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Number: \_\_\_\_\_  
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Action-Date: \_\_\_\_\_

UWUCC USE Only *99-22e*  
Number: \_\_\_\_\_  
Submission Date: \_\_\_\_\_  
Action-Date: *UWUCC App 12/14/99*  
*Senate App 2/29/00*

**CURRICULUM PROPOSAL COVER SHEET**  
University-Wide Undergraduate Curriculum Committee

**I. CONTACT**

Contact Person John Cross Phone 7-4478  
Department Computer Science

**II. PROPOSAL TYPE (Check All Appropriate Lines)**

**COURSE** Unix Systems  
Suggested 20 character title

**New Course\*** \_\_\_\_\_  
Course Number and Full Title

**Course Revision** CO 362 Unix Systems  
Course Number and Full Title

**Liberal Studies Approval +** \_\_\_\_\_  
**for new or existing course** Course Number and Full Title

**Course Deletion** \_\_\_\_\_  
Course Number and Full Title

**Number and/or Title Change** CO 362 Unix and C  
Old Number and/or Full Old Title

CO 362 Unix Systems  
New Number and/or Full New Title

**Course or Catalog Description Change** CO 362 Unix Systems  
Course Number and Full Title

**PROGRAM:**  Major  Minor  Track

**New Program\*** \_\_\_\_\_  
Program Name

**Program Revision\*** \_\_\_\_\_  
Program Name

**Program Deletion\*** \_\_\_\_\_  
Program Name

**Title Change** \_\_\_\_\_  
Old Program Name

\_\_\_\_\_  
New Program Name

**III. Approvals (signatures and date)**

[Signature]  
Department Curriculum Committee

[Signature]  
Department Chair

[Signature]  
College Curriculum Committee

[Signature]  
College Dean

Director of Liberal Studies (where applicable)

Provost (where applicable)

## Part II. Description of Curriculum Change

### 1. New Syllabus of Record

See Attachment A.

### 2. Summary of the proposed revision.

The principal revision is to remove instruction in C/C++ as a new programming language from the course. In its place, there will be increased emphasis on topics of system administration, systems programming and networks - features that contribute to the continued success of the Unix operating system. Adjustments in the course name, description, and syllabus are contained in Attachment A, the new syllabus of record.

### 3. Justification for the revision

In Fall of 1996, we changed to C++ in our courses in introductory programming (CO 110). In Spring 1997, we changed our course in data structures (CO 310) to C++. We continued to teach C/C++ in CO 362 as roughly one-third of the course to accommodate the needs of students who had taken CO 110 and CO 310 before they were changed to C++. In Fall 1997, the amount of C/C++ in CO 362 was reduced to two weeks. By Spring 1999, we plan to have no instruction in basic C/C++ as part of this course.

The portion of the course that was formerly C/C++ has become applied operating systems, networking, and system programming. Including these topics in the course will enhance the Unix experience for the students and make the course more worthwhile. In addition, knowledge of the systems aspects of Unix are much in demand from industry.

### 4. Old Syllabus of Record

See Attachment B.

### 5. Letters of Support

See Attachment C.

NEW CO 362 Syllabus of Record

Attachment A

NEW CO 362 Syllabus of Record

Attachment A

## I. Catalog Description

CO 362 Unix Systems

3c-01-3sh

Prerequisites: CO 310 or permission of instructor

An introduction to the features, syntax, applications, and history of UNIX. Coverage includes utilities, system administration, development environments, and networking concerns including distributed systems, client-server computing and providing Web services.

## II. Course Objectives

A. Students will demonstrate understanding of basic terminology, concepts, language syntax, technical features, and standards of UNIX, Perl, and related network concerns, including distributed systems, client-server computing and providing Web services on Unix systems.

B. Students will use UNIX effectively as a tool, a way to provide services, and a system administrator.

C. Students will demonstrate an understanding of the historical context of UNIX including its roots, current successes and flaws, applications, "culture," features which appear in other popular systems, and trends.

D. Students will make sound judgments about UNIX in system design and administration situations. These judgments will be based on knowledge of strengths and weaknesses of UNIX, trends in computing hardware and software, and alternatives.

E. If time and resources allow, students will be introduced to additional topics of current and foreseeably lasting relevance to UNIX computing.

## III. Course Outline

<u>Topic</u>	<u>Hours</u>	<u>Cumulative Hours</u>
Introduction history, overview, variations, importance, directions Workstations GUI's	2	2
Basic commands and syntax	1	3
Regular expressions	2	5
File systems hierarchy, file types, pathnames, directories, access permissions, links	2	7

hidden files		
distributed file systems (e.g., NFS)		
Unix shells	3	10
bourne, C, bash, tc , z, korn		
Editors	2	12
pico, jpico, vi, emacs		
Shell programming	3	15
Programming environments	3	18
C/C++ in Unix		
Makefiles		
source code management		
Major Unix utilities	5	23
perl, sed, awk		
Networks	5	28
client/server computing in Unix		
LANs, WANs and the Internet		
networking utilities		
email and newsgroups in Unix environments		
distributed processing		
System administration (Linux)	6	34
system installation		
adding users		
performance measurement		
routine tasks		
(e.g., changing passwords)		
Security		
System programming concepts	5	39
pipes, sockets, and system calls		
Exams, quizzes	3	42

IV. Evaluation Methods

The final grade is determined as follows:

- 50-60% Examinations. There are normally two exams during the semester and a final.
- 30-40% Assignments. There are approximately six assignments worth varying numbers of points.
- 10-20% Quizzes, class participation, and other activities.

The final grade is determined by the following cutoffs for letter grades based on the percent of points earned in the above categories.

90 and above (A), 80-89 (B), 70-79 (C), 60-69 (D)

V. Required textbooks, supplemental books and readings

Required textbooks:

Sobell, Mark G. A Practical Guide to Linux. 1996. Addison Wesley.

Nemeth, Evi, and others. UNIX System Administration Handbook, 2<sup>nd</sup> Edition. 1995. Prentice-Hall.

Recommended Book:

Wall, Larry, Christiansen, Tom, and Schwartz, Randal. Programming Perl, 2nd Edition. O'Reilly & Associates, Inc. 1996.

Supplemental books and readings:

Man and Web pages for all compilers and utilities related to this course!

Online resources for this course beginning at <http://www.iup.edu/~jacross/362.html>.

Newham, Cameron and Rosenblatt, Bill. Learning the bash shell. O'Reilly & Associates, Inc. 1996.

Aho, Kernighan, and Weinberger. The AWK Programming Language. 1988. Addison-Wesley.

C/C++ Users Journal. Available in Str 107 and Str 319 and at <ftp://ftp.mfl.com/pub/cuj/1996/>

VI. Special resource requirements

The Linux systems maintained by the Computer Science Department (in Tompkins Lab) will be used for this course. Students who are enrolled in CO 362 will be given logon ids and disk space. Additional Intel systems maintained in Tompkins Lab will be used for installing the Linux operating system and doing minimal system administration tasks. Students may be encouraged to own or have access to systems where they can install Linux or have access to other versions of Unix, but this will in no way be a requirement for earning a particular grade in the course.

Web pages and resource materials will be used to support this course. IUP Web access will be adequate for this purpose.

I. Catalog Description

CO 362 UNIX and C

3c - 0l - 3sh

Prerequisites: CO 310 or permission of instructor

An introduction to the history, features, syntax, and applications of UNIX and C. Lectures, reading, and hands-on projects. Coverage includes two or more user interfaces and variations in C, and addresses portability issues.

II. Course Objectives

- A. Students will demonstrate understanding of basic terminology, concepts, language syntax, technical features, and standards of UNIX and C.
- B. Students will use UNIX and C effectively as tools.
- C. Students will demonstrate an understanding of the historical context of UNIX and C including their roots, current successes and flaws, applications, "culture," and trends.
- D. Students will make sound judgments about UNIX and C in system design and administration situations. These judgments will be based on knowledge of strengths and weaknesses of UNIX and C, trends in computing hardware and software, and alternatives to UNIX and C.
- E. If time allows, introduce the next evolutionary steps: friendly interfaces and standards for Unix and C. Students will be introduced to additional topics of current and foreseeably lasting relevance to UNIX computing.

III. Course Outline

A. Unix

- 1. Introduction to course and history of Unix & C 1 hour
- 2. Basic Unix 3 hours
  - a. Operating systems
  - b. History
  - c. The good, the bad, and the ugly
  - d. Commands and utilities
  - e. The shell and kernel
  - f. Files

- g. The ed, sed, vi, and emacs editors
- h. Editing the command line
- i. Listing the current directory
- j. Viewing, deleting, renaming, and copying files
- 3. Getting started on a workstation 2 hours
  - a. FTP and Telnet
  - b. NeXT workstations and Decstation 5000s
  - c. Logging on and off
  - d. Passwords
  - e. Online help (man)
  - f. Preferences
  - g. GUI in general: mice, icons, windows, menus, panels, sliders and dials
  - h. Printing
  - i. Editors: WriteNow, Edit, Unix editors and formatters, upload/download
  - j. Key mapping in Kermit
- 4. Basic utilities 1.5 hours
- 5. System File Structure 0.5 hours
  - a. Hierarchical organization of directories
  - b. Terminology
  - c. Directory commands
  - d. Hidden files, standard directories, and pathnames
  - e. Access restrictions
  - f. ls options
  - g. Links
- 6. Unix Shells as Programming Languages 2 hours
  - a. Versions: Bourne, C, Korn, Bash, vms shell
  - b. Commands
  - c. Standard input and output and redirection
  - d. Pipes
  - e. Filters and tee
  - f. Running a program in the background
  - g. Ambiguous file references
- 7. The Bourne Shell 3 hours
  - a. Shell Scripts
  - b. Commands: separation, pipes and background, grouping, continuation, redirecting standard error
  - c. Processes
  - d. Variables
  - e. Flow control
  - f. Functions
- 8. The C shell 2 hours
- B. The C Programming Language

OLD CO 362 Syllabus of Record

Attachment B

1. Getting Started	1 hour
a. A first program - printf	
b. Compile and execute	
c. Examples of variables, expressions, and assignment	
d. #define, scanf, and while	
e. A program with input and a loop	
f. Redirecting the standard I/O files	
2. Fundamentals	1 hour
a. Character set and language elements	
b. Identifiers and keywords	
c. Data types, conversions, casts	
d. Operators and separators	
e. Comments and constants	
f. Characters and strings	
g. Exercise on operators - precedence, increment, implicit operand	
3. Fundamental data types	1 hour
4. Flow of control	2 hours
a. Conditional expressions	
b. Compound statements	
c. The null statement	
d. if statements	
e. Looping - while, for, do	
f. break and continue statements	
g. switch statement for cases	
h. The conditional operator	
i. Sample programs	
5. Functions and Program Structure	2.5 hours
a. Function declaration, prototypes, and calling	
b. Call by value / call by address	
c. Program structure	
d. Builtin functions	
e. Scope and class	
f. Recursion	
g. Separately compiled modules	
6. Arrays, pointers, and strings	2.5 hours
7. Bitwise operators and enum	2 hours
8. Structures	2 hours
a. Declaration and reference	
b. typedef	
c. unions	
d. Dynamic memory allocation	
9. Data structure programming	2 hours



OLD CO 362 Syllabus of Record

Attachment B

- 10. Environmental concerns 2 hours
  - a. Porting
  - b. Concurrent and communicating processes
- C. Unix and C: Synergism
  - 1. File input and output 1 hour
  - 2. C in a Unix environment 1 hour
    - a. cd to "prettyprint"
    - b. make and makefile for developing modularized code
    - c. lint as a static code checker
    - d. prof to do run-time analysis
  - 3. Sockets 1 hour
  - 4. awk 3 hours

IV. Evaluation Methods

The final grade is determined as follows:

- |        |   |
|--------|---|
| 50-60% | Examinations: two during the term and a final.              |
| 30-40% | Assignments: approximately worth varying numbers of points. |
| 10-20% | Quizzes, class participation, and other activities.         |

V. Required Texts

Kelley, Al and Pohl, Ira, *A Book on C*, Benjamin/Cummings, Reading, MA (1990).

Sobell, Mark G., *A Practical Guide to the Unix System*, Second Edition, Benjamin/Cummings, Reading, MA (1989).