct construction of the Configuration and Input-Output Sections of the Environment Division.

- Writing the File and Working-Storage Sections of the Data Division

- Writing a Procedure Division that accomplished a two-file merge, detects and processes single and multiple control breaks, and produces a well-formatted printed report.

- Analytic techniques for identifying and correcting program logic errors, language syntax errors, and keypunch errors.

COURSE ABSTRACT

This course is designed to prepare the student to write complete COBOL programs of moderate complexity. Lecture sessions are complemented by a heavy emphasis on individual solutions to workshop problems.

CLASS SIZE:    10-20

COURSE OFFERING LOCATION:    Any FPA office

COURSE DURATION:    10 days


METHOD/CONDUCT OF COURSE:    Lecture and workshop

RESOURCE/MATERIAL HANDOUT

The material supplied to the student should include a COBOL syntactical handbook, a student guide, a student workbook, and COBOL coding forms.

INTRODUCTION TO COBOL (cont'd)


FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

TOPICAL OUTLINE OF COURSE

- Historical development and purpose of COBOL

- COBOL language syntax and coding form

- Field definitions and record and file structures

- Editing, literals, and data initialization

- Control of logic flow

- Input/output statements

- Formatting printed reports

- Extensions of various COBOL statements

- Numeric data definition efficiency considerations

- Multiple file processing

- Program testing and compiler diagnostics

FOLLOW-ON COURSE:   Advanced COBOL

COURSE DELIVERY STRATEGY

Recommended use of commercially available course.

DIRECT ACCESS CONCEPTS

TARGET AUDIENCE:   Programmers and systems analysts

PREREQUISITE SKILLS AND KNOWLEDGE

Computer Programming Concepts or equivalent work experience.

OBJECTIVES OF CURRICULUM:

After completing this course, the student should have a working knowledge of:

- Functional differences between disc and drum direct access storage devices

- Various types of file organizations, and the advantages associated with each type.

- File back-up methods, error recovery, and restart procedures

- Uses of direct access devices in an integrated data base/data communications environment

- Methods for selecting the appropriate file accessing technique for a given application.

COURSE ABSTRACT

This course is designed to familiarize programmers and analysts with direct access storage device concepts. A combination of lectures and workshop exercises convey and reinforce the student's understanding of general device characteristics, basic file organization and addressing techniques, record design considerations, file maintenance and recovery procedures, and timing considerations.

CLASS SIZE:   10 - 20

COURSE OFFERING LOCATION:    Any EPA office

COURSE DURATION:    5 days

METHODS/CONDUCT OF COURSE:    Lecture and workshop

RESOURCES/MATERIAL HANDOUT

The material supplied to the student should consist of a student guide/workbook.

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FREQUENCY OF COURSE OFFERING

Approximately twice each year, or as employee requirements demand.

TOPICAL OUTLINE OF COURSE

- Uses of direct access storage

- Physical characteristics of disc and drum

- File accessing and processing requirements

- Direct, sequential, and random file organization

- File design criteria

- File control routines

- Advantages of various types of direct access devices

- Randomizing techniques

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:    Recommend use of commercially available course.

CORE DUMP ANALYSIS

## TARGET AUDIENCE

The IBM Dump Analysis course is suitable for application or system programmers who will be writing or maintaining IBM programs. This course is applicable to all programming languages used in an IBM environment.

## PREREQUISITE SKILLS AND KNOWLEDGE

Proficiency with at least one IBM programming language.

## OBJECTIVES OF CURRICULUM

Upon the completion of this course the student will be able to analyze the various types of IBM dumps and to use the information found in them to:

- Determine the cause of abnormal termination for all system completion codes.

- Describe in writing the relationship among the program's applicable control blocks.

- Identify and describe the important control blocks and fields used by the Operating system in the management of the multi-programming environment.

- Find the instruction causing the termination and the data area referenced in that instruction, when the error is within the problem program.

- If the interrupt leading to termination occurs within a supervisor call, determine what type of SVC it was and its intended function.

- State the major differences between the full abnormal termination dump, the snapshot dump, the storage image dump, and the stand-alone dump.

- Trace control program procedures and linkage conventions and determine register contents expected for each of several common system completion codes.

- Analyze channel programs causing abnormal termination within certain common SVC routines.

## COURSE ABSTRACT

This course is designed to provide the problem programmer with the knowledge required to locate the address of the instruction which was being executed at the time of an abnormal termination. From this address, the programmer will be able to locate the source statement which resulted in the generation of the invalid instruction.

CORE DUMP ANALYSIS (cont'd)

The programmer will be able to locate work areas defined within the program, the name and type of each data file and the current record being processed for each file in the program. In addition, he will be able to locate parameters passed between programs and important control blocks related to the program.

Also, the course will provide the programmer with the knowledge required to locate and identify problems which occur in supervisor routines, especially data management.

CLASS SIZE: 10-20

COURSE OFFERING LOCATION: Any EPA office

COURSE DURATION: One week

METHODS/CONDUCT OF COURSE: Lecture and workshop

RESOURCE/MATERIAL HANDOUT

The material supplied to the student should include a source program and its core dump as well as graphic diagrams of system control blocks.

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

TOPICAL OUTLINE OF COURSE

- Determine causes of abnormal program terminations

- Develop knowledge of user program control blocks

- Develop knowledge of operating system control blocks

- Explore methods for locating invalid user program instructions

- Develop the ability to locate program interrupts not in the user program

- Identify and understand the function of Supervisor Calls

- Explore inter-program communications

- Develop ability to identify files and data records within core dumpt

FOLLOW-ON COURSES: None

COURSE DELIVERY STRATEGY: Recommend use of commercially available course.

DEMAND TERMINAL OPERATIONS

TARGET AUDIENCE

Personnel who need an introduction to the functions and flexibilities of data communication terminals.

PREREQUISITE SKILLS AND KNOWLEDGE

An introduction to and very basic understanding of digital computers.

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- The physical operation of computer terminals

- The functional and operational aspects of computer terminals

- Trouble shooting minor problems with computer terminals

- Software facilities which may be activated through computer terminals

COURSE ABSTRACT

This course is designed to provide the non-data processing student with the information required to operate and efficiently utilize a computer terminal. The course begins with an introduction to computer terminals and progresses through their physical operation, logical operation and trouble-shooting facilities. In addition, many of the operating system facilities which are available through computer terminals are discussed. These include: system codes, mass storage file saves, data set manipulation, and library procedures.

CLASS SIZE:     10 - 20

COURSE OFFERING LOCATION:    Any EPA office

COURSE DURATION:    Three days

METHODS/CONDUCT OF COURSE:    Lecture with student handouts and workshop

RESOURCE/MATERIAL HANDOUT:    Daily handouts of student material

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

DEMAND TERMINAL OPERATIONS (cont'd)

TOPICAL OUTLINE OF COURSE

- Introduction to computer terminals
- Physical operation of terminals
- Logical operation of terminals
- Trouble shooting terminal malfunctions
- Computer system codes
- Data set manipulation
- Data file processing
- Public vs. private volumes
- Library catalog procedures
- Terminal oriented job management

COURSE DELIVERY STRATEGY: Recommend use of commercially available course.

ADP CONCEPTS

TARGET AUDIENCE

Scientists, engineers, environmental technicians, secretaries, managers; all EPA employees who have no prior experience in ADP

PREREQUISITE SKILLS AND KNOWLEDGE:    None

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student will be able to:

- Converse with ADP professionals using basic terminology

- General understanding of how the computer processes data, stores, and retrieves it.

- Understand how data is remotely transmitted to the computer through a terminal.

COURSE ABSTRACT

The theme of the course is to give the trainee an overview of computer processing.  He will learn how computers process data and produce outputs. He will learn about time-sharing software; computer program instructions; the concept of executive versus application programs; and limitations; how to make changes to programs.

The course will give the trainee a concept of how long it takes to get results and/or questions answered.  He will also learn terminology that is commonly used such as data set, JCL, modem, etc.

COURSE DURATION:    2 days

TOPICAL OUTLINE OF COURSE

- What is a computer program?

- Computer memory organization

- How the computer services the terminal

- ADP terminology

- How is data entered into the computer?

- How is data retrieved from the computer?

- How is data stored in the computer?

ADP AND BUDGET COST CONTROL

TARGET AUDIENCE

ADP coordinators, system managers,program managers, ADP Branch Chiefs.

PREREQUISITE SKILLS AND KNOWLEDGE:    None

OBJECTIVES OF CURRICULUM

Upon completion of this course the student will be able to:

- Implement a budget allocation approach to project control.
- Understand the principles of cost accountability

COURSE ABSTRACT

The theme of the course is accountability for costs and methods of putting cost control programs in operation.  The trainee will learn how to suballocate to division level; how to control usage; how to implement cost-sving techniques, such as restricting use of priority runs.  Zero-base budgeting principles and procedures shall be explained and example budgets shown.

COURSE DURATION:    2 days

TOPICAL OUTLINE OF COURSE

- How the ADP budget process works
- Cost accountability
- Cost chargeback
- Suballocation
- Shifting funds between accounts
- Zero-based budgeting

# DATA BASE ADMINISTRATION

## TARGET AUDIENCE

System managers, program managers responsible for national data systems, ADP project managers.

## PREREQUISITE SKILLS AND KNOWLEDGE

Previous experience in maintaining and updating data base files.

## OBJECTIVES OF CURRICULUM

Upon completion of this course the student will be able to:

- Define the responsibilities of a DBA
- Determine the applicability of a DBA function of their system environment.

## COURSE ABSTRACT

The theme of the course is that information must be managed and controlled just like the computer resource they use. Participants are challenged to work out a plan for administrative control. What types of controls are needed? What is the data base administrator's responsibility? What authority does he need? How can he enforce controls over access, data input, data definition, editing rules, etc. Should ADP systems people have any say about data base content, retrieval access, etc.?

A case problem will be presented to the trainees in which they must devise a workable data base administrative function without reorganization.

CLASS SIZE: 20

COURSE OFFERING LOCATION: Regional Offices, Hdq.

COURSE DURATION: 3 days

TOPICAL OUTLINE OF COURSE

- Need for controls
- Problems of enforcing controls
- List of administrator responsibilities
- Case applications

TARGET AUDIENCE

Engineers, scientists, accountants, administrators, program managers, system managers.

PREREQUISITE SKILLS AND KNOWLEDGE

Introduction to ADP or equivalent experience

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student will be able to:

- Define requirements for information systems
- Understand the types of documentation needed
- Design a report output format

COURSE ABSTRACT

This course will provide a non-technical understanding of information system design in order to facilitate the user's role in defining information requirements and interacting with the ADP branch.

The course will stress the functions of the user in each phase of the system development cycle and provide training on each task that he performs.

TOPICAL OUTLINE OF COURSE

- Design specifications
- Definition of system objectives
- System development cycle phases
- Report forms design
- Documentation for system development cycle phases
- File organization impact on retrieval

STRUCTURED DESIGN

TARGET AUDIENCE:  Analysts and Programmers

PREREQUISITE SKILLS AND KNOWLEDGE

Two years programming experience

OBJECTIVES OF CURRICULUM

Upon completion of this course the student will be able to:

● Utilize structured design techniques in program design

COURSE ABSTRACT

This course will teach system design approaches that use engineering methods of program design.  The course will begin with design objectives of:  1) error-free programs, 2) maintenance simplicity, and 3) increased programmer productivity.

The course will analyze basic design techniques which are built around data structures within which processing logic is implied.  This approach will be compared with the alternative of using top-down design involving schematic logic.  Another approach is to use a standard program structure.

The special problem of designing transaction-oriented systems will be discussed.  The course will include a case problem in structured design techniques.

CLASS SIZE:  20

COURSE OFFERING LOCATION:  Laboratories, Hdq.

COURSE DURATION:  5 days

TOPICAL OUTLINE OF COURSE

● Top-down design philosophy

● Alternative design approaches

● Benefits over traditional program development

● Program design built on sequential data structures

● Structure clashes

● Backtracking
  - when it is needed
  - how to use it in the design
  - side effects

ADP COST MONITORING

TARGET AUDIENCE

ADP coordinators, administrators, system managers

PREREQUISITE SKILLS AND KNOWLEDGE:   None

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student will be able to:

- Interpret and use OSI accounting reports

- Interpret and use NCC accounting reports

COURSE ABSTRACT

This is a specialized course for all persons responsible for monitoring ADP expenditures on an account or project basis.  The course will discuss in detail the accounting reports available on the NCC and OSI computers.  The trainees will be given a class problem requiring report interpretation and use.

COURSE DURATION:   1 day

TOPICAL OUTLINE OF COURSE

- Requirements for cost monitoring

- Monitoring fund utilization against budget suballocation

- MIDSD account number structure

- Auditing contractor charges

- Auditing time-sharing computer center charges

- OSI accounting reports

- NCC accounting reports

INTRODUCTION TO PLOTTING USING CALCOMP PLOTTER

TARGET AUDIENCE:  Scientists and engineers

PREREQUISITE SKILLS AND KNOWLEDGE:  Programming fundamentals

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student will be able to:

- Be familiar with the types of applications that may use the digital plotter

- Prepare input control cards for simple plotting applications.

- Prepare the job control procedures necessary to run the plotter.

COURSE ABSTRACT

This course serves as an introduction to simple Cartesian plotting using automated plotting devices and canned software subroutines.  It will enable a trainee to prepare the data and instructions necessary to produce CALCOMP plots.

The participant will learn selected CALCOMP scientific subroutines and applications programs.  He will have hands-on practice in preparing data cards for scaling factors, vectors and plot labels and headings.  The trainee will run a CALCOMP job including preparing job control procedures.

COURSE DURATION:  1 day

TOPICAL OUTLINE OF COURSE:

- Plotting equipment

- Plotting software

- Plot output specification parameters
  - Scaling factors
  - Plot headings

- Preparing input for a sample plot

- Preparing job control statements necessary to invoke the job

# INTRODUCTION TO LABORATORY COMPUTING

TARGET AUDIENCE:   Laboratory scientists

PREREQUISITE SKILLS AND KNOWLEDGE:   None

OBJECTIVES OF CURRICULUM

   Upon completion of this course, the student will be able to:

   * Describe the basic operations in lab automation

   * Understand how laboratory automation aids a quality assurance program

   * Identify cost-benefit trade-offs of laboratory automation

## COURSE ABSTRACT

   This course is an introduction to laboratory automation for scientific personnel who are involved in planning and directing laboratory programs for collecting data using laboratory instruments that measure characteristics of environmental samples.

   Advantages and limitations of laboratory automation for controlling quality of measurements will be addressed.  The course will explain and demonstrate various applications and laboratory instruments which operate under computer control.  Attendees will have hands-on experience in running a computer-controlled experiment, including providing sampling parameters and data to the control program.

   Costs of equipment and available software needed to establish an automated laboratory configuration will be addressed for those who are considering acquisition of such systems.  Examples of applications will be demonstrated.

METHODS/CONDUCT OF COURSE:   Lecture-demonstration

COURSE OFFERING LOCATION:   Laboratories

TOPICAL OUTLINE OF COURSE

   * The automation system configuration
   * Computer components
   * Operating system
   * Analysis procedures
   * Sampling parameters
   * Data analysis

TARGET AUDIENCE

For personnel direct[?] responsible for application programming or computer system design.

PREREQUISITE SKILLS

Participation in courses on Operating System Concepts and Facilities and Data Management Techniques is desirable but not required. The student should have taken Introduction to JCL or have equivalent experience.

OBJECTIVES OF CURRICULUM

Upon successful completion of this course, the student should be able to:

- Use in-stream procedures with symbolic parameters including backward references and concatenation of data sets.

- Use JCL to create program libraries and partitioned data sets and pass data sets from one step to another.

- Use JCL to assemble, (compile) load and execute programs including:
    - invoking cataloged procedures
    - overriding DD statements
    - overriding EXEC parameters
    - adding DD statements

- Identify the sources of information for the DCB in the order of their precedence as it relates to actual programs.

- Calculate space requirements for DASD data sets

- Use the SORT/MERGE program to sort either fixed or variable length records.

- Select the proper utility to perform a given function.

- Use the following Utilities including all their options:
    - IEBGENER      - IEBPTPCH      - IEBUPDTE
    - IEBCOPY       - IEHLIST       - IEHPROGM

COURSE ABSTRACT

This course is designed to give the student with an understanding of JCL a working knowledge of all JCL facilities and use of Utilities through both lecture and use of several machine exercises.

CLASS SIZE:    5 - 10

COURSE OFFERING LOCALES

EPA Headquarters or where adequate access to the computer is available.

ADVANCED JCL AND UTILITIES (OS) (cont'd)

COURSE DURATION:   16 hours

METHODS/CONDUCT OF COURSE

This course should be structured around several machine exercises tailored to the needs of the individual student. Audio-visual aids should be used wherever possible.

RESOURCE MATERIAL/HANDOUTS

The following manuals should be available for use by each student;
- OS/VS JCL REFERENCE
- OS/VS JOB CONTROL LANGUAGE USER'S GUIDE
- OS/VS MESSAGES AND CODES
- OS/VS SORT/MERGE
- OS/VS UTILITIES

Each student should also be provided with a JCL Syntax Reference Summary Card and sufficient JCL Coding forms to perform the required exercises. Machine access including approximately one minute of CPU time per student will be required for the exercises.

FREQUENCY OF COURSE OFFERING

Twice each year at EPA Headquarters and once yearly in regional or field offices as required.

TOPICAL OUTLINE OF COURSE

Session 1: - Review basics of JCL (JOB, EXEC, DD statements)
- Discuss the establishment and use of cataloged procedures with emphasis on use of symbolic parameters.
- Describe techniques for backward reference and concatenation of data sets.
- Define class exercise involving use of material covered
- Student performs coding exercise
- Review solution to exercise

Session 2: - Describe the use of the SORT/MERGE package and detail use of its control statements
- Define class coding exercise involving the use of a cataloged procedure to sort and merge a group of files.
- Student performs class exercise
- Review solution to exercise.

Session 3: - Describe the use of the data set utility programs and the control statements required for each.
- Define class machine exercise requiring the coding of several utilities to manipulate a set of input data through sorting, modification and printing. This small job should also be made into an in-stream procedure and run as such.

ADVANCED JCL AND UTILITIES (OS) (cont'd)


Session 4: - Student performs class exercise.

Session 5: - Review solution to class exercise.
- Discuss use of JCL parameters as they relate to several
program examples stressing defaults and precedence order.
- Discuss space allocation and determination for data sets of
various access methods.
- Review all material covered.

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY

Customized course or use of existing commercial package under close super-
vision of instructor/manager.  This course is not to be strictly tutorial in
nature and should include as much practical experience and active participation
by the student as possible.

TARGET AUDIENCE

ADP Coordinators and administrators who prepare ADP procurement requests.

PREREQUISITE SKILLS AND KNOWLEDGE:    None

OBJECTIVES OF CURRICULUM

Upon completion of the course the student will be able to:

● Prepare ADP procurement forms

● Understand the criteria for sole source justification

COURSE ABSTRACT

This course is designed to impart an understanding of how to avoid having procurement requests bounce back.  The course will cover the administrative aspects of the procurement process including obtaining the appropriate approvals and the requirements of specific procurement actions.  The course will also include practical exercises in completing the proper forms including all required information.

COURSE DURATION:    One day

TOPICAL OUTLINE OF COURSE

● ADP procurement policy
  - Terminal
  - Computer
  - Consultant

● Procurement forms

● Contract processing

● ADP approval

● Justification guidelines

● Contract modification

TARGET AUDIENCE

Managers of programs in which ADP systems are utilized.

PREREQUISITE SKILLS AND KNOWLEDGE:   None

OBJECTIVES OF CURRICULUM

Upon completion of the course the student will be able to:

- Recognize potential areas in which ADP systems may provide information for aiding EPA administrative and program management

- Cite specific techniques for presenting managerial level information.

- Give examples of EPA systems which provide data needed for managing EPA programs.

COURSE ABSTRACT

This course will present information systems from a management viewpoint. The course will highlight ways in which inforamtion systems can support management control and decision-making.  The course will emphasize case studies in which EPA management functions are or can be aided by the computer.

COURSE DURATION:   2 days

METHOD/CONDUCT OF COURSE:   Workshop

COURSE OFFERING LOCATION:   Regional offices

TOPICAL OUTLINE OF COURSE

- Information for management decision-making
    - Trend data
    - Milestone data
    - Summary data

- Identification of management data needs

- Data systems as a work planning tool

- Environmental data system:  Management information
    - Graphic trend data
    - Environmental equality indicators

TARGET AUDIENCE

Systems Analysist who will be directly responsible for designing application systems which are to utilize System 2000.

PREREQUISITE SKILLS AND KNOWLEDGE:   System 2000 Language and Reports.

OBJECTIVES OF THE CURRICULUM

Upon completion of this course, the student should have a working knowledge of:

- Storage and access methods

- Efficient command combinations

- PLI fine tuning procedures

- Expanded report generation

- File management

- Security Control

COURSE ABSTRACT

This course is designed to introduce systems analysts to various advanced concepts useful in System 2000 applications designs.  In addition, efficient command combinations and fine tuning procedures are presented in a combination of lecture and workshop.  During the workshop sessions, concepts and methodology presented in lectures will be reinforced by coding exercises involving actual casebook problems.

CLASS SIZE:    10 - 20

COURSE OFFERING LOCATION:   Any EPA office.

METHODS/CONDUCT OF COURSE:    Lecture and workshop

RESOURCE MATERIAL/HANDOUT

The material supplied to the student should include a System 2000 Design Techniques manual.

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

SYSTEM 2000 DESIGN (cont'd)


TOPICAL COURSE OUTLINE

- Data Base Management concepts and terms
- System 2000 data base table structure
- Host operating system considerations
- Where - clause processing
- Data base table update processing
- Quened access processing
- PLI fine tuning techniques


FOLLOW-ON COURSE; None

COURSE DELIVERY STRATEGY: Recommend use of commercially available course.

# DATA ENTRY METHODS AND TECHNIQUES

## TARGET AUDIENCE

Managers and data processing personnel who wish to learn the concepts and methods of source data entry.

## PREREQUISITE SKILLS

An overview knowledge of general data processing concepts.

## OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- The general classification of data entry devices
- The requirements for data collection and recommended type of collection for each distinct set of data requirements.
- The types of data entry devices in each of the general categories
- Equipment considerations and characteristics for data entry devices
- Conventional terminals and their use in the data entry environment
- Data collection systems.

## COURSE ABSTRACT

The objective of this course is to introduce the concept of data entry and the equipment types which are integral to this field. The three principle areas of data entry are introduced; key entry, source data automation, and factory data collection, and representative equipment for each of the areas is discussed.

CLASS SIZE:    10 - 20

COURSE OFFERING LOCATION:    Any EPA office

COURSE DURATION:    Three days

METHODS/CONDUCT OF COURSE:    Lecture with handouts

RESOURCE/MATERIAL HANDOUTS:

Daily handouts of printed material will be supplied to the student.

FREQUENCY OF COURSE OFFERING:

Approximately twice each year or as employee requirements demand.

DATA ENTRY METHODS AND TECHNIQUES (cont'd)


TOPICAL OUTLINE OF COURSE

- The three principle areas of data entry

- Data collection techniques

- Requirements analysis for data collection

- Equipment considerations for data collection

- Equipment types:

        Communciation terminals
        Data Collection Systems
        Optical Character Recognition
        Point-of-sale terminals

FOLLOW-ON COURSE:    None

COURSE DELIVERY STRATEGY:    Recommend use of commercially available course.

# INTRODUCTION TO GRAPHICS

TARGET AUDIENCE

Data processing managers and personnel who wish to be introduced to the field of computer graphics and plotting.

PREREQUISITE SKILLS

A working knowledge of computers and general business data processing systems.

OBJECTIVES OF CURRICULUM:

- To introduce the student to the concept of computerized graphics and plotting.

- To explore the types of endeavor which may benefit from the application of computerized graphics/plotting.

- To present and discuss the various types of output which can be obtained from graphics terminals and plotters.

- Discuss computer software, its nature and complexity when used in graphical applications.

- Present special software, such as scientific packages, which presently exist and may be obtained for special function use.

- Discuss the types of computer hardware which are presently available for graphic and plotting functions.

COURSE ABSTRACT

This course is designed to provide an overview of computer graphical and digital plotting techniques. It begins with a definition of graphics and plotting as it relates to the computer environment and proceeds to discuss computer for graphical/plotting use. Information relating to specialized software packages which are available for special function use (e.g., contours, etc.) will be discussed. The many types of graphical/plotting hardware in the two functional categories of graphic displays and digital plotters will be explored. Both color and black and white displays and ink and electrostatic plotters will be surveyed.

CLASS SIZE:    10 - 20

COURSE DURATION:    One day

METHODS/CONDUCT OF COURSE:    Lecture with hand-out material.

RESOURCE MATERIAL/HANDOUTS

Each student will receive handout material relating to each topic discussed.

FREQUENCY OF COURSE OFFERING:  As required by individual demand.

TOPICAL OUTLINE OF COURSE

- Course overview
- Introduction to computer graphics
- Computer software for graphical purposes
- Types of graphic display terminals
- Introduction to digital plotting
- Computer software for plotting purposes
- Pen and Ink plotting devices
- Electrostatic plotting devices
- Course summary

FOLLOW-ON COURSE:   None

COURSE DELIVERY STRATEGY:  Commercial Course

TARGET AUDIENCE

Programmers, engineers and scientists who would use WYLBUR for program development.

PREREQUISITE SKILLS

Facilities familiarization and knowledge of at least one programming language.

OBJECTIVES OF CURRICULUM

Upon completion of this course the student should be able to:

● Be proficient in use of the typewirter terminal used during the course.

● Correctly signon/signoff the system

● Create, edit, save and retrieve data sets or text using the facilities of WYLBUR.

● Select and use the appropriate WYLBUR commands to accomplish the desired task.

● Thoroughly understand how to handle any abnormal conditions.

COURSE ABSTRACT

This course is intended to provide the programmer or other technical person with the necessary skills and information required for effective use of WYLBUR.

CLASS SIZE:    10 - 20

COURSE OFFERING LOCATION:  Major EPA installations

COURSE DURATION:  4 hours

METHODS/CONDUCT OF COURSE:  Lecture with practice exercises

RESOURCE MATERIAL/HANDOUTS:  Access to Terminal and use of Computer Time.

FREQUENCY OF COURSE OFFERING:  As required based upon demand.

TOPICAL OUTLINE OF COURSE

● Introduction to and History of WYLBUR

● Typewriter terminal operation procedures

● Explain the vairous modes and command types.

- Describe in detail the various WYLBUR commands:

    - Data Set Creation
    - Housekeeping
    - Editing
    - Data Set Retention
    - Data Set Usage

- Give a brief demonstration using WYLBUR commands

- Present an exercise for the student requiring use of material covered

- Student performs exercise

- Review exercise

FOLLOW-ON COURSES:   JCL, TSO, HASP/RJE

# INTRODUCTION TO DATA PROCESSING FOR TECHNICIANS

TARGET AUDIENCE

Any person not familiar with the concepts and facilities of data processing.

PREREQUISITE SKILLS AND KNOWLEDGE: None

OBJECTIVES OF CURRICULUM

Upon completion of this course the student should:

- Know the historical development of computers

- Be aware of the broad range of services which computers can provide

- Be aware of the various components of a computer system

- Understand what computers can and cannot do -- its powers and limitations

- Understand how a computer stores information both internally and on external devices

- Understand the concept of programming and why there are several different computer languages

- Be aware of the functions and tasks of the personnel employed in a computer department

- Know the methods used in the development and implementation of a computer system

- Understand commonly used terms such as batch, real-time, tele-processing, on-line, interactive, etc.

COURSE ABSTRACT

This course is intended for the student with no prior background in data processing. It should provide him with an appreciation of the subject areas which comprise the field of data processing.

CLASS SIZE: 10 or more

COURSE OFFERING LOCATION: Any EPA office as required

COURSE DURATION: 12 hours

METHODS/CONDUCT OF COURSE

This course should probably utilize some sort of audio-visual media so as to best be able to present some of the abstract ideas.

INTRODUCTION TO DATA PROCESSING FOR TECHNICIANS


RESOURCE MATERIAL/HANDOUTS:    None

FREQUENCY OF COURSE OFFERING

Approximately 4 times each year or as new employee requirements demand.

TOPICAL OUTLINE OF COURSE

Each session requires approximately 2 hours.

Session 1: - Trace the development of the computer and describe the
             components of a modern-day computer (memory, ALU and
             control unit)
           - Analog, digital and hybrid computers
           - Give a brief introduction to binary, octal and hexadecimal
             numbering systems and how the computer uses them.

Session 2: - Discuss internal storage in terms of function, composition
             and importance.
           - Describe the concept of registers and buffers.

Session 3: - Discuss typical types of computer instructions and their
             functions (arithmetic, conversion, compare, move, logical
             and branch)
           - Describe the various computer languages and their differences

Session 4: - Describe the various I/O devices used on computers and the
             concept of channels.
           - Contrast the addressing methods, capacities, and access
             speeds of internal and external storage.

Session 5: - Describe the roles of analysts, users, programmers and
             operators in the development of a system.
           - Summarize the activities required in system development
             and implementation

Session 6: - Describe the concept and functions of operating systems
           - Define and explain such subjects as multi-programming,
             batch, on-line and time-sharing.
           - Define the purpose of Job Control Language.

FOLLOW-ON COURSES

Facilities Familizarization for all potential users and Computer
Programming Concepts for the technical staff.

COURSE DELIVERY STRATEGY:   Commercially available course.

# 1100 SERIES SYSTEM CONCEPTS

TARGET AUDIENCE

Operators and managers who require an overview, or experienced programme's and analysts with little or no knowledge of 1100 Series systems.

PREREQUISITE SKILLS AND KNOWLEDGE

Programming experience or a fundamentals course or workshop in computer programming.

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a working knowledge of:

- Architecture of 1100 Series systems

- Components of the 1100 Series Operating System

- Operational concepts associated with processing user jobs

COURSE ABSTRACT

This course is designed to introduce data processing personnel to a conceptual overview of 1100 Series processors and their associated operating system. In addition, it lays specific groundwork necessary for effective use of 1100 Executive Control Language (ECL). The material is presented in a series of lectures.

CLASS SIZE:   10 - 20

COURSE OFFERING LOCATION:   Any EPA office

COURSE DURATION:   2 days

METHODS/CONDUCT OF COURSE:   Lecture

RESOURCE/MATERIAL HANDOUT

The material supplied to each student should include an 1100 Series Systems Concepts manual.

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

1100 SERIES SYSTEM CONCEPTS (cont'd)


TOPICAL OUTLINE OF COURSE

- 1100 Series hardware concepts
- 1100 Series operating system components
- 1100 Series operating system concepts
- Job control and job stream processing
- File concepts and structures

FOLLOW-ON COURSE:    1100 Executive Control Language

COURSE DELIVERY STRATEGY:   Recommend use of commercially available course.

ADVANCED FORTRAN


TARGET AUDIENCE

Programmers who are experienced with the FORTRAN IV language and who
wish to explore the true flexibilities of the language and enhance their
own skills with the language.

PREREQUISITE SKILLS AND KNOWLEDGE

Programming knowledge of FORTRAN IV.

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should have developed a
working knowledge of:

- Efficient data handling techniques for input/output

- Loop control principles, including: explicit and implied loops,
  nested loops, compound IF statements and effective loop entry and
  exit.

- Data handling and definition techniques to include the following
  statements: implicit, dimension, adjustable dimension, and
  equivalence

- Program modularity (function subprogram, function statement, and
  subroutines).

COURSE ABSTRACT

This course is designed to introduce FORTRAN programmers to selected
advanced features of the language. Efficient coding techniques and language
optimization methods will be presented. In a combination of lecutre and work-
shop, the students will learn about these features and their applications.
During the workshop sessions, the concepts and techniques presented will be
reinforced through coding exercises and problem programs which will be tested
on a local computer.

CLASS SIZE:    10 - 20

COURSE OFFERING LOCATION:    Any EPA office

METHODS/CONDUCT OF COURSE:    Lecture and workshop

RESOURCE/MATERIAL HANDOUT

The material supplied to the student should include an advanced FORTRAN
manual, flowcharting template, flowchart paper, and coding sheets.

ADVANCED FORTRAN (cont'd)

FREQUENCY OF COURSE OFFERING

Approximately twice each year or as employee requirements demand.

TOPICAL OUTLINE OF COURSE:

- Designing FORTRAN data input/output for maximum efficiency -- formatted/unformatted read and write statements.
- Advanced loop control to include: explicit loops, implied loops in input/output, nested loops, compounded IF statements.
- Data handling features such as implicit, dimension and equivalence statements.
- Table handling
- Matrix and array control
- Constant/variable types and core requirements
- Control statements
- Features of the compiler
- Specification statement
- Functions and subroutines
- Debug features and methods

FOLLOW-ON COURSE: None

COURSE DELIVERY STRATEGY: Recommend use of commercially available course.

INTRODUCTION TO JCL (OS)


TARGET AUDIENCE

For personnel responsible for the submission of jobs to be run under an IBM OS system.

PREREQUISITE SKILLS AND KNOWLEDGE

Participation in introduction to EDP and facilities familiarization or equivalent.

OBJECTIVES OF CURRICULUM

Upon successful completion of this course, the student should be able to use the facilities of Job Control Language (JCL) to:

- Code the JOB card and all of its parameters

- Code the EXEC statement and the following parameters:
  ACT, ADDRSPC, COND, PARM, REGION.

- Code DD statements and the following parameters:
  *, DATA, DUMMY, CIPHS, DCB, DDNAME, DSNAME, DISP, DLM,
  LABEL, SPACE, SYSOUT, UNIT, VOLUME.

- Use the JOBLIB and STEPLIB DD cards.

- Identify, interprete, and correct JCL errors.

COURSE ABSTRACT

This course is intended for personnel who will be responsible for the creation of modification of Job Control Language statements. Upon completion of the course the student should understand the use of JCL and its function in the execution of both application programs and utilities. A practical machine exercise is included to provide experience in JCL coding.

CLASS SIZE:   10 - 30

COURSE OFFERING/LOCATION

EPA Headquarters or where adequate access to the computer is available.

COURSE DURATION:   8 hours.

METHODS/CONDUCT OF COURSE

The primary means of instruction should be through lecture with audio-visual aids. However, individual A-V courses could be utilized for very small class sizes. Usage of machine exercise(s) is extremely desirable to insure complete understanding of subject.

INTRODUCTION TO JCL (OS) (cont'd)


RESOURCE MATERIAL/HANDOUTS

The following manuals should be available for use by each student:

- OS/VS JCL Reference.
- OS/VS Messages and Codes

Each student should also be provided with a JCL Syntax Reference Summary Card and sufficient JCL Coding forms to perform the required exercise. Machine access including approximately 10 seconds of CPU time per student is required for the exercise.

FREQUENCY OF COURSE OFFERING

Twice each year at EPA Headquarters and once yearly in regional or field offices as required.

TOPICAL OUTLINE OF COURSE

Each session lasts approximately 2 hours.

Session 1:

- Describe the relationship of jobs and data sets (including a brief review of data set structures) with the Operating System
- Present sample job streams and show the kinds of JCL statements required to execute them.
- Describe the JOB card in detail.


Session 2:

- Describe the EXEC card in detail and present examples of its usage.
- Describe the usage of JOBLIB and STEPLIB DD Cards.

Session 3:

- Describe the DD card in detail stressing required versus optional elements.
- Describe JCL error conditions and the associated messages produced and how to correct errors using the Messages and Codes manual.
- Review and give examples of all material covered.

Session 4:

- Define class coding exercise and distribute materials. This exercise should be divided into two parts. The first requires the

INTRODUCTION TO JCL (OS) (cont'd)

>       coding of a very simple set of JCL for a job.  After this
>       has been corrected then a more complex problem should be
>       presented.  This problem is to be entered on the computer.
>       The student should correct any mistakes and re-submit
>       (within reason) until correct.

- Review briefly material covered in all four sessions.

FOLLOW-ON COURSES

- Advanced JCL and Utilities
- HASP/RJE
- TSO

COURSE DELIVERY STRATEGY

Customized course or use of existing commercial package under close
supervision of instructor/manager.

SYSTEM 2000 CONCEPTS AND CAPABILITIES

TARGET AUDIENCE

Managers and systems analysts who are considering the use of
System 2000.

PREREQUISITE SKILLS AND KNOWLEDGE

Previous experience in developing information systems or managing projects
which use them.

OBJECTIVES OF CURRICULUM

Upon completion of this course, the student should be able to:

- Identify the major trade-offs between System 2000 and available
  file organizations.

- Understand the output retrieval capabilities of the system for
  producing inquiry-type output and standard reports.

- Understand the efficiency of the system in terms of computer
  processor utilization.

- Understand the basic planning steps of converting existing systems
  to System 2000.

*COURSE ABSTRACT*

This course will provide an overview of the System 2000 capabilities in
terms of file structures, retrievals, and languages used. The course will
stress the trade-offs of using standard computer file structures versus using
the hierarchical structure of System 2000.

COURSE DURATION:  2 days.

TOPICAL OUTLINE OF COURSE

- System 2000 components

- Organization of data under System 2000

- System 2000 language

- The effect on search times of repeating groups and elements

- Conversion of ISAM files to System 2000

- EPA applications of System 2000

# ADP FACILITIES AND SERVICES

## TARGET AUDIENCE

Any person not familiar with the EDP services available within the Agency and the required procedures for their use.

## PREREQUISITE SKILLS AND KNOWLEDGE

Participation in Introduction to EDP or its equivalent.

## OBJECTIVES OF CURRICULUM

Upon successful completion of the course the student should:

- Know the organizational structure or the entire EDP operation of EPA as it relates to the remainder of the Agency and EDP commercial vendors.

- Be aware of what computer hardware equipment and software packages are available throughout the Agency.

- Be aware of what EDP-related services are available at the installation. This includes such things as data entry, micrographics and programming and clerical support.

- Know how to obtain permission for use of EDP services and the procedures established for their accountability.

- Know the required procedures for submission of jobs using both batch and terminal entry.

- Know how to obtain technical support including the ordering of required manuals and requests for training.

## COURSE ABSTRACT

This course will provide the new or potential user of EDP services with the required information on what facilities are available and how they may be properly utilized.

CLASS SIZE: 10 or more.

COURSE OFFERING/LOCATION: Any EPA office as required.

COURSE DURATION: 1 day

## METHODS/CONDUCT OF COURSE

Oral presentation either in person or using video tape utilizing appropriate slides or charts.

ADP FACILITIES AND SERVICES   (cont'd)

RESOURCE MATERIAL/HANDOUTS:    None.

FREQUENCY OF COURSE OFFERING

Approximately 4 times each year or as new employee requirements demand.

TOPICAL OUTLINE OF COURSE

- Present the organizational structure of the ADP organization describing how it relates to the rest of the Agency and its existing connections with commercial vendors.

- Identify software and operating systems available through each.

- Identify on-site EDP services of a support nature available as well as those offered elsewhere within the Agency.

- Identify and discuss computer usage procedures.
    *Accounting requirements
    *Submission or access procedures

- Identify technical support services available.

FOLLOW-ON COURSES:    None.

COURSE DELIVERY STRATEGY

Customized course developed by EPA EDP staff and tailored to the needs of the particular student group if possible.

EXECUTIVE ORIENTATION TO ADP

TARGET AUDIENCE

Division Director, Deputy Division Director, RU Directors, Lab Directors.

PREREQUISITE SKILLS AND KNOWLEDGE: Introduction to ADP.

OBJECTIVES OF CURRICULUM

- Learn how to make data processing a more effective contributor in meeting EPA's overall objectives.
- Learn how to more effectively control data processing operations.
- Increase management awareness of ADP organizational impact.

COURSE ABSTRACT

DPA executives are provided the basis necessary to bridge the gap which exists between the expression of functional program requirements and the specification of an information system to support those requirements. The responsibilities of top management in the systems development process are presented and the controls required for a successful systems development are emphasized.

The information system is analyzed both as it contributes to the executive's role as a decision-maker and as it supports the ongoing operations of the total organization.

Typical problems involving existing systems are dealt with in order to provide information which will be useful in the executives' immediate environment.

An atmosphere of vigorous student involvement is created by the use of a detailed case study, introduced via a scenario which places the senior executive in the role of a top level decision-maker, who must confront the problems of an inadequate information system. (Inefficiencies, data accuracy, duplication.)

Technical detail is presented only when it enhances the understanding of how program objectives can be supported by ADP.

CLASS SIZE: 10 - 15

COURSE OFFERING/LOCATION

Three times per year--Hdg.
Twice yearly at designated Regions.

COURSE DURATION

Each session: 4 hours
Total hours: 16
Session frequency: Once per week--Hdg.; 2-1/2 consecutive days--Regions

EXECUTIVE ORIENTATION TO ADP (cont'd)

TOPICAL OUTLINE OF COURSE

| | Description |
|---|---|
| 1. Agency ADP Overview | Agency applications<br>Number of people involved<br>ADP expenditure levels<br>Management control problems<br>Misuse of ADP resources<br>Current problems |
| 2. Management Control | Case study for hypothetical program<br>Ineffective systems<br>Lack of staff experts<br>User complaints<br>Budget out of control<br>Management action to solve problem:<br> (5-year ADP plan<br> System studies<br> Steering committee<br> Centralization of DP function<br> Detailed budget sub-allocation) |
| 3. Cost Control | Major cost sources<br>Cost breakdown of major systems<br>Cost reduction problem<br>Budgeting philosophy<br>User accountability and chargeback systems<br>Cost consciousness<br>User needs |
| 4. Effective Systems | Program versus system objectives<br>Manager's responsibility for stating requirements<br>System development cycle (steps, tasks, development estimates)<br>System terminology<br>System audits<br>Feasibility studies |

FOLLOW-ON COURSES:     None

COURSE DELIVERY STRATEGY

Contractor-developed course tailored to EPA environment.  Mission contractor will work with training contractor on course strategy, case studies, EPA background development.

MANAGING AND SUPERVISING ADP DEVELOPMENT PROJECTS/SEMINAR SERIES

TARGET AUDIENCE

Lead Analysts; ADP Section Chiefs; others with direct responsibility for system development.

PREREQUISITE SKILLS AND KNOWLEDGE

ADP Fundamentals; EPA Computing Resources; 3 + years ADP experience

OBJECTIVES OF CURRICULUM

At the completion of this curriculum sequence, participants will be able to:

- Describe ten major elements of a Project Control System for managing a current or planned project in their organization.

- Describe procedures and tasks to be followed in order to identify and document user requirements for a particular new system or system modification.

- Develop realistic system objectives.

- List 25 key items of information to be included in system specifications.

- Develop estimates of development time and costs for an example system.

- Develop estimates of operating time and costs for an example system.

- Interpret and evaluate results of feasibility study.

- Prepare documented recommendations to senior management on whether and how to implement a proposed system.

- Establish milestones for system development.

- Specify acceptance conditions for an example system.

- Assign tasks and responsibilities to project team members.

- Initiate, monitor and evaluate software development contracts.

- Assemble consolidated information on development costs and relate to project cost estimates.

- Identify variances from system specifications and development milestones.

- Prepare a plan for orienting and training users of the new system.

- Initiate, supervise and evaluate a plan for conversion of records and/or files.

- Supervise and evaluate system testing.

- Make recommendations and obtain management decisions on full-scale installation of the system.

## COURSE ABSTRACT

The theme of the seminar is accountability for systems development and operation. The need to assign responsibilities at each phase of the system development cycle is brought out including clarification of the responsibilities of ADP systems and program personnel.

This seminar will cover many topics that project managers needs to know--how to manage feasibility studies, system development, operations and maintenance, and review of systems. How to use and interface with Agency cost control mechanisms including cost chargeback, feasibility studies, and system audits. How to make technical changes in the systems to improve system efficiency. How to make users more accountable for costs.

CLASS SIZE:  10 - 20

COURSE OFFERING/LOCATION:  EPA Headquarters, Regional offices

## COURSE DURATION

Headquarters: 6-hour sessions, once per week, five-eight weeks.
Regional Locations: 6-hour sessions, every day for one week.

## METHOD/CONDUCT OF COURSE

Primary means of instruction is workshop, with participants providing case materials from current or planned development activities.

Homework assignments related to participants' work will be assigned.

Participants will be provided opportunity to select from the curriculum sequence, those topics of highest priority to them. Class manager is to tailor course to requirements of the participants.
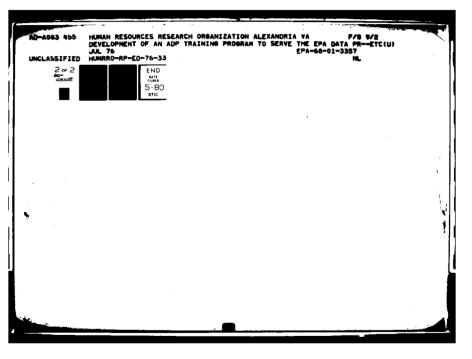
Not more than 25% of course time shall be lecture mode.

## RESOURCE MATERIALS/HANDOUTS

- Selected issues of Auerbach Data Processing Manual on System Development and Project Management
- EPA ADP Manual
- Homework Assignments

## FREQUENCY OF COURSE OFFERING

To be offered on a pilot basis at EPA Headquarters. Further offerings to be determined on the basis of pilot.

TOPICAL OUTLINE OF COURSE

| | |
|---|---|
| Session 1:<br>Problem Definition | Approaches to PM Rationale |
| | Participants will identify priority areas for study based on: |
| | • Their role in system development<br>• Type of system<br>• Stage of system development<br>• *Critical problem areas*<br>• Reasons for wanting to structure the project development process<br>• Definitions of PM |
| Session 2.<br>System Development Cycle | Tasks and Products of each Stage |
| | Project Manager's Responsibility for each Stage |
| | Documentation Required for each Stage |
| Session 3:<br>User Requirements<br>System Objectives | Procedures methods for identifying requirements |
| | Documenting requirements |
| | Obtaining user approval of requirement |
| | Case study |
| | Developing realistic objectives |
| Session 4:<br>Feasibility Studies | When and how to initiate |
| | Cost of study vs. cost of system |
| | Procurement procedures |
| | Data needed |
| | Sources of data |
| | Evaluating study results |
| | Case Study |
| *Session 5:*<br>System Specifications | Users and uses of system specifications, management, contractors, users. |
| | Information to be included in specifications |
| | Level of detail needed for what purposes |
| | Documenting specifications |
| | Class Exercise: Given a sample set of specifications, participants will identify missing elements, ambiguities, etc. |

| | |
|---|---|
| Session 6:<br>Estimating, Budgeting &<br>Scheduling | Tools for planning and tracking development steps: Milestone Charts, Critical Path Diagrams.<br><br>Techniques for estimating development costs: ADP fund costs, Personnel costs/time, Contractor costs. |
| Session 7:<br>Project Team & Steering<br>Committee | Organization<br>Responsibilities<br>Control |
| Session 8:<br>EPA Policies and<br>Procedures | System Development Cycle<br>Equipment Purchase<br>Standard Terminals<br>Documentation |
| Session 9:<br>Acceptance | Acceptance Criteria<br><br>Acceptance Testing: Techniques, Tools, Procedures, Conditions<br><br>Contractual Requirements<br><br>Identifying variances from specifications and objectives |
| Session 10:<br>Users | User Guide--content, format<br><br>User role in system--testing, implementation and conversion<br><br>User orientation and training<br><br>User accountability for costs |
| Session 11<br>Conversion and Implementation | |
| Session 12:<br>Final System Documentation | |
| Session 13:<br>The Realities of Project | Pitfalls: Failing to act on control information<br><br>● Interim documentation<br>● Lack of checkpoints<br>● Unclear requirements<br>● Cost overruns<br>● Unanticipated delays |

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