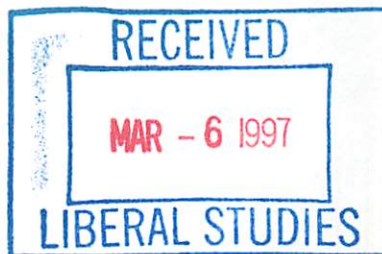


LSC Use Only  
Number: \_\_\_\_\_  
Submission Date: \_\_\_\_\_  
Action-Date: \_\_\_\_\_



UWUCC USE Only  
Number: 96-68  
Submission Date: Apr 4/22/97  
Action-Date: Senate App 9/9/97

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

**I. CONTACT**

Contact Person James L. Wolfe Phone 357-6104  
Department Computer Science

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

       **COURSE** \_\_\_\_\_  
Suggested 20 character title  
       New Course\* \_\_\_\_\_  
Course Number and Full Title  
       Course Revision \_\_\_\_\_  
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 \_\_\_\_\_  
Old Number and/or Full Old Title  
\_\_\_\_\_  
New Number and/or Full New Title  
       Course or Catalog Description Change \_\_\_\_\_  
Course Number and Full Title  
 X  **PROGRAM:**  X  Major        Minor  X  Track  
       New Program\* \_\_\_\_\_  
Program Name  
 X  Program Revision\* Computer Science \_\_\_\_\_  
Program Name  
       Program Deletion\* \_\_\_\_\_  
Program Name  
       Title Change \_\_\_\_\_  
Old Program Name  
\_\_\_\_\_  
New Program Name

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

[Signature]  
Department Curriculum Committee

[Signature]  
College Curriculum Committee

+ Director of Liberal Studies (where applicable)

[Signature]  
Department Chair

[Signature]  
College Dean

\* Provost (where applicable)

## Part II. Description of Curriculum Change

### 1. Catalog Description for the revised program.

Additions in the program appear in ***bold italics***. There are no deletions.

#### Department of Computer Science

William W. Oblitey, Chairperson;  
Buterbaugh, Cross, Cunningham, R. F. Grove, McKelvey, Micco, Shubra, Sweeney, Watts, Wolfe; and professor emeritus Tompkins

The programs in Computer Science at IUP lead to the B.S. or B.A. degree and are designed primarily to prepare graduates for productive work in highly computer-dependent areas of business, government, and industry. In recent years, majors graduating from the program have attained their first jobs in business applications, programming and systems analysis, computer software development, scientific and applied mathematical programming, and other computer-related areas and have gone to graduate school.

In a rapidly developing field such as Computer Science, it is important that the graduate's education be broad and fundamental so that new trends can more readily be followed. Our goal is to balance fundamentality and breadth with sufficient supervised practice so that our graduates are productive at the time they graduate but ready and willing to change with the field.

Most applied computer scientists work in cooperation with professionals trained in other areas and with managers. Hence, the ability to work and communicate with others of different educational backgrounds is an important characteristic. To that end, we encourage Computer Science majors to take a strong minor (or area concentration) in a second area of interest. Some students may wish to double major. Majors in other disciplines at IUP are also welcome to take Computer Science courses for which they are qualified or a Computer Science minor.

Students majoring in Computer Science should set their goals beyond simple programming and should be preparing

1. to program well, both in design and implementation phases, and document what they have programmed
2. to analyze real-world problems in preparation for program design and implementation
3. to manage activities that are strongly computer dependent
4. to improve the tools that programmers and systems analysts use, i.e., to develop

- a. better machine systems
  - b. better software systems
  - c. better languages for communicating with machines
  - d. better methods for solving intractable problems
  5. to teach about computers at college or high school level
  6. to advance the fundamental theory of digital information processors.
- 

## Bachelor of Arts-Computer Science

Liberal Studies: As outlined in Liberal Studies section 55-58  
 with the following specifications:  
 Mathematics: MA123 (or MA121-MA122 or MA127)  
 Liberal Studies electives: MA216 (or MA214 or MA217),  
 no courses with CO prefix

Major: 35

### Required courses:

|       |                                            |     |
|-------|--------------------------------------------|-----|
| CO105 | Fundamentals of Computer Science           | 3sh |
| CO110 | Problem Solving and Structured Programming | 3sh |
| CO220 | Applied Computer Programming               | 3sh |
| CO300 | Assembly Language Programming              | 3sh |
| CO310 | Data Structures                            | 3sh |
| CO315 | Large File Organization and Access         | 3sh |
| CO380 | Seminar on the Computer Profession         | 1sh |
| CO480 | Seminar on Technical Topics                | 1sh |

Controlled electives: Select 9sh (1)

|              |                                                                |            |
|--------------|----------------------------------------------------------------|------------|
| <b>CO201</b> | <b>Internet and Multimedia</b>                                 | <b>3sh</b> |
| CO250        | Introduction to Numerical Methods                              | 3sh        |
| CO319        | Software Engineering Concepts                                  | 3sh        |
| CO320        | Software Engineering Practice                                  | 3sh        |
| CO345        | Data Communications                                            | 3sh        |
| CO355        | Computer Graphics                                              | 3sh        |
| CO360        | IBM Job Control Language                                       | 1sh        |
| CO362        | UNIX and C                                                     | 3sh        |
| CO481        | Special Topics in Computer Science<br>(as approved for majors) | 1-4sh      |
| CO485        | Independent Study                                              | 1-4sh      |
| CO493        | Internship in Computer Science                                 | 12sh (2)   |

Upper-level Electives by Categories 6sh (3)

Computer Architecture: CO410

Theory of Languages: CO419, CO420, CO424, CO460

Systems Programming: CO430, CO432

Numerical Methods: CO450, **CO451**

Artificial Intelligence: CO405

Data Base Management: CO441, C0444

Other Requirements:

6-22

Additional Writing:

EN322 Technical Writing 3sh  
Foreign Language Intermediate Level 0-6sh (4)  
Additional Mathematics: 3-13sh (5)

MA123 Calculus for Physics and Chemistry  
(MA121 and MA122 or MA127 may be substituted)  
MA216 Probability and Statistics for Natural Sciences  
(MA363 and MA364, MA214 and MA417, or MA217 and  
MA417 may be substituted)  
MA219 Discrete Mathematics

Free Electives:

9-28

Total Degree Requirements:

124

- (1) Select at least 9sh from the list of controlled electives and/or the list of upper-level electives. Note: Only 4sh of CO493 may be counted toward these 9sh.
  - (2) CO493 may be selected in either the second semester of the junior year or the first semester of the senior year. If CO493 is selected and approved, CO380 should be taken in the immediately preceding semester.
  - (3) Select at least two additional courses, from at least two different categories, from the list of upper-level electives.
  - (4) Foreign Language intermediate-level courses are counted as Liberal Studies electives.
  - (5) Any of the Mathematics options satisfy the Learning Skill requirement, and one course may be counted as a Liberal Studies elective. The three-credit minimum applies to students who take MA123 and MA216. The thirteen-credit maximum applies to students who take the MA121-MA122 calculus option and the MA363-MA364 statistics option.
- 
- 

Bachelor of Science-

Computer Science/Applied Computer Science Track

Liberal Studies: As outlined in Liberal Studies section  
with the following specifications:

54-58

Mathematics: MA123 (or MA121-MA122 or MA127)  
Liberal Studies electives: MA216 (or MA214 or MA217),  
no courses with CO prefix

## Major:

## Required courses:

|       |                                            |     |
|-------|--------------------------------------------|-----|
| CO105 | Fundamentals of Computer Science           | 3sh |
| CO110 | Problem Solving and Structured Programming | 3sh |
| CO220 | Applied Computer Programming               | 3sh |
| CO300 | Assembly Language Programming              | 3sh |
| CO310 | Data Structures                            | 3sh |
| CO315 | Large File Organization and Access         | 3sh |
| CO319 | Software Engineering Concepts              | 3sh |
| CO380 | Seminar on the Computer Profession         | 1sh |
| CO441 | Data Base Management                       | 3sh |
| CO480 | Seminar on Technical Topics                | 1sh |

## Select one of the following two courses:

|       |                                |          |
|-------|--------------------------------|----------|
| CO320 | Software Engineering Practice  | 3sh (1)  |
| CO493 | Internship in Computer Science | 12sh (2) |

## Controlled electives: Select 6sh (3)

|              |                                                                           |            |
|--------------|---------------------------------------------------------------------------|------------|
| <b>CO201</b> | <b>Internet and Multimedia</b>                                            | <b>3sh</b> |
| CO250        | Introduction to Numerical Methods                                         | 3sh        |
| CO345        | Data Communications                                                       | 3sh        |
| CO355        | Computer Graphics                                                         | 3sh        |
| CO360        | IBM Job Control Language                                                  | 1sh        |
| CO362        | UNIX and C                                                                | 3sh        |
| CO481        | Special Topics in Computer Science<br>(only sections approved for majors) | 1-4sh      |
| CO485        | Independent Study                                                         | 1-4sh      |

## Upper Level Electives by Categories: Select 3sh (4)

Computer Architecture: CO410  
 Theory of Languages: CO419, CO420, CO424, CO460  
 Systems Programming: CO430, CO432  
 Numerical Methods: CO450, **CO451**  
 Artificial Intelligence: CO405  
**Data Base Management: CO444**

## Other Requirements:

6-22

## Additional Writing:

|       |                                                                                                                                 |            |
|-------|---------------------------------------------------------------------------------------------------------------------------------|------------|
| EN322 | Technical Writing                                                                                                               | 3sh        |
|       | Foreign Language Intermediate Level                                                                                             | 0-6sh (5)  |
|       | Additional Mathematics:                                                                                                         | 3-13sh (6) |
| MA123 | Calculus I for Physics and Chemistry<br>(MA121 and MA122 or MA127 may be substituted)                                           |            |
| MA216 | Probability and Statistics for Natural Sciences<br>(MA363 and MA364, MA214 and MA417, or MA217 and<br>MA417 may be substituted) |            |
| MA219 | Discrete Mathematics                                                                                                            |            |

## Complete a minor from one of the following areas:

6-18

- a) From any department in the College of Natural Sciences  
and Mathematics 6-18sh

- |    |                                                     |             |
|----|-----------------------------------------------------|-------------|
| b) | From designated Business courses                    | 18sh        |
| c) | From designated Economics courses                   | 15sh        |
| d) | From designated Geography courses                   | 15sh        |
| e) | <b>From designated Communications Media courses</b> | <b>18sh</b> |

Free Electives:

0-20

Total Degree Requirements:

124

- (1) Credit for both CO320: Software Engineering Practice and CO493: Internship in Computer Science may be counted toward the degree, but only one will be counted toward the major requirements.
- (2) CO493 may be selected in either the second semester of the junior year or the first semester of the senior year. If CO493 is selected and approved, CO380 may be taken in the immediately preceding semester.
- (3) Select at least 6sh from the list of controlled electives and/or the list of upper-level electives.
- (4) Select at least one additional course from the list of upper-level electives.
- (5) Foreign Language intermediate-level courses are counted as Liberal Studies electives.
- (6) Any of the Mathematics options satisfy the Learning Skill requirement, and one course may be counted as a Liberal Studies elective. The three-credit minimum applies to students who take MA123 and MA216. The thirteen-credit maximum applies to students who take the MA121-MA122 calculus option and the MA363-MA364 statistics option.

#### Bachelor of Science-

#### Computer Science/Languages and Systems Track

Liberal Studies: As stated in Liberal Studies Requirements 54-58 with the following specifications:

Mathematics: MA123 or MA127

Liberal Studies electives: MA124, no course with CO prefix

#### Major:

#### Required courses:

41

- |       |                                            |     |
|-------|--------------------------------------------|-----|
| CO105 | Fundamentals of Computer Science           | 3sh |
| CO110 | Problem Solving and Structured Programming | 3sh |
| CO220 | Applied Computer Programming               | 3sh |
| CO300 | Assembly Language Programming              | 3sh |
| CO310 | Data Structures                            | 3sh |
| CO315 | Large File Organization and Access         | 3sh |
| CO319 | Software Engineering Concepts              | 3sh |

|                                      |                                                                |            |
|--------------------------------------|----------------------------------------------------------------|------------|
| CO380                                | Seminar on the Computer Profession                             | 1sh        |
| CO410                                | Processor Architecture and Micro Programming                   | 3sh        |
| CO420                                | Modern Programming Languages                                   | 3sh        |
| CO432                                | Introduction to Operating Systems                              | 3sh        |
| CO480                                | Seminar on Technical Topics                                    | 1sh        |
| Controlled electives: Select 9sh (1) |                                                                |            |
| <b>CO201</b>                         | <b>Internet and Multimedia</b>                                 | <b>3sh</b> |
| CO250                                | Introduction to Numerical Methods                              | 3sh        |
| CO320                                | Software Engineering Practice                                  | 3sh (2)    |
| CO345                                | Data Communications                                            | 3sh        |
| CO355                                | Computer Graphics                                              | 3sh        |
| CO360                                | IBM Job Control Language                                       | 1sh        |
| CO362                                | UNIX and C                                                     | 3sh        |
| CO405                                | Artificial Intelligence                                        | 3sh        |
| CO419                                | Software Development and Ada                                   | 3sh        |
| CO424                                | Compiler Construction                                          | 3sh        |
| CO430                                | Introduction to Systems Programming                            | 3sh        |
| CO441                                | Data Base Management                                           | 3sh        |
| <b>CO444</b>                         | <b>Productivity Tools &amp; 4th Generation Languages</b>       | <b>3sh</b> |
| CO450                                | Applied Numerical Methods                                      | 3sh        |
| <b>CO451</b>                         | <b>Numerical Methods for Supercomputers</b>                    | <b>3sh</b> |
| CO460                                | Theory of Computation                                          | 3sh        |
| CO481                                | Special Topics in Computer Science<br>(as approved for majors) | 1-4sh      |
| CO485                                | Independent Study                                              | 1-4sh      |
| CO493                                | Internship in Computer Science                                 | 12sh (3)   |

Other Requirements: 13-21

Additional writing:

|                                                                        |                                                                                                                                 |                 |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------|
| EN322                                                                  | Technical Writing                                                                                                               | 3sh             |
| Foreign Language Intermediate Level                                    |                                                                                                                                 | 0-6sh (4)       |
| Mathematics: A minor in mathematics<br>including the following courses |                                                                                                                                 | 10-12sh (5) (6) |
| MA123                                                                  | Calculus I for Physics and Chemistry<br>(MA127 may be substituted)                                                              |                 |
| MA124                                                                  | Calculus II for Physics and Chemistry<br>(MA128 may be substituted)                                                             |                 |
| MA171                                                                  | Introduction to Linear Algebra                                                                                                  |                 |
| MA216                                                                  | Probability and Statistics for Natural Sciences<br>(MA363 and MA364, MA214 and MA417, or MA217 and<br>MA417 may be substituted) |                 |
| MA219                                                                  | Discrete Mathematics                                                                                                            |                 |

Free Electives: 4-22

---

Total Degree Requirements: 124

- (1) Select at least 9sh from the list of controlled electives. Note:  
Only 4sh of CO493 may be counted toward these 9sh.

- (2) Credit for both CO320: Software Engineering Practice and CO493: Internship in Computer Science may be counted toward the degree, but only one will be counted toward the major requirements.
  - (3) CO493 may be selected in either the second semester of the junior year or the first semester of the senior year. If CO493 is selected and approved, CO380 may be taken in the immediately preceding semester.
  - (4) Foreign Language intermediate-level courses are counted as Liberal Studies electives.
  - (5) Credit for MA123/MA127 and MA124/MA128 counted in Liberal Studies.
  - (6) Any of the Mathematics options satisfy the Learning Skill requirement, and one course may be counted as a Liberal Studies elective. The three-credit minimum applies to students who take MA123 and MA216. The thirteen-credit maximum applies to students who take the MA121-MA122 calculus option and the MA363-MA364 statistics option.
- 
- 

#### Minor-Computer Science

Minor:

15

Required courses:

CO electives

15sh(1)(2)

- (1) The minor in Computer Science consists of 15 semester hours of CO electives. At least 9 semester hours of the 15 must be from CO courses numbered higher than 200.
  - (2) CO101 Microbased Computer Literacy is an appropriate entry course for minors or for students who wish to take only one course.
  - (3) See Computer Science minor adviser for suggestions.
-



## 2. Summary of changes:

### a. Table comparing old and new programs

#### Bachelor of Arts - Computer Science

|                                                    |                                                    |
|----------------------------------------------------|----------------------------------------------------|
| Controlled electives: Select 9sh                   | Controlled electives: Select 9sh                   |
| CO250                                              | <b>CO201</b>                                       |
| CO319                                              | CO250                                              |
| CO320                                              | CO319                                              |
| CO345                                              | CO320                                              |
| CO355                                              | CO345                                              |
| CO360                                              | CO355                                              |
| CO362                                              | CO360                                              |
| CO481                                              | CO362                                              |
| CO485                                              | CO481                                              |
| CO493                                              | CO485                                              |
|                                                    | CO493                                              |
| Upper-level Electives by                           | Upper-level Electives by                           |
| Categories 6sh                                     | Categories 6sh                                     |
| Computer Architecture: CO410                       | Computer Architecture: CO410                       |
| Theory of Languages: CO419, CO420,<br>CO424, CO460 | Theory of Languages: CO419, CO420,<br>CO424, CO460 |
| Systems Programming: CO430, CO432                  | Systems Programming: CO430, CO432                  |
| Numerical Methods: CO450                           | Numerical Methods: CO450, <b>CO451</b>             |
| Artificial Intelligence: CO405                     | Artificial Intelligence: CO405                     |
| Data Base Management: CO441                        | Data Base Management: CO441, <b>CO444</b>          |

#### Bachelor of Science (Applied Computer Science Track)

|                                                    |                                                    |
|----------------------------------------------------|----------------------------------------------------|
| Controlled electives: Select 6sh                   | Controlled electives: Select 6sh                   |
| CO250                                              | <b>CO201</b>                                       |
| CO345                                              | CO250                                              |
| CO355                                              | CO345                                              |
| CO360                                              | CO355                                              |
| CO362                                              | CO360                                              |
| CO481                                              | CO362                                              |
| CO485                                              | CO481                                              |
|                                                    | CO485                                              |
| Upper Level Electives by                           | Upper Level Electives by                           |
| Categories: Select 3sh                             | Categories: Select 3sh                             |
| Computer Architecture: CO410                       | Computer Architecture: CO410                       |
| Theory of Languages: CO419, CO420,<br>CO424, CO460 | Theory of Languages: CO419, CO420,<br>CO424, CO460 |
| Systems Programming: CO430, CO432                  | Systems Programming: CO430, CO432                  |
| Numerical Methods: CO450                           | Numerical Methods: CO450, <b>CO451</b>             |
| Artificial Intelligence: CO405                     | Artificial Intelligence: CO405                     |
|                                                    | <b>Data Base Management: CO444</b>                 |

Complete a minor from one of the following areas: 6-18

- a) From any department in the College of Natural Sciences and Mathematics 6-18sh
- b) From designated Business courses 18sh
- c) From designated Economics courses 15sh
- d) From designated Geography courses 15sh

Complete a minor from one of the following areas: 6-18

- a) From any department in the College of Natural Sciences and Mathematics 6-18sh
- b) From designated Business courses 18sh
- c) From designated Economics courses 15sh
- d) From designated Geography courses 15sh
- e) ***From designated Communications Media courses 18sh***

Bachelor of Science (Languages and Systems Track)

Controlled electives: Select 9sh

CO250  
CO320  
CO345  
CO355  
CO360  
CO362  
CO405  
CO419  
CO424  
CO430  
CO441  
CO450  
CO460  
CO481  
CO485  
CO493

Controlled electives: Select 9sh

***CO201***  
CO250  
CO320  
CO345  
CO355  
CO360  
CO362  
CO405  
CO419  
CO424  
CO430  
CO441  
***CO444***  
CO450  
***CO451***  
CO460  
CO481  
CO485  
CO493

b. List of all associated course changes:

New Courses:

- CO 201      Internet and Multimedia
- CO 444      Productivity Tools & 4th Generation languages
- CO 451      Numerical Methods for Supercomputers

3. Rationale for changes

- a. Add a Communications Media minor to the list of minors approved for a B.S. in the Applied Computer Science track.

Rationale:

Over the past several years, the use of computers has dramatically increased in the field of Communications Media, both in terms of total computer applications and sophistication. The Communications Media department has consequently developed several courses that are useful and appropriate for Computer Science majors. Thus, it makes sense to have a Communications Media minor option for our majors. The minor will consist of 18 sh of courses chosen from the following list (including several computer oriented courses and several core Communications Media courses).

- CM 101      Communications Media in American Society
- CM 201      Internet and Multimedia
- CM 271      Beginning Photography
- CM 330      Communications Media in Training & Education<sup>1</sup>
- CM 335      Consulting Practices in Communications
- CM 435      Organizational Development in Communication Media
- CM 440      Communications Graphics
- CM 441      Advanced Communications Graphics

<sup>1</sup> Computer Science students would be exempted from the CM 303 prerequisite for this course.

The number of Computer Science students expected to take advantage of the Communications Media minor as a way of getting a B.S. degree is low (no more than 5 to 6 per year). The Communications Media department does not expect any adverse effects from the addition of these few students.

- b. Add CO 201, Internet and Multimedia, to the lists of Controlled Electives for each degree path.

Rationale:

CO 201 was passed by the Senate during Spring 1996. This course can be of benefit to Computer Science majors, as well as non-majors. Consequently, the catalog entry needs to be updated to include CO 201 as a controlled elective for each of the degree paths.

- c. Add CO 444, Productivity Tools & 4th Generation Languages, to the lists of Upper-level and Controlled Electives.

Rationale:

CO 444 represents an addition to the upper-level courses in the Database Management area. This change is to update the catalog entry to include CO 444 as an elective in the three degree paths. Additional rationale for the creation of the course are provided in the course proposal.

- d. Add CO 451, Numerical Methods for Supercomputers, to the lists of Upper-level and Controlled Electives.

Rationale:

CO 451 represents an addition to the upper-level courses in the Numerical Methods area. It is a course that is dual listed with MA 451. CO 451 has been in the catalog for some time. This change is meant to include it among the specifically listed courses to meet controlled elective and upper-level requirements for Computer Science majors.

### Part III. Implementation

1. Students already in the existing program and who have taken or will take any of the new courses will be allowed to count them in the designated categories toward their requirements for a degree. Students who are already taking courses toward a minor in Communications Media will be allowed to use that minor to qualify for a B.S. in the Applied track.
2. Affects on faculty teaching loads have already been addressed in the new course proposals. In general, sections of the new courses will be taught in lieu of an equivalent number of sections of CO 101 during the semesters in which they are offered.
3. Resources, as outlined in the course proposals, are adequate.

4. The net change should be very small, if there is any change at all in the number of students. Having the Communications Media minor available may appeal to a few students that were not already attracted to the program.

#### Part IV. Course Proposals

The course proposal for CO 444 is attached. CO 201 has already been approved by the senate (Spring 1996). CO 451 was approved by the senate several years ago.

#### Part V. Letters of Support

Copies of the letters of support for CO 444 and for the Communications Media Minor are attached.

September 17, 1996

Subject: Minor in Communications Media

To: Mr. James Wolfe  
Computer Science Department

From: Kurt P. Dudd, Chairperson  
Communications Media Department

This memo gives the Communications Media Department's support for the Communications Media minor as proposed by the Computer Science Department. The minor would include 18 credits chosen from the following courses:

- CM 101 Communications Media in American Society
- CM 201 Internet and Multimedia
- CM 271 Beginning Photography
- CM 330 Communications Media in Training & Education
- CM 335 Consulting Practices in Communications
- CM 435 Organizational Development in Communications Media
- CM 440 Communications Graphics
- CM 441 Advanced Communications Graphics
- CM 479 Electronic Imaging (in approval process)

Computer Science students that take CM 330 would be exempted the CM 303 Scriptwriting prerequisite.

The expected numbers of Computer Science majors that take this minor option are 5 - 6 per year. These numbers will not adversely affect the CM Department resources or course load.

KPD:mar