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CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. TITLE/AUTHOR OF CHANGE

COURSE/PROGRAM TITLE CO 320 Software Engineering Practice
DEPARTMENT Computer Science
CONTACT PERSON Dr. Charles J. Shubra, 319 Stright, x7917

II. THIS COURSE IS BEING PROPOSED FOR:

X Course Approval Only
_____ Course Approval and Liberal Studies Approval
_____ Liberal Studies and Approval only (course previously
has been approved by the University Senate)

III. APPROVALS

Charles J. Shubra
Department Curriculum Committee
Al Kaniasty
College Curriculum Committee

Harry L. Bentebruch
Department Chairperson
William G. Cole
College Dean*

Director of Liberal Studies
(where applicable)

Provost
(where applicable)

*College Dean must consult with Provost before approving curriculum changes. Approval by College Dean indicates that the proposed change is consistent with long range planning documents, that all requests for resources made as part of the proposal can be met, and that the proposal has the support of the university administration.

IV. TIMETABLE

Date Submitted
to LSC _____
to UWUCC _____

Semester/Year to be
implemented _____

Date to be published
in Catalog _____

Revised 5/88

[Attach remaining parts of proposal
to this form.]

12:19 Tuesday October 8, 1991

PART II. DESCRIPTION OF CURRICULAR CHANGE

PART II. 1 Catalog Description

CO 320 Software Engineering Practice 1c-2d-3sh

Prerequisites: CO 319W or permission of the instructor

Planning, design and implementation of a large software system using software engineering techniques. Students work in project teams on real or realistic software development projects. Credit for either CO 320 or CO 493 may count toward computer science major requirements, but not both. The other course credits are free electives.

PART IIB. COURSE SYLLABUS

Course Objectives

The goal of the CO 320 course is to provide students (primarily those unable to participate in the Computer Science Internship Program) with a vehicle for applying the principles of software engineering studied in CO 319 to a real or realistic software project. The following objectives contribute to successfully meeting this goal:

1. Discipline the development of a software system through the use of installation standards.
2. Experience the uncertainty and lack of structure present in a real problem vs. the well-defined, well-structured problems given as course assignments.
3. Practice the interpersonal skills essential to working on a project team.
4. Write technical documentation for the various phases of the software lifecycle.
5. Experience the complexity of testing a real system.

III. COURSE OUTLINE

IUP Computer Science Department
CO 320 - Software Engineering Practice

Dr. Shubra
Spring, 1987

Introduction

The goal of the CO 320 course is to provide students (primarily those unable to participate in the Computer Science Internship program) with a vehicle for applying the principles of software engineering studied in CO 319W to a real or realistic software project. Project teams structured along the lines of chief programmer teams will be formed. An established set of installation standards will dictate the organization and conduct of the project team. Whenever possible, actual projects for real users will be the object of study for each team.

The course will require everyone to attend one lecture per week during which topics specific to the conduct of projects will be discussed, exams given, and final presentations made. We will have 14 of these lecture sessions held every Monday with all students enrolled in CO 320 attending.

Each of you should also be enrolled in two hours of recitation time per week. Two project groups of 3 to 5 people each are scheduled for each of these laboratory sessions. The recitation sessions will be used for formal walk-thrus, supervised group meetings and faculty member feedback to each group specific to their assigned project. Groups will have to schedule meeting/work times outside of the lecture/recitation periods if work is to progress satisfactorily. Individual team members will also be required to complete tasks pertaining to the projects on an individual out-of-class basis.

CLASS SCHEDULE

<u>Meeting</u>	<u>Topic</u>	<u>References</u>
Recitation (R) 1	Course Administration and Organization. Job descriptions and announcements. Assigned: Complete a cover letter and resume to apply for a position.	Syllabus
	Due: Next lecture	
Lecture (L) 1	Discussion and selection of available projects. Introduction to CO 320 Installation Standards Manual	
R2	Team Organization and initial task assignments.	ReviewProject Documentation
L2	CO 320 Installation Standards	Editor,

	Use of the programming environment	Mail
R3 - 14	Presentation of assigned tasks & determination of new tasks to be accomplished	
L3	Requirements/Walk-thru techniques	
L4	Specifications	
L5	Design	
L6	Alternative Means of Programming - forms processing	
L7	Forms processing (TDMS on MicroVAX II)	TDMS
L8	Query Languages	
L9	Query Languages	
L10	Test plan	
L11	Implementation and TOP DOWN Testing	
L12	Initiation of the project	
L13	Project Presentations	
L14	Project Presentations	
Final	Project Presentations	

IV. Evaluation Methods

The course requires that students work as a program development team. Evaluation is complicated by the fact that while everyone contributes to the outcome of the development project, not everyone contributes equally. Individual contributions are most visible during walkthrus when individual team members present their contributions. With this in mind, each student's grade will be determined through the combination of the project grade (the same for each team member) and the individual contributions (e.g., walkthru, individual artifacts). The following mixture will be used:

- 50% group project grade
- 50% individual contributions

V. Reading Materials

1. Shubra, C. J., et. al, Installation Standards Manual for CO 320, Kinko's, 1989. (required)
2. King, D., Current Practices in Software Development, Yourdon Press, 1984. (required)
3. Digital, A Methodology for Software Development Using VMS Tools, Digital Equipment Corporation, 1988. (required)
4. Excelerator User's Guide and Reference Manuals.

VI. Special Resources Required

None

VII. Resource Materials

An extensive set of software and hardware manuals are used in the teaching of this course. The materials needed vary with the project in terms of the hardware and software to be used. For example:

1. The VAX/VMS documentation set.
2. Word Perfect User's Guide and Reference Manual.
3. DBASE III+ User's Guide and Reference Manual.

PART IIC. COURSE ANALYSIS QUESTIONNAIRE

Section A. Details of the Course

- A1. This course provides students with the experience of developing a real project using the tools and techniques of software engineering. Short, well-defined projects do not provide this to students.

This course or an internship can fulfil the academic need. The problem is that an internship is a competitive program so that not every student can fill the need through an internship.

The course is primarily designed for computer science majors, but anyone who has completed CO 319W Software Engineering Concepts could benefit from this course. Since the programming team approach is used, and since the programming team requires a variety of skills (analysis, design, documentation, programming, testing), majors other than computer science would be welcome.

This course, though writing intensive, is not proposed for inclusion in the liberal studies course list nor for the "W" designation.

- A2. Effect on other courses

As described in the request to modify CO 319W, this course and CO 319W are the outgrowth of an existing software engineering course "CO 320 Software Engineering". CO 319W Software Engineering Concepts (proposed as a revision) will assume the introduction and teaching of the discipline of Software Engineering. CO 320 Software Engineering Practice will then put those concepts to work on real(istic) projects using programming teams.

- A3. Type of Offering

While most course offerings in computer science rely on programming projects to practice what was discussed in lecture, CO 320 is unique in the ratio of recitation time to lecture time. Two thirds of the scheduled class time is in a recitation mode with one third reserved for lecture.

- A4. Trial Offerings

Both the CO 319W (proposed) and CO 320 (proposed) have been offered. Both courses have been successful as reported by students and alumni.

- A5. This course is not to be a dual-listed course.

- A6. This course will not be offered for variable credit.

- A7. Many other institutions of higher education offer such a course. Within SSHE, and Ohio State University and Carnegie-Mellon University have similar course offerings.
- A8. The Software Engineering Institute, a joint venture of the DoD and Carnegie-Mellon University have, for the past four years, spearheaded an effort to define both a graduate and undergraduate curriculum in software engineering. Their curriculum proposals contain a project-oriented course similar to CO 320 as a central requirement.

Initially, the content of this course and CO 319W were attempted as a single CO 320 course. A single course did not permit the teaching and learning of complex concepts to coexist with applying such concepts to a real(istic) large project.

Section B. Interdisciplinary Implications

- B1. This course may and has been taught by one instructor. It is advantageous to involve more than one instructor in the recitation portion of the course for several reasons: 1) the variety of projects attempted would be richer, 2) most professors have project work that will not get accomplished any other way because of time constraints and shortage of labor, 3) because of the intensity of the project, a single instructor quickly burns out if too many different projects are involved.

Should more than one instructor become involved, each would be assigned a recitation section or two, if the volume of students requires multiple recitation sections. The instructors could then either split the lecture time or one instructor could provide the complete lecture component.

- B2. CO 319W Software Engineering Concepts is a prerequisite for CO 320 Software Engineering Practice.
- B3. The Finance and MIS Department of the College of Business offers IM 451 Systems Analysis which "develops an understanding of concepts and techniques involving conventional and structured approaches to analyzing problems of business information systems and system definition feasibility ..." and IM 470 Systems Design where "students learn tools and techniques for design of a business system". While there is an overlap in the subjects being discussed in IM 451/IM 470 and CO 319W/CO 320, the former concentrate on business applications and the initial phases of the software lifecycle. The latter address any problem domain requiring a software based solution and study techniques used in every phase of the software lifecycle from beginning to end.
- B4. No seats in this course will be made available to students in the School or Continuing Education.

Section C. Implementation

- C1. Resources

- a. Dr. Charles Shubra and Dr. John Cross have completed doctoral degrees that address the discipline of software engineering. Both of their dissertations centered on software engineering research. Both have continued to publish in the field.
 - b. No additional space is required to teach the course.
 - c. This course, as all other computer science course, require that appropriate technology (hardware and software) be available. Currently, adequate development facilities (VAX Set and Excelerator Software) are available. Funds to make new technology available as it is developed will be required as needed.
 - d. Laboratory supplies consisting of paper and ribbons are available.
 - e. The computer science department, through its Library Committee chaired by Dr. Katherine McKelvey, has made a conscientious effort to order library materials. The library has been responsive in purchasing such materials.
 - f. Travel funds are needed to stay abreast of the developments in software engineering. At least one conference trip per year is required. Luckily, the cost is minimal since the Software Engineering Institute conducts such conferences in Pittsburgh, PA.
- C2. The Excelerator software package was obtained through a grant obtained by Dr. Shubra. Index Technologies, Inc. has an active laboratory program which provides updates of software at the cost of the medium (less than \$100.00 per year).
 - C3. This course will be offered once per year usually in the Spring Semester.
 - C4. A single lecture section will be offered with one or two recitation sections anticipated.
 - C5. The lecture can accommodate thirty students per section. The recitation can accommodate fifteen students per section.
 - C6. The ACM recommends no more than twenty-five students per section of programming intensive courses.
 - C7. CO 320 or CO 493 will be required in the soon-to-be proposed B.S. in Applied Computer Science curriculum. The addition of this course does not increase the degree requirement beyond 124 credit hours.