

OHLONE COLLEGE
Math, Sciences & Technology Division

Application for a new transfer program:

Program Title: Associate of Science Degree in Computer Engineering

Contact Person: Dr. Ron Quinta, Dean
Math, Sciences & Technology Division

Projected Program Start Date: Program has already started and courses are currently offered

Type of Program: A. S. Degree (Transfer Program)

Recommended T.O.P. code: 0701.00 Computer Engineering Transfer

Units for Major—Degree: 53 units

Total Units for Degree: 60 units

Projected Annual Completers: ~20 students

Estimated FTEF Workload: ~ 3.5 FTEF (1.0 Phys, 1.5 Math, 0.5 CS, 0.5 Engi)

Number of New Faculty Positions: none—present faculty are teaching these courses

Est. Cost, New Equipment: none—present equipment is in use for these courses

Type of New/Remodeled Facility: none—present facility is used for these courses

Est. Cost, Library Acquisitions: none—present library holdings meet the needs of these courses

Approval Criteria Sections

1. Mission—Statement of Goals and Objectives:

The A.S. Degree in Computer Engineering prepares students for a baccalaureate major in Computer Engineering. By fulfilling many of the CSU & UC lower division major requirements at Ohlone College, this program will enhance successful student transfer.

2. Catalog Description:

The Associate of Science Degree in Computer Engineering offered by Ohlone College is designed to prepare students for pursuing studies at the university level in the computer science and engineering. The core courses in CS, ENGI, Math and Physics required in this A.S. Degree will fulfill the lower division major requirements at many universities. Students are advised however to meet with their counselor to assess the course requirements for specific universities. This program will enable students to develop a strong foundation in the computer and engineering sciences as well as a thorough training in applying their mathematical skills. In addition, students completing this program will acquire valuable cognitive skills (logic and common sense, reasoning and problem-solving skills) and practical laboratory skills. The theoretical and practical knowledge acquired through this program will enhance their success with obtaining entry-level jobs that require two years of college-level computer engineering and math.

OHLONE COLLEGE
Math, Sciences & Technology Division

3. Program Requirements (A. S. Degree in Computer Engineering)

Required Core Courses:	units
Engineering:	
ENGI 101 Intro to Engineering	3
ENGI 130 Electric Circuit Analysis	4
Computer Studies:	
CS 102 Intro to Computer Programming	4
CS 113 Discrete Mathematics	3
and	
CS 116 C++ Prg. – An Object-Oriented Lang.	4
or CS 118 Intro to Assembly Language Prg.	4
Total units for Computer Science	11
Mathematics:	
Math 101A Calculus with Analytical Geometry I	5
Math 101B Calculus with Analytical Geometry II	5
Math 101C Calculus with Analytical Geometry III	5
Math 103 Introduction to Linear Algebra	3
Math 104 Differential Equations	5
Science:	
Physics 140 Mechanics	4
Physics 141 Electricity & Magnetism	4
Physics 142 Heat, Light, and Modern	4

Total Required Units in Core Courses: 53 units

Note: At least 50% of the Core courses for the A.S. Degree in Computer Engineering must be completed at Ohlone College and must include 2 or more CS courses plus ENGI 101 & 130

Note: To study computer engineering, students must be familiar with computers and computer applications. To study calculus students must have skills in algebra. The following courses are recommended:

CS 101 Intro to Computers and Info Tech	3 units
CS 101L Computers Applications	2 units
Math 188 Pre-Calculus	5 units

Some schools require additional courses such as:

Chem 101A General Chemistry	5 units
Engl 101B Reading and Composition	4 units
Engi 115 Engineering Communication	4 units
Engi 140 Materials Engineering	3 units
Spch 101 Introduction to Public Speaking	3 units

General Education Requirements: Students should select one of the following G E options to complete the A.S. Degree in Computer Engineering.

Option A: Ohlone College General Education Program

- Area 1. Natural Science (6 units) --This is satisfied by completing the required core courses
 - Area 2. Social Science (3-4 units)--complete either Hist. 117A (3u) or PS 102 (3u)
 - Area 3. Fine Arts/Humanities (3 units)--Complete at least 3 units from approved FA or Humanities list
 - Area 4. Analytical Thinking & Oral Communication
 - English Composition--Complete Engl. 101A (4u)
 - Analytical Thinking--This is satisfied by completing the required core courses
 - Math Proficiency--This is satisfied by completing the required core courses
 - Area 5. Physical Education/Wellness (1u)
 - Area 6. Cultural Diversity (3)--Complete one of the approved courses
 - Area 7. Information Competency (0.5-3 units)
- Electives--To bring the total units for the A.S. Degree to 60.

Option B: CSU General Education Breadth Requirements

Option C: Intersegmental General Education Transfer Curriculum (IGETC Pattern)

Minimum Units for A.S. Degree in Computer Engineering:

60 units

OHLONE COLLEGE
Math, Sciences & Technology Division

4. Background and Rationale:

Students who are pursuing a baccalaureate degree in Computer Engineering must complete a fairly defined lower division curriculum. The Associate of Science Degree in Computer Engineering includes the majority of these lower division core courses in most baccalaureate programs in Computer Science or Computer Engineering Programs. The A.S. Degree in Computer Engineering also validates that a particular set of courses has been completed and lab skills learned by students. This validation is useful for prospective employers who require successful completion of two years of college in the Computer Engineering Major as minimum qualifications for entry-level positions.

5. Enrollment and Completer Projections

(a) Number of sections of required core courses offered annually:

ENGI 101—2, ENGI 130--2, CS102-6, CS 113--4, CS 116--4, CS 118--2

Phys 140--5, Phys 141—4, Phys 142—2

Math 101A--10, Math 101B--8, Math 101C—4, Math 103—3, Math 104--3

(b) Headcount student annual enrollment in the number of sections estimated above (total) ~ 100 students

(c) Number of program completers at the end of the first year of program: ~40 students

(d) Number of program completers at the end of the second year of program: ~20 students

6. Place of Program in Curriculum/Similar Programs

The Computer Studies department also offers a degree in Computer Science. We also offer a Fast Track Certificate in Engineering that allows students not interested in transfer to concentrate on the core courses only.

7. Similar Programs at Other Colleges in Service Area (refer to Appendix A)

The AS Degree in Computer Engineering is a transfer program and its curriculum prepares the students in the Ohlone Community College District for the transfer major in Computer Engineering. The following is a partial list of community colleges in the San Francisco Bay Area who offer similar degree programs. Refer to the supplements showing the specific curricular requirement for each of these institutions:

Chabot College	Hayward, CA	AS Degree in Computer Engineering
Contra Costa College	Richmond, CA	AS Degree in Computer Engineering
Foothill College	Los Altos Hills, CA	AS Degree in Computer Engineering
Las Positas College	Livermore, CA	AS Degree in Computer Engineering

OHLONE COLLEGE
Math, Sciences & Technology Division

8. Display of Proposed Sequence

The following shows the core courses for the AS Degree in Computer Engineering (the sequence may be varied so long as the appropriate prerequisites are satisfied):

<p>1st Semester</p> <table border="0"> <tr><td>Math 101A</td><td>(5 units)</td></tr> <tr><td>CS 102</td><td>(4 units)</td></tr> <tr><td>ENGI 101</td><td>(3 units)</td></tr> <tr><td>GE/Elective</td><td>(variable)</td></tr> </table>	Math 101A	(5 units)	CS 102	(4 units)	ENGI 101	(3 units)	GE/Elective	(variable)	<p>3rd Semester</p> <table border="0"> <tr><td>Math 103</td><td>(3 units)</td></tr> <tr><td>Math 101C</td><td>(5 units)</td></tr> <tr><td>Phys 141</td><td>(4 units)</td></tr> <tr><td>GE/Elective</td><td>(variable)</td></tr> </table>	Math 103	(3 units)	Math 101C	(5 units)	Phys 141	(4 units)	GE/Elective	(variable)
Math 101A	(5 units)																
CS 102	(4 units)																
ENGI 101	(3 units)																
GE/Elective	(variable)																
Math 103	(3 units)																
Math 101C	(5 units)																
Phys 141	(4 units)																
GE/Elective	(variable)																
<p>2nd Semester</p> <table border="0"> <tr><td>Math 101B</td><td>(5 units)</td></tr> <tr><td>CS 116 or CS 118</td><td>(4 units)</td></tr> <tr><td>CS 113</td><td>(3 units)</td></tr> <tr><td>Phys 140</td><td>(4 units)</td></tr> </table>	Math 101B	(5 units)	CS 116 or CS 118	(4 units)	CS 113	(3 units)	Phys 140	(4 units)	<p>4th Semester</p> <table border="0"> <tr><td>ENGI 130</td><td>(4 units)</td></tr> <tr><td>Phys 142</td><td>(4 units)</td></tr> <tr><td>Math 104</td><td>(5 units)</td></tr> <tr><td>GE/Elective</td><td>(variable)</td></tr> </table>	ENGI 130	(4 units)	Phys 142	(4 units)	Math 104	(5 units)	GE/Elective	(variable)
Math 101B	(5 units)																
CS 116 or CS 118	(4 units)																
CS 113	(3 units)																
Phys 140	(4 units)																
ENGI 130	(4 units)																
Phys 142	(4 units)																
Math 104	(5 units)																
GE/Elective	(variable)																

General Education Requirements for the Associate Degree from Ohlone College:

Choose one: Option A “Ohlone College GE Plan” or Option B “CSU GE Plan
or Option C “IGETC Plan”

Option A: Ohlone College General Education Program

- Area 1. Natural Science (6 units) --This is satisfied by completing the required core courses
 - Area 2. Social Science (3-4 units)--complete either Hist. 117A (3u) or PS 102 (3u)
 - Area 3. Fine Arts/Humanities (3 units)--Complete at least 3 units from approved FA or Humanities list
 - Area 4. Analytical Thinking & Oral Communication
 - English Composition--Complete Engl. 101A (4u)
 - Analytical Thinking--This is satisfied by completing the required core courses
 - Math Proficiency--This is satisfied by completing the required core courses
 - Area 5. Physical Education/Wellness (1u)
 - Area 6. Cultural Diversity (3)--Complete one of the approved courses
 - Area 7. Information Competency (0.5-3 units)
- Electives--To bring the total units for the A.S. Degree to 60.

Option B: CSU General Education Breadth Requirements

Option C: Intersegmental General Education Transfer Curriculum (IGETC Pattern)

Note: Students who plan to transfer to a CSU MUST complete English 101A, Oral Communication, Critical Thinking and Quantitative Reasoning with a “C” or better. It is recommended that all students who plan to transfer to a CSU follow the CSU Lower Division Certification pattern and request a G.E. Certification from Ohlone before transferring. It is **imperative** for students to make an appointment to see a counselor for use of the approximate G.E. pattern for the CSU and UC system. Students should also meet with their counselor to develop a specific program of studies (SEP)—since transfer requirements may vary depending upon which major specialty in biological sciences the students will be pursuing at the transfer institution. It is also advisable for students to check with the transfer university of their choice for specific math, chemistry and physics requirement.

9. Outlines of Record for Required Courses (refer to Appendix B)

See attached course outlines for ENGI 101, ENGI 130, CS 102, CS 113, CS 116, CS 118, Phys 140, Phys 141, Phys 142, Math 101A, Math 101B, Math 101C, Math 103, Math 104

10. Transfer Documentation (refer to Appendix C)

See the attached summary spreadsheet “Comparison of Ohlone’s A.S. Degree in Computer Engineering Core Courses with Lower Division Courses at Local Transfer Universities” and supporting pages printed from www.assist.org showing the articulation of the proposed AS Degree Core Courses with similar programs at CSU East Bay, San Jose State University, UC Davis, UC Berkeley, and UC San Diego.

OHLONE COLLEGE
Math, Sciences & Technology Division

11. Program Evaluation Plan (refer to Appendix D)

See the attached document on Program and Service Area Review used at Ohlone College to evaluate educational programs and service areas every three years

Feasibility

12. Library and Learning Resources Plan

The Ohlone College Library and Learning Center presently supports all courses in our Computer Engineering Transfer Program. There will be no additional Learning Resources needs to support the AS Degree in Computer Engineering.

13. Facilities and Equipment Plan

The present computer Engineering and math facilities—lecture classrooms and the computer labs—already meet the needs of our Computer Engineering Transfer Program curriculum. There will be no additional facilities needs to support the AS Degree in Computer Engineering.

14. Financial Support Plan

The Computer Engineering Transfer Program curriculum—including computer science, physics and mathematics—receives adequate financial support from this college. There will be no additional financial support needed to implement the AS Degree in Computer Engineering.

15. Faculty Qualifications and Availability

The resumes for the following full time faculty are on file in the Human Resources Department of Ohlone College. They all meet the minimum qualifications to teach in their respective disciplines. These faculty will be assigned to teach courses in the AS Degree curriculum:

Physics:	Venki Narayan, PhD; Luc Desmedt, PhD
Engineering:	Gajendra Mishra, MS
Mathematics:	Jeff O'Connell, MS; Tania Munding, MS; Bob Bradshaw, M.S, Ron Staszko, M.A; Rob Smedfjeld, MS
Computer Science:	Xisheng Fang, PhD; Yong Gao, PhD; David Topham, MS; Jon Degallier, MS

Compliance

16. Model Curriculum

Our curriculum was designed by studying the requirements at the local 4-year schools and offering courses and topics which best prepare our students for success in those programs.

17. Licensing or Accreditation Standards

NA—Licensing or additional Accreditation Standards do not apply to the AS Degree in Computer Engineering at Ohlone College. The AS Degree in Computer Engineering will come under the college's present Program and Service Area Review every three years.

18. Student Selection and Fees

NA—The AS Degree in Computer Engineering is not a selective program. Any student who meets the course prerequisites may enroll in classes and apply for the degree. There will be no additional fees for students who are working toward the AS Degree in Computer Engineering.

OHLONE COLLEGE
Math, Sciences & Technology Division

Appendix A Similar Programs at Other Colleges

The following are copies of pages for some community colleges in the San Francisco Bay Area with similar programs. Ohlone College is the only college in the Fremont-Newark Community College District service area:

Chabot College	Hayward, CA	AS Degree in Computer Engineering
Contra Costa College	Richmond, CA	AS Degree in Computer Engineering
Foothill College	Los Altos Hills, CA	AS Degree in Computer Engineering
Las Positas College	Livermore, CA	AS Degree in Computer Engineering

OHLONE COLLEGE
Math, Sciences & Technology Division

Appendix B Outlines of Record of Required (Core) Courses in AS Degree in Computer Engineering

Official Course Outlines for the following required courses are included:

		Units:
ENGI 101	Intro to Engineering	3
ENGI 130	Electric Circuit Analysis	4
CS 102	Intro to Computer Programming in C++	4
CS 113	Discrete Mathematics	3
CS 116	C++ Prg. – An Object-Oriented Lang.	4
CS 118	Intro to Assembly Language Prg.	4
Math 101A	Calculus with Analytical Geometry I	5
Math 101B	Calculus with Analytical Geometry II	5
Math 101C	Calculus with Analytical Geometry III	5
Math 103	Introduction to Linear Algebra	3
Math 104	Differential Equations	5
Physics 140	Mechanics	4
Physics 141	Electricity & Magnetism	4
Physics 142	Heat, Light, and Modern	4

OHLONE COLLEGE
Math, Sciences & Technology Division

Appendix C Transfer Documentation

The follow is included in this section:

Table Comparing Ohlone's AS Degree Core Courses with those required in the lower division baccalaureate programs in Computer Engineering from public universities in the San Francisco Bay Area

Assist Articulation Agreements Sheets by Major for the lower division requirements in similar programs at the following universities:

CSU East Bay	Computer Engineering, B.S.
San Jose State University	Computer Engineering, B.S.
UC Davis	Computer Engineering, B.S.
UC Berkeley	Computer Engineering, B.A.
UC San Diego	Computer Engineering, B.S.

OHLONE COLLEGE
Math, Sciences & Technology Division

Appendix D Program Evaluation Plan

This section includes a copy of Ohlone College's Program and Service Area Review guidelines.

OHLONE COLLEGE
Math, Sciences & Technology Division

Comparison of Ohlone's AS Degree in Computer Engineering Core Courses with Lower Division Courses at Local Transfer Universities

Articulation information obtained from: <http://www.assist.org/>

Lower Division Core Courses in Baccalaureate Programs
in Computer Engineering (San Francisco Bay Area Public Universities)

Course Description	Ohlone College	CSUEB	SJSU	UCD	UCB	UCSD
	Required Core Courses for A.S. Degree	California State Univ., East Bay	San Jose State University	University of California, Davis	University of California, Berkeley	University of California, San Diego
CS1 Intro to Prg.	CS 102	CS 1160		Eng CS 30		
Intro to CS w/ Java	CS 170					CSE 11
Struc & Interp of Cp Prg					CompSci 61A ³	
Discrete Math	CS 113/Math 163	Math 2150	Math 42	Eng CS 20	Math 55	CSE 20
OOP	CS 116	CS 2360	CMPE 46	Eng CS 40		
ASM and Arch	CS 118	CS 2430		Eng CS 50		CSE 30
Machine Structure					CompSci 61C ⁴	
Math for Alg & Sys						CSE 21
CS2 Data Structures	CS 124				CompSci 61B ⁵	CSE 12
Intro to Engineering	ENGI 101 ⁸					
Intro to Engineering			ENGR 10 ⁸			
Fund of EE I						ECE 53A
Fund of EE II						ECE 53B
Design & Graphics	ENGI 115		ME 20			
Struc & Interp of SysSig					EL ENG 20N	
Intro EE Lab/Circuits	ENGI 130		EE 97/EE 98	ENGIN 17	EL ENG 40	
Intro to Materials	ENGI 140		MATE 25			
Calc 1	Math 101A	Math 1304	Math 30	Math 21A	Math 1A	Math 20A
Calc 2	Math 101B	Math 1305	Math 31	Math 21B	Math 1B	Math 20B
Calc 3	Math 101C	Math 2304	Math 32	Math 21C/21D	Math 53	Math 20C
Linear Algebra	Math 103	Math 2101	Math 129A	Math 22A	Math 54 ⁷	Math 20F
Differential Equ.	Math 104		Math 133A	Math 22B	Math 54 ⁷	Math 20D
Introductory Physics	Phys 121	PHYS 2702				
Physics/Mechanics	Phys 140		Phys 50	Phys 9A ¹	PHYSICS 7A	Phys 2A
Physics/Elec & Mag	Phys 141		Phys 51	Phys 9C	PHYSICS 7B	Phys 2B
Physics/Heat & Light	Phys 142		Phys 52	Phys 9B ²	PHYSICS 7C	Phys 2C
Chemistry	Chem 101A		Chem 1A	Chem 2A		
Composition	ENGL 101A				ENGLISH R1A	
Composition/Lit.	ENGL 101B		ENGL 1B	ENGLISH 3	ENGLISH R1B ⁶	
Intro to Public Speaking	SPCH 101			COMUNCN 1		

Notes:

1. Articulation with Phys 9A requires that both Phys 140 and 142 be taken.
2. Articulation with Phys 9B requires that both Phys 140 and 142 be taken.
3. CompSci 61A requires use of a functional language (i.e. a LISP interpreter)
4. CompSci 61C requires advanced topics such as cache design and virtual memory
5. CompSci 61B requires CS116 as well as CS124 (this occurs naturally since 116 is a prerequisite of 124)
6. English R1B required beginning Fall 2005
7. UCB requires both Math 103 and 104 to articulate to Math 54
8. Ohlone's ENGI 101 is not articulated with SJSU ENGR 10