COMPUTER SCIENCE INSTRUCTIONAL PROGRAM REVIEW

Part 1—Relevance

- **Catalog Description**
- **Courses**
- **Program Learning Outcomes**
- **Conditions of Enrollment**
- **Program Matrix**

Part 2—Appropriateness

- **Connection to College Mission**
- **Summary of Student Demand**
- **Summary of Student Performance Data**
- **Place of Program in Curriculum/Similar Programs**
- **Transfer**
- **Patterns of Course Scheduling**
- **Patterns of Course Staffing**
- **Methods of Delivery**
- **Teaching Methodologies**
- **Materials Fees**
- **Explanation of Employer Relationship *(CTE only)***
- **Advisory Committee *(CTE only)***

Part 5—Currency

- **Curriculum Currency**
- **Physical Resources Currency**
- **Technology Currency**
- **Current Cost of the Program to Students**
- **Marketing and Publication of Program Information**

Part 4—Achievement of Student Learning Outcomes

- **Summary of Achievement of Student Learning Outcomes**
- **Gaps Identified**

Part 5—Future Needs and Plans

- **Current Program Strengths**
- **Improvements Needed**
- **Three-Year Program Goals**
  - **Action Plan for Achieving Three-Year Goals**
- **Six-Year Program Goals**
  - **Action Plan for Achieving Six-Year Goals**

Part 6—Supporting Documentation

Section Level data by semester (5 years)
Course Offering data by section (5 years)
Student Demography by *subject* (annual over 5 years)
Awards (annual, over 5 years)
Others as appropriate, in consultation with the Institutional Researcher
Course-level Student Learning Outcome Reports for all courses within the program
Program-level Student Learning Outcome Reports for the program as a whole
Advisory Committee Meeting minutes *(CTE Only)*

COMPUTER SCIENCE INSTRUCTIONAL PROGRAM REVIEW

Part 1—Relevance

1. Catalog Description:

PROGRAM OF STUDY

CC Computer Science Associate In Science Degree Program

COMPUTER SCIENCE ASSOCIATE OF SCIENCE DEGREE is designed to prepare students for transfer to a four-year institution to continue studies in Computer Science or comparable programs. Upon completion of the degree, the student will be able to demonstrate an understanding of the fundamental mathematical and scientific principles underlying computing and information processing, apply knowledge of the principles of computer science to a variety of problems, and understand the fundamentals of computer organization, architecture and data structures.

Courses required for the Associate degree major at Cerro Coso Community College may not be the same as those required for the corresponding major at a four-year school. Consult a counselor and visit www.assist.org to identify the courses needed for the major at your transfer school and to develop a plan that will best meet your goals.

You must complete a minimum of 60 units, including the courses listed in the major and general education requirements, with an overall GPA of 2.0 or better, and a grade of "A," "B," "C," or "P" in all courses for the major. A minimum of 12 units must be completed at Cerro Coso Community College.

Your transfer institution may require some of the major courses to be taken for a grade. Please consult a counselor and www.assist.org to determine any limitations on Pass/No pass grading in major preparation courses.

This program prepares students for careers in Computer Science.

This program prepares students for transfer to four year institutions including CSUs and UCs.

Some courses within the major have a required prerequisite. If you feel you have equivalent knowledge and skills to those included in the prerequisite course through professional experience, licensure or certification, you have the opportunity to submit a Prerequisite Challenge to be reviewed by the Department Chair. For the Prerequisite Challenge to be considered, you must submit documentation/verification to substantiate the basis for the challenge. Please see a counselor for more information about the Prerequisite Challenge process.

Complete all of the following courses:
CSCI C252 Intro to Computer Science 3

CSCI C265 Introductory C++ Programming	3
or	
CSCI C267 Introduction to JAVA Programmi	3
MATH C151 Analytic Geometry and Calculus I	5
MATH C152 Analytic Geometry and Calculus II	5
MATH C251 Analytic Geometry and Calculus III	5
PHYS C111 Mechanics	5
PHYS C113 Electricity and Magnetism	5
Total:	31

Complete one of the following general education patterns:
A. Cerro Coso Local General Education Pattern
B. CSU General Education Breadth
C. IGETC—Intersegmental General Education Transfer Curriculum

Units Total: 29 **Total Units 60**

Analysis:

The Computer Science program is clearly described in the current catalog description. The catalog description convey's the program's objective of preparing students to transfer to a four year university. Student outcome expectations are accurately stated as "the student will be able to demonstrate an understanding of the fundamental mathematical and scientific principles underlying computing and information processing, apply knowledge of the principles of computer science to a variety of problems, and understand the fundamentals of computer organization, architecture and data structures." The catalog description does not include exaggerated or unsustainable statements. Many but not all of the classes will transfer and this is documented.

The goal is to make the program more relevent aligning with the California Transfer Model curriculum. This change will also be discussed in this document.

2. Courses:

The program consists of the following courses:

CSCI C252 Intro to Computer Science	3
CSCI C265 Introductory C++ Programming	3
or	
CSCI C267 Introduction to JAVA Programming	3
MATH C151 Analytic Geometry and Calculus I	5
MATH C152 Analytic Geometry and Calculus II	5
MATH C251 Analytic Geometry and Calculus III	5
PHYS C111 Mechanics	5
PHYS C113 Electricity and Magnetism	5

Analysis:

There is only one degree in this area and it has a direct relationship between student learning outcomes and the courses. A student who completes the required courses will be able to transfer to a four year university in the Computer Science area. All of the math and science courses will transfer to four year universities and most are required for the Computer Science degree. Calculus III is not always a requirement for a Computer Science four year degree. At this time only one computer class, either CSCI C252 or CSCI C265/C267, transfers to many colleges. This is discussed further in the document.

As outlined in the catalog description and shown in the program matrix, students have a clear path to achieving the student learning outcomes based on the courses required. Up until last year Cerro Coso did not have a full time Computer Science faculty. Therefore, some of these classes including the critical CSCI C252 Introduction to Computer Science, have not been offered consistantly over the last few years to allow for completion. In the existing program, core courses and electives are at a minimum for the transfer requirements. There may be some dilution in the creation of cohorts because of the CSCI C265 or CSCI C267 option. Since the CSCI C265 or CSCI C 267 is the only option it should not be an obstruction to completion.

With a new full time faculty in this area, the department was already looking at updating the program prior to the Transfer Model Curriculum (TCM) information becaming available. The department met and discussed the TMC and agreed that it was the best course of action to update the program to align with this new model.

In order to align with the Transfer Model Curriculum, there are several changes required. The Transfer Model Curriculum is based on the Association of Computing Machinery (ACM) recommended courses. The ACM is one of the standards bodies for Computer Science.

The proposed evolution of the program consists of the following courses:

CSCI C252 Intro to Computer Science	3
CSCI C254 Object Oriented Programming	3
CSCI C256 Discrete Structures	3
CSCI C258 Computer Organization and Architecture	3
MATH C151 Analytic Geometry and Calculus I	5
MATH C152 Analytic Geometry and Calculus II	5
PHYS C111 Mechanics	5
PHYS C113 Electricity and Magnetism	5

The first change to align with the TMC is to remove the existing Calculus III requirement. This change should make the degree more attainable to more students, which is one of our goals. Ultimately, the Transfer Model Curriculum adds only one unit to the degree even though there are two additional new Computer Science courses required.

We will be removing the two language specific courses, CSCI C265 and CSCI C267, because they are not required by the transfer model. These courses will still be relevant to the Computer

Information Systems A.S. degree at Cerro Coso. The TMC does not mandate a programming language and the courses will be written so that they can be taught with any current programming language.

The new model removes the option between classes and will start a cohort with a clear path from the beginning to the end with the assistance of a career pathway document for guidance.

3. Program Learning Outcomes

A . Demonstrate an understanding of the fundamental mathematical, statistical, and scientific principles underlying computing and information processing.
Assessment: This will be assessed through course examinations and scored with a rubric.
B . Apply knowledge of the principles of computer science to a variety of problems.
Assessment: This will be assessed through course examinations and scored with a rubric.
C . Understand the fundamentals of computer organization, architecture and data structures.
Assessment: This will be assessed through course examinations and scored with a rubric.
D . Discuss social computing issues.
Assessment: This will be assessed by examination and scored with a rubric.

Analysis

The existing Program Learning Outcomes (PLO's) currently capture many of the key knowledge and skills necessary to transfer in a realistic and measurable way. Most of the skills needed to transfer are found in the Math and Science courses. The only issue is that the current PLO's don't capture all lower division courses for Computer Science. Discrete structures, Computer Architecture and advanced data structures are common lower division skills that are not captured in the current PLO's. In this case, often students have to take lower division courses before they are able to continue with upper division courses. The existing artifacts for A and D are sufficient. The existing artifact fo PLO B and C are not appropriate for these outcomes as an examination doesn't demonstrate ability to program.

The Transfer Model Curriculum adds concepts in relation to computer architecture and data structures. This program will be better for students because they will have all of the lower division skills to transfer to upper division classes. The proposed PLO's are:

A. Demonstrate an ability to apply knowledge of computing and mathematics appropriate to the discipline.
B. Demonstrate an ability to analyze a problem, design, implement and evaluate an appropriate computer-based system, process, component or program to satisfy required specifications.
C. Understand the fundamentals of computer organization, architecture and data structures.
D. Discuss social computing issues

The proposed outcomes will be assessed through programming projects and exam questions as applicable.

4. Conditions of Enrollment

CSCI 101 Introduction to Computer Information Systems is the prerequisite for the courses required in the major. This is because it is discusses basics of computers and computer systems including hardware and software. The advisory for that class is CSCI C070, Reading Level 1 and Writing Level 1.

CSCI 252 Introduction to Computer Science has a prerequisite of CSCI C101 and Math C055. Math C055 Intermediate Algebra is required because they will know what equations are and function notation. Functions are concepts introduced in this class. Students must also be able to create algorithms which require some mathematical concepts.

CSCI 265 Introductory C++ Programming has a prerequisite of CSCI C101. This probably needs at least a Math C055 prerequisite much like the C252 course.

CSCI 267 Introduction to Java Programming has the prerequisites of CSCI C101 and Math C055.

The required Math Courses start at Math C151 Analytic Geometry and Calculus I with the prerequisites Math C141, Math C142. You must follow that with MATH C152 and MATH C251. These are Analytical Geometry and Calculus II and III.

There are two required Physics courses PHYS C111 Mechanics and PHYS C113 Electricity and Magnetism. They require at least concurrent enrollment in the Math courses.

Analysis:

The prerequisites identified above are desirable because they will prepare students to be more successful in the future classes. The Math and Physics prerequisites are required by the Math and Physics departments. At this time, the Computer Science prerequisites are self-imposed and not imposed by an external agency. We have not done a validation study to accomplish the continued use of the prerequisites.

The curriculum model from the ACM continues to enforce many of the same prerequisites that are required currently. For the CSCI C252 – Introduction to Computer Science the pre-requisites are CSCI C101 – Computer Fluency but no previous programming experience, writing Level 1, and Math C55. All of the other courses will require CSCI C252 as prerequisites and MATH C151 as a recommendation.

5. Program Matrix

	Program Learning Outcomes			
Courses	A	B	C	D
CSCI C252		X	X	X
CSCI 265		X	X	

CSCI 267		X	X	
MATH C151	X			
MATH C152	X			
MATH 251	X			
PHYS C111	X			
PHYS C113	X			

Analysis:

All of the courses complement each other because the Math and Physics concepts are used in the CSCI courses. CSCI C252 course introduces concepts that are built on in other programming classes. There is some overlap in the skills between CSCI C252 and CSCI 265 or 267. This is likely because of the transfer agreements. It also allows for review of the early concepts.

The Transfer Model Curriculum will still have strong coupling between courses. There will be even more complementing because the programming courses will build on each other instead of overlapping. These are the recommended prerequisites from the ACM.

The proposed matrix:

	Program Learning Outcomes			
Courses	A	B	C	D
CSCI C252		X	X	X
CSCI 254		X	X	X
CSCI 256			X	
CSCI 258	X	X		
MATH C151	X	X		
MATH C152	X	X		
PHYS C111	X			
PHYS C113	X			

Part 2—Appropriateness

1. Connection to College Mission

Department Mission: The Department of Business and Information Technology mission is to provide computer information systems, business office technology, paralegal studies, as well as business administration and computer science transfer preparation; vocational business and computer technology education; employment retraining and computer literacy skills. We support lifelong learning and participation in a technological world. We respond to the business training and information technology needs of the community and empower students with the skills they need to be successful in the modern business environment.

COMPUTER SCIENCE INSTRUCTIONAL PROGRAM REVIEW

The mission of the Computer Science Program at Cerro Coso Community College is to provide students with the skills to transfer to a four year university Computer Science program.

Analysis:

Computer Science fits into the Cerro Coso Community College Mission as a transfer program and is currently under the Department of Business and Information Technology.

By changing the program to match the Transfer Model Curriculum we are ensuring the program is of high quality and appropriate to an institution of higher learning. It is based on the ACM model for Junior Colleges. It will still have a transfer program mission.

2. Summary of Student Demand Data:

	Census Enroll	FTES	Retention	Success
2007-2008	21.0	2.0	85%	70%
2008-2009	60.0	9.9	74%	59%
2009-2010	29	5	86%	79%
2010-2011	12	2	58%	50%
2011-2012	32	6	79%	57%

Analysis:

Demand is less than 10 FTES with moderate success and retention rates. There don't seem to be any real trends over time. Some times numbers are up and then down and up again. The need appears to be low with plenty of capacity. Improving enrollment, FTES, retention and success are all needed. We are going to be working to build up this program through the new TMC and having a dedicated instructor. Demographically and diversity it does match the community and typical Computer Science programs. One area that we can improve on is women in Computer Science; this is an area typically lacking in CS programs. Many students are confused between Computer Information Systems and Computer Science and what each degree does. We can improve marketing in both areas by discussing how each is different.

With our new Computer Science instructor and the changes the Transfer Model Curriculum will bring more students who are interested in the degree. Because it is a transfer degree, it doesn't translate into a job after completing. This limits the number of students that are in the program. The classes have also not been offered consistently enough to encourage a cohort. The new TMC will represented in a two year career pathway document. The new program will be marketed by pointing out they can transfer; it will improve the number of students in the program.

3. Student Performance Data:

The overall student performance data can be found above. Below is the student performance data by course.

			Success Rate	
			Dist Ed	**Traditional**
CSCIC252	Intro to Computer Science	**2011-2012**		61.5%
		2008-2009	46.2%	
		Sum	46.2%	61.5%
CSCIC265	C++ Programming Language I	**2007-2008**	70.0%	
		Sum	70.0%	
	Introductory C++ Programming	**2011-2012**		52.6%
		2009-2010	79.3%	
		2008-2009	65.4%	
		Sum	72.7%	52.6%
CSCIC267	Introduction to JAVA Programmi	**2010-2011**	50.0%	
		Sum	50.0%	
	Java Programming	**2008-2009**	65.0%	
		Sum	65.0%	

Analysis:
The retention and success rates are around 70%. These results may have been impacted through a number of factors including the absence of a full time faculty in the Computer Science program. Many of the classes have only been offered once or twice in the last few years. The TMC will be offered in a 2 year pathway to completion. The delivery methods have been relatively consistent in facilitating student learning.

4. Place of Program in Curriculum/Similar Programs:

The Computer Science program is a technical transfer degree at Cerro Coso Community College. It is an option for students that want to remain in the area but still get the necessary skills for transferring. The program is similar to the Computer Information Systems program and there may be a split of students in these areas. The Computer Information Systems degree will transfer but is based on being a terminal degree with career skills to get a job. Computer Information Systems has significantly less math and programming requirements. They Computer Information Systems and the Computer Science program share a few courses. The CSCI C101 Introduction to Computer Information Systems is a prerequisite to the Computer Science courses. Currently the CSCI C265 Introduction to C++ and CSCI C267 Introduction to Java Programming are electives for the CIS degree and certificates.

Because the Computer Information Systems has less programming, the Computer Science degree fills the need for programming courses. Currently, those programming courses are language specific. With the Transfer Model Curriculum they will focus more on the skills a programmer

needs. These programming classes have been used by other degrees such as Physics and Engineering.

This program competes for students with the Engineering, Physics and Computer Information Systems degrees. It competes with Computer Information Systems because students that want to work with computers but are not interested in the higher level math go into the CIS degree. It competes with Engineering and Physics for students who are interested in the higher level degrees.

The Transfer Model Curriculum is still going to compete for students from the Math, Engineering, Physics and Computer Information Systems. Since, the degree will offer more classes that transfer it should help separate it from other programs.

5. Transfer Documentation:

Currently the Computer Science program is NOT a SB1440 TMC degree but the goal is to become one. All of the Math and Science courses transfer and are required by many institutions, but only one of the programming classes, either CSCI C252 or CSCI C265, transfer. In this case, we are requiring students to take courses that don't transfer. The course that does transfer, does not usually fulfill the lower-division courses for the degree. There are other skills like Discrete Structures and Computer Architecture that students will have to take before starting upper-division work. Depending on the program and which of the courses, they accept, students may see some repeat work. See the Attached documents from www.assist.org.

The TMC model will allow all of the courses will fulfill lower division requirements and they should not be repeated in Upper Division.

6. Patterns of Course Scheduling:

2007 - 2008 – C++
2008 - 2009 – Intro to Computer Science, C++, Java Programming
2009 – 2010 – C++
2010 – 2011 - Java Programming
2011 – 2012 – C++, Intro to Computer Science

The introductory course, CSCI C252 Intro to Computer Science, has only been offered twice in the last five years. With the exception of 2008-2009 year, only one course in the Computer Science degree was offered each year. This would make it almost impossible to complete the degree. Many of these courses have been offered online only. The courses that have been offered onsite have been offered in the evening. We are offering all three of the Computer Science courses this year 2012-2013 and will continue to offer all courses required for graduation between fall and spring semesters. At this time, the courses have been offered in the evening, but it is not limited to that time.

The scheduling until 2012 has been based on availability of appropriate faculty. With the hiring of a full time faculty, the department is now able to offer the courses more consistently and both

online and onsite. This allows a clear course to completion for students using a two way pathway.

The current pathway to completion is
1st semester Fall – CSCI 101, Math 151 - These course are prerequisites for the CSCI 252 course.
2nd semester Spring – CSCI 252, MATH 152, PHYS 111
3rd semester Fall – CSCI 265 or CSCI 267, MATH 251, PHYS 113
4th Semester Spring– General Education

The workload will be increased by 1 course per semester with the move to the Transfer Model Curriculum. The path to completion will be much clearer. Two courses can be offered each semester which would allow students to graduate in 2 years. The proposed sequence is as follows:

1st semester Fall – CSCI 101, Math 055 - These course are prerequisites for the CSCI 252 course.
2nd semester Spring – CSCI 252, MATH 151
3rd semester Fall – CSCI 254, 256, MATH 152, PHYS 111
4th Semester Spring– CSCI 258, PHYS 113

This is proposed because it gives students time to prepare for their courses as well as take what is needed. If a student is not prepared for the higher level math, this degree could take longer than 2 years to complete.

The target is the IWV on campus delivery program. In the future we may address the ability to offer the program online.

Courses are scheduled to run for 2 ½ hours two times a week.

7. Patterns of Course Staffing:

Previous to Spring 2012, all of the courses in the program have been taught by adjunct faculty. In Spring 2012 a full time faculty was hired. The department anticipates the courses in the proposed program to be taught in full by the fulltime faculty.

8. Methods of Delivery:

The programming courses have predominately been offered online. Two of the courses have been offered onsite in the last five years. The entire program cannot be offered online because the Physics classes are only offered on site. During the review period, many classes were only offered online because of the faculty available. The goal is to provide the current program onsite and not require any online courses.

The focus of the new curriculum will be onsite with direct teacher interaction. The reason for this is because at least one of the Physics classes is only offered onsite. Since the program cannot be completed online, the idea is to get a cohort onsite. There may be effective use of hybrid courses (online and onsite). There are no required courses that will be online. We may

move to more online courses in the future. Although the TMC is steering our direction at this time, the advisory committee will continue to play a critical role. We have met a regularly while developing the new curriculum.

9. Teaching Methodologies:

All of the courses in this program are 2 units lecture (36 hours) and 1 unit lab (54 hours). This allows students the opportunity to practice the skills taught in the classes. Programming can be very frustrating in that sometimes it can take one hour and the next assignment may take 40 hours. Having time to discuss these with the instructor can be very helpful. The instructors use interactive learning with hands-on projects and programming assignments along with lecture and textbook reading to convey information.

The courses will utilize industry standard and free software for program development. There is an effort to get more video for the courses, but there is very little which directly matches the textbooks which can cause confusion for some students as the vocabulary is different. The teaching methodologies are selected by the instructors but ideas are shared between faculty.

10. Materials Fees:

There are no materials fees required for this course. There is often software required but that software is available on the school machines and free versions if possible.

11. Explanation of Employer Relationship *(CTE only):*

There is no current employer relationship in place. The program is actively seeking employers for our Advisory Committee. It is difficult to place students because it is a transfer degree, though the coursework compliments many jobs in the local area. It would be great to find out how many students have transferred, but we have only had one documented completer. The reasons for this are discussed later in the document.

12. Advisory Committee *(CTE only):*

The committee meets once a semester. We are currently in a rebuilding phase for our advisory committee.

Computer Science/Computer Information Systems Advisory Group:

Attendees at IWV:

- John Bradley: Operations Lead
- Alan Van Nevel: Branch Head/Academic Coordinator
- Jonathan Bushnell: Cyber Security Lead and Branch Head, CC part time faculty
- Forrest Lloyd: Business Owner
- April Browne: CIS/CS faculty IWV

- John Dancy: Branch Head Systems Engineering, Navair
- Jason Hayes: Computer Scientist, Navair
- Rafaele Hill: System Administrator, Booze Allen Hamilton
- Steven Burns : Real Time Data Network Systems Administrator, L-3 Communications
- Christ Ricketts: Branch Head Software Division Navair

Analysis:

The advisory committee meets once a semester every semester. It has often been combined with the Business and Business Office Technology advisory groups. The committee is in a rebuilding stage and has not been a shaping force in the curriculum design but they have been consulted. As this is a rebuilding time for the advisory group, it does not adequately represent those who may hire the graduates but we are actively pursuing the appropriate representation. As it turns out, since this is a transfer program, the advisory committee is not absolutely required.

Part 3—Currency

1. Curriculum Currency:

The program was reviewed and changed in 2008. All of the courses are no more than 5 years old. They demonstrate an integrated outline with the student learning outcomes reflected in the topical outline and methods of evaluation. The course texts are all up to date. The process for program outcome modifications has been in response to an external stimuli such as program review and the TMC creation. As such the advisory committee has not played a large role.

With the hiring of a full time faculty, the department began the discussion of the program. The Transfer Model Curriculum for Computer Science had just been released. Our goal is to follow the Transfer Model Curriculum which is based on the ACM recommendations which are updated every few years since 2001. The goal is to review the program when new ACM recommendations come out. The Transfer Model Curriculum was a major discussion at the Fall 2012 advisory committee meeting.

2. Physical Resources Currency:

We currently use two facilities in the LRC building Room 709 and 631. These are both safe rooms and support the program. There are adequate computers with the software added that is requested. There is no need to update at this time. There are some changes coming down the line with Windows 8 but it shouldn't strongly affect the Computer Science program.

3. Technology Currency:

Software utilized by the courses include: Microsoft Office, Windows 7, Visual C++ express 2010, Eclipse Java IDE, Up to date JRE and JDK., Mozilla Firefox. We are hoping to stick with Windows 7 and Office 2010 for at least a few more years.

4. Current Cost of the Program to Students:

Tuition – $2520 (60 units at $42)
$1302 (31 units at $42) for just the program
Books (based on Spring 2013 and assuming new) – $1665.25 (program only)
Total – $4,185.25 Plus textbooks for General Education courses

New program
Tuition –$2520 (60 units at $42)
$1344 (32 units at $42) for just the program
Books (based on Spring 2013 and assuming new) – $1665.25 (program only)
Total – $4,185.25 Plus textbooks for General Education courses

5. Marketing and Publication of Program Information

The Computer Science program was presented to students at Preview day Fall 2012. The program information is marketed from what is presented in the catalog. This information is clear and accurate when describing the purpose, content, course requirements and expected learning outcomes. There could be more marketing distinguishing it from the Computer Information System program. The new changes would also help the program with marketing because it gives students better standing to transfer.

The Computer Science program was represented at the High School Preview day and the I'm Going to College event in the 2012-2013 school year. These are opportunities that should be continue to be pursued.

Part 4—Achievement of Student Learning Outcomes

1. Summary of Achievement of Course Learning Outcomes:

Students are a achieving the course learning outcomes for which learning outcomes have been assessed. None of the math courses and one of the computer course, CSCI C267, have not been assessed. One computer course, CSCI C265, assessement was incomplete. These need to be assessed as soon as possible.

Student Learning outcomes will be changing for the new TMC program. As soon as those courses are offered we will be doing SLO assessments.

2. Course Learning Gaps Identified:

All of the courses but CSCI 267 have been evaluated. CSCI 265 was incomplete and needs to be completed. It was offered last semester so that will be done. CSCI 267 will have the SLO's evaluated at the end of the Spring 2013 semester. The current course learning outcomes do not show any learning gaps.

The new TMC degree courses and programs will be evaluated after their first offering. This should help us identify learning gaps early in the program.

3. Summary of Achievement of Program Learning Outcomes:

A program assessment was completed in 2008. In 2008, one of the objectives wasn't reviewed. This was due to the courses not being offered. All other objectives had been met. There are no patterns to student achievement. Unfortunately, this does not explain the lack of student's completing the program.

4. Program Learning Gaps Identified:

There are no gaps identified by the Program Learning Outcome. There are gaps between the Transfer Model Curriculum and the current program. The hope is that the TMC will address these gaps. The new program will need to be evaluated after it is offered to identify and improve the program.

Part 5—Future Needs and Plans

1. Analysis of Current Program Strengths:

The current program has a great base of Math and Physics classes which are important to a good Computer Science program. All of the Math and Physics courses transferred as well as the general education that the students took. The hiring of a full time faculty is a strength to the program.

2. Analysis of Improvements Needed:

The main area that needs improvement is getting students to complete the program. There has only been one completer since 2007. There may be many reasons that students are not completing the program. One reason may be that the program hasn't been offered consistently or had faculty to advocate for it. These have been improved with the hiring of a full time faculty in Spring 2012. Another reason is that it may be easier to transfer without completing the degree program. Calculus III is difficult to get to if students do not come in ready to take Calculus courses. At most only one of the two computer courses transfers to most four year institutions. There are a number of skills that are missing in those that would better transfer to another institution. Theses courses include Computer Architecture, Discrete Structures and Data Structures programming. Without these courses, student's have to take a number of lower division courses before they are able to start their upper division work.

The Transfer Model Curriculum will address many of these issues. This program will address the minimal transferability by providing lower division classes that will all transfer. The TMC will also remove the Calculus 3 requirement also allowing more students to get the degree before transferring.

3. Three-Year Program Goals

Goal	Person Responsible	Resources Required	Plan
A. Create Transfer Model Curriculum and program.	Faculty and Department	No additional resources are needed.	Courses submitted to Curricunet Spring 2013 Once those courses are approved, submit the program.
B. Marketing to students	Faculty	CTE brochures and other marketing products available	This will be ongoing through the 3 years taking advantage of opportunities presented.
C. SLO assessments for TMC curriculum and program.	Faculty	None	To be completed each semester after the course is completed
D. Improve Advisory Committee	Faculty, Department Chair and Dean	Support inviting participants	Find at least 1 new participant each year.

4. Six-Year Program Goals

Goal	Person Responsible	Resources Required	Plan
A. Move to online courses	Faculty	None	Get the onsite courses solidified with good enrollment. Create the online courses in Moodle
B. TMC Program SLO's updates	Faculty	None	Update after running the program.
C. Increase success and retention	Faculty	None	Use the marketing and new program.

Conclusion

COMPUTER SCIENCE INSTRUCTIONAL PROGRAM REVIEW

Part 6—Supporting Documentation

The following data is to be supplied by the Office of Institutional Research

I. Section Level data by semester (5 years)

II.					Sections	Census Enrollmt	Actual FTES	FTEF	FTES/ FTEF	Retention Rate	Success Rate
CSCIC252	Intro to Computer Science	**2011 - 2012**	201230	IWV Main	1	13	2.3	0.3	6.8	84.6%	61.5%
			Annual Yr Sum		**1**	**13**	**2.3**	**0.3**	**6.8**	**84.6%**	**61.5%**
		2008 - 2009	200870	CC On-line	1	13	2.1	0.3	6.4	61.5%	46.2%
			Annual Yr Sum		**1**	**13**	**2.1**	**0.3**	**6.4**	**61.5%**	**46.2%**
CSCIC265	C++ Programming Language I	**2007 - 2008**	200770	CC On-line	1	21	2.0	0.2	9.8	85.0%	70.0%
			Annual Yr Sum		**1**	**21**	**2.0**	**0.2**	**9.8**	**85.0%**	**70.0%**
	Introductory C++ Programming	**2011 - 2012**	201170	IWV Main	1	19	3.2	0.3	9.7	73.7%	52.6%
			Annual Yr Sum		**1**	**19**	**3.2**	**0.3**	**9.7**	**73.7%**	**52.6%**
		2009 - 2010	201030	CC On-line	1	29	4.8	0.3	14.4	86.2%	79.3%
			Annual Yr Sum		**1**	**29**	**4.8**	**0.3**	**14.4**	**86.2%**	**79.3%**
		2008 - 2009	200930	CC On-line	1	26	4.3	0.3	12.9	84.6%	65.4%
			Annual Yr Sum		**1**	**26**	**4.3**	**0.3**	**12.9**	**84.6%**	**65.4%**
CSCIC267	Introduction to JAVA Programmi	**2010 - 2011**	201070	CC On-line	1	12	2.0	0.3	5.9	58.3%	50.0%
			Annual Yr Sum		**1**	**12**	**2.0**	**0.3**	**5.9**	**58.3%**	**50.0%**
	Java Programming	**2008 - 2009**	200870	CC On-line	1	21	3.5	0.3	10.4	75.0%	65.0%
			Annual Yr Sum		**1**	**21**	**3.5**	**0.3**	**10.4**	**75.0%**	**65.0%**
MATHC151	Anal. Geometry & Calculus I	**2009 - 2010**	200970	CC On-line	1	21	3.3	0.3	9.8	71.4%	52.4%
				ESCC Bishop	1	33	5.7	0.3	17.0	100.0%	100.0 %
				IWV Main	1	36	6.5	0.3	19.5	100.0%	77.8%
			Annual Yr Sum		**3**	**90**	**15.4**	**1.0**	**15.4**	**93.3%**	**80.0%**
		2008 - 2009	200870	ESCC Bishop	1	23	4.5	0.3	13.6	100.0%	92.6%
				IWV Main	1	47	8.5	0.3	25.4	89.6%	75.0%
			Annual Yr Sum		**2**	**70**	**13.0**	**0.7**	**19.5**	**93.3%**	**81.3%**
		2007 - 2008	200770	ESCC Bishop	1	38	5.9	0.3	17.6	100.0%	97.4%
				IWV Main	1	52	4.6	0.3	13.8	92.3%	73.1%
			Annual Yr Sum		**2**	**90**	**10.5**	**0.7**	**15.7**	**95.6%**	**83.3%**

	Analy Geometry & Calculus I	**2011 - 2012**	201170	CC On-line	1	38	5.9	0.3	17.7	71.1%	44.7%
				ESCC Bishop	1	25	4.3	0.3	12.9	100.0%	100.0 %
				IWV Main	1	36	6.3	0.3	18.8	72.2%	58.3%
			201150	CC On-line	1	40	6.2	0.3	18.6	80.0%	60.0%
			Annual Yr Sum		**4**	**139**	**22.7**	**1.3**	**17.0**	**79.1%**	**62.6%**
		2010 - 2011	201070	CC On-line	1	33	5.1	0.3	15.4	84.8%	63.6%
				ESCC Bishop	1	27	4.6	0.3	13.9	100.0%	100.0 %
				IWV Main	1	18	3.1	0.3	9.4	44.4%	27.8%
			201050	CC On-line	1	32	5.0	0.3	14.9	87.5%	59.4%
			Annual Yr Sum		**4**	**110**	**17.8**	**1.3**	**13.4**	**82.7%**	**65.5%**
MATHC152	Analy Geometry & Calculus II	**2011 - 2012**	201230	CC On-line	1	14	2.2	0.3	6.5	71.4%	64.3%
				ESCC Bishop	1	25	4.1	0.3	12.4	96.0%	96.0%
				IWV Main	1	17	3.0	0.3	8.9	82.4%	70.6%
			Annual Yr Sum		**3**	**56**	**9.3**	**1.0**	**9.3**	**85.7%**	**80.4%**
	Analytical Geometry & Calc II	**2011 - 2012**	201150	CC On-line	1	19	2.9	0.3	8.9	89.5%	73.7%
			Annual Yr Sum		**1**	**19**	**2.9**	**0.3**	**8.9**	**89.5%**	**73.7%**
		2010 - 2011	201130	CC On-line	1	25	3.9	0.3	11.6	92.0%	88.0%
				ESCC Bishop	1	27	4.5	0.3	13.5	96.3%	96.3%
				IWV Main	1	5	0.9	0.3	2.6	60.0%	60.0%
			201050	CC On-line	1	23	3.6	0.3	10.7	95.7%	73.9%
			Annual Yr Sum		**4**	**80**	**12.8**	**1.3**	**9.6**	**92.5%**	**85.0%**
		2009 - 2010	201030	CC On-line	1	11	1.7	0.3	5.1	90.9%	81.8%
				ESCC Bishop	1	28	4.8	0.3	14.4	96.4%	96.4%
				IWV Main	1	30	5.4	0.3	16.2	93.3%	83.3%
			Annual Yr Sum		**3**	**69**	**11.9**	**1.0**	**11.9**	**94.2%**	**88.4%**
		2008 - 2009	200930	ESCC Bishop	1	24	4.1	0.3	12.4	100.0%	100.0 %
				IWV Main	1	38	6.8	0.3	20.5	89.2%	75.7%
			Annual Yr Sum		**2**	**62**	**11.0**	**0.7**	**16.5**	**93.4%**	**85.2%**
		2007 - 2008	200830	ESCC Bishop	1	36	6.9	0.3	20.8	100.0%	97.3%
				IWV Main	1	27	4.9	0.3	14.6	84.0%	64.0%
			Annual Yr Sum		**2**	**63**	**11.8**	**0.7**	**17.7**	**93.5%**	**83.9%**
MATHC251	Anal. Geometry & Calculus III	**2008 - 2009**	200870	IWV Main	1	15	2.7	0.3	8.1	93.3%	80.0%
			Annual Yr Sum		**1**	**15**	**2.7**	**0.3**	**8.1**	**93.3%**	**80.0%**

		2007 - 2008	200770	IWV Main	1	8	1.4	0.3	4.3	75.0%	75.0%
		Annual Yr Sum			**1**	**8**	**1.4**	**0.3**	**4.3**	**75.0%**	**75.0%**
	Analy Geometry & Calculus III	**2011 - 2012**	201170	CC On-line	1	22	3.4	0.3	10.3	63.6%	36.4%
		Annual Yr Sum			**1**	**22**	**3.4**	**0.3**	**10.3**	**63.6%**	**36.4%**
		2010 - 2011	201070	CC On-line	1	15	2.3	0.3	7.0	93.3%	86.7%
				IWV Main	1	18	3.1	0.3	9.4	100.0%	88.9%
		Annual Yr Sum			**2**	**33**	**5.5**	**0.7**	**8.2**	**97.0%**	**87.9%**
		2009 - 2010	200970	IWV Main	1	21	3.8	0.3	11.4	95.2%	95.2%
		Annual Yr Sum			**1**	**21**	**3.8**	**0.3**	**11.4**	**95.2%**	**95.2%**

					Sections	Census Enrollmt	Actual FTES	FTEF	FTES/ FTEF	Retention Rate	Success Rate
PHYSC111	Mechanics	**2011 - 2012**	201230	IWV Main	1	19	5.3	0.5	10.0	89.5%	73.7%
		Annual Yr Sum			**1**	**19**	**5.3**	**0.5**	**10.0**	**89.5%**	**73.7%**
		2010 - 2011	201130	IWV Main	1	16	4.5	0.5	8.4	81.3%	75.0%
		Annual Yr Sum			**1**	**16**	**4.5**	**0.5**	**8.4**	**81.3%**	**75.0%**
		2009 - 2010	201030	IWV Main	1	21	5.9	0.5	11.0	76.2%	61.9%
		Annual Yr Sum			**1**	**21**	**5.9**	**0.5**	**11.0**	**76.2%**	**61.9%**
		2008 - 2009	200930	IWV Main	1	20	5.6	0.5	10.5	90.0%	90.0%
		Annual Yr Sum			**1**	**20**	**5.6**	**0.5**	**10.5**	**90.0%**	**90.0%**
		2007 - 2008	200830	IWV Main	1	20	5.6	0.5	10.5	89.5%	78.9%
		Annual Yr Sum			**1**	**20**	**5.6**	**0.5**	**10.5**	**89.5%**	**78.9%**
PHYSC113	Electricity and Magnetism	**2011 - 2012**	201170	IWV Main	1	11	3.1	0.5	5.8	100.0%	72.7%
		Annual Yr Sum			**1**	**11**	**3.1**	**0.5**	**5.8**	**100.0 %**	**72.7%**
		2010 - 2011	201070	IWV Main	1	10	2.7	0.5	5.1	90.0%	80.0%
		Annual Yr Sum			**1**	**10**	**2.7**	**0.5**	**5.1**	**90.0%**	**80.0%**
		2009 - 2010	200970	IWV Main	1	14	3.9	0.5	7.3	92.9%	92.9%
		Annual Yr Sum			**1**	**14**	**3.9**	**0.5**	**7.3**	**92.9%**	**92.9%**
		2008 -	200870	IWV Main	1	14	3.9	0.5	7.3	100.0%	78.6%

		2009									
			Annual Yr Sum		**1**	**14**	**3.9**	**0.5**	**7.3**	**100.0 %**	**78.6%**
		2007 - 2008	200770	IWV Main	1	12	3.4	0.5	6.3	90.9%	90.9%
			Annual Yr Sum		**1**	**12**	**3.4**	**0.5**	**6.3**	**90.9%**	**90.9%**

III. Course Offering data by section (5 years)

IV.					Sections	Census Enrollmt	Actual FTES	FTEF	FTES/ FTEF	Retention Rate	Success Rate
CSCIC252	Intro to Computer Science	**2011 - 2012**	201230	IWV Main	1	13	2.3	0.3	6.8	84.6%	61.5%
			Annual Yr Sum		**1**	**13**	**2.3**	**0.3**	**6.8**	**84.6%**	**61.5%**
		2008 - 2009	200870	CC On-line	1	13	2.1	0.3	6.4	61.5%	46.2%
			Annual Yr Sum		**1**	**13**	**2.1**	**0.3**	**6.4**	**61.5%**	**46.2%**
CSCIC265	C++ Programming Language I	**2007 - 2008**	200770	CC On-line	1	21	2.0	0.2	9.8	85.0%	70.0%
			Annual Yr Sum		**1**	**21**	**2.0**	**0.2**	**9.8**	**85.0%**	**70.0%**
	Introductory C++ Programming	**2011 - 2012**	201170	IWV Main	1	19	3.2	0.3	9.7	73.7%	52.6%
			Annual Yr Sum		**1**	**19**	**3.2**	**0.3**	**9.7**	**73.7%**	**52.6%**
		2009 - 2010	201030	CC On-line	1	29	4.8	0.3	14.4	86.2%	79.3%
			Annual Yr Sum		**1**	**29**	**4.8**	**0.3**	**14.4**	**86.2%**	**79.3%**
		2008 - 2009	200930	CC On-line	1	26	4.3	0.3	12.9	84.6%	65.4%
			Annual Yr Sum		**1**	**26**	**4.3**	**0.3**	**12.9**	**84.6%**	**65.4%**
CSCIC267	Introduction to JAVA Programmi	**2010 - 2011**	201070	CC On-line	1	12	2.0	0.3	5.9	58.3%	50.0%
			Annual Yr Sum		**1**	**12**	**2.0**	**0.3**	**5.9**	**58.3%**	**50.0%**
	Java Programming	**2008 - 2009**	200870	CC On-line	1	21	3.5	0.3	10.4	75.0%	65.0%
			Annual Yr Sum		**1**	**21**	**3.5**	**0.3**	**10.4**	**75.0%**	**65.0%**
MATHC151	Anal. Geometry & Calculus I	**2009 - 2010**	200970	CC On-line	1	21	3.3	0.3	9.8	71.4%	52.4%
				ESCC Bishop	1	33	5.7	0.3	17.0	100.0%	100.0 %
				IWV Main	1	36	6.5	0.3	19.5	100.0%	77.8%
			Annual Yr Sum		**3**	**90**	**15.4**	**1.0**	**15.4**	**93.3%**	**80.0%**
		2008 - 2009	200870	ESCC Bishop	1	23	4.5	0.3	13.6	100.0%	92.6%
				IWV Main	1	47	8.5	0.3	25.4	89.6%	75.0%
			Annual Yr Sum		**2**	**70**	**13.0**	**0.7**	**19.5**	**93.3%**	**81.3%**

		2007 - 2008	200770	ESCC Bishop	1	38	5.9	0.3	17.6	100.0%	97.4%
				IWV Main	1	52	4.6	0.3	13.8	92.3%	73.1%
			Annual Yr Sum		**2**	**90**	**10.5**	**0.7**	**15.7**	**95.6%**	**83.3%**
	Analy Geometry & Calculus I	**2011 - 2012**	201170	CC On-line	1	38	5.9	0.3	17.7	71.1%	44.7%
				ESCC Bishop	1	25	4.3	0.3	12.9	100.0%	100.0 %
				IWV Main	1	36	6.3	0.3	18.8	72.2%	58.3%
			201150	CC On-line	1	40	6.2	0.3	18.6	80.0%	60.0%
			Annual Yr Sum		**4**	**139**	**22.7**	**1.3**	**17.0**	**79.1%**	**62.6%**
		2010 - 2011	201070	CC On-line	1	33	5.1	0.3	15.4	84.8%	63.6%
				ESCC Bishop	1	27	4.6	0.3	13.9	100.0%	100.0 %
				IWV Main	1	18	3.1	0.3	9.4	44.4%	27.8%
			201050	CC On-line	1	32	5.0	0.3	14.9	87.5%	59.4%
			Annual Yr Sum		**4**	**110**	**17.8**	**1.3**	**13.4**	**82.7%**	**65.5%**
MATHC152	Analy Geometry & Calculus II	**2011 - 2012**	201230	CC On-line	1	14	2.2	0.3	6.5	71.4%	64.3%
				ESCC Bishop	1	25	4.1	0.3	12.4	96.0%	96.0%
				IWV Main	1	17	3.0	0.3	8.9	82.4%	70.6%
			Annual Yr Sum		**3**	**56**	**9.3**	**1.0**	**9.3**	**85.7%**	**80.4%**
	Analytical Geometry & Calc II	**2011 - 2012**	201150	CC On-line	1	19	2.9	0.3	8.9	89.5%	73.7%
			Annual Yr Sum		**1**	**19**	**2.9**	**0.3**	**8.9**	**89.5%**	**73.7%**
		2010 - 2011	201130	CC On-line	1	25	3.9	0.3	11.6	92.0%	88.0%
				ESCC Bishop	1	27	4.5	0.3	13.5	96.3%	96.3%
				IWV Main	1	5	0.9	0.3	2.6	60.0%	60.0%
			201050	CC On-line	1	23	3.6	0.3	10.7	95.7%	73.9%
			Annual Yr Sum		**4**	**80**	**12.8**	**1.3**	**9.6**	**92.5%**	**85.0%**
		2009 - 2010	201030	CC On-line	1	11	1.7	0.3	5.1	90.9%	81.8%
				ESCC Bishop	1	28	4.8	0.3	14.4	96.4%	96.4%
				IWV Main	1	30	5.4	0.3	16.2	93.3%	83.3%
			Annual Yr Sum		**3**	**69**	**11.9**	**1.0**	**11.9**	**94.2%**	**88.4%**
		2008 - 2009	200930	ESCC Bishop	1	24	4.1	0.3	12.4	100.0%	100.0 %
				IWV Main	1	38	6.8	0.3	20.5	89.2%	75.7%
			Annual Yr Sum		**2**	**62**	**11.0**	**0.7**	**16.5**	**93.4%**	**85.2%**
		2007 - 2008	200830	ESCC Bishop	1	36	6.9	0.3	20.8	100.0%	97.3%
				IWV Main	1	27	4.9	0.3	14.6	84.0%	64.0%
			Annual Yr Sum		**2**	**63**	**11.8**	**0.7**	**17.7**	**93.5%**	**83.9%**

MATHC251	Anal. Geometry & Calculus III	**2008 - 2009**	200870	IWV Main	1	15	2.7	0.3	8.1	93.3%	80.0%
			Annual Yr Sum		**1**	**15**	**2.7**	**0.3**	**8.1**	**93.3%**	**80.0%**
		2007 - 2008	200770	IWV Main	1	8	1.4	0.3	4.3	75.0%	75.0%
			Annual Yr Sum		**1**	**8**	**1.4**	**0.3**	**4.3**	**75.0%**	**75.0%**
	Analy Geometry & Calculus III	**2011 - 2012**	201170	CC On-line	1	22	3.4	0.3	10.3	63.6%	36.4%
			Annual Yr Sum		**1**	**22**	**3.4**	**0.3**	**10.3**	**63.6%**	**36.4%**
		2010 - 2011	201070	CC On-line	1	15	2.3	0.3	7.0	93.3%	86.7%
				IWV Main	1	18	3.1	0.3	9.4	100.0%	88.9%
			Annual Yr Sum		**2**	**33**	**5.5**	**0.7**	**8.2**	**97.0%**	**87.9%**
		2009 - 2010	200970	IWV Main	1	21	3.8	0.3	11.4	95.2%	95.2%
			Annual Yr Sum		**1**	**21**	**3.8**	**0.3**	**11.4**	**95.2%**	**95.2%**

					Sections	Census Enrollmt	Actual FTES	FTEF	FTES/ FTEF	Retention Rate	Success Rate
PHYSC111	Mechanics	**2011 - 2012**	201230	IWV Main	1	19	5.3	0.5	10.0	89.5%	73.7%
			Annual Yr Sum		**1**	**19**	**5.3**	**0.5**	**10.0**	**89.5%**	**73.7%**
		2010 - 2011	201130	IWV Main	1	16	4.5	0.5	8.4	81.3%	75.0%
			Annual Yr Sum		**1**	**16**	**4.5**	**0.5**	**8.4**	**81.3%**	**75.0%**
		2009 - 2010	201030	IWV Main	1	21	5.9	0.5	11.0	76.2%	61.9%
			Annual Yr Sum		**1**	**21**	**5.9**	**0.5**	**11.0**	**76.2%**	**61.9%**
		2008 - 2009	200930	IWV Main	1	20	5.6	0.5	10.5	90.0%	90.0%
			Annual Yr Sum		**1**	**20**	**5.6**	**0.5**	**10.5**	**90.0%**	**90.0%**
		2007 - 2008	200830	IWV Main	1	20	5.6	0.5	10.5	89.5%	78.9%
			Annual Yr Sum		**1**	**20**	**5.6**	**0.5**	**10.5**	**89.5%**	**78.9%**
PHYSC113	Electricity and Magnetism	**2011 - 2012**	201170	IWV Main	1	11	3.1	0.5	5.8	100.0%	72.7%
			Annual Yr Sum		**1**	**11**	**3.1**	**0.5**	**5.8**	**100.0 %**	**72.7%**
		2010 - 2011	201070	IWV Main	1	10	2.7	0.5	5.1	90.0%	80.0%
			Annual Yr Sum		**1**	**10**	**2.7**	**0.5**	**5.1**	**90.0%**	**80.0%**
		2009 -	200970	IWV Main	1	14	3.9	0.5	7.3	92.9%	92.9%

		2010									
			Annual Yr Sum		1	14	3.9	0.5	7.3	92.9%	92.9%
		2008 - 2009	200870	IWV Main	1	14	3.9	0.5	7.3	100.0%	78.6%
			Annual Yr Sum		1	14	3.9	0.5	7.3	100.0 %	78.6%
		2007 - 2008	200770	IWV Main	1	12	3.4	0.5	6.3	90.9%	90.9%
			Annual Yr Sum		1	12	3.4	0.5	6.3	90.9%	90.9%

V. Student Demography by *subject* (annual over 5 years)

CSCI Demographics

	2007-08		2008-09		2009-10		2010-11		2011-12	
	Students	%	Students	%	Students	%	Students	%	Students	%
African American	98	5%	113	5%	67	5%	79	6%	66	7%
American Indian	54	3%	99	4%	101	8%	92	7%	63	6%
Asian/ Filipino	80	4%	108	5%	59	4%	44	3%	45	4%
Hispanic/ Latino	242	13%	342	16%	205	15%	198	16%	177	18%
Pacific Islander	7	0%	14	1%	4	0%	2	0%	1	0%
Two or More Races	29	2%	55	2%	44	3%	48	4%	35	3%
Unknown	67	4%	75	3%	24	2%	9	1%	1	0%
White	1,233	68%	1,398	63%	831	62%	792	63%	617	61%
Sum	1,810	100%	2,204	100%	1,335	100%	1,264	100%	1,005	100%

CSCI

	2007-08		2008-09		2009-10		2010-11		2011-12	
	Students	%	Students	%	Students	%	Students	%	Students	%
17 or Younger	85	5%	113	5%	39	3%	26	2%	31	3%
18-19	160	9%	205	9%	59	4%	79	6%	39	4%
20 - 24	577	32%	743	34%	384	29%	362	29%	303	30%
25 - 29	213	12%	289	13%	218	16%	188	15%	154	15%
30 - 39	272	15%	346	16%	233	17%	239	19%	207	21%
40 - 49	259	14%	264	12%	218	16%	200	16%	140	14%
50 or Older	244	13%	243	11%	184	14%	169	13%	131	13%
Unknown			1	0%			1	0%		
Sum	1,810	100%	2,204	100%	1,335	100%	1,264	100%	1,005	100%

CSCI

	2007-08	2008-09	2009-10	2010-11	2011-12

	Students	%	Students	%	Students	%	Students	%	Students	%
Female	1,097	61%	1,311	59%	780	58%	700	55%	559	56%
Male	704	39%	880	40%	550	41%	561	44%	442	44%
Unk	9	0%	13	1%	5	0%	3	0%	4	0%

VI. Awards (annual, over 5 years)

			Awards by Academic Year
			2007-08
CC	Computer Technology	Associate in Science	1
		Sum	1
	College Sum		1
Grand Sum			1

VII. Others as appropriate, in consultation with the Institutional Researcher

The following data is to be supplied by the department:

I. Course-level SLO Reports for all courses within the program (from CurricUNET

CSCI 252 assessed Fall 2011:

A. Learning Outcome:

Target of Performance:

Learning Outcome: illustrate basic networking concepts.

Assessment Tool/Scoring Method: an exam

B. Assessment Plan:

Changes Made Since Last Assessment:

Assessment Plan: Midterm 1 specifically the following questions 1. (3 points) What do TCP and IP stand for, and what is the role of each protocol in transmitting and receiving information? 2. (3 points) What is the process a browser goes through to display a webpage?

C. Assessment Results:

Results: 10 of 10 students completed the assessment and 8 of 10 completing the outcome successfully met the outcome. I do not have the specific data for the questions. This is overall for the midterm. Midterm #1 Student 1 48.25 Student 2 41.00 Student 3 47.00 Student 4 34.00 Student 5 40.00 Student 6 36.50 Student 7 28.00 Student 8 41.25 Student 9 37.25 Student 10 44.00 Total Score 49 Passing Score 34.3 Total Passing 8 Total Students 10

D. Learning Outcome:

Target of Performance:

Learning Outcome: demonstrate an understanding of high-level programming languages through designing a basic application using an object-oriented programming language.

Assessment Tool/Scoring Method: a project, scored by rubric

E. Assessment Plan:

Changes Made Since Last Assessment:

Assessment Plan: Assignment #15 Convert from Decimal values to Binary, Octal and Hex.

F. Assessment Results:

Results: 9 of 10 students completed the assessment and 7 of 9 completing the outcome successfully met the outcome. #15: C++ #2 Student 1 20 Student 2 18 Student 3 17 Student 4 20 Student 5 6 Student 6 19 Student 7 20 Student 8 Student 9 20 Student 10 10 Total Score 20 Passing Score 14 Total Passing 7 Total Students 9

G. Learning Outcome:

Target of Performance:

Learning Outcome: analyze a computational problem through the use of simulation and modeling.

Assessment Tool/Scoring Method: an exam

H. Assessment Plan:

Changes Made Since Last Assessment:

Assessment Plan: Final Exam Question 1. (5 points) Write a function that takes the time an object has been falling and returns the height it was dropped at. Use the equation d = ½ (9.8)t^2. You don't need to use any math functions. t = time; d = distance. You do not need to use the function. a. (2 points) Identify one thing that is not taken into account with this model that are needed in the real world?

I. Assessment Results:

Results: 10 of 10 students completed the assessment and 5 of 10 completing the outcome successfully met the outcome. Most had a problem with the function. 2f 2a Student 1 1 2 Student 2 3 2 Student 3 1 2 Student 4 3 2 Student 5 1 1 Student 6 4 2 Student 7 0 2 Student 8 0 2 Student 9 5 2 Student 10 2 2 Total Score 3 2 Passing Score 2 1.4 Total Passing 5 9 Total Students 10 10

J. Learning Outcome:

Target of Performance: discuss social computing issues and the impact they have on making decisions about computers, inform

Learning Outcome: discuss social computing issues and the impact they have on making decisions about computers, information, and society.

Assessment Tool/Scoring Method: a paper, scored by rubric

K. Assessment Plan:

Changes Made Since Last Assessment:

Assessment Plan: Complete an essay on the social computing issues and their impacts on computers, information and society.

L. Assessment Results:

Results: 9 of 10 students completed the assessment and 9 of 9 completing the outcome successfully met the outcome.

M. Learning Outcome:

Target of Performance:

Learning Outcome: explain algorithmic problem solving methods, attributes of algorithms, and analysis of algorithms.

Assessment Tool/Scoring Method: a project, scored by rubric

N. Assessment Plan:

Changes Made Since Last Assessment:

Assessment Plan: Assignment #4 on different algorithms.

O. Assessment Results:

Results: 6 of 10 students completed the assessment and 5 of 6 completing the outcome successfully met the outcome. #4: Algorithms Student 1 9 Student 2 15 Student 3 14 Student 4 Student 5 Student 6 15 Student 7 14 Student 8 Student 9 Student 10 14.5 Total Score 15 Passing Score 10.5 Total Passing 5 Total Students 6

CSCI 265 assessed Fall 2011:

P. Learning Outcome:

Target of Performance: Define and apply the fundamentals, structure, logic and syntax of C++ programming.

Learning Outcome: Define and apply the fundamentals, structure, logic and syntax of C++ programming. Assessment of Outcome: This will be assessed through creation of a basic C++ program, as evaluated by a rubric.

Assessment Tool/Scoring Method: Other()

Q. Assessment Plan:

Changes Made Since Last Assessment:

Assessment Plan: create an array and fill it with numbers 1 - 100 use the swap function to order the array smallest to largest. outer loop inner loop compare and swap use a function to traverse and output the array Assignment 6

R. Assessment Results:

Results: 10 of 13 students completed the assessment and 10 of 10 completing the outcome successfully met the outcome. Student 1 13.5 Student 2 Student 3 14 Student 4 15 Student 5 14

Student 6 12 Student 7 15 Student 8 15 Student 9 13 Student 10 15 Student 11 15 Student 12 15 Student 13 15 Total 15 Passing Score 10.5 Total Passing 10 Total Students 10

Math C151 has not been assessed

This course needs to be assessed.

Math C152 has not been assessed

This course needs to be assessed.

Math C251 has not been assessed

This course needs to be assessed.

PHYS C113 assessed Fall 2012

Target of Performance: 75% of students completing successfully

Learning Outcome: Demonstrate an understanding of the nature of electricity and magnetism, including electric and magnetic fields, charge, current and potential.

Assessment Plan: Determine electric potential of a current carrying wire. Determine the magnetic field using the Biot-Savart Law.

Results: 71% of students solved the problem correctly or made minor mathematical errors.

Analysis and Plan for Improvement and Reassessment: 75% was arbitrarily chosen, 71% is within an acceptable range. Analyze with respect to continuing present advisory/prerequisite for the course; especially with respect to reading, writing and math prerequisites/advisories. Reassess during next cycle.

Target of Performance: 75% of students completing successfully

Learning Outcome: Demonstrate an understanding of the laws of induction, Ampere's law, Ohm's law and Kirchhoff's laws, and apply these laws to solve problems.

Assessment Plan: Solve for the current and potential in an electrical circuit. Give physical explanations as to why a magnet drops slowly through a copper pipe.

Results: 73% of students demonstrated the ability to use the "loop rule" and solve for the relevant variables, as well as describe the induced currents in the copper pipe and the associated Lorentz force.

Analysis and Plan for Improvement and Reassessment: 75% was chosen arbitrarily, 73% is within the necessary range. Analyze with respect to continuing present advisory/prerequisite for the course; especially with respect to reading, writing and math prerequisites/advisories. Reassess during next cycle.

Target of Performance: 75% of students completing successfully

Learning Outcome: Demonstrate an understanding of Maxwell's equations, electromagnetic waves transmission lines, and RLC circuits, and apply these equations to solve problems.

Assessment Plan: Determine the resonance frequency of a simple RLC circuit representing an FM radio.

Results: More than 78% of student demonstrated an understanding of time varying phenomenon. Extra time was spent in lectures addressing this topic.

Analysis and Plan for Improvement and Reassessment: Reassess during next cycle.

Target of Performance: 75% of students completing successfully

Learning Outcome: Apply the laws of physics relating to electricity and magnetism to laboratory experiments.

Assessment Tool/Scoring Method: a lab report, scored by rubric

Assessment Plan: Set up a Helmholtz coil experiment. Using a Hall probe, measure the corresponding magnetic field. Scored with a rubric from the appropriate professional society guidelines.

Results: 100% of all students safely performed the experiments. More than 70% of students measured the expected spatial dependence of the magnetic field for this experiment.

Analysis and Plan for Improvement and Reassessment: Continue to monitor professional society and transfer institution guidelines. Reassess during next cycle.

Target of Performance: 75% of students completing successfully

Learning Outcome: Use critical thinking and an understanding of the relevant laws of physics to interpret the results from laboratory experiments.

Assessment Tool/Scoring Method: an exam, scored by rubric

Assessment Plan: Write a concise report describing the physics of a time varying RC circuit. Analyze sources of uncertainty in the measurements and describe deviations from textbook results. Scored with a rubric based on the appropriate professional society guidelines.

Results: 100% of all students safely performed the experiments. More than 77% of students accurately identified parts of the experiment that could result in variations from ideal behavior. Students properly discussed the experiment within the framework of the Coulomb force law and energy conservation.

Analysis and Plan for Improvement and Reassessment: Continue to monitor professional society and transfer institution guidelines. Determine if redundant with D. Reassess during next cycle.

PHYS C113 assessed Fall 2012

Target of Performance: 75% of students completing successfully

Learning Outcome: Demonstrate an understanding of and solve equations about the laws governing wave motion, thermodynamics, and optics

Assessment Tool/Scoring Method: an exam

Assessment Plan: A quiz was given at the end of the semester after the final exam to access the basic understanding of the definitions and the application of the Scientific method and were able to distinguish facts from pseudoscience.

Results: Over 75% of students demonstrated basic understanding of the definitions and the application of the Scientific method and were able to distinguish facts from pseudoscience.

Analysis and Plan for Improvement and Reassessment: Reassess during next cycle.

Target of Performance: 75% of students completing successfully

Learning Outcome: Demonstrate an understanding of and solve equations involving wave motion in elastic media, free space, heat transfer, kinetic theory, statistical mechanics, and optics.

Assessment Tool/Scoring Method: an exam

Assessment Plan: Solve problems Simple Harmonic Oscillator, simple and physical pendulum, wave motion, geometrical and physical optics, polarization and nature of light.

Results: About 75% solved the problems In SHO and wave motion, basic geometrical optics, interference, diffraction, and polarization With minor mathematical errors.

Analysis and Plan for Improvement and Reassessment: All students had very adequate math background (Calc I, II, III, and were taking ODE during the same semester) Reassess during next cycle.

Target of Performance: 75% of students completing successfully

Learning Outcome: Demonstrate an understanding of an understanding of the wave nature of matter, atomic physics, conduction in solids and nuclear physics.

Assessment Tool/Scoring Method: an exam

Assessment Plan: Solve problems in time dilation, length contraction, mass increase, and calculation of total and rest mass energies in a relativistic sense. Work problems in wave-particle duality, Heisenberg uncertainty principle, atomic physics, diffraction in crystals, and semiconductors physics. Write and balance nuclear equations, radioactive decay, calculate binding energy and released energy in nuclear reactions, fission and fusion. Conservation of energy, charge, lepton #, baryon #, strangeness in particle production and decay equations. Basic understanding of the Standard model (quarks, leptons, and force bosons).

Results: About 75% 0f the students were able solve problems relating to special relativity, quantum physics, and atomic and nuclear physics. Some students had difficulty with the basic

concepts of quantum physics but that was due not putting enough effort in reading the book and the supplemental material that was handed to them.

Analysis and Plan for Improvement and Reassessment: Students were very enthusiastic about learning modern and quantum physics. Lack of enough lab demo experiments made it a little harder. Relied on Video demos via internet (youtube have almost all the quantum physics dmos And animation one might need). In every lecture I kept 10-15 minutes for video demos. Reassess during next cycle.

Target of Performance: 75% of students completing successfully

Learning Outcome: Demonstrate an understanding of and apply and analyze the laws of physics relating to wave motion, thermodynamics, optics, atomic physics, quantum physics and modern physics to laboratory experiments.

Assessment Tool/Scoring Method: a lab report, scored by rubric

Assessment Plan: Describe basic concept by equations, translate the concept to experimental setup and apply the proper techniques to conduct measurements. Assessed with a rubric based on the appropriate professional society guidelines.

Results: 80% percent of the students were able grasp the basic concept and were able to translate it to experimental setup. Some students lacked the knowledge of how to use an oscilloscope. This resulted in adding an extra lab on the techniques of using the oscilloscope in measuring waveform parameters.

Analysis and Plan for Improvement and Reassessment: Lots of handouts, I used about 200 pages of handouts to give them more examples and problems. Used MathCAD extensively to hand topics and application notes such as Space Sail ship, CERN and Fermi lab accelerator design examples, Fission and Fusion energy, cooling of radioactive decay products to prevent meltdown (Japan nuclear disaster example), and basic examples of writing and balancing Particle physics equations. Reassess during next cycle.

Target of Performance:

Learning Outcome: Use critical thinking and an understanding of the relevant laws of physics to interpret the results from laboratory experiments.

Assessment Tool/Scoring Method:

Assessment Plan: Conduct data analysis, hypothesis testing and arrive to correct conclusions. Experimental techniques covered pendulum experiments to measure g, geometrical ray tracing to measure focal lengths of mirrors and lenses, interference and diffraction methods to measure wavelengths, photoelectric effect to measure h/e and charged particle motion in electric and magnetic field to measure e/m. Assessed with a rubric based on the appropriate professional society guidelines.

Results: 80% of the students have demonstrated the ability to perform experimental measurements and perform statistical analysis on the data. Based on lab report format and sample

lab report that was given to them at the beginning of the semester, all of them presented their results appropriately.

Analysis and Plan for Improvement and Reassessment: Reassess during next cycle.

II. Program level SLO Reports for the program as a whole (from CurricUNET

Outcome and Assessment Definitions					Assessment and Data Collection		
	Condition of Outcome	**Target Level of Performance**	**Learning Outcome**	**Assessment Tool/Scoring Method**	**Detailed Description of Assessment Plan**	**Results**	**Plan for Improvem and Reassessm**
A.	Upon successful completion of the program,	75%	demonstrate an understanding of the fundamental mathematical, statistical, and scientific principles underlying computing and information processing.	This will be assessed through course examinations.	Description: Identify final exam questions in PHYS C112 and PHYS C113 and tabulate the results. Timeline: Assess Spring 09 classes. Sample: Collect samples from all instructors in all delivery modes. Pending Tasks: • Identify or create exam questions. • Create a rubric to identify items of proficiency. • Identify the assessors. • Conduct the assessment. • Karen is working with John	11 out of 14 people met this outcome in Fall 08.	As there is 78% succes rate for this there is no specific act required at time.

					Stenger Smith on this one.		
B.	Upon successful completion of the program,	75%	apply knowledge of the principles of computer science to a variety of problems.	This will be assessed through course examinations.	Description: Identify final exam questions in CSCI C252 and tabulate the results. Timeline: Assess Fall 08 classes. Sample: Collect samples from all instructors in all delivery modes. These details are researched and reported by Debby Kurti.	CSCI 252: test I part 1: #1, #2 CSCI 252: test II part 1: #6, #7, #10 5 of 7 students successfully completed questions with a score of 75% or better.	Results met targeted lev of performanc
C.	Upon successful completion of the program,	70%	understand the fundamentals of computer organization, architecture and data structures	This will be assessed through course examinations.	Description: Identify final exam questions in CSCI C267 and tabulate the results. Timeline: Assess Spring 09 classes. (May use Fall 08 where course results/data is available) Sample: Collect samples from all instructors in all delivery modes. Pending Tasks: • Identify or create exam questions. • Identify the assessors. (Matt Hightower or Joanne LaRue or	Data from last offering of course (Fall 08) is not available.	Data will be collected or the next offering of t class

					Debby Kurti may be assessors.) • Conduct the assessment.		
D.	Upon successful completion of the program,	80%	discuss social computing issues.	This will be assessed by examination and scored with a rubric.	Description: Identify final exam questions in CSCI C252 and tabulate the results. Question: In addition to the examples listed in this chapter, describe two other aspects of society that have been greatly impacted by computer technology. Within these areas, what specific activities or jobs were most affected? On the whole, has the impact been positive or negative? Justify your answers. These details are researched and reported by Debby Kurti.	5 of 7 students successfully completed essay with a score of 80% or higher.	Results met targeted lev of performanc

III. Advisory Committee Meeting minutes *(CTE Only)*

Business and Information Technology
Advisory Committee Meeting
Meeting Date November 30, 2012
Meeting Location IWV Room 722
Bishop ITV room

COMPUTER SCIENCE INSTRUCTIONAL PROGRAM REVIEW

Meeting time 12:00-2:00

Minutes

I. Attendees:

Business Office Technology group:

Present at IWV:

- Michelle Lemke HR Administrator Ridgecrest Regional Hospital michelle.lemke@rrh.org
- Patricia Keith, BSOT student
- Jan Moline, Counseling chair

Present at Bishop:

- Gina Jones OVCDC
- Joanie Hanson OVCDC
- Karen O'Connor BSOT Faculty and chair

Absent:

- Carter Pope, HR Alta One (Also for Business and CIS)
- Patricia Gresham, Navy patrica.gresham@navy.mil
- Nicole Osborne: Executive Office Manager, China Lake Nicole.osborne@navy.mil
- S Kennedy, Sierra Sands School District
- Margaret Porter
- Sean Callahan: Jacobs Industries (Also for Business, CIS, and DMA)

Digital Media Arts Group:

Present at IVW:

- Jim Fallgatter: Business Owner and Entrepreneurs group, iPad App developer (also BSAD)
- Forrest Lloyd: Business Owner and Retired Lab Administrator (also BSAD)
- Cherie Plett: eMarketing Specialist Alta One
- Richard Swift: Graphic artist
- Suzie Ama: DMA faculty
- Lisa Darty: DMA Faculty
- Elaine Rudis-Jackson DMA part time faculty

Present in Bishop:

- Vickie Taton: DMA part time faculty

Absent:

- Rich Christensen: Recruiter and Training Coordinator, Jacobs Industries
- Ronald Rodriguez: Head, Visual Communications
  Office ronaldrodriguez@navy.mil
- Abigail Gardner: Abigail.gardner@ndti.net
- Julia Stepro: Stepro Web Design juliastepro@yahoo.com

Business Group

Attendees at IWV:

- Barbara D. Agerton CPA barb@agertoncpa.com (also for BSOT)
- Merrie Giles NAWCWC Comptroller merrie.giles@navy.mil (also for BSOT)
- Russ Mathewson, Sole Proprietor
- Jim Fallgatter: Business Owner and Entrepreneurs group, iPad App developer (also DMA)
- Forrest Lloyd: Business Owner and Retired Lab Administrator (also DMA)
- Frank Timpone: Business Faculty IWV
- Anthony Damiano: BSAD and PARA part time faculty IWV and online

Attendees at Bishop:

- Randy Broderick: Mammoth Mountain
- Sophie Kenn: School District
- Billy G: Business Owner, Pupfish Design
- Bishop Chamber of Commerce
- Matt Hightower, Business Faculty ESCC
- rboccia@mammothusd.org
- Veronica Daugherty: Bishop High School
- Billy Gogesch:
- DeeAnn Chiatovich:

Absent:

- Swift@iwvisp.com

- Lois Johnson: Chief Financial Officer Ridgecrest Regional Hospital
- Ronald Rodriguez: Head, Visual Communications
  Office ronaldrodriguez@navy.mil
- Laura Hickle: Sierra Sands

Computer Science/Computer Information Systems Group:

Attendees at IWV:

- John Bradley: Operations Lead johnbradley@navy.mil
- Alan Van Nevel: Branch Head/Academic Coordinator alan.vannevel@navy.mil
- Jonathan Bushnell: Cyber Security Lead and Branch Head, CC part time faculty
- Forrest Lloyd: Business Owner
- April Browne: CIS/CS faculty IWV

Absent:

- John Dancy: Branch Head Systems Engineering, Navair
- Jason Hayes: Computer Scientist, Navair
- Rafaele Hill: System Administrator, Booze Allen Hamilton
- Steven Burns : Real Time Data Network Systems Administrator, L-3 Communications
- Christ Ricketts: Branch Head Software Division Navair

II. Meeting Overview: This was led by department chair, Karen O'Connor. Discussion followed in the following areas as orientation to assist small group breakouts.
   a. Program areas: Career Pathways for Degrees and Certificates
   b. Course Outlines of Record: What they are and why we need to review.
   c. Outcomes Assessments:
   d. Program Reviews (2 and 6 year)

III. Matt Hightower led a discussion on Employable Graduates/ Internships and job shadowing/job placements and tracking.

IV. Breakouts for Program Areas: *Discussion followed on the following general topics:* 30 minutes
   a. The breakout session for Business discussed the following topics:
      i. Quarters System vs. Semester – The business community was unclear about the difference between the course content in both systems. I explained that the course content for both formats is the same. The only

difference is that each student only takes 12 quarter hours (3 courses) per quarter compared to 15 semester hours (5 courses) per semester.

ii. Internship Program – The business community agreed that an active internship program is very valuable for the student as well as for the employer. Two employers, one from the Base and the other from a CPA firm, are willing to partner with the college in hiring student interns. Frank Timpone has some students that would be interested in such a program.

iii. Ethics – The group agreed that business ethics is a vital part of the curriculum. Frank explained that many of our courses include chapters in ethics. Frank explained that Cerro Coso is committed to promoting ethical and sound business practices in all of our courses. The group was encouraged with our leadership role in this area.

iv. Financial Analysis – The group wants to see the college place significant emphasis on financial analysis. This is important because it demonstrates an understanding of the interrelationships of the accounting concepts, principles and practices. One member of the group mentioned that some of her employees do not have a thorough understanding of the entire accounting cycle and the formulation of the financial statements. Frank explained that he spends several class periods demonstrating the use of Ratio, Vertical, Horizontal and Common-size Analysis, along with real-world examples and hands-on exercises.

v. Diversity – We discussed the impact and emphasis of actively managing diversity in the workplace. Frank explained that we have a course that addresses this, and, it is incorporated in many of our other courses. The participants from the Base were very concerned that this be an area that we teach throughout our programs.

vi. Alumni Association – One member asked if Cero Coso has an active Alumni Association. She cited that their active participation with the college could aid in determining the number of students that complete our programs.

vii. Grooming – The group agreed that academic and practical understanding of the content of our courses is only part of the necessary requirements for a potential employee. Being well groomed and dressed is also very vital. Visible Tattoos, piercings, multi-colored hair and inappropriate attire is not tolerated in most businesses. An employee is a reflection of the organization that it represents, and therefore, must reflect the desired image of the business. The group suggests that we explain to the students that successful employability relies on acceptable grooming.

viii. Written and verbal communication – The group strongly suggest that we emphasize the use of proper written and verbal communication skills.

Frank explained that all of our classes, even the quantitative courses, require the students to use these skills in all of their exercises, assignments, exams and presentations.

b. The Computer Science Area discussed the following:
   i. The group was presented with the current CIS program. It was brought up that a Systems Engineering course would be beneficial. It would address the issue of students being able to take the skills they have learned in all of the classes and use them to solve problems.
   ii. CS program: Presented the current CS program and the Transfer Model Curriculum. Discussed how the TMC would allow students to transfer at the junior level. Discussed how it would change the current program. Talked about how it was modeled on the ACM program
   iii. Internship: Jonathon sends recommendations for IT to his boss.

c. The Digital Media Arts area discussed the following:

   i. Suzie Ama distributed outlines of the recently restructured Web Fundamentals Certificate, Web Professional Certificate, and Web Professional Associate Degree. She presented the list of courses for each of the certificates and degree, and outlined how each course relates to CIW certification. Suzie explained that the program has been revised as a result of input from advisory group members; it now includes more CIS components, and has been streamlined to facilitate student completion.
   ii. Suzie asked advisory group members for suggestions on the specific skills that employers are looking for in graduates from our program. Richard Swift stated that graduates need to be able to come into a job well prepared to begin work, since on the job training is not always offered. Cheri Plett suggested that students need the soft skill of being able to hear and recognize the needs of any client, rather than focusing on the development of their own individual style. Jim Fallgatter stated that he recently utilized the services of an online design marketplace called 99designs, in order to find a design for an application he was promoting; he suggested that students could promote their designs in this type of market in order to build a portfolio and gain experience in industry. Forrest Lloyd pointed out that search engine optimization is a critical skill. Cheri noted that students also need to be able to create proposals and contracts.
   iii. The group discussed the paradigm shift within the community college system from an open-ended center of learning for all, to one focused on transfer, degree and/or certificate completion.

iv. Jim commended the inclusion of an e-Commerce course within the Web Professional Certificate and Associate Degree, but noted that e-Commerce would not fully prepare students to be entrepreneurs.
v. Forrest asserted that the issue of increasing student completion numbers needs to be addressed via marketing and outreach. Suzie discussed the brochure website, and noted that she will be promoting the programs to area high schools. Elaine Rudis-Jackson added that home school populations could also be targeted.

d. The Business Office Technology area discussed the following:
   i. Program Outcomes were reviewed and found to be excellent. **All** existing outcomes are deemed to be of great value, with particular emphasis on the first outcome related to professionalism and the last outcome related to listening.
   ii. The hospital representative said that when they call our admissions and records to verify whether students really have the degrees and certificates stated on resumes, they never get a call back in a timely manner. This is detrimental to hiring Cerro Coso grads. This came up when the group discussed hospital hiring procedures and the kinds of office jobs that come available.
   iii. Although the hospital does have customized hospital software for use in some of the offices, they expect their hires to know how to use MS Office and those programs, Excel, Word, PowerPoint, Outlook, and Access are all either used or have great value in areas for skill transferability.
   iv. Certificates and the degree were discussed, as well as course content and areas of emphasis.
   v. The importance of good writing skills was reflected and confirmed by advisory members.

e. The ESCC group discussed the following:

   i. Our session was lively and more general in nature. We talked about the gap between education and business; how we as instructors tend to nurture our students along which might not actually be the best way to prepare them for the fast pace of the business world but unfortunately is often the way to keep them in the class and help them complete the class. We talked about online classes and keeping students. Joanie Hanson attended a conference in Vegas last week that addressed creating community in online classrooms - and recommended hybrid classes as the most successful. Evidently establishing a F2F connection between the instructor and other students is hard to replace. She did say

if hybrid classes are not an option, then video instruction by the instructor (and by extension I think our Connect sessions) where the students can see the instructor is next best.

ii. The OVCDC tried an informal internship placement program this past summer. They only had two students take internships and one dropped out midway.

iii. We talked about motivation - none of us had any epiphany on new and effective ways to motivate and all of us agreed that it is so frustrating when students just disappear mid-semester, especially when there had been no sign that he or she was struggling.

iv. We discussed learning outcomes and measuring success. How do you create learning outcomes that encompass the abstract thinking that Billy Gogesch brought up and how do you measure it?

v. We brainstormed on ways each class might incorporate independent and create problem-solving and how to avoid students learning "steps" instead of concepts. Like teaching a technique using Photoshop and then asking the students to achieve a similar result using alternate software (like GIMP). I thought that would be great for our classes - to help students understand the underlying image editing concepts and then be able to figure out a similar but not mirror process (does that make sense?).

vi. We talked about internships and how business groups (like Rotary and Kiwanis) might be able to help with them. I'll bring it up at Bishop Sunrise and see what the reaction is.

vii. Billy Gogesch is still interested in talking to Suzie and /or Elaine about a Mammoth Chamber website intern (and perhaps other projects).

V. Anatomy of Computer Science 6-year Program Review: April Browne gave a brief report on the upcoming Computer Science Program review and the importance of getting feedback on industry hiring of our degree and certificate completers.

VI. Between meetings communication was discussed. We meet on Friday at noon partly because that is when the faculty are not already teaching and also because many are available on non-flex Fridays for lunch meetings. However, Mammoth and Bishop Campuses are closed during this time and Matt can only open one of the rooms and be in one place at a time. This meant we lost our Mammoth participants. Groups will have follow up communication as needed as well as individual meetings before we meet again in the spring. The group will strive to be inclusive with members that were unable to attend this meeting.

I. Assist.org Transfer agreements

CSU Bakersfield

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science====

Lower Division Major Requirements

Students majoring in the **Computer Science Track** must complete the following courses:					
CMPS 150	Introduction to Unix	(1)	No Course Articulated		
OR					
CMPS 215	Unix Programming Environment	(3)	No Course Articulated		
CMPS 221	Programming Fundamentals	(5)	CSCI C252	Introduction to Computer Science	(3)
CMPS 222	Object-Oriented Programming	(5)	No Course Articulated		
CMPS 223	Data Structures and Algorithms	(5)	No Course Articulated		
CMPS 224	Assembly Language Programming	(5)	No Course Articulated		
CMPS 295	Discrete Structures	(5)	No Course Articulated		
Additional Major Requirements					
MATH 201	Calculus I	(5)	MATH C151	Analytic Geometry & Calculus I	(5)
MATH 202	Calculus II	(5)	MATH C152	Analytic Geometry & Calculus II	(5)
MATH 203	Calculus III	(5)	MATH C251	Analytic Geometry and Calculus III	(5)
OR			**OR**		
MATH 231	Calculus I for Engineering Sciences	(5)	No Course Articulated		
MATH 232	Calculus II for Engineering Sciences	(5)	No Course Articulated		
MATH 233	Calculus III for Engineering Sciences	(5)	No Course Articulated		
PHYS 221	Classical Physics I	(6)	PHYS C111	Mechanics	(5)
PHYS 222	Classical Physics II	(6)	PHYS C113	Electricity & Magnetism	(5)
Students majoring in the **Computer Information Systems Track** must complete the following courses:					
CMPS 150	Introduction to Unix	(1)	No Course Articulated		
OR					

CMPS 215	Unix Programming Environment	(3)	No Course Articulated		
CMPS 211	Internet Programming and Web Design	(5)	No Course Articulated		
CMPS 221	Programming Fundamentals	(5)	CSCI C252	Introduction to Computer Science	(3)
CMPS 222	Object-Oriented Programming	(5)	No Course Articulated		
CMPS 223	Data Structures and Algorithms	(5)	No Course Articulated		
CMPS 295	Discrete Structures	(5)	No Course Articulated		
	Additional Major Requirements				
MATH 140	Elementary Statistics	(5)	MATH C121	Elementary Probability & Statistics	(4)
OR			**OR**		
MATH 192	Precalculus Mathematics II: Trigonometric Functions	(5)	MATH C142	Trigonometry	(4)
GE Area B: B4					
MATH 190	Pre-Calculus I: Intermediate and College Algebra	(7)	No Course Articulated		
OR					
MATH 191	Pre-Calculus I: College Algebra	(5)	MATH C141	College Algebra	(4)
Students majoring in the **Computer Science Hardware Track** must complete the following courses:					
CMPS 150	Introduction to Unix	(1)	No Course Articulated		
OR					
CMPS 215	Unix Programming Environment	(3)	No Course Articulated		
CMPS 221	Programming Fundamentals	(5)	CSCI C252	Introduction to Computer Science	(3)
CMPS 222	Object-Oriented Programming	(5)	No Course Articulated		
CMPS 223	Data Structures and Algorithms	(5)	No Course Articulated		
CMPS 224	Assembly Language Programming	(5)	No Course Articulated		
CMPS 295	Discrete Structures	(5)	No Course Articulated		
	Additional Major Requirements				
ENGR 207	Electric Circuits	(5)	No Course Articulated		
GE Area A: A3					
MATH 201	Calculus I	(5)	MATH C151	Analytic Geometry &	(5)

			|	Calculus I	
MATH 202	Calculus II	(5)	|MATH C152	Analytic Geometry & Calculus II	(5)
MATH 203	Calculus III	(5)	|MATH C251	Analytic Geometry and Calculus III	(5)
MATH 204	Calculus IV	(5)	|No Course Articulated		
OR			|		
MATH 205	Ordinary Differential Equations	(5)	|No Course Articulated		
OR			|		
MATH 206	Advanced Engineering Mathematics	(5)	|No Course Articulated		
OR			**OR**		
MATH 231 &	Calculus I for Engineering Sciences	(5)	|No Course Articulated		
MATH 232 &	Calculus II for Engineering Sciences	(5)	|No Course Articulated		
MATH 233 &	Calculus III for Engineering Sciences	(5)	|No Course Articulated		
MATH 234	Calculus IV for Engineering Sciences	(5)	|No Course Articulated		
PHYS 221	Classical Physics I	(6)	|PHYS C111	Mechanics	(5)
PHYS 222	Classical Physics II	(6)	|PHYS C113	Electricity & Magnetism	(5)

END OF MAJOR

CSU Chico

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science B.S.====

NOTE: This major has modifications to General Education requirements. Please consult the CSU Chico 2012-13 online catalog (http://catalog.csuchico.edu) for details.

ENROLLMENT IN ANY MATHEMATICS COURSE REQUIRES A GRADE OF C- OR HIGHER IN ALL PREREQUISITE COURSES OR THEIR TRANSFER EQUIVALENTS.

LOWER DIVISION CORE PROGRAM

CSCI 111	Programming and Algorithms I	(4)	|CSCI C265	Introductory C++ Programming	(3)
CSCI 211	Programming and Algorithms II	(4)	|NOT ARTICULATED		
CSCI 217	Foundations of Computing	(3)	|NOT ARTICULATED		
OR			|	**OR**	
MATH 217	Discrete Mathematical Structures	(3)	|NOT ARTICULATED		
CSCI 221	Assembly Language Programming	(3)	|NOT ARTICULATED		

MATH 120	Analytic Geometry and Calculus	(4)	MATH C151	Analytic Geometry & Calculus I	(5)
MATH 121	Analytic Geometry and Calculus	(4)	MATH C152	Analytic Geometry & Calculus II	(5)
NSCI 102	Introduction to Living Systems	(3)	BIOL C101 **&** BIOL C102	Principles of Biology Principles of Biology Laboratory	(3) (1)
			OR		
			BIOL C105	Concepts of Biology	(4)
PHYS 204A	Mechanics	(4)	PHYS C111	Mechanics	(5)
PHYS 204B	Electricity and Magnetism	(4)	PHYS C113	Electricity & Magnetism	(5)

END OF MAJOR

CSU Dominguez Hills

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science (B.S.)====

Students entering the Computer Science program must complete the following:

1. Earn an overall grade point average of 2.0 or better in courses taken outside of the department.
2. Earn a grade of "C" or better in each course taken within the department.
3. Earn a grade of "C" or better in all direct and indirect prerequisite courses listed in the catalog before advancing to the next level course in a sequence for English, Mathematics, and Science courses.
4. Students must take capstone course CSC 492 at CSUDH.

Lower Division Required Courses

CSC 121	Introduction to Computer Science and Programming I	(4)	No Course Articulated		
CSC 123	Introduction to Computer Science and Programming II	(4)	No Course Articulated		
CSC 221	Assembly Language and Introduction to Computer Organization	(3)	No Course Articulated		
MAT 191	Calculus I	(5)	MATH C151	Analytic Geometry & Calculus I	(5)
MAT 193	Calculus II	(5)	MATH C152	Analytic Geometry & Calculus II	(5)
MAT 271	Foundations of Higher Mathematics	(3)	No Course Articulated		
MAT 281	Discrete Mathematics	(3)	No Course Articulated		
PHY 130 **&** PHY 132	General Physics I General Physics II	(5) (5)	PHYS C111 **&** PHYS C113 **&**	Mechanics Electricity & Magnetism	(5) (5)

			PHYS C211 &	Waves, Heat, Optics and Modern Physics	(5)
			NOTE: Articulation is approved as a sequence only.		

END OF MAJOR

CSU East Bay

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science B.S.====

The Computer Science B.S. degree requires a total of 180 quarter units; the major consists of 84 quarter units including both lower and upper division coursework. The following courses are the required lower division (freshman-sophomore) major requirements and each course must be completed with a grade of "C" or higher:

CS 1160	Introduction to Computer Science I	(4)	CSCI C265	Introductory C++ Programming	(3)
CS 2360	Introduction to Computer Science II	(4)	No Course Articulated		
CS 2370	Introduction to Computer Science III	(4)	No Course Articulated		
CS 2430	Computer Organization and Assembly Language Programming	(4)	No Course Articulated		

Note: Students who have completed courses in C, C++, Java or Pascal should contact the Mathematics/Computer Science Department; they may be able to substitute their previous coursework for CS 1160 and possibly CS 2360 and 2370.

MATH 1304 & MATH 1305	Calculus I Calculus II	(4) (4)	MATH C151 &	Analytic Geometry & Calculus I	(5)
			MATH C152	Analytic Geometry & Calculus II	(5)
MATH 2101	Elements of Linear Algebra	(4)	MATH C257	Linear Algebra	(4)
MATH 2150	Discrete Structures	(4)	No Course Articulated		

Questions regarding the major requirements listed above may be directed to the Mathematics and Computer Science Student Service Center at (510) 885-4011. For upper division (junior-senior) major and option requirements, please see the CSU East Bay catalog or visit our web site at http://www.csueastbay.edu/ecat.

END OF MAJOR

Students should meet with a community college counselor for up-to-date information on degree requirements and other transfer-related services.

CSU Fullerton

The agreement you selected was not available for 12-13. The agreement for 11-12 is shown instead.

Articulation Agreement by Major
Effective during the 11-12 Academic Year

====Computer Science====

Each Computer Science major is required to complete a minimum of 124 units including general education. A maximum of 6 units of a grade of "D-"(.7) through "D+"(1.3) can count towards the elective track, mathematics and science courses only. A "C" average (2.0) and a grade of "C-"(1.7) or better is required in all courses applied to the major. Note: CSUF GE variation for CPSC majors waives lifelong learning requirement (area IV) and requires only 3 units for the development of world civilization (area II.A).

All Computer Science students must select an elective track aimed at your specific career goals. There are five tracks to choose from: Multimedia & Digital Game Technologies Track; Internet & Enterprise Computing Technologies Track; Software Engineering Track; Scientific Computing Track; and Customized Track.

LOWER-DIVISION CORE COURSES

CPSC 120	Intro to Programming	(3)			
CPSC 121	Programming Concepts	(3)	CSCI C252	Introduction to Computer Science	(3)
CPSC 131	Data Structures Concepts	(3)			
CPSC 223H	Visual Basic Programming	(3)	NO ARTICULATION Course Denied: CSCI C251		
	OR		**OR**		
CPSC 223J	Java Programming	(3)			
	OR		**OR**		
CPSC 223N	Visual C# Programming	(3)			
CPSC 240	Comp Org & Assembly Lang	(3)			
CPSC 254	UNIX and Open Source Systems	(3)			

LOWER-DIVISION REQUIREMENTS IN RELATED FIELDS
MATHEMATICS (18 units)

MATH 150A	Calculus	(4)			
MATH 150B	Calculus	(4)			
MATH 270A	Mathematical Structures I	(3)			
MATH 270B	Mathematical Structure II	(3)			
Additional Lower Division Math Requirements for "Scientific Computing Track"					
MATH 250A	Multivariate Calculus	(4)			
	AND		**AND**		
MATH 250B	Intro to Linear Algebra and Diff. Equations	(4)			

PHYSICAL SCIENCE (8 units)

One of the following combinations:

PHYS 225	Fundamental Phys; Mechanics	(3)			
PHYS 225L	Fundamental Physics Lab	(1)			
PHYS 226	Fund Phys.Elect + Magnetism	(3)			
PHYS 226L	Fundamental Physics Lab	(1)			
--OR--					
CHEM 120A	General Chemistry	(5)	CHEM C111	General Inorganic Chemistry I	(5)
CHEM 125	Gen Chemistry Engineers	(3)			
--OR--					
GEOL 101 &	Physical Geology	(3)	GEOL C111	Physical Geology	(4)
GEOL 101L	Physical Geology Lab	(1)			
GEOL 201	Earth History	(3)	NO ARTICULATION Course Denied: GEOL C121		
GEOL 201L	Earth History Suplmtl Lab	(1)			

BIOLOGICAL SCIENCE (4 units)

BIOL 101	Elements of Biology	(3)			
	AND			**AND**	
# BIOL 101L	Elements of Biology Lab	(1)			

END OF MAJOR

GE Areas with this symbol indicate an approved lab course

CSU Long Beach

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science====

Bachelor of Science in Computer Science

IMPORTANT ADMISSIONS INFORMATION FOR FALL 2013

ALL MAJORS AT CSU LONG BEACH ARE IMPACTED. As a result, all undergraduate majors will have major specific admission requirements in the form of a list of major preparation coursework and gpa requirements. Please refer to the admissions web site for these major-specific admission details.

ADMISSION BASICS: Transfer students may only enter at the upper division (junior) level. You are considered an upper-division transfer student if you will have completed 60 or more transferable semester units or 90 transferable quarter units by the end of the prior Spring term for Fall entrance or the prior Summer term for Spring entrance. As an upper-division transfer student, you must meet minimum CSU admission requirements to be considered for admission, as stated on the admissions web site.

The CSU GE (General Education) requirements in Written Communication, Oral Communication, Critical Thinking and Mathematics/Quantitative Reasoning must be completed with a grade of 'C' or better **by the end of the prior Spring term for**

Fall admission or by the end of the prior Summer term for Spring admission.

Major-specific course and gpa requirements for admission as referenced above must also be met by these same timelines.

LOWER DIVISION MAJOR REQUIREMENTS The courses listed below make up the lower division major requirements for this specific major and this catalog year. Students are encouraged to take as many of these courses prior to transfer as possible to promote timely completion of the degree at CSULB. **BE AWARE**: The courses on this list may not all be required for admission, but are required for the award of the bachelor's degree. **Refer to the information and links provided above for major-specific admission requirements.**

Lower-Division Course(s)for the Major:

CECS 100	Critical Thinking in the Digital Information Age	(3)	No Course Articulated		
CECS 105	Introduction to Computer Engineering and Computer Science	(1)	No Course Articulated		
CECS 174	Introduction to Programming and Problem Solving	(3)	CSCI C265	Introductory C++ Programming	(3)
CECS 201	Computer Logic Design I	(3)	No Course Articulated		
CECS 228	Discrete Structures with Computing Applications	(3)	No Course Articulated		
CECS 274	Object Oriented Programming and Data Structures	(3)	No Course Articulated		
CECS 277	Object Oriented Application Development	(3)	No Course Articulated		
CECS 282	C++ for Java Programmers	(3)	No Course Articulated		
CECS 285	Computer Organization and Assembly Language Programming	(3)	No Course Articulated		
ENGR 101	Introduction to Engineering Profession	(1)	No Course Articulated		

ENGR 101 and 102 are substituted for transfer students who have 3 units of CSU General Education Area E.

ENGR 102	Academic Success Skills	(1)	No Course Articulated		

ENGR 101 and 102 are substituted for transfer students who have 3 units of CSU General Education Area E.

MATH 122	Calculus I	(4)	MATH C151	Analytic Geometry & Calculus I	(5)
MATH 123	Calculus II	(4)	MATH C152	Analytic Geometry & Calculus II	(5)
MATH 224	Calculus III	(4)	MATH C251	Analytic Geometry and	(5)

				Calculus III	
	OR			**OR**	
MATH 233	Fundamental Concepts for Advanced Mathematics	(3)	No Course Articulated		
	OR			**OR**	
MATH 247	Introduction to Linear Algebra	(3)	No Course Articulated		
Minimum of 12 units of approved science-electives to include a two-semester science sequence. Take either:					
CHEM 111A	General Chemistry	(5)	CHEM C111	General Inorganic Chemistry I	(5)
			OR		
			CHEM C122	General Inorganic Chemistry for Nursing and Allied Health Science Majors	(5)
	AND			**AND**	
CHEM 111B	General Chemistry	(5)	CHEM C113	General Inorganic Chemistry II	(5)
	OR			**OR**	
PHYS 151	Mechanics and Heat	(4)	PHYS C111	Mechanics	(5)
	AND			**AND**	
PHYS 152	Electricity and Magnetism	(4)	PHYS C113	Electricity & Magnetism	(5)
	OR			**OR**	
PHYS 151	Mechanics and Heat	(4)	PHYS C111	Mechanics	(5)
	AND			**AND**	
E E 210	Electro-Magnetic Foundations in Electrical Engineering	(3)	No Course Articulated		
	AND			**AND**	
E E 210L	Electro-Magnetic Foundations in Electrical Engineering Laboratory	(1)	No Course Articulated		
Remaining units are to be chosen from the following:					
BIOL 153	Introduction to Marine Biology	(3)	No Course Articulated		
	OR			**OR**	
BIOL 200	General Biology	(4)	BIOL C105	Concepts of Biology	(4)
	OR			**OR**	
BIOL 205	Human Biology	(4)	BIOL C121 **&**	Survey of Anatomy and Physiology Lecture	(3)
			BIOL C122	Survey of Anatomy and Physiology Laboratory	(1)
	OR			**OR**	
BIOL 207	Human Physiology	(4)	BIOL C255	Human Physiology	(4)

A grade of 'C' or better is required in the following courses: BIOL 153, 200, 205, 207; CHEM 111A, 111B; PHYS 151, 152 (or EE 210 and 210L); MATH 122, 123, 222, 224, 233, 247; CECS 100, 105, 174, 201, 228, 274, 277, 282, 285, ENGR 101, 102.

Degree Progress: Transfer students must complete the following requirements within one calendar year of declaring the major: A grade of C or better must be achieved in MATH 123 (Calculus II) and PHYS 151 (Mechanics and Heat) within one calendar year after transfer to CSULB(if the equivalent was not taken before transfer). Questions can be directed to the College of Engineering Recruitment and Retention Center at (562) 985-1800 or coe-admit@csulb.edu.

The courses shown above constitute lower-division coursework required for this

major for this catalog year. Minimize the number of G.E. (General Education) units/courses to only that which is required for CSU Transfer Admissions. Maximize your transfer units by taking as many lower-division prerequisites for the Major as you can handle.

Be advised that lower-division course requirements are subject to change from year to year, and catalog rights (actual course requirements) will be established for the student effective with the catalog in effect as of the first term of matriculation at CSULB. Questions regarding this agreement may be directed to the CSULB Articulation Office at (562) 985-7171 or (562) 985-1746 or by email at nor.sharif@csulb.edu

---

END OF MAJOR

CSU Los Angeles

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science - BS====

CSULA is an impacted campus. Campus impaction requires that we give priority admission consideration to first time freshman applicants and upper division transfers from within our local area. For additional information regarding impaction please visit http://www.calstatela.edu/univ/admiss/impaction/

University Requirement:

ENGL 102	Composition II	(4)	

A minimum C grade is required

Requirements for the Major (126-129 units)

The objective of the Bachelor of Science degree in Computer Science is to prepare qualified students for careers involving the design of computer systems and their applications to science and industry. The program provides an excellent foundation in all core areas of computer science with the opportunity to choose electives in a variety of specialized fields. A total of 180-183 units is required for the degree, including 126-129 in the major.

A grade of "C" or better is required for all prerequisites courses in the major.

Lower Division Required Courses (60 -63 units)

CS 120	Introduction to Web Site Development	(3)			
CS 122	Using Relational Databases and SQL	(3)			
CS 201	Introduction to Programming	(5)			
CS 202	Introduction to Object Oriented Programming	(5)			
CS 203	Programming with Data Structures	(5)			
CS 245	Introduction to Computer Organization, Operation Systems and Networks	(3)			
MATH 206 &	Calculus I: Differentiation	(4)	MATH C151 &	Analytic Geometry & Calculus I	(5)

MATH 207 &	Calculus II: Integration	(4)	MATH C152 &	Analytic Geometry & Calculus II	(5)
MATH 208	Calculus III: Sequences, Series and Coordinate Systems	(4)	MATH C251	Analytic Geometry and Calculus III	(5)
MATH 270	Introduction to Probability and Statistics	(4)			
MATH 248	Discrete Math	(4)			
MATH 255	Introduction to Matrix Theory	(4)			
PHYS 101 &	Physics	(4)			
PHYS 102 &	Physics	(4)			
PHYS 103	Physics	(4)			
	OR			**OR**	
PHYS 211 &	Mechanics	(5)			
PHYS 212 &	Waves, Optics, and Thermodynamics	(5)			
PHYS 213	Electricity and Magnetism	(5)			

END OF MAJOR

CSU Northridge

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science====

COMPUTER SCIENCE: B.S., College of Engineering and Computer Science

(Upper division transfer students applying as Computer Science majors do not have to complete Critical Thinking prior to admission.)

To qualify for admission into the Computer Science major program, students must first complete a pre-major program consisting of **seven** lower division courses covering math, computer science and the university General Education requirements for Written Composition and Oral Communication. Transfer students will be admitted into the Computer Science pre-major. Upon successful completion of pre-major requirements they may apply for admission into the Computer Science major by completing a pre-major to major evaluation form available from the Computer Science Department. Admission into the Computer Science major program is required prior to enrolling in Upper-Division Computer Science courses.

Note: No grade lower than a "C" will be accepted on transfer to satisfy Computer Science requirements. This agreement displays the lower-division courses required in the major: CSU Northridge courses on the left and approved (articulated) transfer courses on the right. General education and upper-division courses are also necessary for completion of this degree.

Computer Science students may benefit by following CSU Northridge GE Plan R instead of CSU-GE Breadth or IGETC. On the ASSIST agreement For General Education/Breadth, select General Education: Engineering and Computer Science.

Advanced Placement (AP) Exam information for the major in Computer Science:
-Score of 4 or 5 on AP Computer Science A satisfies COMP 110/110L
-Score of 3 on AP Computer Science AB satisfies COMP 110/110L
-Score of 4 or 5 on AP Computer Science AB satisfies COMP 110/110L & 182/182L
-Score of 4, or 5 on AP Math: Calculus AB satisfies MATH 150A

-Score of 3, 4, or 5 on AP Math: Calculus BC satisfies MATH 150A
-Score of 4, or 5 on AP Math: Calculus AB + BC satisfies MATH 150A and 150B
-Score of 3, 4, or 5 on AP Biology satisfies BIOL 106 & 107 (NOT Labs)
-Score of 4 or 5 on AP Chemistry satisfies CHEM 101/101L
-Score of 3, 4, or 5 on AP Physics C:Mechanics satisfies PHYS 220A/220AL
-Score of 3, 4, or 5 on AP Physics C:Electricity & Mag satisfies PHYS 220B/220BL
Consult CSU Northridge catalog for complete AP Exam information.

THE COMPUTER SCIENCE PRE-MAJOR REQUIREMENTS ARE AS FOLLOWS:

CSU General Education: Written Communication			ENGL C101	Freshman Composition	(4)
CSU General Education: Oral Communication			SPCH C101 **OR** SPCH C105	Elements of Speech Interpersonal Communication	(3) (3)
COMP 110	**&**	Introduction to Algorithms and Programming (3)	No Course Articulated		
COMP 110L		Introduction to Algorithms and Programming Laboratory (1)			
COMP 122	**&**	Computer Architecture and Assembly Language (1)	No Course Articulated		
COMP 122L		Computer Architecture and Assembly Language Lab (1)			
COMP 182	**&**	Data Structures and Program Design (3)	No Course Articulated		
COMP 182L		Data Structures and Program Design Lab (1)			
MATH 150A		Calculus I (5)	MATH C151	Analytic Geometry & Calculus I	(5)
PHIL 230		Introduction to Formal Logic (3)	No Course Articulated		

ADDITIONAL LOWER DIVISION REQUIREMENTS FOR THIS MAJOR ARE AS FOLLOWS:

COMP 222		Computer Organization (3)	No Course Articulated		
COMP 256	**&**	Discrete Structures for Computer Science (3)	No Course Articulated		
COMP 256L		Discrete Structures for Computer Science Lab (1)			
COMP 282		Advanced Data Structures (3)	No Course Articulated		
MATH 150B		Calculus II (5)	MATH C152	Analytic Geometry & Calculus II	(5)
MATH 262		Introduction to Linear Algebra (3)	MATH C257	Linear Algebra	(4)

COMPUTER SCIENCE INSTRUCTIONAL PROGRAM REVIEW

Select one of the following science sequences

CSU Sacramento

The agreement you selected was not available for 12-13. The agreement for 11-12 is shown instead.

Articulation Agreement by Major
Effective during the 11-12 Academic Year

====Computer Science====

A grade of "C-" or better is required in all courses applied to the Computer Science major.

A. REQUIRED LOWER-DIVISION COMPUTER SCIENCE COURSES:					
CSC 15	PROGRAM CONCEPT+METHOD I	(3)	NOT ARTICULATED		
CSC 20	PROGRAM CONCEPT+METHOD II	(3)	NO COMPARABLE COURSE		
CSC 28	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	(3)	NOT ARTICULATED		
CSC 35	INTRODUCTION TO COMPUTER ARCHITECTURE	(3)	NO COMPARABLE COURSE		
CSC 60	INTRODUCTION TO SYSTEMS PROGRAMMING IN UNIX	(3)	NO COMPARABLE COURSE		
B. REQUIRED LOWER-DIVISION MATH COURSES:					
MATH 30	CALCULUS I	(4)	MATH C151	Analytic Geometry & Calculus I	(5)
MATH 31	CALCULUS II	(4)	MATH C152	Analytic Geometry & Calculus II	(5)
STAT 50	INTRO PROBABILITY+STAT	(4)	NO COMPARABLE COURSE		
Select One of the following:					
MATH 32	CALCULUS III	(4)	MATH C251	Analytic Geometry and Calculus III	(5)
MATH 35	INTRO TO LINEAR ALGEBRA	(3)	MATH C257	Linear Algebra	(4)
MATH 45	DIFFERNTL EQUATN SCI+ENGR	(3)	MATH C255	Ordinary Differential Equations	(4)
C. REQUIRED LOWER-DIVISION SCIENCE COURSES:					
PHYS 11A	GEN PHYS-MECHANICS	(4)	PHYS C111	Mechanics	(5)
PHYS 11C	GEN PHYS-ELECT,MAG,MOD	(4)	PHYS C113	Electricity & Magnetism	(5)
Select one of the following: **(The course chosen cannot be used to satisfy the CSU General Education B2 "Life Science" requirement)**					
BIO 10	BASIC BIOLOGICAL CONCEPTS	(3)	NOT ARTICULATED		

BIO 22	INTRO HUMAN ANATOMY	(4)	BIOL C251	Human Anatomy	(4)
CHEM 1A	GENERAL CHEMISTRY I	(5)	NOT ARTICULATED		
ENGR 17	INTRO CIRCUIT ANALYSIS	(3)	NOT ARTICULATED		
ENGR 45	ENGINEERING MATERIALS	(3)	NOT ARTICULATED		
PHYS 11B	GEN PHYS-HEAT,LIGHT,SOUND	(4)	PHYS C211	Waves, Heat, Optics and Modern Physics	(5)

END OF MAJOR

The above Major Preparation Agreement is subject to periodic change and revision. **Please check with a counselor every semester to obtain current information about possible changes in the articulated courses.**

CSU San Bernadino

Articulation Agreement by Major
Effective during the 12-13 Academic Year

====Computer Science - B.S.====

Required lower-division course(s):

CSE 201	Computer Science I	(4)	CSCI C265	Introductory C++ Programming	(3)
CSE 202	Computer Science II	(4)	No Comparable Course		
* MATH 211 & * MATH 212 & * MATH 213	Basic Concepts of Calculus / Calculus II / Calculus III	(4) (4) (4)	MATH C151 & MATH C152	Analytic Geometry & Calculus I / Analytic Geometry & Calculus II	(5) (5)
MATH 262	Applied Statistics	(4)	No Comparable Course		
MATH 272	Discrete Mathematics	(4)	No Comparable Course		
PHYS 221	General Physics I	(5)	PHYS C111	Mechanics	(5)
PHYS 222	General Physics II	(5)	PHYS C113	Electricity & Magnetism	(5)
PHYS 223	General Physics III	(5)	PHYS C211	Waves, Heat, Optics and Modern Physics	(5)

In addition, select one course from the following:

BIOL 100	Topics in Biology	(5)	BIOL C105	Concepts of Biology	(4)
			OR		
			BIOL C105H	Concepts of Biology - Honors	(5)
BIOL 200	Biology of the Cell	(5)	BIOL C111	General Biology I	(5)
			OR		
			BIOL C111H	General Biology I - Honors	(6)

Select one additional science course, with lab, and not used elsewhere, from BIOL, CHEM, GEOL, or PHYS.

The courses shown above constitute all lower-division coursework required for this major for this catalog year. In addition, lower-division general education coursework is required (select General Education/Breadth on the main menu).

END OF MAJOR

* A grade of C or better is required if additional calculus courses will be attempted.