FINAL FACULTY SENATE APPROVAL ON APRIL 10, 2018

MEMORANDUM

TO: Faculty Senate

FROM: Jack Kirby

DATE: April 4, 2018

SUBJECT: Curriculum Proposal #17-18-26

Computer Science

I recommend approval of the attached Curriculum Proposal 17-18-26. The intent of this proposal is to redesign COMP 1101 – Applied Technical Programming, redesign COMP 1108 – Principles of Programming II to a 4-hour lab based course, and renumber COMP 1102 – Principles of Programming I.

Dr. Christina Lavorata
Dr. Donald Trisel
Dr. Mahmood Hossain
Mr. Michael Waide
Ms. Laura Ransom
Ms. Cheri Gonzalez
Ms. Lori Schoonmaker

FAIRMONT STATE UNIVERSITY

MEMORANDUM

TO: Curriculum Committee

FROM: Jack Kirby JRK

DATE: March 20, 2018

SUBJECT: Curriculum Proposal #17-18-26

Computer Science

I recommend approval of the attached Curriculum Proposal 17-18-26. The intent of this proposal is to redesign COMP 1101 – Applied Technical Programming, redesign COMP 1108 – Principles of Programming II to a 4-hour lab based course, and renumber COMP 1102 – Principles of Programming I.

Dr. Christina Lavorata
Dr. Donald Trisel
Dr. Mahmood Hossain
Mr. Michael Waide
Ms. Laura Ransom
Ms. Cheri Gonzalez

Proposal Number:	17-18-26
School/Department/Program:	Science and Technology / Computer Science and Math / Computer Science
Preparer/Contact Person:	Dr. Mahmood Hossain Associate Professor of Computer Science
Telephone Extension:	4967
Date Originally Submitted:	
Revision:	
Implementation Date Requested	Fall 2018

I PROPOSAL

The intent of this proposal is to redesign COMP 1101 - *Applied Technical Programming*, redesign COMP 1108 - *Principles of Programming II* to a 4-hour lab based course, and renumber COMP 1102 - *Principles of Programming I*.

II DESCRIPTION OF THE PROPOSAL

A. Deletion of courses/credits from program

Computer Science Option

COMP 1102 Principles of Programming I (3)
COMP 1108 Principles of Programming II (3)

Total hours deleted: 6

Computer Security Major Option

COMP 1102 Principles of Programming I (3)
COMP 1108 Principles of Programming II (3)

Total hours deleted: 6

B. Addition of courses/credits to program

Computer Science Option

COMP 1120 Principles of Programming I (3)
COMP 1130 Principles of Programming II (4)

Total hours deleted: 7

Computer Security Major Option

COMP 1120 Principles of Programming I (3)
COMP 1130 Principles of Programming II (4)

Total hours deleted: 7

C. Provision for interchangeable use of course(s) with program(s) Not Applicable

D. Revision of course content

COMP 1101 - *Applied Technical Programming* will be redesigned as COMP 1110 - *Introduction to Programming*. COMP 1108 - *Principles of Programming II* will be redesigned as a 4-hour course COMP 1130 - *Principles of Programming II*. (Appendix A)

E. Other changes to existing courses

COMP 1102 Principles of Programming I: The course will be renumbered as 1120 Principles of Programming I. (Appendix A)

F. Creation of new courses Not Applicable

G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).

Changing COMP 1108 to a 4-hour course will not affect the total 120 hours requirement for graduation, but it will readjust the major and free elective hours in the following ways (Appendix B):

Computer Science Option	Present Requirements	New Requirements
Major Area	71-74	72-75
General Studies	35-36	35-36
Free Electives	10-14	9-13
Total	120	120

Cybersecurity Option	Present Requirements	New Requirements
Major Area	71-73	72-74
General Studies	32-33	32-33
Free Electives	14-17	13-16
Total	120	120

The total hour requirements for a minor in Computer Science will also change to 19 hours from the current requirements of 18 hours (Appendix B).

III. RATIONALE FOR THE PROPOSAL

1. Quantitative Assessment:

Redesign of COMP 1101 Applied Technical Programming

This class has primarily been taught to Technology majors, for almost 15 years. Three programs (Mechanical, Electronics, and Graphics) currently require this class. The programming language, that has been used to teach introductory programming concepts in this class, is Visual Basic. Even though VB is Graphical User Interface (GUI) based and allows the students to design nice user interfaces, VB is primarily used for business applications development. The students often get bogged down in the syntax and jargon of the language, without learning too much about the problem-solving aspects of programming. One of the fastest growing languages these days is Python. High schools and even undergraduate programs (both for major and non-majors) are increasingly using Python. It is a versatile language, easy to learn, and can be used for simple problem solving, data analysis, game design, and so on. The redesigned course will cover introductory programming concepts using the Python programming language instead of Visual Basic.

Revision of COMP 1108 - Principles of Programming II

As part of the Title III grant, some courses with high DFW rates were identified in 2016. We received some assistance from the grant to redesign COMP 1108. One of the major areas of the redesign was to introduce a lab component for the course. Typically, most Computer Science departments throughout the country offer introductory programming courses with labs. At FSU, previously we did not have any labs with programming courses. Starting in Fall 2017, we started offering COMP 1108 with lab, but as a special topic course COMP 1199. We are offering it for the second time this Spring. Based on student feedback received so far, we believe there has been a positive impact to student success and learning. Weaker students have benefited the most from the collaborative learning environment because assistance and instruction are readily available to them every week in the lab. Coding in the labs every week provide consistency to their learning which is essential for developing programming skills. The lab activities have also helped reinforce lecture material and given the instructor immediate feedback on which concepts are difficult to grasp and require further explanation and demonstration. We believe this will help with the retention of Computer Science majors.

2. Qualitative Assessment: Not Applicable

IV. PROPOSAL AFFECTING OTHER COLLEGES/SCHOOLS.

Not Applicable

V. PROPOSAL AFFECTING GENERAL STUDIES.

Not Applicable

VI. ADDITIONAL COMMENTS.

Not Applicable

APPENDIX A

Redesigning COMP 1101 Applied Technical Programming

Current Description

COMP 1101 Applied Technical Programming 3 hrs. This course provides familiarity with hardware and software concepts and an introduction to the Visual BASIC programming language. Several short programming projects are assigned to provide the students with experience in program development. This course may not be substituted for either COMP 1100 or 1102. PR: MATH ACT score of 19 or MATH SAT score of 460 or MATH 1011 or MATH 1101 or MATH 1107.

Revised Description

COMP 1110 Introduction to Programming 3 hrs. This course provides an introduction to problem solving using a suitable high-level programming language (e.g., Python), with applications in engineering technology and science. Topics include basic hardware and software concepts, data types, input/output, control structures, and modularization. Several programming projects are assigned to provide the students with experience in program development. This course will not count towards the requirements for a Computer Science/Cybersecurity degree and may not be substituted for COMP 1102. Computer Science/Cybersecurity majors may take this course as a free elective if they do not meet the prerequisite for COMP 1102. PR: MATH ACT score of 19 or MATH SAT score of 500 or MATH 1400.

Revised course outline:

- Overview of Computers and Programming
    - Hardware and Software
    - Data Storage
    - How a Program Works
    - Program Development Life Cycle
- Structure of a Program
    - Basic Syntax
    - Reading Input from the Console
    - Displaying Output on the Console
    - Documenting code with Comments
- Variables and Arithmetic Operations
    - Data Types
    - Variables and Constants
    - Assignment
    - Arithmetic Operators
- Decision Structures
    - Relational and Logical Operators
    - Simple and Compound Conditions
    - Different Decision Structures
    - Nested Decision Structures
- Repetition Structures
    - Different Loop Structures
    - Applications of Loops
    - Nested Loops
- Functions
    - Defining and Calling a Function
    - Passing Arguments to Functions
    - Local and Global Variables
    - Modularizing a Program using Functions

APPENDIX A

Outcome	Direct Assessment	Satisfactory performance standard
Demonstrate competency in using different data types.	Quiz/Exam	A class average of 70% or more.
Demonstrate competency in performing I/O.	Quiz/Exam	A class average of 70% or more.
Use the appropriate decision structure in a given situation	Quiz/Exam	A class average of 70% or more.
Use the appropriate repetition structure in a given situation.	Quiz/Exam	A class average of 70% or more.
Solve a problem by decomposing it into modules.	Programming projects	A class average of 70% or more.
Analyze a given problem, and design and implement a solution.	Programming projects	A class average of 70% or more.

APPENDIX A

Renumbering COMP 1102 Principles of Programming I

Current Description

COMP 1102 Principles of Programming I 3 hrs. A study of the foundations of computer programming. Students are introduced to computer organization, data representation, the software development cycle, and programming concepts including data types, input/output, control structures, functions, and text file processing. Programming projects in C++ are assigned to provide students with experience in program development. PR: MATH ACT score of 21 or MATH SAT score of 500 or Compass score of 49 or MATH 1101.

Revised Description

COMP 1120 Principles of Programming I 3 hrs. A study of the foundations of computer programming. Students are introduced to computer organization, data representation, the software development cycle, and programming concepts including data types, input/output, control structures, functions, and text file processing. Programming projects in C++ are assigned to provide students with experience in program development. PR: MATH ACT score of 21 or MATH SAT score of 530 or MATH 1400 or MATH 1430 or a grade of C or better in COMP 1110.

APPENDIX A

Redesign of COMP 1108 Principles of Programming II

Current Description

COMP 1108 Principles of Programming II 3 hrs. This course is a continuation of COMP 1102 and covers arrays, searching/sorting, pointers, classes, recursion, and advanced file I/O. The concept of object oriented programming is introduced. Projects in C++ are assigned to provide students with experience implementing multi-part applications using these concepts. PR: A grade of C or better in COMP 1102.

Revised Description

COMP 1130 Principles of Programming II 4 hrs. This course is a continuation of COMP 1120 and covers arrays, searching/sorting, pointers, classes, recursion, and advanced file I/O. The concept of object oriented programming is introduced. Projects in C++ are assigned to provide students with experience implementing multi-part applications using these concepts. The course consists of three hours of lecture and three hours of lab per week. PR: A grade of C or better in COMP 1120.

Revised course outline:

- Review of C++
    - Data Types
    - Arithmetic Operators
    - Input/Output
    - Decision Structures
    - Loop Structures
    - Functions
- Arrays
    - Declaring and Initializing an Array
    - Operations on Arrays
    - Two-Dimensional Arrays
    - Arrays as Function Parameters
    - Searching
    - Sorting
- Pointers
    - Declaring, Initializing, and Dereferencing a Pointer
    - Operations on Pointers
    - Dynamic Memory Allocation
    - Memory Leaks and Dangling Pointers
    - Pointers as Function Parameters
- Classes
    - Object-Oriented Programming
    - Declaring a Class
    - Constructors and Destructors
    - Shallow Copy and Deep Copy
    - Operator Overloading
- Recursion
    - Base Case and General Case
    - Avoiding Infinite Recursion
    - Examples
- Advanced File I/O
    - Reading Data from a Binary File
    - Writing Data into a Binary File
    - Random Access Files

APPENDIX A

Outcome	Direct Assessment	Satisfactory performance standard
Store and process data using one-dimensional and two-dimensional arrays.	Programming Project	A class average of 70% or more.
Demonstrate how common searching and sorting algorithms work.	Quiz/Exam	A class average of 70% or more.
Use pointers for accessing and processing data.	Quiz/Exam	A class average of 70% or more.
Implement user-defined classes and manipulate instances of these classes.	Programming Project	A class average of 70% or more.
Demonstrate comprehension of recursive functions.	Quiz/Exam	A class average of 70% or more.
Read/write data using advanced file-processing techniques.	Quiz/Exam	A class average of 70% or more.

APPENDIX B

B.S. Degree in Computer Science
Modified Program

Required Major Courses		**HRS**
COMP 1100	Introduction to Computing	3
COMP 1120	Principles of Programming I	3
COMP 1130	Principles of Programming II	~~3~~4
COMP 2200	Object-Oriented Programming	3
COMP 2201	Machine Organization	3
COMP 2230	Network Programming	3
COMP 2270	Data Structures	3
COMP 3330	Analysis of Algorithms	3
COMP 3340	Operating Systems	3
COMP 3395	Ethical Issues in Computing	3
COMP 4400	Automata and Language Design	3
COMP 4410	Database Management	3
COMP 4440	Software Engineering	4
MATH 1561	Introduction to Mathematical Reasoning	3
MATH 2562	Introduction to Discrete Mathematics	3
MATH 2501	Calculus I	4
MATH 2502	Calculus II	4
Elective Major Courses (Any 3 from the following with at least one COMP and at least one MATH course)		
COMP 3300	Computer Graphics	3
COMP 3310	Artificial Intelligence	3
COMP 3380	Introduction to Cryptography	3
COMP 4420	Selected Advanced Topics	3
COMP 4450	Introduction to Data Mining	3
MATH 2510	Mathematical Logic	3
MATH 3503	Calculus III	4
MATH 3504	Differential Equations	3
MATH 3520	Linear Algebra	3
MATH 3540	Numerical Analysis	3
MATH 3550	Probability and Statistics	3
Elective Science Courses (Any 2 from the following)		
BIOL 1105	Biological Principles I	4
BIOL 1106	Biological Principles II	4
CHEM 1105	Chemical Principles	5
CHEM 2200	Foundational Biochemistry	4
PHYS 1101	Introduction to Physics I	4
PHYS 1102	Introduction to Physics II	4
PHYS 1105	Principles of Physics I	5
PHYS 1106	Principles of Physics II	5
TOTAL HOURS FOR MAJOR		**~~71-74~~72-75**

APPENDIX B

General Studies Courses	HRS
Attribute I – Critical Analysis ENGL 1102 or ENGL 1103 or Choice	3
Attribute 2 – Quantitative Literacy Met in Major requirements with MATH 2501	X
Attribute 3 – Written Communication ENGL 1101 or Choice	3
Attribute 4 – Teamwork COMM 2200 or Choice	3
Attribute 5 – Information Literacy ENGL 1102 or ENGL 1103 or Choice	X
Attribute 6 – Technology Literacy Any Course	3
Attribute 7 – Oral Communication COMM 2200 or Choice	X
Attribute 8 – Citizenship Any Course	3
Attribute 9 – Ethics Any Course	3
Attribute 10 – Health and Well-being Any Course	2-3
Attribute 11 – Interdisciplinary and Lifelong Learning Any Course	3
Attribute 12 – Fine Arts Any Course	3
Attribute 13 – Humanities Any Course	3
Attribute 14 – Social Sciences Any Course	3
Attribute 15 - Natural Sciences Met in Major requirements	X
Attribute 16 – Cultural Awareness and Human Dignity Any Course	3
TOTAL GENERAL STUDIES HOURS	**35-36**
TOTAL FREE ELECTIVES	**~~10-14~~9-13**
TOTAL HOURS	**120**

Note: In order to complete a a second major in Mathematics with 21-24 extra hours of required coursework or a minor in Mathematics with 3-7 extra hours of required coursework, a student should double dip on the general studies coursework as much as possible and use the free elective hours. They will be able to complete the requirements for an additional major or a minor within 121-124 hours.

APPENDIX B

B.S. Degree in Computer Science (Cybersecurity Concentration)
Modified Program

Required Major Courses		**HRS**
COMP 1100	Introduction to Computing	3
COMP 1120	Principles of Programming I	3
COMP 1130	Principles of Programming II	~~3~~4
COMP 2200	Object-Oriented Programming	3
COMP 2201	Machine Organization	3
COMP 2220	Fundamentals of Computer Security	3
COMP 2230	Network Programming	3
COMP 2270	Data Structures	3
COMP 3340	Operating Systems	3
COMP 3380	Introduction to Cryptography	3
COMP 3390	Network Security	4
COMP 4410	Database Management	3
COMP 4415	Vulnerability Assessment	4
COMP 4440	Software Engineering	4
COMP 4495	Cybersecurity Senior Project	3
BISM 2600	Introduction to Networking Administration	3
CRIM 2250	Cybercrime	3
MATH 1561	Introduction to Mathematical Reasoning	3
MATH 2562	Introduction to Discrete Mathematics	3
MATH 2501	Calculus I	4
Elective Major Course (Any 1 from the following)		
COMP 3310	Artificial Intelligence	3
COMP 3330	Analysis of Algorithms	3
COMP 4400	Automata Theory	3
COMP 4420	Selected Advanced Topics	3
COMP 4450	Introduction to Data Mining	3
MATH 2510	Mathematical Logic	3
MATH 2502	Calculus II	4
Elective Science Course (Any 1 from the following)		
BIOL 1105	Biological Principles I	4
BIOL 1106	Biological Principles II	4
CHEM 1105	Chemical Principles	5
PHYS 1101	Introduction to Physics I	4
PHYS 1105	Principles of Physics I	5
TOTAL HOURS FOR MAJOR		**~~71-73~~72-74**

APPENDIX B

General Studies Courses	HRS
Attribute I – Critical Analysis ENGL 1102 or ENGL 1103 or Choice	3
Attribute 2 – Quantitative Literacy Met in Major requirements with MATH 2501	X
Attribute 3 – Written Communication ENGL 1101 or Choice	3
Attribute 4 – Teamwork COMM 2200 or Choice	3
Attribute 5 – Information Literacy ENGL 1102 or ENGL 1103 or Choice	X
Attribute 6 – Technology Literacy Met in Major requirements with CRIM 2250	X
Attribute 7 – Oral Communication COMM 2200 or Choice	X
Attribute 8 – Citizenship Any Course	3
Attribute 9 – Ethics Any Course	3
Attribute 10 – Health and Well-being Any Course	2-3
Attribute 11 – Interdisciplinary and Lifelong Learning Any Course	3
Attribute 12 – Fine Arts Any Course	3
Attribute 13 – Humanities Any Course	3
Attribute 14 – Social Sciences Any Course	3
Attribute 15 - Natural Sciences Met in Major requirements	X
Attribute 16 – Cultural Awareness and Human Dignity Any Course	3
TOTAL GENERAL STUDIES HOURS	**32-33**
TOTAL FREE ELECTIVES	**~~14-17~~13-16**
TOTAL HOURS	**120**

Note: In order to complete a second major in Mathematics with 27-30 extra hours of required coursework or a minor in Mathematics with 10-14 extra hours of required coursework, a student should double dip on the general studies coursework as much as possible and use the free elective hours. They will be able to complete the requirements for an additional major or a minor within 121-124 hours.

APPENDIX B

Minor in Computer Science
Modified Program

Required Courses (10 Hours)			**HRS**
COMP	1120	Principles of Programming I	3
COMP	1130	Principles of Programming II	~~3~~4
COMP	2200	Object-Oriented Programming	3
Elective Courses (9 Hours)			
COMP	2201	Machine Organization	3
COMP	2220	Fundamentals of Computer Security	3
COMP	2230	Network Programming	3
COMP	2270	Data Structures	3
COMP	3300	Computer Graphics	3
COMP	3395	Ethical Issues in Computing	3
COMP	4440	Software Engineering	4
MATH	2562	Introduction to Discrete Mathematics	3
TOTAL HOURS			~~18~~19-20