State Board for Community and Technical Colleges
Program Proposal

Bachelor of Science
Computer Science

APPCONNECT NORTHWEST CONSORTIUM:

CASCADIA COLLEGE, CENTRALIA COLLEGE, EDMONDS COLLEGE, GREEN RIVER COLLEGE, LAKE WASHINGTON INSTITUTE OF TECHNOLOGY, RENTON TECHNICAL COLLEGE, SKAGIT VALLEY COLLEGE

TABLE OF CONTENTS

Cover Page — Program Proposal

Program Information

Institution Name: Cascadia College, Centralia College, Edmonds College, Green River College, Lake Washington Institute of Technology, Renton Technical College, and Skagit Valley College

Degree Name: Bachelor of Science in Computer Science

    CIP Code: 110701

Name(s) of existing technical associate degree(s) that will serve as the foundation for this program:

    Degree: Application Development AAS Centralia College

        CIP Code: 110201

        Year Began: 04/26/2018

    Degree: Computer Science AAS- Renton Technical College

        CIP Code: 110701

        Year Began: 08/01/2019

    Degree: Computing and Software Development AAS- Lake Washington Institute of Technology

        CIP Code: 110201

        Year Began: 09/26/2019

Proposed Start Implementation Date (i.e. Fall 2023):

Projected Enrollment (FTE) in Year One: 15 Students

Projected Enrollment (FTE) by Year Three: 100 Students

Funding Source: State FTE

Mode of Delivery

Multi Campus Delivery: Cascadia College, Centralia College, Edmonds College, Green River College, Lake Washington Institute of Technology, Renton Technical College, and Skagit Valley College

Distance Learning: Some courses may be hybrid, online, or in person.

Program Proposal

Contact Information (Academic Department Representative)

Name: Cherie Bachman - Lake Washington Institute of Technology

Title: Director of Industry Outreach

Address: 11605 132nd Ave NE Kirkland, WA 98034

Telephone: 425-739-8147

Email: cherie.bachman@LWTech.edu

Name: Joyce Hammer - Centralia College

Title: Vice President of Instruction

Address: 600 Centralia College Blvd, Centralia WA 98531

Telephone: 360-623-8486

Email: joyce.hammer@centralia.com

Name: Stefanie McIrvin, Ed.D - Renton Technical College

Title: Dean of Business & IT

Address: 3000 NE 4th St, Renton WA 98056

Telephone: 425-235-2352 ext. 5763

Email: smcirvin@rtc.edu

Name: Dr. Carey Shroyer - Edmonds College

Title: Dean of STEM

Address: 20000 68th Ave W, Lynnwood WA 98036

Telephone: 425-640-1626

Email: carey.schroyer@edmonds.edu

Name: Erik Tingelstad, Ed.D – Cascadia College

Title: Dean for Student Learning

Address: 18345 Campus Way NE, Bothell WA 98011

Telephone: 425-352-8277

Email: etingelstad@cascadia.edu

Name: Michael Wood - Green River College

Title: Information Technology Faculty and Division Chair

Address: 12401 SE 320TH St, Auburn WA 98092

Telephone: 253-833-9111 Ext. 6566

Email: mawood@greenriver.edu

Name: Lynette Bennett, Ed.D. – Skagit Valley College

Title: Dean for Instruction- Program Development

Address: 2405 East College Way, Mount Vernon WA 98273

Telephone: 360-416-7869

Email: lynette.benett@skagit.edu

Chief Academic Officers signature

The Program Proposal must be signed.

Tuấn Đang (Aug 12, 2022 11:25 PDT)

Chief Academic Officer, Lake Washington Institute of Technology

Date Aug 12, 2022

Chief Academic Officer, Centralia College
Date 8/11/2022

Delaney
Stephanie Delaney (Aug 12, 2022 09:23 PDT)

Chief Academic Officer, Renton Technical College

Date Aug 12, 2022

Kim Chapman
Kim Chapman (Aug 12, 2022 11:21 PDT)

Chief Academic Officer, Edmonds College

Date Aug 12, 2022

Eric Murray
Eric Murray (Aug 11, 2022 15:41 PDT)

Chief Academic Officer, Cascadia College

Date Aug 11, 2022

Rolita Flores Ezeonu (Aug 11, 2022 15:46 PDT)

Chief Academic Officer, Green River College

Date Aug 11, 2022

Chief Academic Officer, Skagit Valley College

Date Aug 11, 2022

Criteria 1

Curriculum demonstrates baccalaureate level rigor.

The curriculum for the Bachelor of Science in Computer Science (BSCS) has been developed by a group of faculty from seven community and technical colleges that make up the AppConnect NW consortium. The Program Learning Outcomes were built based on ABET requirements and a combination of technical and soft skills that faculty found valuable for students to be successful in their work post-graduation. Faculty leveraged lessons learned from BAS Software Development programs (successful with nearly 500 graduates, employed in various roles) and the Developing a Curriculum (DACUM) process that was conducted from industry and Washington Technology Industry Association (WTIA) to inform the curriculum development process.

The legislation authorizing the creation of BSCS degrees at Washington State Community and Technical Colleges begins with an equity-focus, "The legislature finds it essential that Washington students, **especially low-income students and students of color**, have the necessary credentials to secure the high-demand jobs of the future." (p. 1, emphasis added) It goes on to articulate the current uneven outcomes that these new degree programs are tasked with addressing. This curriculum incorporates design elements to mitigate entry barriers[1], improve retention[2], foster belonging[3], support career transition, and explicitly assess progress toward more equitable outcomes.

Utilizing the consortium as an advantage, the curriculum uses the unique programs each institution currently offers to provide students attending any of the colleges' broader options for their 15 credit BSCS emphasis. While we are not currently pursuing ABET accreditation, program outcomes align with ABET accreditation guidelines.

1. Program Learning Outcomes

Following the ABET Criteria for Accrediting Computing Programs, graduates of the program will have an ability to:
  1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

---

[1] Louise Ann Lyon and Jill Denner. 2017. Community colleges: a resource for increasing equity and inclusion in computer science education. Commun. ACM 60, 12 (December 2017), 24–26. https://doi.org/10.1145/3152914

[2] Petri Vesikivi, Minna Lakkala, Jaana Holvikivi & Hanni Muukkonen (2020) The impact of project-based learning curriculum on first-year retention, study experiences, and knowledge work competence, Research Papers in Education, 35:1, 64-81, DOI: 10.1080/02671522.2019.1677755

[3] Rebecca Bates, Jonathan Hardwick, Guarionex Salivia, and Lin Chase. 2022. A Project-Based Curriculum for Computer Science Situated to Serve Underrepresented Populations. In Proceedings of the 53rd ACM Technical Symposium on Computer Science Education V. 1 (SIGCSE 2022). Association for Computing Machinery, New York, NY, USA, 585–591. https://doi.org/10.1145/3478431.3499312

2. Using application of knowledge and skills acquired in the program, design, implement, test, evaluate and present a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed and equitable judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline including responding to feedback, handling ambiguity, and communicating with internal and external stakeholders.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

2. Program Evaluation Criteria and Process

While each institution in the consortium has their own process to assess faculty and courses, AppConnect NW will collaborate to determine the program's success as a whole. Success of the program will include growth in historically underserved students joining and completing the program, high retention rates, high completion rates, and high job placement rates. In order to assess this, the AppConnect NW colleges will be utilizing the following data:

- Total state and contract funded enrollments for the program
- Student FTE
- Faculty FTE
- Student/faculty ratio
- Student demographics (entering, after one year, and graduating)
- Course-level student success (Course Completion Rates)
- Employment and graduate school acceptance rates within 6 months of graduation
- Alumni participation in program activities

3. Course Preparation Needed to Enter the BSCS Program

The BSCS program allows for students to start at the first-year level, transfer in at the second-year level if they have previously completed a general studies associate degree, a degree from another field, or credit equivalent to an associate degree. Students can also transfer in at the third-year level if they have previously completed a computer science related associate degree. Students will meet with advisors to discuss their previous course history and determine which starting point best suits them.

Students Starting the Program at Year 1

To begin the program at Year 1, students need to have the following prerequisites are met:
- Placement into ENGL& 101
- Placement into Intermediate Algebra (MATH 09x)

Students Starting the Program at Year 2 (Transfer)

Students who have completed an general studies associate degree, such as the Associate of Arts (AA-DTA) or a degree that is not related to Computer Science, or the credit equivalent to an associate degree may begin the program at Year 2 as long as the following prerequisites are met either through their prior degree or by completing the courses before beginning Year 2:
- ENGL& 101 English Composition 1
- A second course in English composition (ENGL& 235 Technical Writing preferred)
- MATH& 141 Precalculus 1
- MATH& 142 Precalculus 2 or MATH& 146 Introduction to Statistics
- Humanities course (5 credits)
- Social Sciences course (5 credits)

Students Starting the Program at Year 3 (Transfer)

Students who have completed a Computer Science related associate degree, such as those listed in the table below, may begin the program at Year 3 as long as the following prerequisites are met either through their prior degree or by completing the courses before beginning Year 3:
- ENGL& 101 English Composition 1
- A second course in English composition (ENGL& 235 Technical Writing preferred)
- MATH& 141 Precalculus 1
- MATH& 142 Precalculus 2 or MATH& 146 Introduction to Statistics
- Humanities course (5 cr)
- Social Sciences course (5 cr)
- Natural Science course with lab (5 cr)
- A two- or three-course Introduction to Programming sequence
  - Two of the courses must be in the same programming language
  - The programming course sequence must have included object-oriented programming and elementary data structures concepts.
  - The grade earned for the last course in the sequence must be 2.5 or higher
  - The student may take a proctored placement exam to demonstrate proficiency if they have experience programming through other means or if the courses were completed over two years ago

If students have not taken the below courses, they can still enter at year three, but students shall complete the following courses within the first two quarters of their junior year:
- CS 243 Software Development Tools (3 cr)
- CS 296 CS Career Seminar (2 cr)

These courses must be completed before graduation:
- CS 170 Linear Algebra for Data Analysis (5 cr)
- CS 222 Computing, Data, and Society (5 cr)
- CS 233 Web and Database Programming (5 cr)

In Table 1 you will see the following degrees from the consortium meet the criteria to transfer into the Computer Science program:

Table 1: Degrees Transferable to BSCS

Degree	Schools
Associate in Computer Science DTA/MRP	Edmonds College, Green River College, LWTech, Renton Technical College, Skagit Valley College
Associate in Science - Transfer (AS-T) - Track 2 Computer Science	Cascadia College, Green River College, Edmonds College, Skagit Valley College
Computer Science AAS/AAS-T	Renton Technical College
Web Application Programming Technology AAS-T	Cascadia College
Application Development AAS	Centralia College
Multimedia, Web Developer AAS/AAS-T	Skagit Valley College
Computing and Software Development AAS-T	LWTech
Data Analytics and Software Development AAS-T	Green River College
Information Management and Data Science AAS	Skagit Valley College

Academic Credit for Prior Learning

As another avenue to recognize student knowledge and experience, the AppConnect NW consortium sees the value in prior learning and will encourage BSCS students to apply for Academic Credit for Prior Learning (ACPL) if their previous coursework, training, work experience, or military service warrants. Ideally, prior learning assessment would be done at the onset of their associate degree but if this hasn't been done it should be explored with their advisor and then the faculty coordinator upon admittance to the program. The AppConnect NW consortium recognizes the importance and relevance of ACPL and will make strides towards streamlining the process in making ACPL accessible for students.

The AppConnect NW consortium will seek to follow the recommendations made by the American Council on Education when evaluating military training and education records. The AppConnect NW consortium member colleges' Veterans Centers will help active and veteran military personnel initiate the process for ACPL.

Students may test out of certain specified courses by taking the final examination according to the individual school's policy. This Credit-by-Exam method is widely used. Some colleges in the consortium may allow students to receive credit through a Prior Experiential Learning Portfolio (PELP) program. This method is appropriate for persons who have acquired knowledge and skills in ways that are not covered by "traditional" tests and transcripts. While the review process for PELP is extensive, students will find faculty very helpful in completing the portfolio.

Each college has an established process for working with students that have requested credit for prior learning and documented experience. With a shared program such as this, there will be opportunity to discuss and identify specific courses that may align with industry-recognized certifications or experiences and how we could support experienced students who have the potential to accelerate through certain content.

Unique supports available at each college:

· 	Cascadia College: ACPL process will award up to 15 credits for a degree or certificate.

· 	Centralia College: Grants non-traditional credits on a case-by-case basis consistent with nontraditional credit requirements established by the Northwest Commission on colleges and Universities including;

- Credit by testing
- Advanced Placement
- Cambridge International
- International Baccalaureate
- Prior Experiential Learning
- Extra-Institutional Learning
- Course Challenges

· 	Edmonds College: The ACPL process validates students' previous knowledge and can reduce the number of courses a student needs to take.

· 	Green River College: A maximum of 25% of a program's course requirements may be earned through the ACPL process, which include prior learning experience, course challenges, and extra-institutional learning.

· 	Lake Washington Institute of Technology: Up to 25% of the credits for a degree or certificate may be earned through the ACPL process.

· 	Renton Technical College awards credits on a case-by-case basis including Advanced Placement, International Baccalaureate, and Course Challenges.

·   Skagit Valley College: A maximum of 30 credits for a degree or certificate may be earned through the ACPL process.

4. General Education Component

The BS Computer Science program requires 60 credits of general education coursework (out of a total 180 credits for the degree).

Table 2: General Education Requirements

Requirement	Credits
ENGL& 101 Composition 1	5
ENGL& 235 Technical Writing or a second course in composition	5
MATH& 141 Precalculus 1	5
MATH& 142 Precalculus 2 or MATH& 146 Introduction to Statistics	5
Humanities	5
Social Sciences	5
Natural Science with Lab (2 classes)	10
Natural Science: Introductory Programming Series CS 121 Introduction to Programming 1 CS 122 Introduction to Programming 2 CS 123 Introduction to Programming 3	15
General Education Electives: courses selected by the student from the Humanities, Social Sciences, Natural Sciences, or from the ICRC Handbook generally transferable list of courses	5
If a student has taken math courses at a higher level than MATH& 141 or MATH& 142, such as calculus coursework, they can use that coursework to fulfill the math requirements above.	
Five credits from the requirements above must be from courses designated as cultural/diversity courses.	
Total	60

5. Coursework needed at all levels in the baccalaureate program

The coursework listed below covers all four years of the degree. Students can enter the program at the first, second, and third year of the degree. Advisors at each institution will work with students to determine which entry point is the best fit for them in order to have all the coursework completed. The courses listed below meet ABET requirements for a Computer Science degree. A table to demonstrate the requirements and the courses that meet them can be found in Appendix A.

In hopes to create a more equitable curriculum, faculty decided to take a deeper look at math requirements for the BSCS degree. According to a March 15, 2022 article in Scientific American, it's time to "weed out the weed-out math classes" that are barriers to under-represented groups pursuing STEM degrees. Calculus is widely acknowledged as a barrier to under-represented students. Further, many question whether or not calculus is necessary to find success in computer science careers. Several of the faculty reached out to our professional network of people in computer science careers who affirmed that many of them do not use calculus in their work. Consequently, in order to design a program that can both prepare students for rewarding careers in computer science and broaden participation in computer science, this program will focus on math skills that are routinely used in computer science careers: discrete math, statistics and linear algebra. Students who want to pursue calculus as part of their BSCS degree are still able to complete this through choosing the calculus series as part of their electives. The required math sequence is reflected in the coursework below.

Year 1

Fall
- ENGL& 101 Composition 1 (5 cr)
- MATH 09x Pre-College Algebra (5 cr)
- CS 101 Introduction to Computer Science (5 cr)

Winter
- MATH& 141 Precalculus 1 (5 cr)
- Humanities (5 cr)
- CS course (academic planning / career planning / success course) (5 cr)

Spring
- MATH& 142 Precalculus 2 or MATH& 146 Introduction to Statistics (5 cr)
- Social Science (5 cr)
- ENGL& 235 Technical Writing (5 cr)

Year 2

Fall
- CS 121 Introduction to Programming 1 (5 cr)
- CS 170 Linear Algebra for Data Analysis (5 cr)
- Natural Science with Lab 1 (5 cr)

Winter
- CS 122 Introduction to Programming 2 (5 cr)
- CS 222 Computing, Data, and Society (5 cr)
- Natural Science with Lab 2 (5 cr)

Spring
- CS 123 Introduction to Programming 3 (5 cr)
- CS 233 Web and Database Programming (5 cr)
- CS 243 Software Development Tools (3 cr)
- CS 296 CS Career Seminar (2 cr)

Year 3

Fall
- CS 301 Foundations of Computer Science (leveling course) (5 cr)
- CS 397 CS Seminar (1 cr)
- CS 321 Database Systems (5 cr)
- CS 202 Discrete Structures 1 (5 cr)

Winter
- CS 333 Data Structures and Algorithms 1 (5 cr)
- CS 302 Discrete Structures 2 (5 cr)
- CS 3xx CS Elective (5 cr)

Spring
- CS 334 Data Structures and Algorithms 2 (5 cr)
- CS 350 Software Engineering (5 cr)
- CS 3xx CS Elective (5 cr)
- CS 398 CS Seminar (1 cr)

Year 4

Fall
- CS 421 Algorithmic Problem Solving (5 cr)
- CS 442 Principles of Computer Systems (5 cr)
- CS 450 Security Foundations (2 cr)
- CS 499 CS Seminar (1 cr)

Winter
- CS 485 Capstone Project 1 (5 cr)
- CS 433 Programming Languages (5 cr)
- CS 4xx Elective (5 cr)

Spring
- CS 486 Capstone Project 2 (5 cr)
- CS 4xx Elective (5 cr)

- CS 402 Statistical Methods for Testing (5 cr)

Course descriptions for the core courses listed above can be found in Appendix B. Below in Table 3, the elective courses are listed. Students can choose an area in which they want to gain expertise in and take a 2-3 course series on that topic. Students can take these electives regardless of the school they are attending. In order to make this possible, each individual college will offer a small, limited set of technical electives for students to successfully complete the program. Over the course of the next 2-3 years, AppConnect NW will work to establish the infrastructure to allow for students to take a broader variety of electives from different institutions.

Computer Science Elective Course Options

Table 3: Computer Science Elective Options

Elective Topic	School Offered	Courses
Computer Architecture	LWTech	CSD 322 Computer and Network Architecture CSD 415 Operating Systems Concepts
Cloud Computing	LWTech	CSD 323 Data Analytics CSD 425 Cloud Computing CSD 438 Big Data Application Development
Data Science	RTC	CSI 470- Data Mining CSI 475- Advance Database Intelligence
Object Oriented Development	GRC	SDEV 426 Software Design Patterns
Mobile App Development	Cascadia	ITMOB 381, 382 - iOS apps ITMOB 371, 372 - Android apps ITMOB 271 - Mobile UI Design ITMOB 470 - Mobile Backend Services
User Interface Design	Cascadia	BIT 112 Basics Of Web Authoring BIT 113 User Interface Development BIT 175 - Frontend Dev BIT 271 - Mobile App Design
Calculus Series	All Colleges	MATH& 151 Calculus I MATH& 152 Calculus II MATH& 163 Calculus III

Criteria 2

Qualified faculty

The AppConnect NW consortium is uniquely positioned that all the colleges involved have already established Bachelor of Applied Science degrees in Software or Application Development. Therefore, they have already built faculty teams that have the skills needed to be successful in the new BSCS degree. While there will still need to be some hiring done to prepare for the headcount increase and program specific courses, there is already a committed base of faculty. As the consortium looks to hire new faculty, they will be searching for candidates who are committed to creating an equitable learning environment through curriculum and support services. Qualified faculty will be involved in teaching, curriculum development, and advising.

Some of the main faculty from the AppConnect NW consortium who are currently involved in the development of the BSCS degree and will continue forward with curriculum development and teaching are as follows:

Mike Panitz, Cascadia College- Michael Panitz comes to Cascadia from a business background. Mr. Panitz has a Master of Engineering, and a Bachelor of Arts from Cornell University in Computer Science. He has experience with Microsoft and Lucent Technologies as a software development engineer. He has provided instruction in computer programming and mathematics for Cascadia students for many years. He has taught at the University of Washington-Bothell and the University of Washington-Tacoma in addition to teaching at Cascadia for several years.

Brian Bansenauer, Ph. D., Cascadia College- Dr. Brian Bansenauer received a Bachelor's in Mechanical Engineering at Gonzaga University and a Doctorate in Aerospace Engineering from the University of Colorado at Boulder, with extensive work in programming and computer modeling. He became fascinated with learning theory and web programming while teaching in the mathematics and computer science departments at the University of Wisconsin, Eau Claire. He has led the creation and development of web and mobile application programs at both North Seattle and Cascadia College, where he serves as Senior Founding Faculty.

Dan Taylor, M.S., Centralia College- Dan Taylor has Bachelor of Arts in Mathematics and Education from The Evergreen State College and a Master's in Science in Mathematics from Lehigh University. He has taught mathematics as a tenured faculty member at Centralia College since 2004. He also took 30 upper-division credits of coursework in computer science at UW-Tacoma. In addition to mathematics courses, Dan is also qualified and plans to teach discrete structures 1 and 2 for the proposed BSCS degree.

Alexandra Vaschillo, M.S., Lake Washington Institute of Technology (LWTech)- Alexandra holds a Master of Science Degree in Computer Science from Florida International University and Master of

Science Degree in Mathematics from St. Petersburg State University. Alexandra Vaschillo has taught computer science courses at LWTech since 2006. She developed the curriculum for the Computing and Software Development program and created several new courses to keep the program up to speed with the rapidly changing world of software development. Prior to joining LWTech she worked for the High Performance Database Research Center, doing research in the area of semantic databases, and developing system software for NASA Regional Applications Center.

Tom Abbott, M.S., Lake Washington Institute of Technology (LWTech) - Tom Abbott is the Faculty Director of the Applied Bachelor's Degree program in Computing and Software Development (CSD BAS) at LWTech. He holds bachelor and master degrees, both in computer science. Upon receiving his bachelor' degree in 1981 from the Rochester Institute of Technology, he spent the next 35 years pursuing a career in software development on a variety of projects including graphic displays, avionics systems, games, e-commerce, and bio-tech. In 1992 he began teaching computer science classes part-time at some of the local community colleges. Having thoroughly enjoyed the experience of teaching, and wanting to develop that facet of his career, Tom enrolled at the University of Washington (Seattle) and in 2012 received a Master of Science degree in Computer Science. Not long after that Tom began teaching computing classes part-time at LWTech. When a full-time position was posted, Tom took the opportunity to change careers, become a full-time instructor, and help students launch their own careers in the computing industry.

Naser Chowdhury,M.S., Renton Technical College- Naser Chowdhury has a Master degree in Computer Science and is from Bangladesh, a small country in Southern Asia. His love and passion for mathematics & logic encouraged him to enroll into the Computer Science Program. After graduation, he worked almost 6 years in the software industry as a full time Software Engineer. After completing his Master degree in Science in Computer Science at Boise State University, he became an instructor at Nashville State Community College and now works at Renton Technical College.

Catherine Wyman, M.S., Skagit Valley College- Catherine Wyman is the Program Chair for both Computer Science and Application Development at Skagit Valley College. She earned a Master degree in Information Systems from Hawaii Pacific University. Ms Wyman taught programming classes at Scottsdale Community College for over 30 years. For 13 years she taught AP Computer Science and built the computer science program at Xavier College Prep in Phoenix, Arizona. Ms Wyman has worked with a variety of NSF-funded programs to broaden participation in computer science.

Michael Wood, M.S., Green River College - Michael Wood earned a Bachelor of Science in both Mathematics Education and Computer Science at Colorado State University in 1999, followed by a Master degree in Applied Discrete Mathematics at Colorado University in 2010. He taught high school mathematics from 1999 until 2014 teaching all levels from pre-algebra to I.B. Mathematics, including college level classes as an adjunct of C.U. in the high school.   In 2014 he joined Green River College teaching Math, IT, and eventually as a tenured Computer Science teacher at the

school. During his tenure, he implemented the Computer Science DTA degree at Green River, while learning the college system, and is now the division chair for the Technology Division at Green River.

Kendrick (Ken) Hang, M.S., Green River College-Ken has a Master degree in Software Engineering and has worked as a software developer for more than a decade, developing aircrew and tactics training systems for the naval aviation community. He has a Bachelor of Science in Computer Science from the University of Virginia, a Master of Software Engineering degree from the University of Maryland University College, a certificate in community college teaching from Seattle University, and is a Certified ScrumMaster. His primary interest areas include software craftsmanship, technical leadership, computer science education, and diversity in computing.

Linda Zuvich, M.S., Edmonds College- Linda has her Master degree in Physics from Brigham Young University and has her Bachelor degree in Computer Science from Oregon State University. Linda has worked in community colleges for over 15 years. She has worked the last 7 years at Edmonds College and received tenure in 2018.

Allison Obourn, M.S., Edmonds College- Allison has a bachelor's and master's degree in computer science from the University of Washington. Before joining EC's computer science department, Allison taught at the University of Washington and University of Arizona. She has a broad teaching portfolio, extensive curriculum development experience, and is the coauthor of a computer science textbook. She is passionate about computer science, teaching, and recruiting/retaining students in the field of computer science, particularly women and students of color.

The AppConnect NW consortium also has many qualified faculty to teach the general education requirements. Appendix C holds a table with the general education faculty listed, their college, and their qualifications.

AppConnect NW will have the advantage of having teams of faculty from 7 colleges. The consortium will build off the already established faculty team to create and revamp curriculum, problem solve, and share best practices. They will continually meet throughout the year to discuss areas that are creating success as well as roadblocks for students.

Two positions will be created to provide continuity for the program among all the colleges and to support faculty and advisors with any questions or support they may need. These positions will be housed at LWTech while the cost of their salary and benefits will be split among the 7 colleges. An Associate Dean position will be created to provide support for faculty, to confirm any curriculum or degree changes, and to be a point person for the degree in order to create consistency among all the colleges. This position will require someone with a Ph.D. and experience leading a Computer Science program. Also, a Program Advisor/Coordinator role will be created to provide a student facing support for the degree. This position will focus on working with faculty and advisors to verify consistency in requirements to complete the degree. It will also support students who may run into issues with credit transfers or potential inconsistencies among colleges. The person hired for this

position will preferably have a Masters degree and experience in advising for Computer Science programs.

In June 2022, AppConnect NW applied for a National Science Foundation grant. Within this grant, funds were allocated towards curriculum development, stipends or release time, and a stipend for an outside faculty member to lead building the curriculum through an equity lens. If the grant is accepted, funds will also go towards mentorship, and real-world project opportunities. The consortium will know if the grant is accepted by mid-August and will begin work with faculty at that time. If the grant is not accepted, the consortium is applying for another grant through the Department of Labor and will continue to keep the Director of Industry Outreach to coordinate the faculty meetings and support.

Criteria 3

Selective admissions process, if used for the program, consistent with an open-door institution.

In order to inform incoming students of requirements and opportunities of the proposed BSCS program, potential applicants will be required to attend a Program Information Session on campus or online in which they will learn more about the program. Following attending the Program Information Session, all participants will receive information to access the application. Topics covered in the program will include entry requirements, the admission process, costs, curriculum and application deadlines and services available to students accepted into the program. Information Sessions will be offered monthly and take place online and in person.

Entry requirements
The BSCS program allows for students to start at the first-year level, transfer in at the second-year level if they have previously completed a general studies associate degree, a degree from another field, or credit equivalent to an associate degree. Students can also transfer in at the second year if they have completed the general education requirements and the third-year level if they have previously completed a computer science related associate degree. Students will meet with advisors to discuss their previous course history and determine which starting point best suits them, please refer to Criteria 1, for a full list of requirements.

Currently the AppConnect NW consortium has programs at each college that align with the technology field and will directly articulate into the proposed Bachelor of Science in Computer Science:

- Computer Science DTA/MRP
- Computer Science AST-Track 2
- Web Application and Web Application Programming AAS-T (Cascadia)
- Application Developer AAS (Centralia)

- Web Developer AAS-T (Skagit)
- Information Management and Data Science AAS (Skagit)
- Computing and Software Development AAS-T (LWTech)

Most community and technical colleges in the Washington State system offer two-year degrees in these areas, AppConnect NW will collaborate with all interested institutions in developing articulation agreements to establish clear pathways for computer and technology students to enter the proposed BSCS program. To facilitate student articulation, AppConnect NW consortium will provide peer institutions clear guidelines for core course requirements for entry into the proposed BSCS program. This will ensure that students who wish to transfer are well prepared, and they can transfer without delay due to additional course requirements.

Admissions Process

The admissions process has been intentionally designed to encourage access and eliminate barriers to program entry, while accounting for academic preparation and space available. It is recommended that the BSCS admissions will be selective entry, however some colleges in the consortium may choose to enroll students on a first-come, first-serve process. Each college will follow their standard timeline for baccalaureate admissions.

1. Applications will be due in Winter or Spring quarter prior to Fall start dates, with applications arriving after the deadline considered on a space available basis, application fees will not exceed $50, if chosen to implement application fees at all. Students will be notified of acceptance prior to the first quarter of enrollment.
2. Prospective bachelor's students must have 3 entry points in the program depending on their previous education.
    a. Students entering the first or freshman year of the program will submit:
        i. State application (if not already a Washington state community and technical college student)
        ii. Program application
        iii. Personal statement (optional)
        iv. Resume (optional)
    b. Students entering the second year of school are required to have completed the general education requirements as detailed on page 8 and will submit:
        i. Official transcript
        ii. State application (if not already a Washington state community and technical college student)
        iii. Program application
        iv. Personal statement (optional)
        v. Resume (optional)
    c. Students entering the 3rd year of school are required to have a minimum of 90 credits (or an associate degree) with a minimum cumulative GPA of 2.50. Applicants will submit:
        i. Official transcript

ii. State application (if not already a Washington state community and technical college student)
　　　　iii. Program application
　　　　iv. Personal statement (optional)
　　　　v. Resume (optional)
3. Applications will be reviewed to ensure that minimum requirements and prerequisites have been met, requests will be sent for any missing information.
4. Complete applications will be reviewed and selected by designated personnel or a Program Admissions Committee.

When applications exceed the number of spots available in the program, student applications will be scored using a standard rubric. A recommended rubric will be developed, which colleges can adapt, based on the following steps: determining eligibility; assessing academic readiness; assessing motivation through a review of the personal statement; and then prioritizing selection. Final selection will be based on space in the program and the applicant's score. All applicants who met the March priority deadline will be notified of their status at the same time. Program faculty will approve applications for admissions with consultation with designated personnel or a Program Admissions Committee where there is question whether or not minimum requirements were met. Students selected to participate will be provided with next steps.

Prior to the start of the first quarter, students who were accepted into the program will be encouraged to attend a program orientation which will explain specifics of first quarter classes and suggestions for student success. Applicants not selected will be placed on the program waiting list, managed by the Computer Science faculty. The program faculty will work with waitlisted students and their advisers to support them with an application to the next program.

Criteria 4

Appropriate student services plan.

As part of the consortium planning process, each partnering college has had internal conversations with their respective student services team regarding the proposed BSCS to ensure existing comprehensive support services are ready and available to future BSCS students. These services will include:

Financial Aid and Scholarships

The tuition cost for this BSCS program will make it one of the most affordable in the state, and yet there will still be student need for financial assistance. Each college has an established financial aid program with experience distributing aid for baccalaureate level education that will serve students in the BSCS program. Once this degree is approved, each college will submit a request to the Department of Education for approval for the use of federal aid, including veterans' benefits. Aid

packages, based on the demonstrated need of individual students, will include loans, work study, grants, and scholarships to meet their educational expenses.

Federal, state and local funds will be sought for potential scholarship support. Each college foundation and financial aid office partners to make scholarship resources available to students.

Unique supports available at each college:

· Cascadia College: The Foundation at Cascadia offers scholarships specific to baccalaureate level students.

· Centralia College: Centralia College does not participate in the federal student loan program so no students who leave the college default on the federal loans. To meet student financial needs, the Centralia College Foundation provides an incredible amount of scholarships to students. Most scholarships are available to associate and bachelor students, however, there are some that are targeted specifically at bachelor students. A number of students enrolled in the current bachelor degrees are often employed part-time by the college, which is one of the largest employers in Lewis County. This is particularly the case for our current IT application development and applied management bachelor's degrees and would be a consideration for current students enrolled in the BSCS degree program.

· Edmonds College: The financial support of the BSCS students will be facilitated by the STEM BAS/BS Manager, and specific opportunities for support of the bachelor's degree will be explored in an individualized manner. Students have access to the Financial Aid in the form of scholarships, Worker Retraining funds, grants (including EC foundation grants many of which are STEM specific), and loans. Each new bachelor degree budget supports a quarter of an FTE, over time allowing for a dedicated staff person just for bachelor students. In addition, the STEM Division has a dedicated STEM study space (STEM Study Room) where CSBS students can get free drop-in academic support from tutors and STEM faculty. The space is open 5 days a week and staffed at all times with any of the following: STEM faculty, staff, and/or student tutors. The tutors are current Edmonds CC students who have taken advanced coursework in Math, Biology, Chemistry, Physics, Computer Science, and Engineering. The study room is a great place for students to connect and collaborate with one another and with STEM faculty and staff. In addition to the free tutoring, the STEM Study Room is equipped with whiteboard tables, LCD screens, textbooks, headphones, Engineering laptops, and Chromebooks for in-room use. Free snacks and drinks are also provided for students using the study room.

· Green River: The Benefits Hub which provides wrap-around support to help students navigate and overcome non-academic barriers to completion. For example, the Benefits Hub provides housing support, emergency aid, financial coaching, transportation assistance, tax preparation help, and support in accessing community benefits. The Gator Pledge can assist students with financial emergencies that often become barriers to completion, such as food insecurity, housing insecurity, and incidental emergencies such as unpaid utility bills or car trouble. Faculty or staff members in any area of the college can initiate Gator Pledge help for a student in need. The Gator Pantry provides free food assistance to students on a temporary basis and connects them to longer-term resources in the community.

· Lake Washington Institute of Technology: LWTech provides dedicated scholarships for baccalaureate programs through the Foundation as well as emergency scholarships for students who find themselves in financial emergencies such as food or housing insecurity.

· Renton Technical College: Provides dedicated scholarships for baccalaureate programs.

· Skagit Valley College: Cardinal STEM Scholars Program (CSSP) specifically supports computer science, biology, chemistry, physics, engineering, math and environmental science. The CSSP program provides financial support as well as mentoring, cohort experiences and exposure to undergraduate research.

Advising Services

All colleges commit to providing a designated point of contact for questions related to the program and academic planning. This individual will be available for consultation regarding issues like first quarter class selection and mapping an educational plan, required courses versus elective courses within the program, and any advising triage or program orientation information.

Unique supports available at each college:

· Cascadia: Cascadia has an "early alert" system in which faculty can report students who appear to be struggling or become disengaged creating an opportunity for advising staff to reach out with an offer of additional resources or support.

· Centralia College has a centralized new student intake model that starts in the Advising Center. After the initial intake and first quarter registration, students are assigned a discipline specific faculty adviser. We have contracted with EAB to implement Navigate that will provide a case management tool and a place to develop and store academic plans. Adviser notes will be stored in Navigate and if students shift majors the notes will follow the student. Each student will have a Support Team automatically assigned to them based on their characteristics and needs. These services are also available for bachelor degree-seeking students with advisors trained to work with bachelor's degree education plans.

· Edmonds: Provides advising in partnership with the students at each step of their academic experience. Pre-advising and orientation to college procedures and support services will be supported by the BAS/BS Manager. The Edmonds CC full-time faculty load includes 10 hours/quarter of advising to students. Enrolled students will meet regularly for advising and career planning with faculty advisors in the BS program. This maintains individualized support and guidance for furthering professional goals and opportunities in the BSCS program. In addition to the individualized support of the BSCS Manager, the Enrollment Services staff members assist students with information about college resources and procedures in Registration, Assessment, and Enrollment processes.

· Green River College: The Career and Advising Center which provides academic and career exploration and planning for all prospective students, which will include the BSCS cohorts. Students can access services in person, over the phone, and via email. Key services for students include the new student advising and registration (NSAR) sessions, first quarter advising, onboarding, transfer

resource library, course registration support, and advising triage. The center also provides faculty advisor training and support.

·   Lake Washington Institute of Technology: Student Success Navigators provide comprehensive, case-managed advising to prospective and enrolled students in all programs of study including the BSCS. The Student Success Navigators for this program will also advise for appropriate feeder programs. This ensures students receive consistent and accurate information about courses and transferring as early as possible. It also creates a strong relationship between students and a single point of contact in Student Services for the full associate and baccalaureate experience whenever possible.

·   Renton Technical College: Students in the BSCS program will have access to all the support, advising, and counseling services generally available to all students at RTC. These services include: Assistance with admissions, registration, and enrollment; advising and behavioral health counseling, accessibility/disability resources, technology services, veteran's services, career services, and affinity groups and student leadership clubs.

·   Skagit Valley College: Upon acceptance into the program, bachelors-level students are transitioned to a bachelor's degree faculty advisor within the proposed Computer Science program. This faculty-driven advising model leverages classroom relationships between students and their instructors, providing yet another avenue for engagement and retention. Throughout the quarter, students missing class will get a phone call to check on the reason they are missing school. They will be advised on any resource that may be available to resolve their issues. At the midterm of the first quarter, a grade check will go to each student and primary faculty advisor. Students who have earned below a 2.50 in any of their core classes will be required to meet with their advisor. An appropriate plan for additional support will be developed between student and advisor. In addition, regardless of their GPA, all students will also be required to meet with their advisor at the end of their first quarter, as well as at their 45-credit threshold, to assess their progress.

Tutoring/Learning Support

Each college is equipped with tutoring resources that would be available to BSCS students. Campus based tutoring is a free resource that can help students be successful with their math and writing courses. Support is usually available in either group or individualized appointments. The pandemic has resulted in most tutoring centers offering remote services which means additional access and availability options for students.

Unique supports available at each college:

·   Cascadia College: The Bock Learning Center supports both upper and lower division students. In addition to writing support, they will be able to provide group and individual tutoring in mathematics through Calculus. The Center also has a dedicated computer programming tutor.

·   Centralia College: Tutoring is available for general subjects in Blazer Central tutoring services, for STEM subjects in our STEM Tutoring Center, and for writing assistance in our Writing Center. These services are available in-person or online. For the BSCS students, additional tutors will be hired who

can specifically serve that program. The STEM Tutoring Center is housed in the Walton Science Center, a relatively new building that provides the latest equipment and classrooms for STEM programs.

· **Edmonds College: The** Learning Support Center provides supplementary academic support to students in strengthening their college-wide abilities in math, the sciences, the humanities, and social sciences. Assistance is available in three ways: drop-in at the Learning Support Center, enrollment in WRITE, a learning support class, and through e-tutoring, available 24/7. Tutors will be hired to help students in the BSCS pathway, and the tutoring will be offered either just before or after classes or as part of the e-tutoring services, depending on the wishes of the cohort. Edmonds also has the STEM Division has a dedicated STEM study space (STEM Study Room) where EdCC students can get free drop-in academic support from tutors and STEM faculty. The space is open 5 days a week and staffed at all times with any of the following: STEM faculty, staff, and/or student tutors. The tutors are current Edmonds CC students who have taken advanced coursework in Math, Biology, Chemistry, Physics, Computer Science, and Engineering. The study room is a great place for students to connect and collaborate with one another and with STEM faculty and staff. In addition to the free tutoring, the STEM Study Room is equipped with whiteboard tables, LCD screens, textbooks, headphones, Engineering laptops, and Chromebooks for in-room use. Free snacks and drinks are also provided for students using the study room

· Green River College: Free tutoring is available in a number of areas, including a dedicated Language Center, a Math Learning Center, a Public speaking center, a writing & reading center and finally a general tutoring and resource center ran from our library for science, computer science, business, foreign language and other topics, which will be enhanced with additional tutors for the upper division BSCS students.

· Lake Washington Institute of Technology: The Learning Lab is a drop-in tutoring center where any LWTech student can ask questions about any course, discover, and utilize learning resources, and receive assistance in understanding important course concepts. The Learning Lab also helps LWTech students develop stronger study skills (e.g., test taking, textbook reading, time management, organization, stress management). Also, supplemental instruction is employed in high enrollment, low pass rate courses and has been a successful initiative at LWTech.

· Renton Technical College: RTC's Learning Resource and Career Center (LRCC) offers free drop-in and appointment tutoring for students in-person and online via Zoom. The LRCC helps students to achieve success in math, programming, writing, English, and many other courses. Tutors are recruited to provide support for subjects as requested by RTC students and faculty. BSCS program faculty will work with LRCC staff to help them understand the requirements of the program and the standards that students are expected to achieve to be successful – particularly in math.

The LRCC open computer lab also offers Internet access and a variety of assistive technologies. The LRCC provides laptop loaners which can be used to access RTC's virtual servers. The Information Technology staff as well as the computer troubleshooting and repair center in the LRCC provides the student technical support. There is an Information and Digital Literacy classroom and multiple media-enhanced small group study rooms as well as reflection areas for quiet study.

·   Skagit Valley College: Skagit Valley College's Writing Center supports writing assignments at all levels in the college. Students can drop in or make appointments. Tutors and faculty will assist students in crafting their writing assignments. The Writing Center also supports Bachelor degree program applicants with their personal statements through specifically tailored coaching sessions. Similarly, the Math Department offers math tutoring from developmental math courses to advanced calculus and statistics. This level of math tutoring will be appropriate for Computer Science students to succeed in their math assignments. Additionally, Skagit Valley College hosts the Tutoring Center staffed by near peers to support student learning in a variety of subjects. Each of these services are available both on-campus and online.

Library Services and eLearning Support

Each college within this consortium already has an existing baccalaureate level program related to application development with corresponding library services deemed satisfactory for that level designation. Existing library facilities, resources and services will be sufficient for supporting the BSCS program.

Unique supports available at each college:

·   Cascadia College: As part of a shared campus agreement with the University of Washington Bothell, Cascadia students have full access to the University's library and services and each program at Cascadia is assigned a specific reference librarian for support.

·   Centralia College: All upper-division programs at Centralia College are assigned a specific instruction librarian for support and library faculty provide fully developed instruction throughout all upper division programs. Library information resources (print, media, online digital resources, and open education resources) consistently reflect the depth, breadth, and currency needed to support a rigorous, upper-division program, as has been the case for Centralia's existing five bachelor's degree programs. Additional resources and staff will be assigned to meet the needs of the BSCS program and its specific discipline and pedagogical needs.

·   Edmonds College: The library at Edmonds has multiple resources that include books, eBooks, academic searches, and extensive databases that provide access to articles and periodicals in a large range of subjects that would be appropriate for the BSCS students' research and learning process. BSCS funds will be used to enhance the collection on an ongoing basis, and to help pay the salary of a librarian (.25 FTE). The designated library faculty member will be available for student support throughout the bachelor's program and will also serve as a research guide for the capstone project of the BSCS students. Desktop computers are provided in the library, and laptop computers can be checked out. All students have access to the wireless network in the library and throughout the campus. Rooms are available in the library for group projects, videotaping, and study sessions.

·   Green River College: Holman library at GRC is a full-service library with full support for the BS-CS degree. In addition, Green River has an eLearning support department for all electronic learning support programs. The Holman Library's physical and electronic collections provide appropriate support for the college's various students. The library's collection includes 2,785 books, 417 videos, and 605 journals as well as 14 databases.

· Lake Washington Institute of Technology: LWTech added a full time Librarian focused on upper division education when it started its first baccalaureate degree in 2009. Another half-time librarian was hired in 2019. BSCS collection materials are included via online database subscriptions to support coursework and research processes requiring academic literature.

· Renton Technical College: The RTC Library provides a variety of print, media, and online digital resources to students, faculty, and staff. The collection of books, reference materials, journals, and multimedia resources focus on supporting RTC's instructional programs. All the digital resources including specialized online reference databases, a large collection of eBooks, and digital journals are available from any computer on campus or through remote access. A professional library staff is ready to provide research and reference assistance either in the library, online, or within program courses as specialized workshops.

· Skagit Valley College: Specific to baccalaureate students, Skagit Valley College librarians identify and select OER resources, assist with student research projects and curriculum design and delivery particularly as it relates to information literacy. In addition to working with individual students and providing classes in information literacy, librarians routinely assist faculty members on research projects or in their studies for advanced degrees. The Library provides study rooms, interlibrary loan, and a quiet study area. It has over 40 computers available to students, with full search capabilities and Microsoft Office software. The library is using additional collection development institutional funds to actively select and acquire materials directly related to the proposed Computer Science program, with the intent to build a collection to support study and research at the undergraduate level. A reference librarian will be appointed to act as a liaison to the proposed Computer Science program faculty, collaborating with them to select relevant titles. These selections are based on the curriculum that has been developed for the degree. With the introduction of remote operations due to COVID-19, library services have increased their systems and services to accommodate an online platform, librarians and library services are more accessible to online and hybrid students.

Diversity, Equity and Inclusion

As community colleges, the partnering colleges take pride in their collective history of serving historically under-represented student populations. Each college facilitates multi-cultural support services in similar fashion depending upon the size and make-up of the institution.

· Cascadia's Office of Equity and Inclusion offers a Cascadia Scholar's program that provides structured mentoring, resources and support for BIPOC and underrepresented students.

· Centralia College: There are a multitude of student organizations that support underrepresented students. Additionally, the Justice Equity Diversity and Inclusion (JEDI) committee, a college wide committee with cross-campus representation, has strong student leadership. Blazer Central has developed a peer mentor program for students of color. Centralia College is in the process of implementing the Guided Pathways framework with a grounding in equity, diversity, and inclusion work. The college's executive director of institutional research was recently hired to oversee data needs and an additional analyst will be hired in fall 2022 to provide necessary data support for the BSCS degree.

· Edmonds College: The Center for Student Cultural Diversity and Inclusion provides space for students from traditionally marginalized backgrounds to be celebrated, empowered, and advocated for all working towards the end goal of equity. They create events and provide practical resources to support students as they work towards their success.

· Green River College: The Office of Diversity, Equity, & Inclusion (O.D.E.I.) was created to create inclusive spaces that promote intellectual discourse, diverse leadership and social justice among students, staff, faculty, and our surrounding communities. We aim to empower, enhance, educate, encourage, and engage our diverse populations to have ownership of their narratives and to succeed in their educational journeys.

· Lake Washington Institute of Technology: The Rise Center was created to provide resources, community, and support to students from traditionally underrepresented and underserved backgrounds. They work in collaboration with students, faculty, and staff to create a more equitable and inclusive campus.

· Renton Technical College: The Student Success Center offers many year-round Diversity, Equity and Inclusion events for students, faculty, and staff. In addition, funding was recently secured to renovate for a newly designed DEI campus Multicultural Center, and a DEI Director was recently hired as well.

· Skagit Valley: All new Skagit Valley College faculty are required to participate in a year-long Inclusive Pedagogy Learning Community to improve equitable and inclusive teaching and learning. SVC's Office for Equity and Inclusion (OEI) leads and facilitates the development of institutional policies and protocols intended to create a more representative, equitable and inclusive Skagit Valley College. The OEI leads by example, partnering with campus departments and units to create inclusive and equitable educational opportunities for all students, faculty and professional staff. With a collaborative approach to diversity, equity and inclusion efforts, the Office for Equity and Inclusion serves as the primary college resource for the identification and analysis of best practices and national trends related to access, achievement, inclusion, intercultural competencies, diversity and equity.

Counseling

Wellness services are available to any BSCS student in need of counseling and mental health care. College counselors are licensed practitioners and are available for confidential, short term care that is provided free of charge to students. Additionally, colleges have intervention resources in place.

Unique supports available at each college:

· Cascadia partners with the University of Washington Bothell for counseling services as part of a shared campus agreement. Cascadia students have access to credentialed counselors on a short-term basis.

· Centralia College has three mental health credentialed counselors on staff. These counselors can provide short-term mental health counseling but refer students with long-term needs to Cascade Mental health.

· Edmonds College: The Counseling and Resource center provides personal counseling, career counseling, resources, and referrals free to students. The center has a team of licensed mental health counselors to meet with and support students.

· Green River College: The Counseling Services department provides free, confidential short-term mental health counseling and self- care/wellness education to all Green River students by licensed psychologists, social workers, and professional mental health therapists. Counseling services support students and faculty by providing workshops, classroom visits, and online resources.

· Lake Washington Institute of Technology: The college provides free, short-term counseling services for all enrolled students. Appointments are available in person, via phone, or online. The college also has a robust CARE team to assess reports about students of concern and provide appropriate support to referred students. The RISE Center (Resources for Inclusion, Support, and Empowerment) is a support service for students from traditionally underrepresented and underserved backgrounds, such as students from minoritized ethnic/racial groups, students with disabilities, first-generation college students (those who are the first in their family to attend/graduate from college), undocumented students, and members of the Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) community.

· Renton Technical College: The college provides free, short-term counseling services for all enrolled students. Appointments are available in person, via phone, or online.

· Skagit Valley College: Counselors offer students of all backgrounds, races, religious beliefs, sexual orientations, gender identities, abilities, ethnicities, and cultures a safe place to discuss and resolve issues that interfere with personal and academic success. Counselors do not diagnose or provide long-term treatment but do provide referrals to outside therapists if needed. If any student or staff is concerned about an individual, they can submit a CARE report to the Counseling office for follow-up. Skagit Valley College also worked closely with the local Mobile Crisis Outreach Team.

Disability Support Services

The DSS office of each campus ensures compliance with the rules and regulations set forth by various congressional acts, i.e., the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. DSS staff work to ensure access for students with documented disabilities and to contribute to the development of self-advocacy of students with disabilities. Reasonable and appropriate academic accommodations will be made for BSCS students working through their respective DSS processes.

Unique supports available at each college:

· Cascadia's Student Accessibility Services supports both Associate and Bachelor degree seeking students.

· Centralia College: Provides accommodations to students as requested and approved. Staff in DSO work with faculty to transcript videos and lectures to provide universal design for all students. Blazer Central provides navigation and student support for incoming students and connects all students with disabilities to the appropriate resources.

· Edmonds College: The Services for Students with Disabilities, provides an easy and accessible way to request for accommodations in the classroom setting. They also work with faculty and staff to ensure that programs at Edmonds College are accessible and useable by students regardless of ability.

· Green River College: In addition to a fully Disability Support Services (DSS) office to support students with Physical, Learning, Sensory, Cognitive and/or Psychological disabilities, Green River also has a full TRiO student support office to support for first generation, low income students and/or students with disabilities.

· Lake Washington Institute of Technology: In addition to Disability Support Services (DSS), TRiO Student Support Services is a federally funded project that assists students in achieving their post-secondary ambitions. The Student Support Services project is focused on increasing the retention and graduation rates of students with disabilities as well as low income and first-generation students. This is accomplished by providing supportive services such as academic and transfer advising, financial literacy workshops, individualized and group tutoring, and student success appointments such as study skills, motivation, financial aid, stress reduction, test anxiety, life skills, and campus resources as well as mentoring and monitoring of student progress.

· Renton Technical College: Disability Resource Services (DRS) provides accommodations to students with disabilities and health conditions at RTC. DRS can also provide resources on and off-campus for students with disabilities. Common accommodations include extended time on tests and quizzes; testing in a private or quiet location; ASL interpretation or real-time captioning; braille, audiobooks, or other alternative formats; note-taking during lectures; audio recording of lectures; ergonomic chairs and sit/stand tables; and accessible technology.

· Skagit Valley College: The Skagit Valley College Disability Access office is also dedicated to working with staff and faculty in developing and implementing the most appropriate strategies for a successful learning experience while maintaining the academic standards and integrity of the mission of the College.

Career Services/Job Search Readiness

A strength of this consortium program will be the opportunity for partnering colleges to work collaboratively on creating unique experiences for graduating students to prepare themselves as information technology job seekers and the nuances of industry hiring practices such as "white boarding" demonstrations. There is also potential to get the attention of industry recruiters by connecting them with upcoming graduates across the consortium in closed venue networking and hiring events that could be conducted in-person or facilitated remotely.

Unique supports available at each college:

· Cascadia students pursuing Information Technology Careers are supported by a specific Navigator position with regards to applying for internships and industry related positions. This support includes job search workshops that address interviewing, application materials and other related topics.

· Centralia College students are networked to professionals in their field by faculty who teach in their program. The discipline specific advising model allows discipline faculty to customize each relationship with students and connect students into the appropriate employment sector. Faculty teaching in bachelor's degree programs are assigned to incoming students in those programs with additional informational sessions provided to specific cohorts. Advisory board members representing the relevant fields meet regularly to ensure that the bachelor's degree programs are meeting industry needs.

· Edmonds College: As part of the Counseling and Resource Center, they provide Career Counseling services. Students are able to learn more about themselves and research careers and degrees in order to make an informed decision and plan towards their next career.

· Green River College: As stated above, the Career and Advising Center Services center serves students, alumni, and the community by helping students clarify career goals, offering resources, partnering with faculty and linking employers with students to help launch their career.

· Lake Washington Institute of Technology: The Employment Resource Center (ERC) provides a comprehensive suite of services focused on individuals' career and professional development at all academic and career levels. The ERC provides career exploration, career and personality assessments, and labor market information and research. Through individual work and a workshop series, the Center assists students in clarifying their career aspirations, developing job readiness skills, and learning job search and job success skills (such as resume and cover letter writing and interviewing techniques). On-campus employment recruiting is coordinated through the ERC. An online e-career center allows employers to post job notices, and students to search and apply for those jobs or post their resumes.

· Renton Technical College: The Learning Resource and Career Center (LRCC) houses all career services for students, faculty, and employers. Using the Handshake platform, employers can post internship and job openings specifically for RTC students, while students are able to search for and apply for jobs on Handshake as well. The LRCC also hosts the College's annual Career Fair, as well as cover letter and resume writing workshops. Faculty can request career workshops and mock interviews for their classes as well.

· Skagit Valley College: To successfully assist program graduates with job placement, Counseling, and Advising Services and Computer Science faculty will acquire resources about placement opportunities relevant to career pathways. These resources will be available in individual sessions and in curriculum for career exploration courses. The program will collaborate with advisory councils and industry internship site hosts for job opportunities for graduates. The program will also identify opportunities for students to establish mentoring relationships within the technology community. Computer Science students that wish to continue their education will work with faculty to identify appropriate resources including bridges to Master level programs, access to GRE and GMAT

preparation workshops and specific help in choosing graduate programs and assembling application materials.

Criteria 5

Commitment to build and sustain a high-quality program.

Projected program expenses and Revenue

The proposed Bachelor of Science in Computer Science program will be funded by a combination of tuition and fees. FTEs generated by the program are eligible for state reporting, but the program itself is not dependent on state funding. The table below projects five years of expenses and revenue per college. Each college in the consortium will maintain a new program development budget to cover the small shortfall in Years 1 and 2 if realized. The projected enrollment numbers below include students from all four years of the degree: freshman, sophomore, junior, and senior. The program is built for a capacity of 30 students per year per college. The estimation of 15 students is made because conservatively that represents a minimum enrollment for the program to commence at each college. It is completely possible a college will enroll 30 students in the quarter they launch the program or reach 30 during the first year of operation. Colleges are prepared for low enrollment in the first year or two and commit to subsidizing the operating expenses until enrollment builds. Retention was not factored in because it would be an added complexity based on looking at other programs that might or might not have similar retention rates. For example, at LWTech the retention rate for the BAS programs is near 100% and the completion rate varies from 70% to 100%, far above the rate for associate degrees and certificates. Adding the complexity of retention to the financial model will not increase the rigor as much as assuming 50% fill rate in the first year does.

*Table 4: Projected program expenses and revenue per college (*Assume 45 credits, 3% tuition and 2% COLA increase per yr)

	Year 1	Year 2	Year 3	Year 4	Year 5
Projected Enrollment	15	30	45	60	60
Projected Revenue					
Tuition [1,2]	$65,151	$130,202	$243,683	$339,164	$339,164

Application ($50) Fees	$750	$750	$750	$750	$750
Total Revenue	$65,901	$130,952	$244,433	$339,914	$339,914
Project Expenses					
Assoc. Dean 1/7th [3]	$15,000	$15,000	$15,000	$15,000	$15,000
Benefits (35%)	$5,250	$5,250	$5,250	$5,250	$5,250
F/T Faculty Salaries [3]	$76,400	$76,400	$76,400	$152,800	$152,800
F/T Benefits (35%)	$26,740	$26,740	$26,740	$53,480	$53,480
P/T Faculty [3]	$34,156	$34,156	$68,312	$68,312	$68,312
Coordinator/Advisor 1/7th [3]	$10,000	$10,000	$10,000	$10,000	$10,000
Curriculum Dev	$6,300	$6,300	$2,070	$2,070	$2,070
Good & Services	$2,000	$2,000	$2,000	$2,000	$2,000
Equipment	$20,000	$5,000	$5,000	$5,000	$5,000
Library	$5,000	$5,000	$5,000	$5,000	$5,000
Tutoring	$10,000	$10,000	$10,000	$10,000	$10,000

Marketing	$5,000	$5,000	$5,000	$5,000	$5,000
Travel & Conf	$3,000	$3,000	$3,000	$3,000	$3,000
Total Expenditures	$218,846	$203,846	$233,772	$336,912	$336,912
Balance	($152,945)	($72,894)	$10,661	$3,002	$3,002

Appropriate facilities, equipment, technology, and instructional resources needed for the program

The facilities, equipment, technology, and instructional resources needed for the program are currently in place for the BSCS degree since each college already offers a related software development BAS degree. Each college may choose to dedicate one or more classrooms to BSCS achieved through scheduling, sharing, or renovation.

Additionally, the colleges have extensive support programs such as the Library, Media, and Information Technology units. The Associate Dean will coordinate with the consortium colleges to develop shared resources, curriculum development, and marketing. Each college has an annual budget development process to seek local resources.

Document the college's ability to sustain the program over time

Each college has a successful integrated system for recruiting students to its baccalaureate programs. Each college also has a prior history successfully operating Associate degree and certificate programs in information technology. Cross-departmental teams will work together to recruit BSCS students to enroll at consortium colleges. Further, the appropriate instructional administrator will lead the effort to recruit faculty and develop industry partnerships.

Criteria 6

Program specific accreditation.

The AppConnect NW consortium will initially create the degree with the framework of potentially seeking accreditation in the future, while not immediately working to achieve it. ABET is the accrediting agency that approves accreditation for programs in the computing field as well as other

STEM programs. Faculty have developed the program outcomes and structured the curriculum so that the BSCS degree would potentially meet ABET requirements and will keep that as an option for the consortium, if it is desired to receive that accreditation in the future. See Appendix A that shows how the curriculum is being built to meet ABET requirements.

All seven colleges that are part of the AppConnect NW consortium have received accreditation through the Northwest Commission on Colleges and Universities (NWCCU) and are currently accredited.

Criteria 7

Pathway options beyond baccalaureate degree.

To represent all of the potential articulations into master's degree programs for the AppConnect NW consortium, a spreadsheet was developed that lists the college/university offering the graduate degree programs, the specific degree pathway, websites where specific information is disseminated about the program, and any comments/notes specific to each potential articulation (See Appendix D). The public universities including the University of Washington (UW), UW-Tacoma, UW-Bothell, Central Washington University, Washington State University (Pullman and Vancouver campuses) and Western Washington University were examined for their graduate programs serving computer science bachelor's degree holders were examined. These universities were chosen because of their prevalence in serving and proximity to the consortium colleges and their students as well as their specific offerings of graduate programs in computer science and related fields. City University and Northeastern University were also included as not-for-profit, private universities in the Puget Sound region with a "brick and mortar" presence. Northeastern University wrote a letter of support of the BSCS program (See Appendix E). St. Martin's University and Seattle University, representing Independent Colleges of Washington, and Western Governors University also have Master of Science in Computer Science graduate degrees. With its strong marketing presence in western Washington, Arizona State University's online Master of Science Computer Science is a viable pathway for students earning the BSCS degree at a community or technical college.

Out of all the Master programs pathways examined, the proposed Bachelor of Science in Computer Science degree meets the requirements for acceptance into all of the master's level programs in computer science. In some cases, additional coursework will be required but can be completed after the student has matriculated into the graduate program. One exception is the Master of Science Computer Science program offered at Washington State University-Vancouver as that campus' program requires the BSCS degree to be nationally accredited through the Accreditation Board for Engineering and Technology (ABET). ABET accreditation will be considered by the consortium community and technical colleges after implementation and establishment of the BSCS program.

Seeking ABET accreditation will be made easier since the BSCS degree outcomes program directly aligns with ABET accreditation guidelines.

Criteria 8

External expert evaluation of program.

The reviewers for the proposal were Gordon Gul who is a professor of Computer Science at The Evergreen State College, Dr. Kelvin Sung who is an associate professor of Computing and Software Systems at University of Washington, Bothell, and Michael McKee who is a full-time instructor in Computer Science at Seattle University. Appendix F contains the individual evaluator responses.

In summation, reviewers gave the program proposal positive comments. They said the curriculum and rigor was appropriate for a bachelor's program. The table below goes over the concerns brought up by the reviewers and how the concerns are addressed.

Table 5: Feedback from Reviewers and Responses

Feedback	Reviewer(s)	Action	Explanation
The number of humanities and social science credits seemed low for a bachelor's program	Gul, McKee	Reject	The additional CS credits maximize the scaffolding for students that need more support. This is a deliberate choice to accommodate the students that we are intending to service.
Use students to create database for tracking data.	McKee	Take Under Advisement	Reviewer recommends a student-project based solution for data tracking. Given the integration necessary with CTCLink, we intend to identify software and process with ongoing support.

Use TA/tutors for help with lower division classes.	McKee, Sung	Take Under Advisement	Many of the consortium colleges already offer tutoring services. Continue to explore online tutoring options shared across the consortium.
Mode of delivery unclear / how do the colleges work together to share classes given the distance between them.	McKee, Sung	Take Under Advisement	This program will mostly be online or hybrid. The actual mode of delivery will depend on the instructor's needs.
Program focuses on Java at the expense of other languages.	McKee	Reject	Java is used in many university bachelor programs as well as master programs. It also has worldwide usability. Since ABET standards only require one language, we decided to choose one language. We feel this will add consistency and stability for our program. In the future, we may add electives with more languages.

Networking classes underrepresented	McKee	Reject	We believe these skills will be addressed in CS 233, CS 301, CS 422 and CS 450. Required course will provide foundational breadth of skills; elective tracks allow students to focus on particular areas of study.
Software engineering underrepresented	McKee	Reject	We believe these skills will be addressed in CS 350, CS 485 and CS 486. Required course will provide foundational breadth of skills; elective tracks allow students to focus on particular areas of study.
Architecture/distributed systems operating systems not dominant in proposed curriculum	McKee	Reject	Students can choose a specialty area in third and fourth year and can select an elective sequence based on their interests and career goals.
Agile methodology absent	McKee	Accept	This was not intended to be missing. We have added wording to three course descriptions to address agile methodology.

Lack of needing calculus.	McKee, Sung	Reject	It was a conscious decision for us to not include calculus in our program. The creators of this program believe calculus is a barrier to computer science for many underrepresented populations. We can suggest calculus as an elective for students interested in that option.
Make CS 433 an elective class rather than core.	Sung	Take Under Advisement	We believe this class works with the scaffolded approach we have taken to the curriculum. We will keep as it is and make changes if the data warrants it.
Book suggestion for SC 170	Sung	Take Under Advisement	The book in the program proposal was just to show the idea of material covered. When classes are developed books will be examined and this book will be on the list for this class.
Modest budget for faculty development should be enhanced because of the changing nature of computer science.	Sung	Take Under Advisement	We hope that as this program thrives, we can add more budget for this category. Faculty development is always a priority.

More detail on specific CS Advisors/Advising was needed	McKee	Accept	Faculty members in the program offer program-specific advising. Some of our programs also have dedicated program coordinators, program managers and advisors to support program-specific advising.
Create a two-quarter CS certificate program to check qualifications and buiid interest	McKee	Take Under Advisement	This is a good idea, but this proposal can only address the BS degree at this time.
Services for the CSC students: • ACM Memberships for all CSC students • Azure or AWS cloud credits (Microsoft offers this for free to students) • IEEE membership • Free software relevant to their program (Visual Studio)	McKee	Take Under Advisement	Will investigate grants through the consortium and the Center of Excellence in Bellevue. The cost of a program like this needs to be addressed before it can be offered.

Appendix A

ABET Curriculum Requirements

Table 6: ABET Curriculum Requirements

ABET Curriculum Requirement	BS Computer Science
At least 30 semester credit hours (45 quarter credit hours) of up-to-date coverage of fundamental and advanced computing topics that provide both breadth and depth. The computing topics must include: 1. Techniques, skills, and tools necessary for computing practice. 2. Principles and practices of privacy and security in computing. 3. Local and global impacts of computing solutions on individuals, organizations, and society. 4. Computing solutions that consider the needs of diverse populations.	CS 121 Intro Programming 1 (5) CS 122 Intro Programming 2 (5) CS 123 Intro Programming 3 (5) CS 222 Computing, Data, and Society (5) CS 233 Web and Database Programming (5) CS 243 Software Development Tools (3) CS 296 CS Career Seminar (2) CS 450 Security Foundations (5) CS 397/398/499 Senior Seminar (3) CS 3xx CS Electives (10) Subtotal: 48 quarter credits
Computer science: At least 40 semester credit hours (60 quarter credit hours) that must include: 1. Substantial coverage of algorithms and	CS 301 Foundations of CS (5) CS 320 Database Systems (5) CS 333 Data Structures and Algorithms 1 (5) CS 334 Data Structures and Algorithms 2 (5) CS 350 Software Engineering (5)

complexity, computer science theory, concepts of programming languages, and software development. 2. Substantial coverage of at least one general-purpose programming language. 3. Exposure to computer architecture and organization, information management, networking and communication, operating systems, and parallel and distributed computing. 4. The study of computing-based systems at varying levels of abstraction. 5. A major project that requires integration and application of knowledge and skills acquired in earlier course work.-	CS 401 Algorithmic Problem Solving (2) CS 422 Principles of Computer Systems (5) CS 433 Programming Languages (5) CS 485 Capstone Project 1 (5) CS 486 Capstone Project 2 (5) CS 4xx CS Electives (10) Subtotal: 60 quarter credits
Mathematics: At least 15 semester credit hours (22.5 quarter credit hours) that must include discrete mathematics and must have mathematical rigor at least equivalent to introductory calculus. The additional mathematics might include coursework in areas such as calculus, linear algebra, numerical methods, probability, statistics, or number theory.	MATH& 146 Statistics (5 gen ed) CS 170 Linear Algebra for Data Analysis (5) CS 202 Discrete Structures 1 (5) CS 302 Discrete Structures 2 (5) CS 402 Statistical Methods for Testing (5) Subtotal: 25 quarter credits
At least six semester credit hours (9 quarter credit hours) in natural science course work intended for science and engineering majors. This course work must develop an understanding of the scientific method and must include laboratory work.	Natural Science with Lab 1 (5 gen ed) Natural Science with Lab 2 (5 gen ed elective) Subtotal: 10 quarter credits
Total: 136.5 quarter credit hours	**Total: 140 quarter credit hours** ● 125/140 in core coursework ● 15/140 in general education

Appendix B

Course Curriculum: Core Courses

CS 101 Introduction to Computer Science (5)
Introduces fundamental concepts of computer science and computational thinking. Includes introduction to logical reasoning, procedural decomposition, problem solving, and abstraction.

CS 121 Introduction to Computer Programming 1 (5)
Introduction to computer programming for students without previous programming experience. Includes procedural programming in Java: primitive data types, control structures (loops, conditionals), methods, and arrays and related algorithms (linear search, binary search).
Example text: Stuart Reges and Marty Stepp, Building Java Programs, chapters 1-7

CS 122 Introduction to Computer Programming 2 (5)
Computer programming for students with some previous programming experience. Emphasizes program design, style, and decomposition. Uses data structures (e.g., lists, dictionaries, sets). Object-oriented programming in Java. Introduction to recursion, memory models, inheritance.
Example text: Stuart Reges and Marty Stepp, Building Java Programs, chapters 8-12

CS 123 Introduction to Computer Programming 3 (5)
Focuses on the implementation and analysis of elementary data structures (arraylist, linked list, binary search tree) and related algorithms.
Example text: Stuart Reges and Marty Stepp, Building Java Programs, chapters 13-18

CS 170 Linear Algebra for Data Analysis (5)
An introduction to linear algebra with applications in Python.
Example text: Mike X Cohen, Linear Algebra: Theory, Intuition, Code

CS 202 Discrete Structures 1 (5)
Set theory, relations, functions, formal logic, constructing proofs, computing with base-n numbers, combinatorics, and discrete probability with applications in Python.
Example text: Ryan T. White and Archana Tikayat Ray, Practical Discrete Mathematics

CS 222 Computing, Data, and Society (5)
Exploration of the use and impact of technology on society including artificial intelligence, algorithmic bias, social media, mass data collection and the spread of disinformation. Topics include privacy, spying, mass personalization and copyright.
Example text: Hal Abelson, Ken Ledeen, harry Lewis, Wendy Seltzer, "Blown to Bits 2/e"

CS 233 Web Application Programming (5)
Foundations of web application programming including client and server programming, use of frameworks and libraries, application design patterns, e.g., MVC and persistent data storage and retrieval. Students will develop, test, and debug applications.
Example text: Marty Stepp, Jessica Miller, and Victoria Kirst, Web Programming Step by Step

CS 243 Software Development Tools (3)
Learn about and practice using the tools that developers use on a daily basis such as the debugger, command line, version control systems, and other collaboration tools. Also includes an introduction to software testing, writing test cases, and the test-driven development process.

CS 296 CS Career Seminar (2)

Includes review and reflection on the variety of computer science careers and their associated skills and professional responsibilities, mapping these to program requirements and ethical implications. Students create or refine a professional persona including resume and online portfolio, identify local professional networks and networking events, and investigate community-based learning, internship and mentorships

CS 301 Foundations of Computer Science (5)
Practice object-oriented programming and apply elementary data structures and algorithms to medium-scale applications. Exposure to the theory of computing and computing machines.
Example text: Robert Sedgewick and Kevin Wayne, Computer Science: An Interdisciplinary Approach

CS 302 Discrete Structures 2 (5)
Computational complexity, graphs, trees, finding shortest paths.
Example text: Susanna Epp, Discrete Mathematics and its Applications

CS 320 Databases and Information Management Systems (5)
Exploration and practice with relational and non-relational databases, including cloud databases.

CS 333 Data Structures and Algorithms 1 (5)
Implementation and algorithm analysis such as bags, queues, stacks, sorting, priority queues, symbol tables, binary search trees, balanced binary search trees, hash tables.
Example text: Robert Sedgewick and Kevin Wayne, Algorithms, chapters 1-3

CS 334 Data Structures and Algorithms 2 (5)
Implementation and algorithm analysis such as undirected graphs, directed graphs, minimum spanning trees, shortest paths, tries, regular expressions, reductions, intractability.
Example text: Robert Sedgewick and Kevin Wayne, Algorithms, chapters 4-6

CS 350 Software Engineering (5)
Fundamentals of software engineering including analysis of system requirements, evaluation of appropriate engineering compromises, and application of collaborative software development practices and tools, such as Scrum, Kanban and other Agile practices.
Example text: Armando Fox and David Patterson, Engineering Software as a Service

CS 397/398/499 CS Seminar (1 credit each, 3 total)
Presentation, review and discussion of individual and team projects across cohorts. Practice effective critique and peer support

CS 401 Algorithmic Problem Solving (2)
Applications of algorithms to solve problems. Includes dynamic programming. Prepares students for technical interviews.

CS 402 Statistical Methods for User Research (5)
Themes include summarizing data and computing margins of error, determining statistical significance, finding appropriate sample sizes for a study, and investigating relationships among variables in the context of quantitative user research.
Example text: Jeff Sauro and James R. Lewis, Quantifying the User Experience: Practical Statistics for User Research

CS 422 Principles of Computer Systems (5)
Exposure to the design, implementation, and evaluation of computer systems, including operating systems, networking, and distributed systems.

CS 433 Programming Languages (5)
Fundamental concepts on which programming languages are based, including fundamental language features such as data structures, functions, objects, types and concurrency and the interaction between each.

CS 450 Security Foundations (5)
Explore elements of security and common threats. Topics include various types of cyber attacks and risks to a system as well as fundamentals for mitigating those risks.

CS 485 Capstone Project 1 (5)
Specify an authentic project for research or implementation related to some aspect of computer science, identify a mentor and stakeholders, articulate scope, define milestones, submit a proposal for review / approval and begin project research and implementation using agile methodologies.

CS 486 Capstone Project 2 (5)
Continued research and implementation toward project milestones, regularly report on progress using agile methodologies, document work and present results to appropriate internal and/or external audiences.

Appendix C

General Education faculty support.

Table 7 General Education Faculty

Faculty Name	Subject	Credentials	College
Soraya Cardenas	Social Sciences	Ph.D	Cascadia College
Jessica Ketcham	English	Ph.D	Cascadia College
Midori Sakura	Science	M.S.	Cascadia College
Steve Yramategui	Math	M.S.	Cascadia College
Mitchler, Sharon	English	Ph. D.	Centralia College
Peterson, Jody	Social Sciences	Ph. D.	Centralia College
Norton, Stephen	Science	Ph. D.	Centralia College
Adams, Teresa	Math	M.S.	Centralia College
Samantha Smith	Math	M.S.	Green River College
Amanda Schaefer	English	M.S.	Green River College
Katy Shaw	Science	M.S.	Green River College
Mark Thompson	Social Science	M.S.	Green River College
Roxanne Smith	Science	Ph. D.	Skagit Valley College
Christina Mohler	English	Ph. D.	Skagit Valley College
Farhana Loonat	Social Science	Ph. D.	Skagit Valley College
Christian Tiffany	English	Ph. D.	Skagit Valley College
Abel Gage	Math	M.S.	Skagit Valley College
Wes Mantooth	English	Ph.D.	LWTech
Jason Sobottka	Humanities	M.F.A.	LWTech
Wiliam Bricken	Math	Ph.D.	LWTech
Barcin Acar	Science	Ph.D.	LWTech
Sharon Raz	Social Science	Ph.D.	LWTech
Kathleen Higgins	English	M.A.	Renton Technical College

Martin Cooksey	Math	M.S.	Renton Technical College
Sallie Shortt	Social Sciences	M.A.	Renton Technical College
Huma Mohibullah	Social Sciences	Ph.D.	Renton Technical College
Sarah Redd	Natural Sciences	M.S.	Renton Technical College
David Zou	Math	M.A.	Renton Technical College
J.R. Hudspeth	English	M.A.	Renton Technical College
Camille Rendal	Humanities	M.F.A.	Renton Technical College
Ruth Harris-Barnett	English	Ph.D.	Edmonds College
Patrick Averbeck	Math	Ph. D.	Edmonds College
Robin Datta	Social Science	Ph. D.	Edmonds College
Lori Hays	Natural Science	Ph. D.	Edmonds College
Susan Meslans	Humanities	M.A.	Edmonds College

Appendix D

Pathway Options beyond a bachelor degree.

Table 8 Degree Pathway Options

College/University	Degree Pathways	Quotes	Confirmation yes/no
St Martin's University	Master of Science in Computer Science		Yes
University of Washington - Tacoma	Master of Science in Computer Science and Systems (MSCSS)		Yes after additional coursework
University of Washington-Seattle	Master of Science in Computer Science & Engineering		Yes
University of Washington-Bothell	Master of Science Computer Science and Software Engineering	BSCS including high level of command and competency in OO concepts and s/w engineering.	Yes
Washington State University-Vancouver	Master of Science Computer Science	BSCS from an accredited program.	No w/o ABET
Washington State University-Pullman	Master of Science Computer Science		Yes
Western Washington University	Master of Science Computer Science		Yes

Western Governor's University	Master of Science-Information Technology Management MS in Cybersecurity and Information Assurance MS in Data Analytics		Yes
Northeastern University	Master of Science Computer Science		Yes
City University	Master of Science Computer Science		Yes
Central Washington University	Master of Science Computer Science		Yes
Seattle University	Master of Science in Computer Science	BSCS from a regionally accredited accredited institution. And additional coursework required: https://catalog.seattleu.edu/preview_program.php?cat oid=47&poid=9691&returnto=4208	Yes
Arizona State University Online	Master of Science Computer Science		Yes after additional coursework

Table 9 Degree Option Websites and notes

College/University	Website	Comments/Notes
St Martin's University	[Master of Science in Computer Science	Saint Martin's University (stmartin.edu)](#)	4 + 1 dual degree, as well as 2 yr MSCS Nothing on website indicates that ctc students are disqualified.
University of Washington - Tacoma	[M.S. in Computer Science & Systems	Engineering & Technology	University of Washington Tacoma (uw.edu)](#)	After additional coursework: GRE < 5 years old; Need calculus plus additional coursework https://www.tacoma.uw.edu/set/programs/graduate/mscss
University of Washington-Seattle	[Professional Master's Program	Paul G. Allen School of Computer Science & Engineering (washington.edu)](#) https://www.uwb.edu/mscsse?gclid=EAIaIQobChMIruTM5_rp9gIVdiCtBh3dIAwzEAAYAiAAEgLLovD_BwE	After additional experience: PMP is the Professional Master's Program. "All applicants must hold a minimum of two years full-time, post-degree professional experience as software developers, engineers or similar roles." BS coursework must include data structures, algorithms, computer systems and programming languages. Must reside in Seattle area.
University of Washington-Bothell	[Master of Science in Computer Science & Software Engineering - UW Bothell](#)	[https://www.uwb.edu/mscsse/admission](#)
Washington State University-Vancouver	[Computer Science M.S. - School of Engineering and Computer Science - WSU Vancouver](#)	[https://gradschool.wsu.edu/degrees/factsheet/master-of-science-in-computer-science-vancouver/#:~:text=Admission%20Requirements%3A,for%20the%20MSCS%20graduate%20program.](#)
Washington State University-Pullman	[Master of Science in Computer Science	Graduate School	Washington State University (wsu.edu)](#)	[https://gradschool.wsu.edu/degrees/factsheet/master-of-science-in-computer-science/](#)
Western Washington University	[Computer Science	Graduate School	Western Washington University (wwu.edu)](#)	

Wester n Govern or's Univers ity	[Online Masters in Information Technology - IT Degree	WGU](#)	
Northe astern Univers ity	[Master of Science in Computer Science	Northeastern University](#)	In Boston: GRE required
City Univers ity	[MS in Computer Science - Online MS Degree in Computer Science	CityU](#)	
Central Washin gton Univers ity	[Computational Science Masters Degree Program	Central Washington University (cwu.edu)](#)	No clear criteria apart from general graduate school admission
Seattle Univers ity	[Computer Science	College of Science & Engineering	Seattle University](#)	After additional coursework
Arizona State Univers ity Online	[Online Master of Computer Science	ASU Online](#)	Need: Prerequisite knowledge To be eligible for this program, you must have programming knowledge in a variety of languages, including C/C++ Java, Python and HTML. You must also have demonstrated knowledge of topics, such as: CSE 230: Computer Organization and Assembly Language Programming Register-level computer organization, instruction set architecture, assembly language, processor organization and design, memory organization, IO programming and exception/interrupt handling. CSE 310: Data Structures and Algorithms Advanced data structures and algorithms, including stacks, queues, trees (B, B+, AVL), and graphs and searching for graphs, hashing and external sorting. CSE 330: Operating Systems Operating system structure and services, processor scheduling, concurrent processes, synchronization techniques,

		memory management, virtual memory, input/output, storage management and file systems. Principles of Programming Languages OR Introduction to Theoretical Computer Science CSE 340: Principles of Programming Languages Formal syntactic and semantic descriptions, compilation and implementation issues, and theoretical foundations for several programming paradigms. CSE 355: Introduction to Theoretical Computer Science Introduces formal language theory and automata, Turing machines, decidability/undecidability, recursive function theory and complexity theory. Are you a non-computer science undergrad? If you don't have these topics on your transcript but have a strong understanding of them, you can take the prerequisite knowledge exams. If you complete the exams with the grade outlined in the respective syllabi, you'll satisfy that prerequisite knowledge requirement. GPA requirements A minimum cumulative GPA of 3.00 in the last 60 credit hours (last two years) of a four-year undergraduate degree. If your degree was completed in the U.S., it must be from a regionally accredited university. Students who are applying who have previously completed graduate-level coursework must have a minimum post-baccalaureate/graduate GPA of 3.00. Math requirements You must have two semesters of advanced math in Calculus I and Calculus II and a background course in Discrete Math.*

Appendix E

Letter of Support

Washington State Board for Technical and Community Colleges
1300 Quince St SE
Olympia, WA 98504

August 22, 2022

To who it may concern:
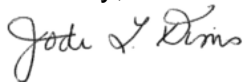
Khoury College of Computer Sciences at Northeastern University is writing this letter in support of the AppConnect NW consortium program proposal for a BS in Computer Science degree to be offered at seven colleges in Washington State. Khoury College offers a Masters of Science in Computer Science (MSCS) degree program at Northeastern University's Seattle campus, and would be thrilled to see this expansion of Washington students entering the field and joining the technology workforce.

In reviewing the proposed curriculum for the new degree programs, we affirm that students who graduate with a BSCS degree under this proposed curriculum would be eligible for admission to Khoury College's MSCS program. Khoury College requires discrete mathematics, data structures, calculus, and programming courses to be completed at the Bachelor's level prior to admission to our MSCS program; the curriculum proposed by the AppConnect NW consortium fulfills these requirements.

Khoury College's mission is to make "CS for everyone", and to provide pathways to computer science education and technology careers accessible for people with marginalized identities who have been historically excluded from technology fields. We offer our support to this expansion of computer science education in Washington state, which shares our goal of broadening access to technology careers for low-income students and students of colors. We hope to see BSCS graduates consider enrolling in our MSCS program upon completion of their BSCS or after they have entered the workforce, and are ready to further advance their education.

Please do not hesitate to reach out with any further questions, and thank you for your consideration of this proposal.

Sincerely,

Dr. Jodi Tims
Associate Dean of Network Programs and Professor of the Practice
Khoury College of Computer Sciences
j.tims@northeastern.edu

Khoury College of Computer Sciences
Northeastern University
202 West Village H
360 Huntington Avenue
Boston, MA 02115
617.373.2462
khoury.northeastern.edu

Appendix F

External Review Responses

Applied Baccalaureate External Review Rubric

College Name:	NW Connect Consortium	BS Degree Title:	Bachelor of Science in Computer Science
Reviewer Name/ Team Name:	Gordon Gul	Institutional or Professional Affiliation:	The Evergreen State College
Professional License or Qualification, if any:	MS in Software Engineering CS Professor at a 4 year college	Relationship to Program, if any:	None

Please evaluate the following Specific Elements

a) Concept and overview	Is the overall concept of the degree program relevant and appropriate to current employer demands as well as to accepted academic standards? Will the program lead to job placement?
	Comment Based on current and predicted industry needs, the degree program is relevant. The Program Learning Outcomes (as outlined in the program proposal) are aligned with IT industry needs and demands. Graduating from the program can lead to employment in the IT industry. The Program Learning Outcomes do meet accepted academic standards.
b) Degree Learning Outcomes	Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?
	Comment Yes, the Program Learning Outcomes are closely aligned with the BSCS program outcomes at 4-year colleges and universities throughout the US and demonstrate appropriate rigor for a baccalaureate degree.
c) Curriculum Alignment	Does the curriculum align with the program's Statement of Needs Document?
	Comment The program proposal, including the curriculum, aligns with all seven of the criteria in the Statement of Needs Document.

Applied Baccalaureate External Review Rubric

		In particular, the proposal aligns with the needs document in terms of future employment options, further study options, and the closing of equity gaps.
d)	Academic Relevance and Rigor	Do the core and elective courses align with employer needs and demands? Are the upper level courses, in particular, relevant to industry? Do the upper level courses demonstrate standard academic rigor for baccalaureate degrees?
		Comment The core computer science courses in conjunction with the elective computer science courses cover a broad range of expected and needed topics. This is particularly true for the elective courses. The upper level courses are both relevant and critical to the IT industry. The upper level courses are aligned with course offerings at other institutions and they do meet the rigor for baccalaureate degrees.
e)	General Education Requirements	Are the general education requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?
		Comment The General Education Requirements, especially the math courses, are suitable for a baccalaureate level program. A larger credit allocation for the Humanities and the Social Sciences would have been preferable, but they do meet the breadth and depth requirements.
f)	Preparation for Graduate Program Acceptance	Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable graduate degree programs?
		Comment Yes, successful completion of the program opens up the possibility for further studies (e.g. Master of Science and PhD) in Computer Science.
g)	Faculty	Do program faculty qualifications appear adequate to teach and continuously improve the curriculum?
		Comment

		Based on the education and work experience of the faculty listed in the proposal the faculty are absolutely qualified to teach and continuously improve the curriculum.
h)	Resources	Does the college demonstrate adequate resources to sustain and advance the program, including those necessary to support student and library services as well as facilities?
		Comment The existing and planned resources in the areas of Financial Aid and Scholarships; Advising Services; Tutoring/Learning Support; Library Services and eLearning Support; and facilities are adequate to sustain and advance the program. It is especially important to have dedicated tutors. These are already in place or there are plans to add them (depending on the institution).
i)	Membership and Advisory Committee	Has the program received approval from an Advisory Committee? Has the program responded appropriately to the Advisory Committee's recommendations?
		Comment Advisory committees are not necessary for Bachelor of Science degrees. However, Centralia College and Skagit College will be working closely with advisory committees.
j)	Overall assessment and recommendations	Please summarize your overall assessment of the program.
		Comment The program includes the expected and required outcomes and courses. The program is aligned with similar programs throughout the nation. This will facilitate transfer to and from the program. The program meets industry needs and the requirements for further studies in computer science. Overall it is a robust degree and has the potential to help students with their professional and academic careers.
Reviewer Bio or Resume		

Applied Baccalaureate External Review Rubric

Evaluator, please insert a short bio here

My name is Gordon Gul and I am a professor at the Evergreen State College where I teach Computer Science (upper and lower division) in a Bachelor of Science in Computer Science (BSCS) program. Before I started working at the Evergreen State College I used to teach as a Professor of Computer Information Systems (CIS) at South Puget Sound Community College. Before then, I was working as an Adjunct Instructor at Centralia College teaching Computer Science, IT, and Math.

I have over 5 years of college level teaching experience. I also have 9 years of IT industry experience between my jobs at G4S (as a Computer Security Consultant), Sony Ericsson Mobile Communications (as a Software Engineer), Axiell Library Group (as a System Architect), and Värner Rydénskolan (as a Library Technician).

My main degrees are in Computer Science, Software Engineering, and Computer Game Development.

Applied Baccalaureate External Review Rubric

Instructions for colleges submitting a BAS degree proposal:

1. As part of completing a program proposal, colleges must select two external experts to review the program.
2. Reviews should be completed by an independent, third-party person or team with subject/discipline expertise.
3. At least one, preferably two, of these external expert reviewers should come from a university level institution, i.e. departmental professor, academic dean or department head.
4. A second external expert reviewer may be a professional/practitioner who works for a private or public organization other than the university.
5. External Expert Reviewers should be instructed by colleges to address the criteria listed in this rubric.

Instructions for External Expert Reviewers:

1. External Expert Reviews provide critical feedback to colleges so that they may address potential concerns, issues or criticisms prior to final submission of a program proposal to the State Board of Community and Technical Colleges.
2. Reviewers should be independent, third-party persons or teams with subject/discipline expertise.
3. The goal of a review is to assess the credibility, design, relevance, rigor, and effectiveness of the proposed BAS program.
4. Reviewers should also validate the congruency and consistency of the program's curriculum with current research, academic thinking and industry standards.
5. Reviewers need not provide responses to every criteria listed in the Rubric. If reviewers feel that they cannot adequately address any one of the criteria, they may simply state that this is the case.
6. This form is designed to assist External Expert Reviewers to complete assessments of baccalaureate degree program proposals. External Expert Reviewers are not restricted to the use of this rubric template. Reviewers may choose, instead, to provide a college with a written narrative.   In whatever format they choose, reviewers should address the criteria outline in the rubric.

Approved February 18, 2016 (Version 1)

Applied Baccalaureate External Review Rubric

Note:

- On July 8th: I received three documents:
    - **First**: Program Proposal CSBS: the proposed degree program,
    - **Second:** CS Computer Science Criteria 7-7-2022: summarizing opportunities of Master's degree admissions, and,
    - **Third**: The blank reviewer form.
- On the morning of July 28: I received a separate 23-page "Statement of Need" document.
    - This was 4 days (2-business days) before the review deadline of August 1st.
    - I tried, but, did not have sufficient time to review and integrate the content of the 23-page document.

College Name:	NW Connect Consortium	BAS Degree Title:	Bachelor of Science in Computer Science
Reviewer Name/ Team Name:	Kelvin Sung	Institutional or Professional Affiliation:	University of Washington Bothell
Professional License or Qualification, if any:	Professor, School of STEM Division of Computing and Software Systems	Relationship to Program, if any:	Currently serving as a member on the Technical Advisory Committee of Cascadia College. I have no involvement with this BAS degree effort.
Please evaluate the following Specific Elements			
     Concept and overview	Is the overall concept of the degree program relevant and appropriate to current employer demands as well as to accepted academic standards? Will the program lead to job placement?		
	Comment The proposed Bachelor of Science in Computer Science (BSCS) degree program is from the AppConnect Northwest Consortium, consisting of seven regional colleges: Cascadia College, Centralia College, Edmonds College, Green River College, Lake Washington Institutive of Technology, Renton Technical College, and Skagit Valley College. Together these colleges are with extensive experiences and demonstrated results in supporting a diverse Washington State citizenry in their pursuit of higher education. The proposed degree program is designed to deliver the outcomes specified by the ABET Criterial for Accrediting Computing Programs. The curriculum represents the combined wisdom form the college's recent experiences in offering a variation of computing related Bachelor of Applied Science (BAS) degree programs.		

Approved February 18, 2016 (Version 1)

Applied Baccalaureate External Review Rubric

<table>
<tr>
<td></td>
<td colspan="2">Yes, the proposed degree program is timely, relevant, and, appropriate to current employer demands. The proposed curriculum adheres to high academic standards where successful graduates from the program should be able to secure job placements.</td>
</tr>
<tr>
<td rowspan="2">• Degree Learning Outcomes</td>
<td colspan="2">Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?</td>
</tr>
<tr>
<td colspan="2">Comment
The learning outcomes of the proposed BSCS degree program are designed to address the ABET Criterial for Accrediting Computing Programs. Table 3 (on Page 8 and 9) in the proposal illustrated a detailed course offering that are capable of delivering the desired outcomes.

Yes, the proposed degree learning outcomes demonstrate appropriate baccalaureate degree rigor.</td>
</tr>
<tr>
<td rowspan="2">• Curriculum Alignment</td>
<td colspan="2">Does the curriculum align with the program's Statement of Needs Document?</td>
</tr>
<tr>
<td colspan="2">Comment

Note: please refer to the comments in the beginning of this review. The following is based on the contents from the actual proposal and not the separate 23-page Statement of Need document that was sent to me 2 business days before the review deadline.

The Statement of Needs of the proposed BSCS degree program is articulated in the first two paragraphs on the first page of the proposal. The statement can be summarized as: to design a BSCS degree program with an equity-focus addressing especially low-income students and students of color, where the proposed curriculum must mitigate the following 5 criteria: A) entry barriers, B) improve retention, C) foster belongings, D) support career transition, and E) explicitly assess progress toward more equitable outcomes.

As discussed above, the learning outcomes of the proposed BSCS degree program is with appropriate rigor where successful graduates should be able to secure job placements. The following analyze the proposed curriculum against the 5 stated criteria from the perspectives of admission, academics, and student support.

Admission. The process straightforward, criteria rigorous and yet considerate, pathways flexible supporting motivated students with diverse background either switching their careers or beginning the pursue for BSCS. Addressing criteria: A, C, and E.</td>
</tr>
</table>

Applied Baccalaureate External Review Rubric

		Academics. Details regarding relevancy and rigor will be discussed in the next section. Here, the focus is on addressing the 5 criterial. There are three main considerations: quantitative skills, academic leveling, and career insights and perspectives of the computing field. For quantitative skills consideration, the proposed curriculum innovatively avoided the traditional rigid requirement of the Calculus series of classes and instead replaced with rigorous, and arguably more appropriate, applied based practical classes in linear algebra (CS170), discrete structures (CS202, CS302), and statistics (CS402). Academic leveling is accomplished via often neglected supporting classes in traditional CS degree programs: CSS 243 Software Development Tools, and CSS 301 Foundations of CS. For career consideration, the proposed curriculum included specific required classes ranging from specific career considerations, e.g., CS 296 CS Career Seminar, to insights and perspectives of the computing field, e.g., CS 222 Computing, Data, and Society, CS 397/398/499 CS Seminar. Address criteria: B, C, D, and E. Student support. Beginning from the bottom of Page 18 Criteria 4, the proposal details the extensive existing student support infrastructure and experience. These are directly applicable to students from the BSCS degree program. Address criteria: B, and C.
• Academic Relevance and Rigor		Do the core and elective courses align with employer needs and demands? Are the upper level courses, in particular, relevant to industry? Do the upper level courses demonstrate standard academic rigor for baccalaureate degrees?
		Comment The alignments with and relevancy to the computing industry can be considered from the following perspectives: quantitative skills, communication skills, foundation classes, and, advanced classes in elective areas. Please refer to the previous discussion on quantitative skills. Communication skills are addressed via two required writing classes, and, CS 397/398/499 CS Seminar and CS 485/486 Capstone Project, where students will learn and practice technical writing and presentation skills. Foundation (core) classes. In addition to the standard intro sequence: CS 121/122/123 (this standard classes are important for potential student transferring between higher ed instructions in general), the proposed curriculum included broader perspectives classes: CS 222/296, and, commonly encountered tools: CS 233/243. The latter two categories of classes are especially important for students from diverse backgrounds who may be new to the field of computing. The more advanced foundation classes cover the important areas of computing including: data structures (CS 333/334), algorithm (CS 401), systems (CS 422), software engineering (CS 350), and, capstone (CS 485/486).

Applied Baccalaureate External Review Rubric

	Advanced classes in elective areas. These are classes based on the successful existing BAS degree programs currently offered by the consortium colleges (Table 4 on Page 12). These classes cover knowledge in relevant contemporary computing areas. Based on this analysis, yes, the core and elective courses do align with employer needs and demands, and, yes, the upper level courses are relevant to industry and do demonstrate standard academic rigor for baccalaureate degrees. *Minor suggestions:* • CS 433 Programming Languages: can be an excellent advanced elective class. It is not necessary to include a programming language class in the core curriculum. I believe it is the case that no existing CS degree program includes a class on programming languages in their core curriculum. Item-2 in the second row of Table-3 (on top of Page 9) "Substantial coverage of at least one general-purpose programming language": can be satisfied by teaching a sequence of non-intro classes in the same programming language, e.g., teach CS 333 and CS 334 based on the same language such as: C++, Java, C#, or Python. • CS 170 Linear Algebra for Data Analysis. The proposed textbook, although with specific coding examples and solutions, as suggested by the title (Linear Algebra: ***Theory***, Intuition, Code), the book approaches topics from theoretical perspectives. For example, the coverage of vector and matrix spaces. Specific coverage of such abstract concepts can seem distant and irrelevant for practical minded students. In this case, may be a book with more emphasis on practical applications, e.g., Introduction to Applied Linear Algebra by S. Boyd and L. Vandenberghe, can be considered.
• General Education Requirements	Are the general educations requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?
	Comment The degree program requires 5 credits each in humanities and social sciences, and 10 credits of natural science with lab. Yes, these are typical requirements for the general educations of a baccalaureate level program.
• Preparation for Graduate Program Acceptance	Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable graduate degree programs?
	Comment As discussed above, the proposed curriculum and learning outcomes are with relevancy and rigor, and align well with typical baccalaureate degree academic standard. As summarized in the separate "*CS Computer Science*

Applied Baccalaureate External Review Rubric

		Criteria 7-7-2022" spreadsheet document, there are clear pathways to graduate degrees for successful graduates from the proposed degree program. *A minor point: It may be the case that most (if not all) of the listed MS degree programs require one or more Calculus classes from their applicants. Students in this proposed degree program who are interested in pursuing graduate degrees in CS should integrate such classes in their schedule. Fortunately, this should be straightforward with the flexible curriculum.*
	• Faculty	Do program faculty qualifications appear adequate to teach and continuously improve the curriculum?
		Comment There are nine faculty listed in the proposal, two from Cascadia (Panitz and Bansenauer), one from Centralia (Taylor), two from Lake Washington (Vaschillo and Abbott), one from Renton (Chowdhury), one from Skagit Valley (Wyman), and, two from Green River (Wood and Hang) colleges. Many of these faculty are with advanced degrees from prestigious institutions and with substantial relevant industry experiences. All nine faculty are with extensive higher ed teaching background with demonstrated effective results. Yes, the nine faculty members listed in the proposal are well-qualified to teach the proposed curriculum. The continual improvement of any CS curriculum is critical. In this fast changing and ever improving field, "continual improvements" require opportunities for continual learning and time for converting the learning results into classroom teaching materials. The proposed budget does include support for conference and travel, however, the modest amount seems insufficient to support the continual development of the nine faculty members. There is no separate budget for faculty training. The proposal does not specify teaching loads and thus it is challenging to assess the time required for continual learning and curriculum improvements.
	• Resources	Does the college demonstrate adequate resources to sustain and advance the program, including those necessary to support student and library services as well as facilities?
		Comment Currently all of the seven colleges offer CS-related Associate degrees with many offering BAS degree programs. As such, this proposed new degree program represents a gradual and initially modest increment in resource needs. The proposed budget on Equipment and Library seem appropriate. The more significant budget in Tutoring reflects the Colleges' experience and sensitivity in supporting learners with diverse backgrounds. Sustainability of human resource, both in advising, and supporting staffs, is a concern. The budget for tutoring and advising should, as in the case for faculty, increase over time as student enrollment grows.

Applied Baccalaureate External Review Rubric

• Membership and Advisory Committee	Has the program received approval from an Advisory Committee? Has the program responded appropriately to it Advisory Committee's recommendations?	
	Comment There is no mentioning of an Advisory Committee in the proposal.	

• Overall assessment and recommendations	Please summarize your overall assessment of the program.
	Comment The proposal is based on well-documented needs, and is well-organized. The proposed degree program is structured and designed specifically to address the articulated needs, with a rigorous curriculum, where successful graduates should be able to secure relevant industrial positions and have clear pathways for pursuing continual post-graduate degree programs.

The concern over human resource support is detailed above. One last concern is with the actual operation and delivery for the degree program. The following first analyze the physical distances between the colleges and then articulate the involved concerns.

The following table lists the approximated distances between the seven colleges (in miles). The entries in orange are distances above 60 miles (more than 2 hours round trip), in yellow are distances between 30 and 60 (between 1 to 2 hours round trip), and entries in green are distances of less than 20 miles (within an hour round trip distance).

	Edmonds	Cascadia	Lake Washington	Renton	Green River	Centralia
Skagit	50	50	55	70	90	145
Edmunds		10	16	32	40	100
Cascadia			6	20	30	100
Lake Washington				17	30	90
Renton					14	75
Green River						70

The proposal seems to suggest the combined resources of the seven colleges will develop, offer, and sustain the proposed curriculum. This idea is excellent however the implementation can be challenging and some details may be important. For example, given the physical distances, it is imagined some form of hybrid or on-line offering will be involved? Will this be the case for all classes? Are there contingency plans for situations where in-person

	meetings are necessary, e.g., user testing and/or specific hardware device access? While these are relatively minor issues, some details and articulation can help strengthen the proposal.

Reviewer Bio or Resume

Kelvin Sung is a Professor with the Computing and Software Systems at University of Washington Bothell (UWB). He came to UWB from Alias|Wavefront (now part of Autodesk) where he played a key role in designing and implementing the Maya Renderer, an Academy Award winning image generation system. Kelvin's research interests are in studying the role of technology in facilitating human communication. Funded by Microsoft Research and the National Science Foundation, Kelvin's recent work focuses on the intersection of videogame mechanics, solutions to real-world problems, and technology-enabled immersive collaborations across distances and realities. Results from these activities include a series of released videogames for education, KinectMath: a Microsoft Kinect-based Algebra teaching system, publications in the Communications of the ACM, IEEE Computers, IEEE Transactions Journals, a published textbook on Computer Graphics, and four books on understanding the basic mathematics for and approaches to building 2D games and game engines. He received his Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign.

Attached: a one-page brief resume.

Kelvin Sung, Ph.D.

Professional Preparation

University of Wisconsin – Madison	Electrical Engineering	B.S.E.E., (86)
University of Illinois at Urbana-Champaign	Computer Science	M.S. (90) Ph.D. (92)

Appointments

University of Washington, Bothell, Computing and Software Systems
Associate Professor/Professor with tenure   Sep 1999 – present

Alias|Wavefront, Toronto, Canada
Senior Software Engineer/Architect   Aug 1995 – Sep 1999

Recent Books [+]Graduate students

- **K. Sung**, J. Pavleas[+], M. Munson[+], and J. Pace, "Build your own 2D Game Engine and Create Great Web Games," 2nd Ed, *APress*, Dec 2021. ISBN-13: 978-1-4842-7376-0.
- **K. Sung**, G. Smith[+], "Basic Math for Game Development with Unity3D," *APress*, December 2019. ISBN 13: 978-1-4842-5442-4.

Recent Publications [+]*Graduate* [*]*Undergraduate students*

- J. Sung, K. Sung, "Integrating Videogames Development and Software Engineering in a College Senior Elective Course," 14th Annual EduLearn, July 2022.
- J. Chesnut(*), K. Sung, "Interactable Topographical Map with Remote Cross Reality Collaboration Support," IEEE CIVEMSA, June 2022.
- G. Smith [+] and **K. Sung**, "Augmented Space Library: Hybrid P2P Library for Remote Cross Reality Investigations," in Proceedings of the 15th INTED, p. 988-997, March 2021.
- K. Yang, [+] T. Brown, [+] and **K. Sung**, "AR Object Manipulation on Depth-Sensing Handheld Devices," Applied Sciences, vol. 9, no. 13, p. 2597, Jun. 2019.
- G. Smith[+] and K **Sung**, "Teaching Computer Graphics Based on a Commercial Product," *Eurographics 2019 - Education Papers*, The Eurographics Association, March 2019.
- J. Albert[+] and **K. Sung**, "User-centric classification of virtual reality locomotion," in *Proceedings of the 24th ACM VRST*, Tokyo, Japan, November 28 - December 01, 2018, pp. 127:1–127:2.
- A. Hitchcock[+] and **K. Sung**, "Multi-view augmented reality with a drone," in *Proceedings of the 24th ACM VRST*, Tokyo, Japan, November 28 - December 01, 2018, pp. 108:1–108:2.

Recent Funded Projects

- "Interactive Affordability Model for WSAC," *Washington Student Achievement Council*, $70,031, Submitted, 2022-2023, PI: **K. Sung**, Co-PI: Jim Fridley.
- "Using Emerging Technologies to Create Common Learning Environments," $30,000, UW Bothell SRCP Seed Grant Program, May 2022, PI: R. Angotti, Co-PI: **K. Sung**.
- "Cross-Reality Collaboration Sandbox," (CRCS) *CSS, UWB,* $22,900- and 12-Quarter RA support, 2017-2022, PI: **K. Sung**.
- "Interactive College Affordability Prototype Model," *Lumina Foundation for Education*, Award Numbers: 9539 ($327,300, 2015-2017), 10381 ($945,300, 2017-2020). PI: Jim Fridley (University of Washington), co-PI: **K. Sung**.

Honors and Awards

- Nominated, Outstanding Community-Engaged Scholar Award, 2020.
- Nominated, University of Washington Bothell Distinguished Teacher Award, 2015, 2014, 2013, 2009, 2004, and 2001.
- Frederick Emmons Terman Teacher, School of Engineering, Stanford University, May 1999.

Applied Baccalaureate External Review Rubric

Note:
I have attempted to answer these questions to the best of my ability. On some of the replies, they are my own opinion that reflects my experience in the field. I have tried to use footnotes to provide a reference to some of my responses. I have appreciated the opportunity to be a small part to this exciting plan that is being proposed.

Mike McKee

College Name:	NW Connect Consortium	BAS Degree Title:	Master in Software Engineering (Seattle University) B. S Computer Science (California Polytechnic SLO)
Reviewer Name/ Team Name:	Michael McKee	Institutional or Professional Affiliation:	Seattle University Computer Science Instructor
Professional License or Qualification, if any:		Relationship to Program, if any:	None
Please evaluate the following Specific Elements			
• Concept and overview	Is the overall concept of the degree program relevant and appropriate to current employer demands as well as to accepted academic standards? Will the program lead to job placement?		
	Acceptable **Comment** The **concept** of offering a B.S. Computer Science degree for underrepresented students is a laudable goal. In their report(s), AppConnect explains why it is important to our state, and our underrepresented populations. In my personal research, various diversity surveys have shown a lack of diversity in the high-tech industry. [1] Hispanics and African Americans (especially women) are underrepresented. AppConnect addresses this by		

---

[1] https://www.eeoc.gov/special-report/diversity-high-tech

designing a program that will offer low-cost Computer Science B.S degree that will enable graduates to interview/obtain jobs in the high-tech industry. AppConnect also stated in detail how it would eliminate barriers that prevents students from attending. I found their explanations to be satisfactory.

I will highlight areas that their report(s) addressed:

- Rigor in Curriculum
  Forthcoming in future sections of this report.

- Program Evaluation
  Acceptable with a suggestion.

  The program lists various data that it would like to track (Retention, FTE, PTE, …). This will involve the need for either a custom database or a package that enables this tracking. While the report does not necessarily go into detail on implementation, this is not an easy task.

  Suggestion: Consider having one of the various student projects attempt to create this database.

- Course Preparation
  Excellent.

  AppConnect gave a superior response to this criterion by listing all the various avenues that a student may enter the program. Their responses seem plausible.

- Student Services Plan

  Acceptable with suggestions

  At Seattle University, it is common for TA's/Tutors to be available for many of the lower division classes. By the time they reach their third year, they have become more self-sufficient. The Student Services plan in the AppConnect report was acceptable with regards to Financial Aid and Scholarships. I wanted to point out two areas that could use examination:

Applied Baccalaureate External Review Rubric

	Advising services The current report lacks detail regarding CSC students on this import aspect of the program. At Seattle University, a priority is placed on this topic, as students will have an advisor (usually teacher), and a department advisor. For a CSC program, it is vital that the advisor understand the intimate details of the classes, so they can be in a better position to advise. The report could be improved by explaining how a CSC advisor for your program might operate as opposed to a generic advisor role that you likely already do. Suggestion: Consider adding more CSC Specific content in your "Advising Services" content. *Tutoring/Learning Support* The report lays out a generic approach to tutoring, but it can be improved by tailoring it directly to the proposed program. How will you get TAs in these new subjects? Will you offer CSC tutoring for only for Year 1/Year 2 subjects? This might be something to include in the report. Suggestion: Include more CSC Specific details in your Tutoring/Learning Support. Classroom Model **Missing** In the AppConnect report, the classroom model was not evident. Will the curriculum be remote, in-person, or hybrid? **It was not obvious** how the BS Computer Science program will conduct the classes. This omission might be something the group would like to address. For example, it might be unlikely that Centralia College would attract qualified instructors for an onsite CSC program. If the program offered only a dozen classes, it could be done. However, the current proposed program requires over twenty different classes. There are cases where "for-profit" schools overload unqualified instructors with classes they have not taught. I say this from personal experience when I taught at Heald College over 30 years ago. Even at Seattle University, we run into situations where we might have to teach a class where we have little experience.

	I believe AppConnect was attempting to create a mixture of models in their initial program, but it is not in the report. In the AppConnect report it did indicate that students wanted flexibility, and would appreciate the remote/hybrid model, but these models can also prevent student collaboration, and lack of engagement between faculty and students. I think a section that would highlight how the Consortium might address this would be applicable for this report.
• Degree Learning Outcomes	Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?
	Acceptable with concerns AppConnect used the ABET criteria for Accrediting Computing Programs as a guideline. An ABET credential means that the program has met the ABET standards. ABET publishes minimum standards that a CSC Program should have. The ABET requirements for a Computer Science program are:[2] <This was taken from ABET COMPUTER SCIENCE PROGRAM REQUIREMENTS> (a) Computer science: **At least 40 semester credit hours** (or equivalent) that must include: 1. Substantial coverage of algorithms and complexity, computer science theory, concepts of programming languages, and software development. 2. Substantial coverage of at least one general-purpose programming language. 3. Exposure to computer architecture and organization, information management, networking and communication, operating systems, and parallel and distributed computing. 4. The study of computing-based systems at varying levels of abstraction. 5. A major project that requires integration and application of knowledge and skills acquired in earlier course work. (b) Mathematics: **At least 15 semester credit hours** (or equivalent) that must include discrete mathematics and must have mathematical rigor at least equivalent to

---

[2] https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-computing-programs-2021-2022/ (You need to download the criteria)

introductory calculus. The additional mathematics might include course work in areas such as calculus, linear algebra, numerical methods, probability, statistics, or number theory.

(c) At least **six semester credit hours** (or equivalent) in natural science course work intended for science and engineering majors. This course work must develop an understanding of the scientific method and must include laboratory work.

Comment:

In preparing for this question, I researched other CSC programs, and included ABET in the analysis. The goal was to accurately put the amount of credit hours required for CSC, Math, Science, and GE. There are footnotes that link back to the data source.

University	CSC Classes	Math	Science	GE
Seattle U[3]	84	23	10	64
UW CSC Program[4]	85	22.5	7.5	65
AppConnect Program	108	25	10	37
ABET (minimum)	60	22.5	9	*

Observations about data:

- AppConnect has 25% more CSC Classes than other CSC programs in the Puget sound area. It reduces the number of Humanities and other GE classes by the same percentage
- ABET produces a minimum threshold to receive accreditation. All three CSC University systems surpass the recommended CSC Courses by a significant margin

Comments:

I believe the data shows that the CSC curriculum has rigor due to the number of required classes that students must take. This distinguishes the program as a BS degree that minimizes GE and offers relevant courses to the major that is being sought after.

[3] https://catalog.seattleu.edu/preview_program.php?catoid=46&poid=9407
[4] https://www.washington.edu/students/gencat/program/S/ComputerScience-210.html#credential-282f765e-0bf9-45db-80f7-1738b8ce7862

Applied Baccalaureate External Review Rubric

	My concern is that the degree will be difficult for students to obtain. Taking fifteen credits where you have a mixture of classes seems easier than fifteen credits where 80% of classes are in your major. With a goal of including underrepresented students into a CSC program, they may find that CSC is not the right program for them. Since first-year classes are CSC centric, they might not transfer as easily to another program. The program seems preferable to students who knows their major before they start the BS CSC program. Unfortunately, it has been my observation as a teacher (and once as a student), that students change their major frequently in their first two years. **Suggestion:** • Analyse a range of other CSC programs to see if your ratio (CSC/GE) is not an outlier. • If the intent was to have CSC classes at the current ratio, then document it into your report. This could be an advantage your program has.
• Curriculum Alignment	Does the curriculum align with the program's Statement of Needs Document?

Acceptable

Comment:

In attempting to answer tis question, I studied the current Statement of Needs document, and wrong comments for each criterion (with respect to alignment)

Criteria	Alignment to curriculum
Relationship to institutional role, mission, and priorities	The report stressed collaboration with regards to development of curriculum. This could come in handy for on-line courses where courses are shared on Canvas. The report did not provide examples of how this would be done but inferred it has already been done on other degrees.
Support of statewide strategic plans	The problem is well-known. There is economic demand, but limited space in current CSC programs. The barriers that

		community college students face in obtaining a degree are also addressed. The proposed curriculum contains rigor that not all introductory students will be prepared for. It will be vital for the state to offer more resources to prepare high school students, and even community college students with programs that will help qualify them.
	Employer/Community demand for graduates	The proposed curriculum provides the necessary classes that will be required to enter the high-tech field. The curriculum should be supplemented with partnerships with local companies. Internships, roundtables, and other
	Baccalaureate program builds from existing profession and technical degree	The needs document expresses that many of the classes in the proposed curriculum have already been developed. Rather than re-invent every class, AppConnect would "share" the existing curriculum to the consortium.
	Student Demand	The curriculum offers a wide range of classes that should appeal to potential CSC Students. Some students may prefer a more specialized program with regards to CSC. The current program proposal includes many different areas of CSC.
	Efforts to maximize state resources to serve place-bound students	The needs report suggests that place-bound students (students who may need to take classes online) be accommodated. The curriculum will have to include virtual/hybrid options to fulfill this.
	Promoting equitable opportunities …	The proposed curriculum is rigorous. It is vital that marginalized students are equipped to enter the program. The report would benefit from responding to various scenarios. • *What if* the 38-year-old incoming first-year student is not prepared in math?

Applied Baccalaureate External Review Rubric

		What if the incoming first-year student is not sure of this program, but attempts it? What if they later find out that CSC is not for them? *What if* you are on-line? How will you promote collaboration/relationships between students, peers, and professors? - Suggestion – I propose you consider a certificate program (Two quarter CSC introductory program?) to see if the student is a good fit. At Seattle University we offer this, and it extremely popular, and enables us to accept qualified students into our master's Program.
Academic Relevance and Rigor	Do the core and elective courses align with employer needs and demands? Are the upper-level courses relevant to industry? Do the upper-level courses demonstrate standard academic rigor for baccalaureate degrees?	
	Acceptable, with concerns **Comment** The core/elective courses align well with employer needs and demands. I found the course and electives to be especially relevant to industry. However, here are concerns: - Program focuses on Java at the expense of introducing other languages. Python/R and other languages are likely introduced in the Programming Languages class. However, it is my experience as an interview that students who are competent in other languages are more desirable. For instance, if they do not have C# experience, they may not get an opportunity to obtain an interview from Microsoft. - Networking classes appear underrepresented. - Software Engineering appear underrepresented. - Computer Architecture, Distributed Systems, Operating systems does not seem to be as dominant in the proposed curriculum. **Agile Methodology is absent from the proposed curriculum**. This is an industry relevant class that should be a separate class. The program should consider adding it to existing curriculum (e.g., Capstone, Software Engineering classes).	

<table>
<tr>
<td></td>
<td>

- **Calculus is absent from the core math requirements**. Precalculus, Statistics, and Discrete Math are the main math classes.

This is an interesting omission. I appreciate the fact that Discrete Math was prominent (this is extremely relevant in Computer Science), but the omission of a more difficult Calculus series was interesting. I was curious about this, so I asked my department chair. He pointed out that Precalculus would not be sufficient. This is the comment made:

"I have never seen a BS degree in computer science that does not require Calculus"

Suggestion:

Revisiting your omission of Calculus as a requirement for your core classes. While ABET does not require it, you will find that most CSC Programs require it. My chair also mentioned that Pre-Calculus would not transfer to our school.

</td>
</tr>
<tr>
<td rowspan="2">

- General Education Requirements

</td>
<td>

Are the general educations requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?

</td>
</tr>
<tr>
<td>

Lacking

Comment

The table displayed earlier shows that the proposed program offers significantly less GE classes than comparable programs in the Puget sound area. This could be intentional, as CSC courses took the place of the missing GE classes. Classes that did show up in the curriculum included:

- Ethics
- Art
- Philosophy and others …

</td>
</tr>
</table>

Applied Baccalaureate External Review Rubric

		A fascinating article explores why more humanities are important in Engineering[5]. Likely this was a source of many conversations in the Consortium. I defer to their expertise, but to an outsider, it is a cause of concern. Another concern was lack of flexibility on GE classes. It was not obvious whether students had a choice. The proposed curriculum will not easily transfer if the student decides to switch majors
	• Preparation for Graduate Program Acceptance	Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable graduate degree programs?
		Acceptable **Comment** Despite not having Calculus, the current program will offer a clear path to transferring to a graduate program. Obtaining ABET accreditation should help. Building relationships with other universities in the local area should help. The importance of faculty in this process is important. Faculty often provides references to students seeking to transfer into another program. The curriculum needs to be personal to enable professors to develop relationships with students.
	• Faculty	Do program faculty qualifications appear adequate to teach and continuously improve the curriculum?
		Acceptable **Comment** An impressive list of current CSC teachers was in their proposal. Their short bio's indicated competence and expertise in the field. The lack of PhD's in the report was interesting. If the faculty member obtained a PhD, it should be reflected.

---

[5] https://blogs.scientificamerican.com/cross-check/why-study-humanities-what-i-tell-engineering-freshmen/

Applied Baccalaureate External Review Rubric

		I am curious how the collaboration aspect will work in improving the curriculum. In my experience, most faculty tend to focus on their specific teaching load. Working as a distributed team creates planning issues that would need to be addressed. While the faculty profiles were interesting, you may benefit by creating a "profile" of the ideal faculty member(s) for your proposed program. The teaching model (online, hybrid, or remote) will require different skillsets for your faculty. For instance, at Seattle University, only certain faculty who have obtained the proper credentials can create an online class.
• Resources		Does the college demonstrate adequate resources to sustain and advance the program, including those necessary to support student and library services as well as facilities?
		Not enough information for me to answer completely **Comment** The report listed impressive "can-do" profiles on the various colleges. The report borders on being too optimistic and should highlight risks that are involved. When I design large software projects, risk management is addressed in the planning documents. While the people reviewing this report will be anxious to see that the proposal is workable, they would appreciate potential risks. The proposed program offered a "Big-Bang" approach to its solution. Creating a B.S. degree is extremely ambitious but adding program phases could be beneficial. As an example, a three-year plan could be in the report. Currently the report reads that this program will have unlimited resources, a full curriculum, and a myriad of teaching options (on-site, hybrid, online). This might not be doable in the initial stages of the program. The report might suggest various stages for the proposed program. As an example, the CSC program at Seattle University has taken over 15 years to evolve. In the initial stages, there was few full-time faculty, and fewer students. It has grown due to a phased approach. Regarding specific student/library services for the CSC students, I expect that you should consider the following: • ACM Memberships for all CSC students • Azure or AWS cloud credits (Microsoft offers this for free to students)

Applied Baccalaureate External Review Rubric

		• IEEE membership • Free software relevant to their program (Visual Studio) The current student services/library that is offered by the colleges should be sufficient.
• Membership and Advisory Committee	Has the program received approval from an Advisory Committee? Has the program responded appropriately to it Advisory Committee's recommendations?	
	Comment NA	
• Overall assessment and recommendations	Please summarize your overall assessment of the program.	
	A good start to a B.S. CSC program **Comment** • The program is well though out, as reflected in the plan document • Program takes advantage of leveraging current curriculum. • Program has faculty experience in the curriculum that will help bring expertise to classroom. • Program has sufficient rigor, although it sacrifices humanities to supplement more rigor in CSC courses • Program identifies how to serve the underrepresented populations • Program uses a well-defined template (ABET) to create the CSC program **Suggestions** • Revisit the current ratio of GE to CSC courses. Currently CSC has a ratio that is significantly higher than two local programs (Seattle University, University of Washington). • Revisit the amount of CSC courses required for degree. Students might find that is difficult to achieve the degree in four years (especially if they switch majors). • Calculus was an interesting omission. Revisiting this would be beneficial. Perhaps the Precalculus could actually be changed with a few additions. By having a Calculus series this would enable the program to be similar to other CSC programs.	

Applied Baccalaureate External Review Rubric

	- Ethics is missing from curriculum. This is an important part of a CSC curriculum. The proposed CS Seminar course has Ethics in its description, but not as a specific course. - More description in your report on the class model (hybrid, online, or in-person). - Detail iterative steps such as Phase 1, Phase 2, Phase 3. - List PhD qualifications in your faculty profiles. - Detail in your report on how you manage students who do not have the introductory skills needed. Would students take certain prerequisites.? - Focus less on being a "skill-shop" degree, where you try to fit skills that the industry needs at this time and focus more on developing a well-rounded student who has CSC skills. - Detail potential risks that the program might face.

Reviewer Bio or Resume
Evaluator, please insert a short bio here

My name is Mike McKee, and I am currently a full-time Computer Science instructor at Seattle University. I have taught full-time at Seattle University for four years and was an adjunct for 18 years. I hold a master's degree from Seattle University in Software Engineering, and an undergraduate degree in Computer Science from California Polytechnic San Luis Obispo.

I have had a thirty-five-year career in the Software industry prior to academia. I worked at companies such as Software A.G (based in Germany), Airtouch, and Raima. My primary roles were developer, consultant, project manager and architect. I also had management roles at times.

My areas of expertise are commercial software and database development. I worked over twenty years on database middleware projects and was instrumental in having our small company bought by a large multi-national company Software AG.

My passion is collaborative software, and oversee student team projects (capstone, and personal). My other passion is helping students get their first job in the software field. I am involved on committees and workshops that help students be prepared for technical interviews.

I have been married for 35 years, have two children, and two grandchildren. My hobbies range from bicycling to singing in a barbershop chorus.

Applied Baccalaureate External Review Rubric

Approved February 18, 2016 (Version 1)