

**To:** Student Success and Institutional Collaboration Subcommittee

**From:** Joint Boards Articulation Commission (JBAC)

**Prepared by:** Donna Lewelling, Academic & Student Affairs Policy Specialist

**Subject:** Associate of Science/Oregon Transfer Degree in Computer Science (AS/OT-CS)

**Issue before the Committee:** Review of newly proposed statewide degree in Computer Science.

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**Background:** A committee was formed by the Oregon Council of Computer Chairs (OCCC) with support from Oregon University System Staff to develop, approve and implement the offering of the degree requirements leading to a statewide AS/OT-CS.

The development of the degree was motivated by several factors including but not limited to:

- The passage of Oregon HB2970 (2013) relating to the “Transfer Student Bill of Rights and Responsibilities”;
- Student financial aid issues when Computer Science (CS) transfer is not part of a specific degree program, when students pass 2 year credit caps, financial aid cannot be used to pay for CS transfer classes;
- Advising issues related to large number of specific community college to University pathways and no specific degrees other than Associate of Arts Oregon Transfer (AAOT) at many community colleges;
- Program evaluation issues; need to show degree 2 year completion where CS transfer does not generally have a specific catalog degree; and
- Improve curriculum coordination, sharing and access for lower division CS courses statewide.

The work related to this effort was started, but not completed in 2003 as individual articulations were seen as working well enough at the time by the OCCC. In 2011-2012 OCCC started work on statewide inventory of lower division CS course outcomes and working toward common outcomes in select courses common to most programs. This led to renewed discussion of ASOT-CS.

The ASOT-CS concept presented to the provosts council of the regional/technical schools in fall 2013. The Provosts Council supported the work and set this as one of 4 statewide Engineering and Technology Industry Council (ETIC) program goals for the regionals.

During the fall 2013 OCCC meeting, a subcommittee was formed and began having bi-monthly conference calls in mid-January 2014. Additional meetings were held to draft the AS/OT-CS for JBACs consideration. JBAC first reviewed the AS/OT-CS in April of 2014 and provided guidance at its April and October 2014 meetings. The OCCC was responsive in gathering the information requested by JBAC and as a result JBAC voted electronically (via email) to adopt the AS/OT-CS and referral of the proposed degree to the Higher Education Coordinating Commission’s (HECC) Student Success and Institutional Collaboration Subcommittee (SSIC).

The following pages include these documents:

- An overview of the degree to be included in the Oregon Community College Handbook
- Overview of Need and Coordination Efforts in Establishing the AS/OT-CS
- Requirements and courses to fulfill those requirements
- List of letters/correspondence in support of AS/OT-CS.

**Recommendation:** The JBAC recommends that the SSIC approve the AS/OT-CS for referral to the HECC for consideration of approval and adoption.

11/5/2014 Draft  
ASSOCIATE OF SCIENCE/OREGON TRANSFER  
COMPUTER SCIENCE (AS/OT-CS)  
*(To be included in the Oregon Community College Handbook)*

" 'Associate of Science' is defined as a state approved associate degree that is intended to prepare students to transfer into an upper division baccalaureate degree program in such areas as Business, Science, Mathematics and Engineering. The Associate of Science degree is often designed to meet the requirements of a specific receiving institution." [OAR 589-006-0050\(8\)](#)

Any student who holds an Oregon community college Associate of Science/Oregon Transfer degree in Computer Science (AS/OT-CS) that conforms to the guidelines set forth below, and who transfers to one of the Oregon public universities, will have met the lower division general education requirements of that university.

GPA and course requirements for entry into the major are not necessarily satisfied by the AS/OT-CS degree. Once admitted to the university and computer science program, students transferring under this agreement will have junior standing for both the computer science major and university registration purposes.

Adopted by Joint Boards Articulation Commission November 2014  
Approved Higher Education Coordinating Commission (TBD - expected December 2014)

### **Background and Intent**

The AS/OT-CS (Associate of Science Oregon Transfer) degree was created in 2013-2014 through collaboration between members of Oregon Council of Computer Chairs (OCCC) which includes Oregon community college faculty and administration, and Oregon public university computer science chairs and faculty. This built upon work originally started in 2002 to begin an exploration of offering statewide Associate of Science transfer degrees. Like the AAOT (Associate of Arts Oregon Transfer degree) the intention is to recognize lower division coursework, but in this case coursework taken by students intending to major in Computer science. Students and advisors should be aware of the opportunities created by the AS/OT-CS, but should also be mindful of its limitations, as summarized in the explanatory notes that follow the description of the degree itself.

Any student having the Associate of Science/Oregon Transfer - Computer science (AS/OT-CS) degree recognized on an official Oregon college transcript will have met the lower division general education requirements of baccalaureate degree programs of any Oregon public university institution.

Students transferring under this agreement will have junior status for registration purposes. Course, class standing, or GPA requirements for specific majors, departments, or schools are not necessarily satisfied by an AS/OT-CS degree.

### **General Guidelines**

A student must complete a total of 90 quarter credits or more to be awarded the AS/OT-CS. All courses should be aligned with the student's intended program of study and the degree requirements of the baccalaureate institution and program to which the student plans to transfer. A student is encouraged to work with an advisor in the selection of elective courses within the AS/OT-CS degree for alignment to the institution the student intends to transfer.

All Foundational Requirements and Discipline Studies courses must be a minimum of 3 credits, except for Health/Wellness/Fitness courses, which may be any number of credits. All Elective courses may be any number of credits.

All courses must be passed with a grade of "C-" or better. Students must have a minimum cumulative GPA of 2.0 at the time the AS/OT-CS is awarded. (note: many CS programs have competitive admission, minimum GPA and grades will not generally be high enough to gain admission to competitive programs)

### **Foundational requirements**

- *Writing:* Students taking writing courses of three credits each must take WR121, WR122, and WR227. Students taking writing classes of four credits each must take WR121 and either WR122 or WR227. Information Literacy will be included in the writing requirement. (Note: WR227 will meet additional requirements at some CS baccalaureate programs)
- *Oral Communication:* One course in the fundamentals of speech or communication designated by the college as meeting the statewide criteria for speech communication.
- *Mathematics:* Must include at minimum Mth251 Differential Calculus and Mth252 Integral Calculus.

### **Discipline Studies**

- *Arts and Letters:* Three courses chosen from two or more disciplines.
- *Social Sciences:* Four courses chosen from two or more disciplines.
- *Science/Math/Computer Science:* Four courses from at least two disciplines including at least three laboratory courses in biological and/or physical science (1. see program specific requirements as some programs require physics; 2. note that the CS and Math core required courses will meet the requirement for 1 of the 4 required courses, so normally only 3 science courses outside of CS/Math are needed)
- *Cultural Literacy:* Students must select one course from any of the discipline studies that is designated as meeting the statewide criteria for cultural literacy.

### **Computer Science specific requirements**

A minimum of sixteen credits in Computer science consisting of the following courses. Each course in this section must be completed with a grade of "C" or better (note: many CS programs have competitive admission, minimum GPA and grades will not generally be high enough to gain admission to competitive programs).

Required courses are:

- CS 160: Introduction to Computer Science
- CS 161: Computer Science 1
- CS 162: Computer Science 2
- CS 260: Data Structures

## Electives

Complete additional courses to bring the total number of credits to at least 90; varies depending on the student's selection of courses to meet the requirements above. Please carefully plan this in consultation with university specific CS program requirements. A current guide for university specific, lower division CS requirements is maintained at <http://occcwiki.org> or consult with an advisor from the target university program.

Lower division courses taken at the community college may not meet the requirements of an upper division course with a similar title and content offered by an Oregon public university Computer Science program. In such cases, the courses in question will normally transfer as electives. The AS/OT-CS degree may include up to 12 approved professional/technical credits as electives.

## Notes & clarifications

[The following notes are not intended to be part of the "Guidelines" (above) but, rather, serve to clarify them for participating institutions.]

1. Community colleges may not add graduation requirements at the local level. The total credits should not exceed the number required to meet these course requirements within the college's credit structure.
2. Writing courses must meet the specific course outcomes as identified by Oregon Writing and English Advisory Council. In addition, the group of courses that is sufficient for meeting this requirement must, together, provide all of the content recommended by the Oregon Writing and English Advisory Committee (OWEAC), including a research component. Further information can be found at [OWEAC](#).
3. Although they are important in terms of preparation, courses that are developmental in nature are designed to prepare students for college-level work and are not counted in the 90 quarter hours required for the AS/OT-CS. However, it is recommended that students and advisors note that grades earned in developmental courses will likely count in the cumulative grade point average (GPA) at the community college. It is also advised to work early with the receiving 4-year institution and determine what policy/practice is in place in calculating cumulative GPA upon transfer (since developmental courses will not transfer).
4. The "Foundational Requirements" above represent minimal skill competencies. As such, they may be open to demonstration of competency. Each community college is encouraged to establish how students may demonstrate competency in lieu of completing the course(s).
5. Computer Science courses used in the Science/Math/Computer Science area must meet Oregon Council of Computer Chairs criteria for a science course. See list of courses at ([Oregon Council of](#)

[Computer Chairs](#)). Math courses listed in the Science/Math/Computer Science area must meet the outcomes and criteria for Mathematics. These can be found in [Appendix K](#).

6. All Foundational Requirement courses and Discipline Studies courses must meet the statewide outcomes and criteria for the specific area. These can be found in [Appendix K](#).
7. The second year of a foreign language, but not the first year, may be included among courses that count toward the Arts and Letters requirement. American Sign Language (ASL) is considered a foreign language.
8. WR 115 may be included in the AS/OT-CS degree as an elective providing that the WR 115 course at the community college has been approved by the Department of Community Colleges and Workforce Development as meeting statewide learning outcomes for the course.
9. The principal advantage of the AS/OT-CS is that it fulfills the lower-division (freshman / sophomore) General Education requirements for baccalaureate degrees at all Oregon public university institutions. It does not necessarily meet all of the degree requirements that an Oregon public university institution might have beyond the requirements for majors. The AS/OT-CS guarantees that all General Education credits that a student earned will be accepted as the General Education requirements at the receiving institution.
10. Students may also be able to use AS/OT-CS general education courses to meet certain lower-division requirements in their intended major. Students who intend to major in Computer Science and also wish to maximize the amount of AS/OT-CS coursework that will count toward graduation, should work closely with an academic adviser and make use of the ATLAS system when designing their AS/OT-CS degrees. General transfer information is available at: <http://www.Oregonpublicuniversity.edu/stucoun/prospstu/transfer.php>
11. Because the amount of coursework required for an AS/OT-CS degree corresponds to two academic years, degree recipients are considered juniors for purposes of registration at an Oregon University System institution. Students should keep in mind, however, that the AS/OT-CS does not guarantee that two additional years will suffice to earn a baccalaureate degree. That is because the AS/OT-CS does not give students junior-standing in their majors. Neither does it guarantee entrance into a competitive major; minimum GPA and grades will not generally be high enough to gain admission to competitive programs. Students may need to take additional introductory work to prepare for certain majors and should check with an advisor regarding availability at their local community colleges.
12. Students and academic advisers should recognize that although the AS/OT-CS provides an excellent structure for many students intending on pursuing a computer science 4 year degree, it is not ideal for everyone. Students should consult closely with a computer science advisor at both their community college and the 4-year transfer institution.
13. All courses must be passed with a C- or better. If a course is taken as a P/NP and the student receives a "Pass" ("P"), it is considered equivalent to a C- or better at all Oregon community colleges. However, it is recommended that students take courses for a letter grade and not P/NP.

14. For purposes of the Oregon AS/OT-CS degree, no student with a disability shall be denied the degree or the benefits flowing there with respect to admission and matriculation at a state university because the student has been granted an academic adjustment or program modification in any course required for the AS/OT-CS degree. This provision includes course substitutions when granted as a disability accommodation in the manner prescribed by the student's community college. This provision may not necessarily apply to major specific course requirements or prerequisites.

Oregon Community Colleges will consider a course substitution request on a case-by-case basis, based on the student's disability as determined by documentation as long as there is no substantial change to the course learning outcomes. Before considering a course substitution, assistive technology, tutoring, or other reasonable accommodations will be considered in an effort to enable the student to succeed in standard course work. However, nothing in these guidelines should be interpreted as requiring the student to attempt and fail a standard course, including one made more accessible through reasonable accommodation, before consideration will be given to a request for course substitution. A course substitution will not automatically be made simply because the student has documentation of a disability impacting a particular area of academics. Requesting a course substitution should follow the process listed below.

- The student must request a disability-related course substitution through the designated Disability Services representative and provide appropriate documentation.
- The Disability Services Office will contact the vice president or college designee to determine whether the substitution course would result in a substantial change in the course learning outcomes.
- If the substitution would result in a substantial change in the course learning outcomes, the substitution will be denied.

If the substitution does not result in a substantial change in the course learning outcomes it will be approved.

**Computer Science transfer specific notes:**

- *Computer Science, Pro School/Program Admission:* Admission to Computer Science or Professional school/program of any Oregon public university institution is not guaranteed upon completion of the Associate of Science/Oregon Transfer in Computer Science (AS/OT-CS) degree. It is strongly recommended that students contact the specific Oregon public university campus' Computer Science school/program early in the first year of their AS/OT-CS program to be advised about additional requirements and procedures for admission consideration to the Oregon public university institution and the Computer Science school/program.

**Approval process**

All colleges are pre-approved to offer this degree

## Overview of Need and Coordination Efforts in Establishing the AS/OT – CS

### 1. Identify the institutions participating and the full title of the degree.

Institutions: Oregon's community colleges and public universities. Potential for the degree to be adopted by Oregon private institutions offering computer science also exists. See attached letters of support from the statewide Provosts Council, the community college Council of Institutional Administrators, Oregon Council of Computing Chairs, and industry partners.

Title: Associate of Science/Oregon Transfer Degree-Computer Science.

### 2. Describe the purpose and relationship of the proposed degree to statewide initiatives and goals.

The primary purpose of the degree is to enable seamless transition between Oregon community colleges and Oregon universities for students studying computer science through creation of a streamlined degree pathway. Secondary purposes of the degree include promoting visibility of computer science as a degree program and career pathway at community colleges, increase access to computer science baccalaureate instruction to students throughout the state, and to help with financial aid issues for community college students.

Currently, many community college students intending to transfer into a program in computer science, pursue a general transfer degree (AAOT) and then take the math, computer science and other courses they need to finish lower division university program requirements. A defined CS transfer degree is needed to increase the success of these transfer students by clearly laying out a program of study with the correct coursework needed to successfully transfer in an efficient, affordable manner, and to increase access for these students to financial aid throughout their time at the community college.

The proposed degree responds directly to HB 2970, which directs the State to develop standards for transfer degree programs in specific areas of study, including those in technology disciplines.

### 3. Describe the partnership between the community colleges and universities in developing the degree. How will implementation be coordinated?

AS/OT-CS (Associate of Science Oregon Transfer degree in Computer Science) was designed in 2013-2014 through collaboration between members of Oregon Council of Computing Chairs (OCCC) which includes Oregon community college faculty and administration and Oregon public university computer science chairs and faculty. The proposed degree builds upon work originally started in 2002 to explore offering statewide Associate of Science degrees. Like the AAOT (Associate of Arts Oregon Transfer degree), the intention is to recognize lower division coursework and enable smooth transfer of students to junior level at the university--in this case for students majoring in computer science.

OCCC will assume the lead role in coordinating the implementation of the degree, will maintain current advising materials for program advisors, and a course access list showing courses and schools offering online lower division CS courses to improve access to students at smaller/rural community colleges. OCCC will also take responsibility for shared course numbers, course descriptions and learning outcomes for the CS core courses in the proposed program. These materials will be made available on the OCCC web site (<http://occcwiki.org>).

**4. What evidence of need does the group have to support the need for the proposed statewide degree?**

Computer Science is an area of critical workforce shortage in Oregon, in many employment sectors. Employers cite the need for more computer scientists and software professionals, at many levels. See attached support letters from industry partners offering initial support for this proposal.

**5. Are there similar degrees in the state? If so, how does the proposed degree supplement, complement, or collaborate with those degrees?**

The program is modeled upon the existing Associate of Science/Oregon Transfer degree in Business, originally approved in 2001. The AS/OT-CS complements that degree as a second statewide Associate of Science transfer degree, pursuant to HB 2970, for students in the field of computer science.

The proposed degree supplements the Associate of Arts Oregon Transfer degree, defining a set of advanced mathematics, science and computer science courses needed for successful baccalaureate study in computer science at the state's public universities.

Establishing a statewide AS/OT-CS degree will enable students at Oregon community colleges to transfer smoothly to any of the state's public universities in computer science. Each community college will not need to articulate CS transfer degrees with each of the 7 different public universities.

There are no other similar state wide degrees, although some community colleges offer transfer associates of science degrees that are articulated with a particular university partner. Some of these degrees that are highly specialized for particular university programs will likely remain as alternatives to the general AS/OT-CS. However, the AS/OT-CS will ensure that 17 community colleges do not each need to separately articulate general CS transfer degrees with each of the 7 different universities and their various computer science programs.

**6. What new resources will be needed initially and on a recurring basis to implement the degree? How will the institutions provide these resources? What efficiencies or revenue enhancements are achieved with this degree, including consolidation or elimination of programs over time, if any?**

Many community colleges already offer the courses required by the AS/OT-CS. Those that do not offer all of the courses, offer all of the general education courses, and some of the math and computer science courses, so the implementation is manageable for most schools. Through online offerings at the different community colleges, it is expected that students would have access to all the courses they need to complete this degree either solely at one school or with some supplemental online courses at another community college. With OCCC coordinating the implementation of this degree, better lower division curriculum coordination will result via shared learning outcomes, curriculum materials, course access listings, advising materials, and semi-annual coordination meetings.

## Associate of Science/Oregon Transfer Degree in Computer Science

Requirements		Courses which satisfy requirements
<b>General Requirements</b>		<b>Note: All general and discipline courses must be completed with a grade of “C-” or better</b>
<b>Writing:</b> A minimum of 8 credits of college-transfer writing courses.	8 credits minimum	WR121, 122 or 227
<b>Oral Communication:</b> One course in the fundamentals of speech or communication	1 course	AAOT/ASOT approved courses (each CC to list specific allowed course numbers)
<b>Mathematics:</b> (Some universities require additional math courses, see electives/university specific requirements on page 2)	2 courses	MTH251 and MTH252
<b>Health/Wellness/Fitness:</b>		<b>One course from HE 242, 250, 254, HPE 295, or three PE courses (not including PE10, 199 or 299)</b>
<b>Discipline Studies</b>		Note: Courses used to meet these requirements must be at least 3 credits each.
<b>Arts and Letters:</b> Three chosen from at least two disciplines. Each course must be a minimum of 3 credits.	3 courses	AAOT/ASOT approved courses (each CC to list specific allowed course numbers)
<b>Social Sciences:</b> Four courses chosen from two or more disciplines, with a minimum of two courses in "principles of economics" (to include microeconomics and macroeconomics) at the 200 level. The Each course must be a minimum of 3 credits.	4 courses	AAOT/ASOT approved courses (each CC to list specific allowed course numbers)
<b>Sciences</b> (Three courses that must be laboratory courses In biological and/or physical science)	3 courses	<b>Choose at least three courses from:</b> AAOT/ASOT approved courses (each CC to list specific allowed course numbers)
<b>Cultural Literacy</b> The course used to meet cultural literacy may also be used to meet arts & letters, social science or science requirement if the course is listed in both sections. Students may <b>not</b> count the credits twice toward completion of the 90 credits required for the degree. Course must be completed summer term 2010 or later.	1 course	AAOT/ASOT approved courses (each CC to list specific allowed course numbers)
<b>Computer Science: common core requirements</b>		<b>All courses here must be completed with a grade of “C” or better</b>
<b>Computer Science-Specific Requirements:</b> Note: Each course in this section must be completed with a grade of “C” or better (“B” or better for SOU). (Some universities may expect additional courses, see electives/university specific requirements below)	4 courses	<b>CS160: Computational Thinking</b> (or high school AP CS Principles exam with score above approved level) <b>CS161: Computer Science 1</b> <b>CS162: Computer Science 2</b> <b>CS260: Data Structures</b>
<b>Electives and/or University-Specific Prerequisites</b> Electives should be taken to meet the requirements of your transfer institution. See your advisor for assistance.	Fill out remaining credits to 90+	Depends on choice of transfer institution. Articulation guide and school specific classes listed on page 2. Be sure to discuss with an advisor.
<b>Additional graduation requirements</b>		
<b>Grand Total Credits:</b> For students graduating from high school 1997 or later, OUS has a second language admission requirement: two terms of college-level language with a grade of “C-” or above, OR two years of the same high school-level second language with an average grade of “C-” or above. ASL will meet this requirement.	90+	A maximum of 12 credit hours in career and technical education courses numbered 050 or higher may be included, with the exception of the following: <b>BT</b> 104, 105; <b>COM</b> 051, 052, 053; <b>MTH</b> 052 through 095; <b>RD</b> 080, 090; <b>SSP</b> 050A,B, C; <b>SSP</b> 051; <b>WR</b> 0080, 90, 091. Students must earn a minimum of <X> credits from <CC name>.

## University program advising guide

Note: below are program specific, lower division BA/BS graduation requirements and program notes. These are not ASOT-CS graduation requirements. See <http://occcwiki.org> for details and regularly updated university specific information. Numbers shown are common community college numbers unless otherwise noted.

BA/BS lower division graduation requirements	University notes
Eastern Oregon University	BS Computer Science
<ul style="list-style-type: none"> <li>● CS133x (C/C++)</li> <li>● Mth231</li> </ul>	<a href="http://cs.eou.edu/">http://cs.eou.edu/</a>
Oregon State University	BS Computer Science
<p>All CS/IS applicants:</p> <ul style="list-style-type: none"> <li>● If you take WR227 instead of WR122 you will also need to take WR214 (The WR227 will transfer in as WR327)</li> <li>● CS275: Database Systems</li> <li>● Mth 231 &amp; 232 (to satisfy 231 at OSU)</li> </ul> <p>Applied CS Option extra requirements:</p> <ul style="list-style-type: none"> <li>● CS271</li> </ul> <p>Information Systems Option extra requirements:</p> <ul style="list-style-type: none"> <li>● CS271, Econ 201</li> </ul> <p>Systems Option extra requirements:</p> <ul style="list-style-type: none"> <li>● Mth 254, Mth306, Ph 211/221, ECE271</li> </ul>	<p>1) To become a CS major at OSU you must be admitted to ProSchool in addition to being admitted to the university. ProSchool admissions is GPA based (cutoff depends on capacity and number of applicants) and requires that you have completed the <b>OSU</b> core degree requirements. Applications are due July 1st for Fall term admission.</p> <p><a href="http://eecs.oregonstate.edu/undergraduate-students/pro-school">http://eecs.oregonstate.edu/undergraduate-students/pro-school</a></p>
Oregon Institute of Technology	BS Software Engineering Technology
<ul style="list-style-type: none"> <li>● Take both WR122 and WR227</li> <li>● Mth254</li> <li>● CST136 OOP (CS261 at PCC)</li> <li>● PSY201 for social science</li> <li>● Can transfer in CS271 and CS275 for needed credits</li> </ul>	<p>1) Physics with Calculus required for science sequence 2) Math253 will be used as one of three technical elective courses 3) Course in Discrete Math or Discrete Structures</p> <p><a href="http://www.oit.edu/academics/degrees/software-engineering-technology">www.oit.edu/academics/degrees/software-engineering-technology</a></p>
Portland State University	BS Computer Science
<ul style="list-style-type: none"> <li>● CS201, CS202 (CS261 at PCC),</li> <li>● CS250, CS 251 (discrete math at PSU)</li> <li>● Mth253, WR227, SP111</li> <li>● Science courses must consist of an approved sequence of lab science courses. Choices are: Ph 211/212/213, Ch 221/222/223, or BI 211/212/253 (PSU numbers 251/252/253) each with appropriate labs.</li> </ul>	<p>1) To become a CS major at PSU you must be admitted to the CS program in addition to being admitted to the university. Admission to the major requires a 2.0 all-attempts GPA in the PSU CS core, a C- or better in other required lower division courses, as well as passing an in person programming proficiency exam. Fall applications to the major are due July 1st.</p> <p><a href="http://pdx.edu/computer-science/bachelor-of-science-program#admission">http://pdx.edu/computer-science/bachelor-of-science-program#admission</a></p>
Southern Oregon University	BS Computer Science
<ul style="list-style-type: none"> <li>● No additional lower division course requirements beyond ASOT-CS required courses</li> </ul>	<p>1) Must have grade of B or higher in CS161/CS162 (SOU CS256/CS257)</p> <p><a href="http://sou.edu/cs/index.html">http://sou.edu/cs/index.html</a></p>
University of Oregon	BS Computer Information Science
<ul style="list-style-type: none"> <li>● MTH 231 &amp; 232</li> <li>● Science courses must consist of an approved sequence of lab science courses. Choices are: PH 211/212/213, CH 221/222/223, or BI 211/212/213</li> <li>● Recommend two of following: MTH 233, 253, 261</li> <li>● Recommend taking all three writing classes</li> </ul>	<p>1) Must have grade of B or higher in CS 161, CS 162, &amp; CS 260 2) MTH 231 &amp; 232 are prerequisites for most 300 level CS courses 3) Take a course in Java, if CS 161/162/CS260 is in another language.</p> <p><a href="http://cs.uoregon.edu/Education/Transfers.php">http://cs.uoregon.edu/Education/Transfers.php</a></p>
Western Oregon University	BS Computer Science, BS Information Systems
<ul style="list-style-type: none"> <li>● CS133x or CS233x or CS234x or CS262: Programming language*</li> <li>● CS271: Computer Organization</li> </ul>	<p>* Take a course in Java, if CS161-162 is in another language, otherwise any 2<sup>nd</sup> language in different programming paradigm from CS161-162 <a href="http://www.wou.edu/las/cs/">http://www.wou.edu/las/cs/</a></p>

**Changes from the 2009 revised AAOT:**

- This degree will meet all of the revised AAOT requirements, with some area specified courses
- Math requirements modified to require both Mth251 and Mth252
- CS requirements added, a sequence of four core classes: CS160, CS161, CS162, CS260
- “Science/Math/CS” AAOT is reduced to “Science” with a three class lab sequence, as ASOT-CS students will have several CS & Math courses that meet the 4th course requirement

**Student resource guide for locating online articulated courses:**

Online courses available at these community colleges; students attending other community colleges may enroll in these online courses to help fulfill university specific requirements. Please consult with the specific Community College for terms and availability of these online courses.

Core courses and electives	Generally offered online at these CCs
CS133x, CS233x, CS234x	PCC, Chemeketa
CS160 Computational Thinking	PCC, Chemeketa, Lane, Umpqua, Treasure Valley
CS161 Computer Science I	PCC, Chemeketa, Lane, Mount Hood, Umpqua
CS162 Computer Science II	PCC, Chemeketa, Lane, Mount Hood, Umpqua
CS201 (PSU)	PCC
CS261 (PSU CS202)	PCC
CS250 (PSU)	PCC
CS251 (PSU)	PCC
CS260 Data Structures	PCC, Lane, Umpqua
CS271 Computer Architecture	
MTH231 Discrete Math 1	
MTH232 Discrete Math 2	

Note on discrete math requirements: Some schools teach these courses in the CS program as CS prefixed classes (PSU, PCC) while others teach this out of math programs (MTH231 & 232). These currently articulate both ways, but students should contact an undergraduate advisor at the selected university for current articulation of these courses.

## NOTES AND CLARIFICATIONS

### University-Specific Prerequisites and Recommendations

See attached list. Please note: This list of prerequisites and recommendations is subject to change without notice.

### Computer Science, Pro School/Program Admission

Admission to Computer Science or Professional school/program of any Oregon University System (OUS) institution is not guaranteed upon completion of the Associate of Science/Oregon Transfer in Computer Science (AS/OT-CS) degree. It is strongly recommended that students contact the specific OUS campus' Computer Science school/program early in the first year of their AS/OT-CS program to be advised about additional requirements and procedures for admission consideration to the OUS institution and the Computer Science school/program.

### Transfer Status

Any student who holds Associate of Science/Oregon Transfer in Computer Science (AS/OT-CS) degree that conforms to the guidelines set forth herein, and who transfers to any institution in the Oregon University System, will have met the lower-division general education requirements of that institution's baccalaureate degree programs. Students transferring with this degree will have junior standing for registration purposes.

For transfer students graduating from high school in 1997 and thereafter, the Oregon University System has a second language admission requirement: two terms of a college-level second language with an average grade of C- or above, OR two years of the same high school-level second language with an average grade of C- or above, OR satisfactory performance on an approved second language assessment of proficiency. Demonstrated proficiency in American Sign Language meets this second language admission requirement.

### Course and Elective Information

Lower-division courses taken at the community college may not meet the requirements of an upper-division course with a similar title and content offered by an Oregon University System Computer Science School/Program. In such cases, the courses in question will normally transfer as electives.

The AS/OT-CS degree may include up to 12 approved professional-technical credits as electives.

Courses that are developmental in nature, designed to prepare students for college transfer courses, are not applicable to this degree.

### Advising Guide Page

Courses listed on the advising guide page apply to meet university specific lower division general ed, computer science, and math requirements. These *may* also be used to meet the total credit and elective requirements of the ASOT-CS. This is a resource guide for student planning information, however, students should contact an undergraduate advisor at the target university for assistance meeting current university specific lower division CS requirements.

**List of Letters/Correspondence in Support of AS/OT – CS:**

1. Oregon Council of Computer Chairs
2. Oregon University Provosts Council
3. Oregon Community College Council of Instructional Administrators
4. Senator Michael Dembrow
5. Engineering and Technology Industry Council
6. Folium Partners
7. Feeney Wireless
8. Garmin
9. Rogue Valley Microdevices
10. MAPS Credit Union
11. Portland General Electric



October 30, 2014

Higher Education Coordinating Commission Address:  
775 Court Street NE  
Salem, OR 97301

I would like to offer my support of the proposed Associate of Science Oregon Transfer degree in Computer Science (ASOT-CS). The proposed degree program will enable seamless transition between Oregon's community colleges and Oregon's public universities for students studying computer science, a field where Oregon industry faces a critical workforce shortage.

This proposed program builds upon the course articulations already in place between many of Oregon's community colleges and our universities' computer science programs, and upon the transfer degree programs already in place in our state. As a focused transfer degree program, the ASOT-CS will improve the visibility of computer science as a degree and career pathway in Oregon. It will benefit students by increasing access to financial aid throughout the community college program, and by providing clear advising pathways to computer science baccalaureate programs at all of our state's public universities.

The increased access and clear pathways will give more opportunities for students to graduate and become successful employees at my company and in the state of Oregon. I look forward to the creation of such opportunities for both current and future students through the ASOT-CS degree.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Jessica L. Gomez", written in a cursive style.

Jessica L. Gomez  
President and CEO



Higher Education Coordinating Commission  
775 Court Street NE  
Salem, OR 97301

Dear Joint Boards Articulation Committee,

I would like to offer my support of the proposed Associate of Science Oregon Transfer degree in Computer Science (ASOT-CS). The proposed degree program will enable seamless transition between Oregon's community colleges and Oregon's public universities for students studying computer science, a field where Oregon industry faces a critical workforce shortage.

Oregon has the 4<sup>th</sup> largest concentration of application developers per capita of any state in the nation—10,800 Oregon developers with an economic impact of \$526 million. Computing jobs are also growing at 4.2x the state average. There are currently 8,004 open computing jobs in Oregon (not limited to application developers), yet there were only 374 computer science graduates in Oregon last year.

At Maps Credit Union, the last time we posted a job opening for a developer, we only received five applications in three months. Of those five applicants, none were qualified, and one would have required sponsoring an H-1B visa. We ultimately hired an out of state employee who works for us remotely. I support remote workers, but with computing jobs paying 75 percent more than the national median salary, it would be beneficial to Oregon's economy to educate more of these students and support the growth of these jobs in our state.

This proposed program will improve the visibility of computer science as a degree and career pathway in Oregon. It will benefit students by increasing access to financial aid throughout the community college program, and by providing clear advising pathways to computer science baccalaureate programs at public universities statewide. The increased access will give more opportunities for students to graduate and become successful employees at Maps Credit Union and in the state of Oregon. I look forward to the creation of such opportunities for both current and future students through the ASOT-CS degree.

Sincerely yours,



Loren Paulsen  
Software & Systems Development Manager  
Maps Credit Union





**Portland General Electric Company**  
121 SW Salmon Street • Portland, Oregon 97204  
503-464-8982 • Facsimile 503-464-2586

**James J. Piro**  
*President and CEO*

October 31, 2014

Dear Joint Boards Articulation Committee:

Established in 2013 by HB2636, Oregon's STEM Investment Council strongly supports the proposed Associate of Science Oregon Transfer degree in Computer Science (ASOT-CS).

As a Council comprised of industry leaders from across Oregon, we understand the importance of improving Science, Engineering, Technology and Mathematics education in our state and preparing our students for impactful careers. Computer science is a STEM field of study where Oregon industry faces a truly critical workforce shortage—not only in our technology firms, but in many industry sectors, at many levels.

The proposed ASOT-CS degree program will enable seamless transition between Oregon's community colleges and Oregon's public universities for students studying computer science. The program will provide clear advising and affordable pathways for students interested in baccalaureate study of this important discipline. We believe the proposed ASOT-CS will increase the number of students achieving baccalaureate computer science degrees, and that its implementation will help elevate the visibility of this important career field in our state-- to students in all regions of Oregon.

Our companies need more well-educated software professionals. We urge your timely approval of the ASOT-CS proposal, and support its implementation.

Sincerely,

A handwritten signature in blue ink that reads "Jim Piro". The signature is written in a cursive, flowing style.

Jim Piro  
Chair  
Oregon STEM Investment Council

Oregon Council of Computer Chairs  
C/O Umpqua Community College  
1140 College Drive  
Roseburg, OR 97470

October 28, 2014

To Whom It May Concern:

As the current chair of the Oregon Council of Computer Chairs (OCCC), I too would like to voice my strong support for the proposed Associate of Science Transfer degree in Computer Science (AS/OT-CS). I am excited to be part of the team that will implement this much-needed program via this statewide transfer degree.

I would also like to voice the unanimous support of the entire council for the degree as well. At our last meeting, a voice vote indicated that all attending members were in support of the degree. OCCC already manages the statewide common course numbering for CS/CIS for Oregon's community colleges, and manages the list of CS/CIS courses that count as non-lab science classes for the AAOT.

Once the AS/OT-CS is adopted, OCCC will manage shared guides for core CS course descriptions and outcomes, and manage regular (at least annually) updates to the elective block advising guides for each university's lower-division CS requirements that are in addition to the core CS requirements. OCCC will also maintain a listing of member schools that offer courses online to help with access for smaller/rural community colleges.

Further, the Umpqua Community College (UCC) is in the process of creating its own AS/OT-CS using the September 2014 draft as our guide and expects to begin offering the degree the Fall 2015 college year.

We support the creation of this degree because it supports employment in a high-wage, high-growth field that will additionally provide graduates with employment that offers good benefits and an excellent quality of life in a growing, challenging field.

Best regards,

John Blackwood, MS  
Associate Professor  
OCCC Chair 2014-15  
Office: 541.440.7686



Oregon  
University  
System

Office of the Chancellor  
P.O. Box 751  
Portland, OR 97207-0751  
PHONE (503) 725-5700  
FAX (503) 725-5709  
<http://www.ous.edu>

July 11, 2014

Dear Joint Boards Articulation Committee:

We, the undersigned Provosts of the Oregon Public Universities, support the proposed Associate of Science Oregon Transfer degree in Computer Science (ASOT-CS). Pursuant to HB 2970, the proposed degree program will enable seamless transition between Oregon's community colleges and Oregon's public universities for students studying computer science, a field where Oregon industry faces a critical workforce shortage.

This proposed program builds upon the course articulations already in place between many of Oregon's community colleges and our universities' computer science programs, and upon the transfer degree programs already in place in our state. As a focused transfer degree program, the ASOT-CS will improve the visibility of computer science as a degree and career pathway in Oregon. It will benefit students by increasing access to financial aid throughout the community college program, and by providing clear advising pathways to computer science baccalaureate programs at all of our state's public universities.

Our institutions will accept the credits that students earn in the ASOT-CS as approved, and recipients of this degree will be admitted to our universities with junior status, for purposes of enrollment. The ASOT-CS may not guarantee admission to specific CS programs, which have separate admissions requirements. We look forward to increased access to the study of computer science at our universities.

Sincerely yours,

Sona K. Andrews  
Provost & Vice President for Academic Affairs  
Portland State University

Scott L. Coltrane  
Provost & Senior Vice President  
University of Oregon

Sabah U. Randhawa  
Provost & Executive Vice President  
Oregon State University

Sarah E. Witte  
Interim Provost & Vice President for Academic Affairs  
Eastern Oregon University

Bradley D. Burda  
Provost & Vice President for Academic Affairs  
Oregon Institute of Technology

James M. Klein  
Provost & Vice President for Academic and Student Affairs  
Southern Oregon University

Stephen H. Scheck  
Vice President for Academic Affairs  
Western Oregon University

CC: Cathy Dyck, Vice Chancellor for Finance & Administration, Oregon University System  
Ben Cannon, Executive Director, Higher Education Coordinating Commission



Oregon  
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**Office of the Chancellor**

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<http://www.ous.edu>



# Clatsop Community College

October 14, 2014

Dear Joint Boards Articulation Committee:

We, the members of the Oregon Community College Council of Instructional Administrators, support the proposed Associate of Science Oregon Transfer degree in Computer Science (ASOT-CS). This proposed degree program will enable seamless transition between Oregon's community colleges and Oregon's public universities for students studying computer science, a field where Oregon industry faces a critical workforce shortage.

The community colleges are excited about this new degree because it will help students majoring in computer science to focus their course selections and streamline their path to the associate and, ultimately, the bachelor's degree. Eleven community colleges are considering offering the degree, with six of those planning to offer the degree within one year of its approval. This degree will increase access for community college graduates to the university and help the state move further towards its 40-40-20 goal.

Sincerely,

A handwritten signature in cursive script that reads "Donna Larson". The signature is written in black ink and is positioned below the word "Sincerely,".

Donna Larson, Ed.D., MT(ASCP)DLM  
Chair, Council of Instructional Administrators  
Vice President of Academic and Student Affairs  
Clatsop Community College

Dear HECC Commissioners:

In 2013 the Legislature passed HB 2970, a bill sponsored by the House Higher Education Committee that calls for the creation of a new Associates Degree of Engineering. It was crafted to address Oregon's need to increase the number of students receiving Bachelor's and Graduate degrees in Engineering as part of its "STEM" initiative. Many students who consider majoring in Engineering wind up dropping out and switching to other majors for a variety of reasons. On the other hand, students who major in Engineering at community colleges and transfer successfully tend to stick with it and complete. However, transfer in engineering is among the most difficult, with different university programs having very different requirements. If we can make it easier for students to transfer from community college engineering programs directly into university engineering programs without their having to take additional courses, it will create more certainty and a higher degree of success.

The bill called on the HECC to develop an Associates of Science Oregon Transfer Degree (ASOT) in Engineering, similar to the existing one in Business (ASOT-Business). The bill anticipated that the HECC would use its convening authority to bring together a group of faculty and administrators from the colleges and universities to address this need and find consensus on the elements that would be included in such a degree.

I was so delighted to learn that Oregon's Computer Science faculty have taken it upon themselves to tackle this problem directly. It's a tribute to their long-standing practice of working cooperatively. I applaud their proactive, collaborative approach and see this as a very positive step in the direction of more seamless transfer from CC programs to university programs. I hope that at some point they will be able to take it even further, so that all impediments to students' ability to move directly from one program to another (CC to university or university to university) will be effectively removed.

I hope you'll join me in supporting this work.

Sincerely,  
Michael E. Dembrow  
Senator, Oregon SD23

ETIC Endorsement of ASOT-CS – April 25

Goal: ETIC agrees to support the proposed Associate of Science Oregon Transfer degree in Computer Science. (ASOT-CS)

Proposed Outcome: A letter of support from ETIC is written, to be shared with the bodies responsible for reviewing/approving the ASOT-CS proposal.

*The ASOT-CS enables seamless transition between Oregon Community Colleges and Oregon Universities for students studying Computer Science.*

- Provides a recognized Computer Science degree at Oregon Community Colleges
  - Enables more students to receive financial aid for studying CS throughout their enrollment at Community Colleges
  - Enables students at Community Colleges to “see” CS as degree option
- Provides clear degree pathways for the study of Computer Science, for students throughout Oregon.
  - Enables cost-effective, timely completion of CS baccalaureate degree programs for students beginning their programs of study at community colleges.

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ASOT-CS proposal review schedule:

May 8: On agenda for OUS Provost’s Council and CC’s CIA (Council of Instructional Administrators). Approval by JBAC to follow Provost Council/CIA sign-off. JBAC to submit recommendation to the HECC, for final approval. Earliest implementation in catalogs: Fall 2015.

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## Another letter of support

1 message

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**Long, Juliet** <jlong@roguecc.edu>  
To: Mitchel Fry <frym@mail.wou.edu>

Wed, Oct 22, 2014 at 11:27 AM

**From:** John LEE [mailto:[john.lee@foliumpartners.com](mailto:john.lee@foliumpartners.com)]  
**Sent:** Wednesday, October 22, 2014 11:25 AM  
**To:** Long, Juliet  
**Subject:** Re: Quick favor?

Hi, Juliet—

Thanks for giving me an opportunity to express my excitement regarding the new 2-year transfer degree program for Computer Science students.

Oregon and other states are clamouring for entry-level knowledge workers. Here in southern Oregon, our small software startup company knows the difficulties of building a business without local access to this class of labor. The new transfer degree program ought to alleviate these problems and should provide a stable base of software engineers and web developers in the coming years.

The history of Silicon Valley clearly shows a heavy reliance on startup labor, which is often defined as younger, freshly degreed from local universities, and less expensive labor than the more experienced engineers. In using the transfer incentive to increase the flow of students into their own Computer Science tracts, our community colleges are making a smart bet—and this should pay off for our regional economies as graduates take their place in the workforce. Though the effects may not be fully measurable until the first decade passes, its conceivable that our CS Engineering diplomas statewide will double, making a noticeable dent in our need.

The US Bureau of Labor predicts that by 2022 there will be more than 300,000 new positions available in computer engineering, programming, network architecture, database administration, and web development. A simplified "portion" of that for our state means that we need to be training and graduating 750 additional tech-oriented students each year beginning this year. Even if we look just at our percentage of the national population, we must increase our qualified, hireable CS graduates in Oregon by nearly 470 per year.

It's an awesome assignment, and the collaboration that has resulted in your 2-into-4 program will surely be a strong part of the solution.

Congratulations for having accomplished this step. Everyone in tech startup communities around the state looks forward to seeing a well executed plan and a stream of qualified job candidates in the future.

Cheers,

John Lee

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John H. Lee, President

Folium Partners, Inc.

☎ Phone: [541.708.1364](tel:541.708.1364) | ✉ e-Mail [John.Lee@FoliumPartners.com](mailto:John.Lee@FoliumPartners.com)

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[www.feeneywireless.com](http://www.feeneywireless.com)

Higher Education Coordinating Commission Address:  
775 Court Street NE  
Salem, OR 97301

I would like to offer my support of the proposed Associate of Science Oregon Transfer degree in Computer Science (ASOT-CS). The proposed degree program will enable seamless transition between Oregon's community colleges and Oregon's public universities for students studying computer science, a field where Oregon industry faces a critical workforce shortage. As a rapidly growing company based in Eugene, we often struggle to fill open software development and engineering positions due to the lack of qualified candidates in the area. I know many other companies in Eugene face similar struggles.

This proposed program builds upon the course articulations already in place between many of Oregon's community colleges and our universities' computer science programs, and upon the transfer degree programs already in place in our state. As a focused transfer degree program, the ASOT-CS will improve the visibility of computer science as a degree and career pathway in Oregon. It will benefit students by increasing access to financial aid throughout the community college program, and by providing clear advising pathways to computer science baccalaureate programs at all of our state's public universities.

The increased access and clear pathways will give more opportunities for students to graduate and become successful employees at my company and in the state of Oregon. I look forward to the creation of such opportunities for both current and future students through the ASOT-CS degree.

Sincerely,

A handwritten signature in black ink, appearing to read 'Justin Bloom'.

**Justin Bloom**

Chief Technology Officer  
FW - PO Box 2549, Eugene, Oregon 97402  
Toll Free 1-800-683-4818  
(P) 541-685-9045 x1216  
(F) 541-284-0030  
(C) 541-337-3769  
(E) [jbloom@feeneywireless.com](mailto:jbloom@feeneywireless.com)  
[www.feeneywireless.com](http://www.feeneywireless.com)

October 24, 2014

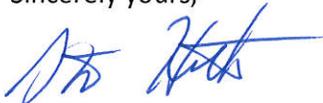
Higher Education Coordinating Commission Address:  
775 Court Street NE  
Salem, OR 97301

I would like to offer my support of the proposed Associate of Science Oregon Transfer degree in Computer Science (ASOT-CS). I have recruited Computer Science students as part of my role at Garmin for many years. The proposed degree program will enable seamless transition between Oregon's community colleges and Oregon's public universities for students studying computer science, a field where Oregon industry faces a critical workforce shortage.

I understand this proposed program builds upon the course articulations already in place between many of Oregon's community colleges and our universities' computer science programs, and upon the transfer degree programs already in place in our state. As a focused transfer degree program, the ASOT-CS will improve the visibility of computer science as a degree and career pathway in Oregon. It will benefit students by increasing access to financial aid throughout the community college program, and by providing clear advising pathways to computer science baccalaureate programs at all of our state's public universities.

The increased access and clear pathways will give more opportunities for students to graduate and become successful employees at my company and in the state of Oregon. I look forward to the creation of such opportunities for both current and future students through the ASOT-CS degree.

Sincerely yours,



Steve Horvath

Staff Software Engineer  
Garmin AT  
2345 Turner Rd.  
Salem OR 97302