LAKE WASHINGTON INSTITUTE OF TECHNOLOGY
DEPARTMENT OF INFORMATION TECHNOLOGY

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Bachelor's of Applied Science
Information Technology Application Development – Software Development
Program Proposal

COVER SHEET
NEW DEGREE PROGRAM PROPOSAL

Program Information

Institution Name: Lake Washington Institute of Technology

Degree: BAS IT Application Development – Software Development CIP Code: 11.0201

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

Degree: AAS Information Technology Applications Development CIP Code: 11.0201 Year Began: 2000 (2012

Degree: AAS-T Information Technology Applications Development CIP Code: 11.0201 Year Began: 2002 (2012

Planned Implementation Date (i.e. Fall 2014): Fall 2017

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Chief Academic Officer

8/16/18
Date

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LAKE WASHINGTON INSTITUTE OF TECHNOLOGY

INFORMATION TECHNOLOGY

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Introduction

The information technology industry, specifically software development and programming, is growing at an unprecedented rate in the Puget Sound. As the software development field grows, bachelor's degrees, at a minimum, are becoming the industry standard. Lake Washington Institute of Technology has an obligation to its students and the community to prepare the future workforce to meet industry expectations by offering a Bachelor of Applied Science Information Technology Application Development – Software Development (ITAD-SD). Software development firms in the information technology rich environment surrounding LWTech will benefit from a new source of talent with critical job skills. Students who chose applied associates degrees in IT fields will benefit from an efficient path to the prosperity generated by the concentration of software development firms on the Eastside of the Puget Sound region.

A large number of world-class high technology companies have their headquarters within 10 miles of LWTech. This includes Microsoft, Amazon, Boeing, Nintendo USA, T-Mobile, F5 networks, and Tableau to name a few. Other technology companies are actively opening regional development offices in the same area. Google recently opened two offices in Kirkland and Seattle, AT&T Wireless is located in Redmond, Adobe Systems and Facebook software development offices are in Seattle. Many of these companies are system software development companies, while others are heavily dependent on developing large-scale software solutions. Google is doubling the size of its Kirkland campus this year and is eager to hire. Many software companies, big and small, are opening new offices in Seattle and the surrounding area

The high level of new-employee demand from such multinational corporations cannot currently be satisfied with the existing regional workforce and local college graduates. Firms are forced to hire from far away, despite a significant expense to the companies, both at hiring and relocation stages. Hiring internationally is a common practice. Thousands of Labor Certification Applications are filed by these software companies and approved by the United States Department of Labor Employment & Training Administration every year. This demonstrates that there is a shortage of qualified U.S. workers willing to do software jobs, and therefore foreign workers are required. In most cases, it takes about a year for a company to hire a foreign software engineer. Companies are willing to wait due to the catastrophic shortage of available talent. While LWTech will not be able to close the gap between the number of open positions and the number of available graduates, the ITAD-SD program will help narrow it.

The majority of open software development positions at large software corporations require a bachelor's degree in a software-related field of study. The level of complexity in the software systems at these companies requires highly-skilled workers, and there is an expectation they possess a bachelor's degree. Thus, the current 2-year LWTech Associate's degree in Information Technology Application Development program is insufficient, and a 4-year program is a vital addition to college offerings.

1. Curriculum demonstrates baccalaureate level rigor.	Describe curriculum including (1) program learning outcomes (2) program evaluation criteria and process (3) course preparation needed by students transferring with technical associate degree (4) general education component (5) course work needed at junior and senior levels in the BAS.

Lake Washington Institute of Technology has designed the Bachelor of Applied Science Information Technology Application Development – Software Development program to provide academically rigorous curriculum that reflects major modern trends of the software industry and demands of the industry employers.

Program Learning Outcomes

The Bachelor of Applied Science Information Technology Application Development – Software Development program prepares students to work as software developers or programmers in a team-based environment supporting large scale product deployments.

BAS ITAD-SD degree graduates will:

1. demonstrate competency in software engineering, software testing principles, and quality assurance techniques
2. implement program management concepts
3. identify, evaluate, and apply efficient algorithms and technologies required for developing software system
4. demonstrate ability to understand and integrate contributions to the architecture design of a large software system
5. be prepared to obtain an entry-level position at a software development company.

Program Evaluation Criteria and Process

LWTech conducts extensive research during the exploratory and implementation phases of new baccalaureate development. Employment and demand data drive the need. Employer and student surveys lend insight into demand and interest. Advisory committee and other industry experts provide guidance on scope and content. Faculty provide expertise on curriculum development. The program proposal received rigorous evaluation by two external experts in higher education and industry. Input from higher education and industry experts will continue throughout the program implementation process. Regular Advisory Committee member input and feedback will be collected through regular meetings. The committee will be particularly helpful as the bachelor's degree curriculum is created and corresponding changes to the associates level curriculum is designed.

At LWTech, each program performs summative and formative assessments, quarterly and annually. Together, those assessments roll up into a comprehensive five-year program assessment. The assessment model is in alignment with the college's core themes. In addition, the assessment includes a five-year comprehensive program overview based on the data collected throughout the years.

Five-Year Comprehensive Program Overview:

- Is the mission statement accurate and current?
- Is the program description accurate ad current?

SWOT Analysis:

- Strengths and achievements
- Challenges
- Opportunities

Plan of action

- Short-term goals
- Mid-term goals
- Long-term

Table 1: LWTech Program Assessment

Core Theme	**Assessment Topic**	**Specific Assessment**	**Timing**
Pathways	Pathways	Flow Chart – how students move through the program	Year 1
		Where students come from	Year 1
		Options students have while they're here	Year 1
		Where students go	Year 1
	Enrollment Data	FTE	Quarterly
		Headcount	Quarterly
		Student-Faculty Ratio	Annually
	Curriculum Review	Up-to-date course outlines	Annually
		Delivery methods	Annually
	Academic Advising	Entering student support	Year 2
		Continuing student support	Year 2
		Completing student support	Year 2
	Employment Opportunities	Employment projections	Annually
		Projected wage data	Annually
		Industry changes/response to changes	Annually
		Pending industry changes	Annually

	Transfer	Articulation agreements	Year 3
		Other transfer options	Year 3
	Resources	Student/Faculty ratio	Annually
		Staffing levels	Annually
		Adequate facilities	Annually
		Adequate equipment	Annually
		Adequate technology	Annually
		Adequate budget	Annually
Student Achievement	Data	Average or higher completion	Annually
		Average or higher retention	Annually
		Licensing/industry exam pass rates	Annually
		Internship/externship/clinical pass rates	Annually
		Employment rates	Annually
		Course Evaluations	Annually
	Global Outcomes	Communication: • Audience/Purpose • Content Development • Clarity/Organization Within Genre and Disciplinary Conventions • Technology/Visual Elements • Grammar/Language • Sources/Evidence Critical Thinking: • Identify the problem • Gather Information • Develop hypothesis • Assess/Analyze • Evaluate Information Literacy • Identify Information Need • Formulate Research Plan • Select/Use Tools • Gather Information • Evaluate/Synthesize Information • Use Information Responsibly	Rotates Annually

		• Apply Technology to Enhance Learning Intercultural Appreciation • Cultural Awareness/Self Knowledge • Acknowledgement of Stereotypes/prejudice • Verbal/Non-Verbal Communication • Respect, Engagement, Inquiry • Teamwork/Openness Teamwork: • Working with Team Members • Time Management • Contributions • Attitude • Leadership/Participation (Reference Global Outcome Guide)	
College Community	Student Support Services	Relationship with library	Year 4
		Relationship with Learning Lab, Math Tutoring Center, Writing Tutoring Center	Year 4
		Relationship with eLearning	Year 4
		Relationship with Counseling	Year 4
		Relationship with Disability Support Services	Year 4
		Relationship with specific population programs (TRiO, BFET, etc.)	Year 4
	Associated Student Government	Relationship with ASG	Year 4
	Instructional Programs	Partnerships with other programs	Year 4
	Faculty Development	Activity engagement	Annually
		Future training opportunities	Annually
	Faculty Engagement	Committees engagement	Annually
		Initiatives involvement	Annually
		Events involvement	Annually
	Safety	Safe classrooms	Annually
		Safe labs	Annually

		Safe offices/workspaces	Annually
External Engagement	Recruiting/outreach	Involvement levels	Annually
		Notable successes	Annually
	Marketing	Supply of materials	Annually
		Adequacy of materials	Annually
	Advisory Committee	Diversity of representation	Quarterly
		Curriculum review feedback	Quarterly
		Contributions/recommendations	Annually
	Foundation	Partnership engagement	Annually

Course Preparation Needed by Students Transferring With a Technical Associates Degree

The ITAD-SD program is designed to provide pathways for students holding technical associates degree in Computer Science or IT-related field. Students with such a degree will be able to complete the ITAD-SD program in two years of full-time study.

Entry requirements are designed to accommodate students with associates degree earned in various IT and computer science (CS) AAS programs. Students must demonstrate preparedness for the rigorous academic and technical curriculum of the BAS program. They can enter the ITAD-SD program if they earned:

1. An associate degree or equivalent from a regionally accredited institution in CS- or IT - related fields. The degree must include the following college-level classes completed with 2.0 minimum GPA:

    a. College level Math (with intermediate algebra as a prerequisite)
    b. College level English (ENGL& 101 or equivalent)
    c. College level Social Science
    d. College level Humanities
    e. Programming II course equivalent to CS 143

2. Minimum cumulative GPA across all college coursework of 2.5

The following technical courses, or their equivalents, are strongly recommended before starting the BAS degree core coursework because they lay the foundation for the curriculum taught in the program.

1. ITAD 122 JavaScript and jQuery
2. ITAD 138 Structured Query Language (SQL)
3. ITAD 268 QA Methodologies

Students who lack the core coursework listed above in their AAS degree will be provided an opportunity to take a "core bridge quarter" before taking BAS program core courses. Fall quarter of the junior year will serve as a bridge for these students needing recommended core courses. Meanwhile, other students will take required BAS general education courses. There will be time later in the program for students who took the core bridge quarter to take the required academic core classes they missed during fall or summer quarters.

General Education Components

General education courses play an important role in the applied baccalaureate degree by providing a solid foundation of knowledge in the areas of communication skills, quantitative reasoning, humanities, social science, and natural sciences. The general education requirements are described in details in Table 2.

Table 2: General Education Requirements

Area of Study	Course	Credits	Typical Completion
Communication Skills (10 credits)	ENGL& 101 English Composition	5	AAS
	ENGL& 235 Technical Writing	5	BAS
Quantitative Reasoning (20 credits)	MATH& 142 Pre-Calculus II	5	AAS
	CS 143 Computer Science II OR equivalent Computer Programming II course	5	AAS
	MATH& 151 Calculus I	5	BAS
	MATH 220 Linear Algebra	5	BAS
Humanities (10 credits)	Humanities Elective: any 5-credit Humanities course approved for AAS-T degree *	5	AAS
	Humanities Elective: any 5-credit Humanities course approved for AAS-T degree * (From 2nd distribution area)	5	BAS
Social Sciences (10 credits)	Social Sciences Elective: any 5-credit Social Sciences course approved for AAS-T degree* (From 2nd distribution area)	5	AAS
	PSYC 324 Psychology of Organizations	5	BAS
Natural Sciences (10 credits)	Natural Sciences Elective: any 5-credit Natural Sciences course from the Natural Sciences Courses List**	5	BAS
	PHYS& 114 General Physics I w/ Lab OR PHYS& 221 Engineering Physics I w/ Lab	5	BAS
	Total Credits of General Education	**60**	**25 AAS 35 BAS**

* LWTech 2015-16 Catalog http://catalog.lwtech.edu/preview_program.php?catoid=2&poid=151

** Natural Sciences Courses List is provided in Appendix B

Coursework Needed at Junior and Senior Levels in the BAS

180 credits are required for the ITAD-SD degree. The first 90 credits are transferred from the technical associate's degree. Ninety credits of the BAS coursework consist of 35 general

education credits and 55 core technical credits. Table 3 details the coursework needed at the junior and senior levels of the BAS program.

Table 3: Coursework Needed at Junior and Senior Levels

Area of Study	Course	Credits
General Education Requirements (35 credits)	ENGL& 235 Technical Writing	5
	MATH& 151 Calculus I	5
	MATH 220 Linear Algebra	5
	Humanities Elective	5
	PSYC 324 Psychology of Organizations	5
	PHYS& 114 General Physics I w/ Lab OR PHYS& 221 Engineering Physics I w/ Lab	5
	Natural Sciences Elective	5
Core Requirements (55 credits)	CSD 322 Computer and Network Architectures	5
	CSD 321 Systems Analysis and Design	5
	CSD 331 Database Modeling and Design	5
	CSD 332 Software Project Management	5
	CSD 335 Algorithms and Data Structures	5
	CSD 412 Web Development	5
	CSD 415 Mobile Application Development	5
	CSD 425 Cloud Computing	5
	CSD 436 Algorithmic Problem Solving	5
	CSD 438 Big Data Application Development	5
	CSD 480 Capstone Project	5
	Total Credits at Junior and Senior Levels	**90**

The BAS curriculum will provide students with a solid foundation in software development knowledge that builds on the basic skills developed at the associate's degree level. Students will be taught critical and algorithmic thinking, industry-relevant skills, and modern technologies using hands-on, project-based learning approaches. Course descriptions of the courses listed in Table 3 are provided in Appendix A.

A student attending full-time, 15 credits per quarter, will be able to complete the BAS program in 2 years (6 - 8 quarters). A sample full-time student academic plan is provided in Table 4. The program adviser will work with each student individually to develop an efficient academic plan that takes into consideration all credits transferred from the lower-division programs.

Table 4: Sample 2-year Academic Plans

Junior Year

Fall	Winter	Spring	Summer
MATH& 151 Calculus I	CSD 322 Computer and Network Architectures	CSD 331 Database Modeling and Design	Internship or Gen Ed if needed
Humanities Elective	CSD 321 Systems Analysis and Design	CSD 332 Software Project Management	
Natural Sciences Elective	MATH 220 Linear Algebra	CSD 335 Algorithms and Data Structures	

Senior Year

Fall	Winter	Spring	Summer
CSD 412 Web Development	CSD 425 Cloud Computing	CSD 438 Big Data Application Development	
CSD 414 Mobile Application Development	CSD 436 Algorithmic Problem Solving	CSD 480 Capstone Project	
ENGL& 235 Technical Writing	PHYS& 114 General Physics I	PSYC 324 Psychology of Organizations	

Academic Plan with Bridge

Junior Year

Fall (Bridge Quarter)	Winter	Spring	Summer
ITAD 122 JavaScript and jQuery	CSD 322 Computer and Network Architectures	CSD 331 Database Modeling and Design	MATH& 151 Calculus I (if needed)
ITAD 138 Structured Query Language (SQL)	CSD 321 Systems Analysis and Design	CSD 332 Software Project Management	Humanities Elective (if needed)
ITAD 268 QA Methodologies	MATH 220 Linear Algebra	CSD 335 Algorithms and Data Structures	Natural Sciences Elective (if needed)

Senior Year

Fall	Winter	Spring	Summer
CSD 412 Web Development	CSD 425 Cloud Computing	CSD 438 Big Data Application Development	
CSD 414 Mobile Application Development	CSD 436 Algorithmic Problem Solving	CSD 480 Capstone Project	
ENGL& 235 Technical Writing	PHYS& 114 General Physics I	PSYC 324 Psychology of Organizations	

2. Qualified faculty.	Provide a profile, including education credentials, of anticipated faculty (full-time, part-time, regular, continuing) that will support the program for each year (junior and senior). Include faculty needed to cover the technical course work, general education courses and electives. In addition, provide the total faculty FTE allocated to the program. Faculty and administrators responsible for technical courses must meet certification requirements for professional and technical administrators and instructors in the Washington Administrative Code.

LWTech expects 25 FTE enrolled in the first year, growing to 50 in the second year. The program will be led by one full-time software development faculty who will teach at the associate's and bachelor's levels, with a number of full- and part-time faculty from software development, science, math, psychology, philosophy and English. In total, 2 FTEF will support the program. The faculty bring vast industry experience. All professional-technical faculty and administrators meet certification requirements in the Washington Administrative Code. Over 60% of our Academic Core faculty have a doctoral degree or terminal Master's degree.

Table 5: Core Faculty Profiles

Faculty Name	Degree	Status	BAS Classes (Tentative)
Alexandra Vaschillo	M.S.	Full-Time	CSD 436
Thomas Abbott	M.S.	Full-Time	CSD 335; CSD 414
Ayaz Ali	Ph.D.	Part-Time	CSD 438 ; CSD 332
Andrew Chapman	Ph.D.	Part-Time	CSD 331
Jeff Finan	M.S.	Part-Time	CSD 321
Marcelo Guerra Hahn	Ph.D.	Part-Time	CSD 322; CSD 412; CSD 480
Paul Wu	Ph.D.	Part-Time	CSD 425

Table 6: General Education Full-Time Faculty Profiles

Faculty Name	Degree	Courses	BAS Classes (Tentative)
Jason Sobottka	M.F.A	Art	Humanities Elective
Laura Toussaint	Ph.D.	Social Science	PSYC 324
Phil Snider	M.A.	English	
Wes Mantooth	Ph.D.		
Sue Kuestner	M.Ed.	Math	MATH 220
Sherry McLean	M.S.		MATH& 151
Narayani Choudhury	Ph.D.		
William Bricken	Ed.D.		
George Dalich	Ph.D.	Science	PHYS& 114
Berry Robinson	PhD		Natural Science Elective
Priyanka Pant	MS		
Jo Nelson	MS		
Aparna Sen	PhD		

3. Selective admissions process, if used for the program, consistent with an open door institution.	Describe the selection and admission process. Explain effort that will be used to assure the program serves as diverse a population as possible. Include specific detail for selecting and students for admittance when there are more applicants than available seats in the program.

Responsibility for the admission process rests with LWTech's Student Services Division. Recruitment is a shared responsibility between Student Services and Instruction with both units having support staff and faculty involved in recruiting prospective students to the program. The recruiting effort involves faculty and staff working with industry, advisory committees, and feeder programs.

Students who apply for the program will be evaluated using the admission requirements shown below.

The admission process for the ITAD-SD program closely follows the patterns previously established for the LWTech Bachelor of Technology in Applied Design (BTAD), Bachelor of Applied Science in Public Health (BAS-PH), and Bachelor of Applied Science in Transportation and Logistics Management (BAS-TLM), programs which have been successfully operated since 2009, 2014, and 2015 respectively. Admission criteria reflect an approach that includes the student's academic record, personal characteristics, and potential to work in the industry.

General

LWTech currently uses selective admissions processes for several programs of study. Our processes meet standards for both community/technical colleges and baccalaureate institutions established by the American Association of Collegiate Registrars and Admissions Officers. The admissions staff members also have extensive experience in community/technical colleges, regional baccalaureates, upper-division, and Masters' level institutions.

Admissions procedures that serve all selective admission programs include:

1. Admissions office as the central locus of application
2. Comprehensive paper application with detailed, step-by-step instructions
3. Regular day, evening, and online information sessions
4. In-house transfer credit evaluations conducted at the time of application so students know their exact status regarding admissions
5. Use of spreadsheets for easy candidate selection by faculty
6. Clearly communicated timelines for admissions

Information Sessions

Information sessions will be presented on a regular basis, both day and evening, to provide prospective students with an overview of the ITAD-SD program and to explain the admission process. An online option will also be available through the Admissions office for prospective students who are unable to attend an in-person session.

Program Admission Requirements

1. An earned associate degree or equivalent from a regionally accredited institution in CS- or IT -related field.
2. 5 credits of college-level math (with intermediate algebra as a prerequisite) or higher with a minimum 2.0 GPA
3. 5 credits of college-level English (ENGL&101 or equivalent) with a minimum 2.0 GPA
4. 5 credits of college-level Social Science with a minimum 2.0 GPA
5. 5 credits of college-level Humanities with a minimum 2.0 GPA
6. Minimum cumulative GPA across all college coursework of 2.5
7. Programming I course equivalent to CS& 141
8. Programming II course equivalent to CS 143
9. A current resume.
10. A one-page cover letter describing their interest as a software developer.
11. $50 non-refundable application fee.

Selection Criteria

Applicants will be selected based on the criteria listed above. Complete applications will be reviewed by a team of faculty and staff. The GPA will be the most heavily-weighted criteria followed by cover letter, and resume.

Prior to reviewing applicants, the admissions selection team (program faculty, dean, director of admissions, and advising representative) will design comprehensive rubrics for evaluating transcript(s), cover letter, and resume. Evaluation rubrics will ensure a consistent and rigorous method is applied to each prospective student equitably.

Evaluation rubrics:

1. Transcripts will be reviewed for the appropriate pre-requisites.

2. Resumes will be evaluated for the range of educational and work experiences, clarity, and expression.

3. Cover letters will be evaluated for clarity of interest the software development industry.

Currently the college uses a weighted method for selection criteria for all selective programs, and anticipates the ITAD-SD program will follow a pattern similar to that shown in Table 5.

The final decision on admission to the ITAD-SD program will be made by the admissions selection team with available spots going to the applicants with the most points based on Table 7.

Table 7 – Weighted Criteria for Selective Program Admission

Application Requirements	Max. Pts	Notes
Cumulative College-Level Associate Degree GPA	40	Multiply cumulative GPA by 10 to determine total points
Resume	20	Based on evaluation rubric
Cover Letter	20	Based on evaluation rubric
Average College Level Math and Programming II classes GPAs	20	Multiply the sum of GPAs by 5
TOTAL	100	

Encouraging Diversity

LWTech values and celebrates student diversity in a number of ways including support for an active Equity, Diversity, and Inclusion Committee, using Intercultural Appreciation as one of the college's five global outcomes (Critical Thinking, Intercultural Appreciation, Information and Technical Literacy, Teamwork, and Communication), focusing on diversity work within its Strategic Plan, and implementing its first 5-year Equity, Diversity, and Inclusion Plan.

LWTech consistently enrolls greater percentages of students of color than reflected in the surrounding school districts. LWTech's fall 2014 enrollment was 33% students of color compared to the surrounding school district average of 29%. Additionally, over 7% of enrolled students report having a disability and the average age of students is 32. This strong enrollment from diverse students in existing programs at LWTech will benefit the recruiting opportunities for a new baccalaureate program.

When recruiting, the college consistently reaches out to historically disadvantaged populations by participating in Veterans job and resource fairs, WorkSource resource fairs, LGBTQ

education events, and students of color career conferences. Outreach for a new applied baccalaureate degree would occur at all of these events.

Because the BAS ITAD-SD program will use selective admission, LWTech will carefully monitor diversity in the program to determine the extent to which it represents the local community and to determine if action needs to be taken to change the recruitment processes.

4. Appropriate student services plan.	Describe services that will be needed by the students admitted to the degree program and college plan for providing those services for baccalaureate level students. Include a description of financial aid services and academic advising for student admitted into the program.

The following student services at LWTech are available to all BAS ITAD-SD applicants and regularly-enrolled students. We believe existing services will be sufficient.

Advising

Advising is available for all new and continuing students on both a drop-in and appointment basis. LWTech recently redesigned advising services to create dedicated Student Success Navigators (SSN) who provide comprehensive, case-managed advising to prospective and enrolled students in all programs of study. The SSN for each baccalaureate program also advises the feeder programs to ensure students receive information about the program as early as possible and to create a strong relationship between students and a single point of contact in student services for the full four years whenever possible. The SSNs report to the Director of Student Development who in turn reports to the Vice President of Student Services. Hours of work vary among the navigators depending on the needs of the programs they serve. The navigator for this program works 4 – 9s in order to be on campus until 6pm for evening student access.

For prospective baccalaureate students, the SSN:

- Answers general inquiry questions
- Leads information sessions
- Provides group and one-on-one coaching for completing a competitive application
- Follows up on students who have inquired but not yet applied.

For enrolled baccalaureate students, the SSN:

- Leads a program-specific orientation prior to initial start
- Ensures all students are registered each quarter and advises them on appropriate course selection
- Provides appropriate referrals for financial aid and support services
- Checks in with all students a minimum of once per quarter to ensure success.

For faculty, the SSN:

- Attends department and/or division meetings to learn about new curriculum developments and student concerns
- Serves at single point of contact for faculty questions about student services processes

An FTE was added to the advising office 2 years ago as part of bringing on more baccalaureate programs at that time and planning for more (such as this one). According to the Council for Academic Standards (2009, p. 5),

- "Academic advising caseloads must be consistent with the time required for the effective performance of this activity,"
- "academic advisors should allow an appropriate amount of time for students to discuss plans, programs, courses, academic progress, and other subjects related to their educational programs,"
- "the academic status of the student being advised should be taken into consideration when determining caseloads,"
- "when determining workloads it should be recognized that advisors may work with students not officially assigned to them and that contacts regarding advising may extend beyond direct contact with the student."

Given LWTech's size and dual advising model (lead faculty also advise students within their program) the target SSN to student ratio is at or below 1 to 500 FTE (for a full time SSN). Caseloads for SSNs and other related staff are detailed below (please note this does not include specialty populations such as WRT, Wk1st, BFET, OG, International, High School Programs, or Veterans all of whom have separate staff that serve as the equivalent of an SSN). While the college is close to capacity in the advising office with the addition of new program development, there is still some growing room before another staff member will be needed. The college's budget process last year prioritized advising staff as the most important need if new funding becomes available.

Position	Programs Covered	Approximate FTE served
Director of Student Development (25% case managed advising to students)	Business • Accounting • Business Technology • Human Resources	100

Coordinator of Disability Support Services (40% direct case managed advising to students)	Services • Horticulture • Culinary/Baking • Early Childhood Ed • Social and Human Services	150
Student Success Navigator (100% case managed advising to students)	Health Care • Dental Hygiene (may become a BAS) • Dental Assisting • Nursing • Medical Assisting • Fitness • Funeral Services • OTA • PTA Baccalaureate Programs • Public Health *All pre-selective admission Health Care (not case managed, not the admissions side of the work, only advising for classes, largely by group advising)*	250 (case managed) 300 (not case managed)
Student Success Navigator (100% case managed advising to students)	Applied Design • Multimedia Design and Production • Game Design • Engineering Graphics (Mechanical/Architectural/Civil) Information Technology • Computer Security and Network Technology • Information Technology Application Development Baccalaureate Programs • Applied Design	500 (with both proposed programs)

	• *BAS-DGIM – Proposed* • *BAS-IT-SD – Proposed*	
Student Success Navigator (100% case managed advising to students)	Transportation • Automotive • Auto Collision • Diesel • Power Equipment Transfer • Biology DTA/MRP • Business DTA/MRP • Computer Science DTA/MRP • Construction Mgt. DTA/MRP • Math Education DTA/MRP • Technology DTA/MRP • Computer and Electrical Pre-Engineering (AS-T/MRP) • Mechanical, Civil, Aeronautical, Industrial, Materials Science Pre-Engineering (AS-T/MRP) Baccalaureate Programs • Transportation/Logistic Mgt	450 (once new programs are fully enrolled)
Career and Recruitment Coordinator (50% case managed advising to students)	Manufacturing • Electronics • Machining • Welding	200

To ensure strong communication within the department, the Vice President of Student Services:

- Leads quarterly division meetings to discuss division and college updates
- Meeting weekly with the student services leadership team who in turn share information with their teams
- Emailing college and division updates to the full division weekly

The Director of Student Development coordinates a weekly meeting for all employees who provide advising services to students (SSNs, TRiO, WRT, OG, Wk1st, BFET, International, High School Programs, etc) to share curriculum updates, services updates, and other information to keep all staff informed and able to serve students. As a small college, admissions, registration, advising, workforce programs, and financial aid are all on the same floor and interact continuously to support students.

*Citation: Council for the Advancement of Standards of Higher Education (CAS) (2009). *Academic advising programs: CAS standards and guidelines*.

Assessment

Provides placement testing, all College Level Examination Program exams, industry certification exams, accommodated testing for students with disabilities, and Washington Online proctoring.

Counseling

Counseling is available to support all students with short-term issues that might impact retention and academic success. One-on-one, crisis-response, and group counseling services are all available and used as appropriate to support student needs. Counseling has established relationships with community mental health and service-providing agencies that are utilized for both referrals and on-campus assistance with programming around mental health issues.

Disability Support Services

Disability Support Services (DSS) offers academic adjustments to all students with documented disabilities. The role of these adjustments is to provide equal access in the classroom. Academic adjustments are specific to the student, his or her disability, and the class requirements. Students registered with this office are also eligible to join TRiO (see below).

Employment Resource Center

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 office provides career exploration, career and personality assessments, and labor market information and research. Through individual work and a workshop series, the office assists students in clarifying their career aspirations, developing job readiness skills, and learning job search and job success skills such resume and cover letter writing, and interviewing techniques.

On-campus recruiting is coordinated through the ERC. An online e-career center allows employers to post job notices, and students to search and apply for jobs or post their resumes.

Financial Aid

Since 2008 the financial aid office has successfully processed grant, loan, and scholarship awards for students in other LWTech baccalaureate programs. All services provided by financial aid, including FAFSA orientations, veterans' services, in person assistance, and scholarship referrals will be made available to students in the ITAD-SD program.

Intervention Services – General Student Population

Students experiencing difficulties making adequate academic progress are assisted through several intervention programs under the direction of the Director for Student Development. Faculty can initiate assistance to students having difficulties with attendance, assignment completions, exams, and class preparation. Faculty inform Student Development of the difficulties followed by interventions by staff via email, phone and/or in-person meetings.

TRiO Student Support Services

TRiO Student Support Services is a federally-funded project established at LWTech for the purpose of assisting 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 action plans, individualized and group tutoring, and academic counseling supported by workshops in study skills, motivation, financial aid, stress reduction, test anxiety life skills, and campus resources as well as mentoring and monitoring of student progress.

The TRiO program also supports the Learning Lab, 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).

In addition, the program offers specialized services such as career guidance, resume and cover letter writing, and interview sessions; and cultural events to promote personal and educational development.

Student Programs

LWTech offers all students a variety of ways to get involved in campus life. ITAD-SD students will enjoy the same access to these services as all other students, including: participation in existing clubs, opportunities to form new student clubs, participation in associated student government, and the ability to enjoy frequent educational programming.

5. Commitment to build and sustain a high quality program.	Provide a financial plan for the first five years of program operation. This plan should include (1) types of funds to be used to support the program; (2) projected program expenses; (3) appropriate facilities to be (4) equipment, technology, and instructional resources needed for the program; and (4) anticipated revenue. Document the college's ability to sustain the program over time.

The budget for the software development bachelor's degree projects first year revenue slightly less than necessary to meet expenditures due to start-up curriculum development and fewer students. However, this is made up for in future years with two years of tuition-paying students and fewer curriculum development costs. The college will expend reserve funds to support the program for its first year. Curriculum development and equipment expenditures are included in each of the five years in order to assure the program keeps pace with this quickly changing industry. The bachelors and associates degrees in Application Development will be led by one exempt program director. Funds will be moved from the associate's degree budget to the bachelor's degree to account for program management fees currently being paid for through release time for faculty at the associate's level. An assumption of a 2 percent tuition increase is accounted for, but the program is not dependent on that increase.

Table 8 – Budget

	Year 1: 17-18	Year 2: 18-19	Year 3: 19-20	Year 4: 20-21	Year 5: 21-22
Expenditures					
Faculty Salaries*	$28,800	$57,600	$57,600	$57,600	$57,600
Faculty Benefits**	$7,776	$15,552	$15,552	$15,552	$15,552
Curriculum Devo***	$9,450	$3,150	$3,150	$3,150	$3,150
Program Director	$89,000	$89,000	$89,000	$89,000	$89,000
Benefits****	$26,700	$26,700	$26,700	$26,700	$26,700
Goods/Services	$1,500	$1,500	$1,500	$1,500	$1,500
Travel	$1,500	$1,500	$1,500	$1,500	$1,500
Library	$10,000	$10,000	$10,000	$10,000	$10,000
Marketing	$10,000	$10,000	$10,000	$10,000	$10,000
Total Expenditures	**$184,726**	**$215,002**	**$215,002**	**$215,002**	**$215,002**
	Year 1: 17-18	**Year 2: 18-19**	**Year 3: 19-20**	**Year 4: 20-21**	**Year 5: 21-22**
Revenue					
Number of students	20	40	40	40	40
Tuition/Fees ONLY*****	$158,460	$322,502	$328,085	$333,667	$339,250
Transfer from ITAD	$12,900	$12,900	$12,900	$12,900	$12,900
	$171,360	$335,402	$340,985	$346,567	$352,150
Net Revenue	-$26,266	$107,500	$113,083	$118,665	$124,248

Notes
* $3,200 per class, 9-5 cr. classes 1st yr., then 18-5 cr. classes
** 27% benefits
*** 9-5 cr. classes 1st yr., then 3-5 cr. classes
**** 30% benefits
***** 2% tuition increase years 2-5; $21 per credit fee, Tech Fee

Facilities

Currently, the Information Technology Application Development (ITAD) two-year program uses three classrooms equipped with modern computers. In addition, the program has a designated computer lab used by students to study, do homework, and receive tutoring help during evening hours. According to the current ITAD schedule, the three classrooms are utilized only 66% of the time during the evening hours (6 - 9 p.m. timeslot) throughout the year. All the classes of the ITAD-SD program will be taught in hybrid mode and will require one class meeting a week each. According to the proposed ITAD-SD schedule, in the second year and beyond when both

junior and senior year cohorts will be taking technical classes that require computers, the number of ITAD-SD technical classes in the annual schedule will be increased to 11. That will increase utilization of the three classrooms to 97%.

In general, LWTech has 16 computer-equipped classrooms that are being used approximately 44% of time in the evening hours (6-9 p.m.). Potentially, there is enough room for future ITAD-SD program expansion.

6. Program specific accreditation.	Indicate whether the institution will seek specialized program accreditation. If so, describe plans for accreditation and identify appropriate accreditation body. Include a statement of college's plan to seek accreditation through NWCCU and/or current status of college's standing to offer applied baccalaureate degrees.

LWTech received accreditation from the Northwest Commission on Colleges and Universities (NWCCU) as a four-year degree granting institution in February, 2012. Two subsequent BAS degrees were also approved by the commission.

Upon receiving SBCTC approval, the LWTech Accreditation Liaison Officer will apply for NWCCU review of the ITAD-SD program via the substantive change process.

Program-specific accreditation is not required for ITAD-SD graduates to be employed in the industry.

7. Pathway options beyond baccalaureate degree.	Describe opportunities and articulation agreements for the place bound BAS graduate to continue their education onto a graduate (Master's) degree program. Detail specific discussions with public and private baccalaureate institutions (when applicable) regarding post-baccalaureate pathways for graduates.

LWTech's respected associates' degree in Application Development sets up its future bachelor's degree students for success. Preliminary conversations with the University of Washington, Bothell indicate a strong likelihood of articulation agreements from LWTech's ITAD-SD program to their Master of Science in Computer Science and Software Engineering program. After reviewing the program, Dr. Munehiro Fukada, the Professor and Chair of University of Washington Bothell's Computing and Software Systems Division said:

"If LWTech students complete the BAS-IT program as outlined in the program proposal, the University of Washington Bothell Computing & Software Systems Division within the School of STEM would consider that the students are qualified to apply for admission to the CSS Graduate Programs, as specified by the minimum standards of admission in http://www.uwb.edu/mscsse/admissions"

8. External expert evaluation of program	The institution will select two external experts to review the program. External experts should come from a university level institution, i.e. departmental professor, academic dean or department head. The expert should be a practitioner/instructor from within the content area of the proposal. In a separate document, provide copies of external evaluators' report or letters. Summarize the institution's responses and subsequent modification to the proposal based on evaluator's recommendations. Attach a short bio of the evaluators.

The program proposal has been evaluated by two external Computer Science experts: the Division Chair of Computer Science Division at the University of Washington, and a Senior Software Engineer at Microsoft Corporation, one of the target employers for our program graduates. The reviewer comments are included in Appendix C. The reviewers were:

Munehiro Fukuda, Ph.D. Professor and Chair
Computing and Software Systems
University of Washington, Bothell
18115 Campus Way NE
Bothell, WA 98011-8246
mfukuda@u.washington.edu
425-352-3459

Dr. Fukuda holds a Master of Science degree in Engineering from the University of Tsukuba, Japan, a Master of Science degree in Information & Computer Science from the University of California Irvine, and a Doctorate in Information & Computer Science from the University of California Irvine. He is Professor and Department Chair in the University of Washington Bothell School of STEM Computer and Software Systems Division. He has taught Computer Science at UW Bothell since 2001, and at the University of Tsukuba, Japan from 1998 to 2001.

Dmitry Vasilevsky, Ph.D.
Senior Software Engineer, Microsoft Corporation,
Lead Faculty, Northwest Academy of Sciences
One Microsoft Way
Redmond, WA 98052
Dmitry.Vasilevsky@microsoft.com
(425) 705-9819

Dr. Vasilevsky holds a Master of Science degree in Mathematics from the St.-Petersburg State University in Russia, and a Ph.D. in Computer Science from Florida International University. Currently, he is a member of the Scientific Committee for the University of Washington Math Hour Olympiad. He teaches advanced mathematical concepts to middle and high school-aged students at Northwest Academy of Sciences. Dr. Vasilevsky has more than 20 years of industry

experience working for European and US software companies. During the last 16 years, he has been a Senior Software Engineer at Microsoft, in Redmond, WA. He has been working on the development of SQL Server, Windows, Xbox, and Microsoft Media technologies.

Response to External Reviews

Although the reviews were very favorable and praised the rigor of the program, quality of instruction, and program's direct applicability to the needs of local employers, we used the reviewers' recommendations to improve on a number of areas of our proposal:

- We agree the qualifications of our instructors are an important component of our proposal. We are very proud to utilize the services of adjunct professors who are employees of world leading software development companies. This puts LWTech in a solid position to build relationships with these companies as we support graduates seeking employment. We are adding biographies of our instructors to the program's web page.
- We added a section explaining that the additional demand for lab space will be satisfied by increasing the utilization of existing computer labs during evening hours.
- We updated course description for CSD 412 Web Development and CSD 415 Mobile Application Development to include CSD 322 Computer and Network Architectures as a prerequisite.
- We updated the CS 143 Computer Science II course description with Java programming language.
- We clarified the course description for CSD 480 Capstone Project allow for student internships at a software company.
- In the degree outcomes, we added a clause about identifying and applying the right technologies.
- We agree with the reviewer's position that "algorithms and data structures" is an extremely important topic that has to be studied in detail. Students study basic data structures and algorithms such as trees, linked lists, stacks, queues, basic sorting and searching, recursion, and Big O notation in CS 143 Computer Science II, then thoroughly study intermediate data structures and algorithms in CSD 335 Algorithms and Data Structures, and finally learn to combine these structures and algorithms to solve harder algorithmic problems in CSD 436 Algorithmic Problem Solving. We believe this sequence of three courses provides adequate training on the topic. We clarified the course description of CSD 436 to show academic rigor, and an emphasis on being able to use the knowledge of existing algorithms to create new ones that can be applied to solve real-world problems. We believe this course is one of the most rigorous in our degree program and is better suited to the goals of Applied BS degree than the common sequence of two Algorithm courses used in the non-applied degrees.

Lake Washington Institute of Technology
Program Proposal

Bachelor's of Applied Science IT Application Development – Software Development

Appendix A: Course Descriptions

CS& 141 Computer Science I

Course teaches computer science and software engineering concepts using Java programming language. The topics include algorithm development, implementation and debugging; basic control structures (sequence, if/else, loops), procedural programming (methods, parameters, return values), file processing, arrays, and introduction to Object Oriented Programming. Prerequisites: ITAD 111 Computer Programming Fundamentals.

CS 143 Computer Science II

This class teaches Object Oriented Programming concepts using Java, and introduces elementary data structures as well as algorithms associated with them. The topics include classes, interfaces, inheritance, OOP design, exceptions, data structures (arrays, lists, queues, stacks, and trees), and algorithm performance analysis. Prerequisites: CS& 141 Computer Science I.

CSD 321 Systems Analysis and Design

In this course students apply the core skills needed to plan, analyze, and design information systems using an object-oriented approach. Requirements for information systems are used to create functional, structural, and behavioral models leveraging the Unified Modeling Language (UML). Prerequisites: ITAD 122 JavaScript and jQuery, ITAD 138 SQL, ITAD 268 QA Methodologies, and admission into the bachelor's degree program.

CSD 322 Computer and Network Architectures

In this course, students study computer architecture as well as network architecture. The topics include data representation, CPU design, memory organization, assembly language, operating system concepts, TCP/IP model, socket level programming, and HTTP protocol. Students work in Linux environment. Prerequisites: ITAD 122 JavaScript and jQuery, ITAD 138 SQL, ITAD 268 QA Methodologies, and admission into the bachelor's degree program.

CSD 331 Database Modeling and Design

In this course, students optimize relational database schema design using real-life data examples. Advanced data management topics are examined, including: data modeling, normalization, analysis of query efficiency, usage of stored procedures and triggers. Non-relational (NoSQL) databases used with Big Data are introduced. Students research similarities and differences between RDMS and NoSQL approach. RDMS. Prerequisites: ITAD 138 SQL, MATH 220 Linear Algebra, CSD 321 Systems Analysis and Design, and admission into the bachelor's degree program.

CSD 332 Software Project Management

In this course, students integrate the fundamentals of software project management. Students plan a software development project at different stages of its life cycle, from analyzing requirements to providing support, examine roles of stakeholders, methods of project planning, scheduling, risk analysis and mitigation, scope control, progress monitoring and quality assurance. Modern techniques such as agile development are studied. Students learn to analyze product readiness and integrate ways to successfully complete a time-driven or a feature-driven project. Different aspects of project readiness are

analyzed from feature completeness and acceptance testing to properly documenting, globalizing and marketing the product. Prerequisites: CSD 321 Systems Analysis and Design, and admission into the bachelor's degree program.

CSD 335 Algorithms and Data Structures

Students study data structures such as stacks, queues, hash tables, heaps, trees and graphs, and integrate different algorithmic approaches to problem solving, such as simple recursion, backtracking, divide and conquer, greedy and brute force algorithms, dynamic programming. Students analyze algorithm efficiency in terms of memory use and speed, using Big O notation for run-time performance estimation. Prerequisites: CS 143 Computer Science II, and admission into the bachelor's degree program.

CSD 412 Web Development

Students design and develop interactive and dynamic web pages based on modern web development standards. This is a team project-based course, where students use a variety of tools, techniques and languages to design, develop and deploy a functional web application. The course covers topics such as client and server side programming, authentication/authorization, security, scalability, integration with databases using object-relational mapping, testing and deployment. Prerequisites: ITAD 122 JavaScript/jQuery, CSD 322 Computer and Network Architectures, CSD 321 Systems Analysis and Design, CSD 331 Database Modeling and Design, CSD 332 Software Project Management, and admission into the bachelor's degree program.

CSD 415 Mobile Application Development

In this course, students analyze the principles of mobile application design and development. Students develop applications for Android OS. Topics include user interface design and implementation, memory management, input methods, data handling, and network techniques. Prerequisites: CSD 321 Systems Analysis and Design, CSD 322 Computer and Network Architectures, CSD 331 Database Modeling and Design, CSD 332 Software Project Management, and admission into the bachelor's degree program.

CSD 425 Cloud Computing

In this course, students evaluate the basic concepts of cloud computing. Students will learn to implement those concepts by building scalable services on one of the major cloud computing platforms, e.g., AWS, Azure, OpenStack etc. This course covers topics such as PaaS, IaaS, SaaS, virtualization, web services, big data computing, security, and operational aspects such as deployment, monitoring and alerting. Students work on projects in teams, store and share code via version control system and utilize small team agile strategies. Prerequisites: CSD 415 Mobile Application Development, and admission into the bachelor's degree program.

CSD 436 Algorithmic Problem Solving

In this course, students research and apply advanced algorithm and problem-solving techniques. Students learn to identify, evaluate, optimize, and combine known algorithms to solve real-world problems, including those, used at a technical job interview for a software development position. Common interview problems are classified, evaluated and solved. Students participate in mock technical interviews, learn to

provide and discuss interview feedback. Prerequisites: CSD 335 Algorithms and Data Structures, and admission into the bachelor's degree program.

CSD 438 Big Data Application Development

Students integrate techniques and tools used to manage, process and interact with massive datasets. The course takes a hands-on approach to explore both relational and non-relational data storage for big data applications. The course covers topics such as distributed data storage, map-reduce, key value stores, stream processing, data mining and basic statistical techniques to perform data analytics. Prerequisites: CSD 331 Database Modeling and Design, CSD 425 Cloud Computing, and admission into the bachelor's degree program.

CSD 480 Capstone Project

Students create a full software product development cycle by designing, implementing and deploying a desktop, web or mobile application. The course is designed to prepare students for employment at a software company, applying the knowledge they accumulated during the entire course of studies, from project management and design, to algorithm development, to coding and quality assurance. The course may be completed as an internship at a software company. Prerequisite: instructor's permission.

ITAD 122 JavaScript and jQuery

Students learn to apply programming skills to build dynamic, interactive web pages and web applications. Students integrate JavaScript and jQuery to manipulate the Browser Object Model, validate forms, use object-oriented techniques, and enhance website usability and user experience by adding dynamic features to the HTML pages.

ITAD 138 Structured Query Language (SQL)

Students will learn how to use Structured Query Language (SQL) to retrieve information from a relational database, filter, modify, group and summarize data, and retrieve joint information from multiple tables in a database.

ITAD 268 QA Methodologies

In this Quality Assurance (QA) Methodologies course students evaluate the theory, concepts, and reasoning behind software testing and automation. Students learn how to create and run test scripts and implement basic test projects.

ENGL& 235 Technical Writing

Students analyze, design, format, and produce documents common in business and industry. Emphasis will be placed on efficiently developing accurate, clear, concise, and visually accessible technical communication. Research techniques for technical writing will be introduced. Prerequisites: ENGL& 101.

MATH 220 Linear Algebra

Linear algebra serves as an introduction to matrix theory. Topics include matrix operations, determinants, solving systems of equations, n-dimensional vector spaces, subspaces, linear transformations, eigenvalues and eigenvectors, and their applications. Prerequisites: MATH& 142.

MATH& 151 Calculus I

This first-quarter calculus course includes the study of function limits, and emphasizes differential calculus and its applications. Prerequisites: MATH& 142.

PHYS& 114 General Physics I w/ Lab

This course covers kinematics, motion in two-dimensions, force and motion, work and energy, momentum and collisions, circular motion, gravitation, rotational motion, and solids. Includes laboratory. Prerequisites: MATH 098, or MATH 099, or instructor permission.

PSYC 324 Psychology of Organizations

This course prepares the student to exercise effective leadership by learning positive psychology, negotiation and labor relations, strength-based management of individuals and teams, motivation/morale, and conflict resolution. Prerequisites: Admission to a baccalaureate program and PSYC& 100 or SOC& 101, or instructor permission.

Lake Washington Institute of Technology
Program Proposal

Bachelor's of Applied Science IT Application Development – Software Development

Appendix B: List of Natural Sciences Classes

BIOL& 160 General Biology with Lab

BIOL& 175 Human Biology with Lab

BIOL& 211 Cellular Biology

ENVS& 101 Introduction to Environmental Science

CHEM& 121 Introduction to Chemistry

PHYS& 114 General Physics I w/Lab

PHYS& 115 General Physics II w/Lab

PHYS& 221 Engineering Physics I with Lab

PHYS& 222 Engineering Physics II with Lab

PHYS& 223 Engineering Physics III with Lab

Lake Washington Institute of Technology
Program Proposal

Bachelor's of Applied Science IT Application Development – Software Development

Appendix C: External Reviews

College Name: Lake Washington Institute of Technology

Bachelor of Applied Sciences Degree Title: Information Technology - Software Development

Reviewer Name: Dmitry Vasilevsky, Ph.D.

Professional Affiliation: Senior Software Engineer at Microsoft Corp., Lead Faculty at Northwest Academy of Sciences.

Overview

The proposed Applied Baccalaureate Degree Program meets and exceeds my expectations for a software degree tailored to the industry needs. The program goes well beyond a typical set of shallow web design/java programming courses. It shows academic breadth and depth necessary for a Baccalaureate program by offering fundamental courses (e.g. Calculus, Physics, Algorithms) as well as diverse, applied topics in Information Technology (e.g. Computer architecture, Networks, Databases). The program also includes modern concepts such as Web/Mobile design, Big Data and Cloud computing, providing knowledge that is in high demand in the industry.

Students will definitely be given the opportunity to acquire all knowledge necessary for applying to entry-level positions and passing interviews at companies like Microsoft, Amazon, Google, etc. Of course, actual job placement will depend on a candidate's performance.

Curriculum

Course descriptions are adequate, and learning outcomes do demonstrate appropriate baccalaureate degree rigor. The choice of courses in the curriculum could be improved.

I applaud the decision to include Linear Algebra as one of the required courses. It will give students a great foundation for studying relational databases and SQL. Calculus, on the other hand, is not as relevant to the program. I would replace it with a Discrete Mathematics and Mathematical Logic course. Topics such as graph theory, combinatorics, set theory, information theory, formal logic, and computability make up the vital foundation of Information Technology and Computer Science. The lack of such knowledge is the main reason for shallow understanding and interview failures in recent graduates.

Technical Writing is very relevant and necessary. On the other hand, the Humanities Elective, in my opinion, could be replaced with a more relevant technical course, although I understand it may be required for the breadth of Baccalaureate degree.

Computer and Network Architectures course may end up being too hard, and has to be carefully adapted. It provides concepts that are necessary but hard to learn. It will be very difficult to fit CPU/hardware design and assembly programming together with network protocols and socket programming. Some simplifications may be required as this course looks like a graduate level course to me.

Web Development, Mobile, Big Data and Cloud Computing is a good set of applied courses that follow modern trends. Many students will find them engaging and relevant. Employers will appreciate shorter learning curves for bringing graduates up to speed. I am especially happy that Microsoft Azure is part of the program, as knowledge of this technology we, at Microsoft are often looking for in job candidates.

Faculty, resources, and advisory committee

Although the document I'm reviewing doesn't provide any background information on faculty, it states that all core faculty members hold graduate degrees with more than a half of them Ph.D., which is adequate for this program. Two members are dedicated to the program full time, which is enough to ensure continuous improvements.

The document provides detailed analysis of resources and funds needed, but I am not in the position to evaluate the budget.

The document does not provide any information about approval or comments from an Advisory Committee. Nor does it provide any responses from the program.

Summary

The program shows academic breadth, depth, and rigor for a baccalaureate degree program. It is a well-positioned program capable of increasing the pool of qualified candidates for IT industry.

Applied Baccalaureate External Review Rubric

College Name:	Lake Washington Institute of Technology	**BAS Degree Title:**	Bachelor of Applied Science Application Development –Software Development
Reviewer Name/ Team Name:	Munehiro Fukuda	**Institutional or Professional Affiliation:**	University of Washington Bothell
Professional License or Qualification, if any:	Professor and Chair of Computing & Software Systems Division	**Relationship to Program, if any:**	
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 As the ITAD advisory board recommended a four-year baccalaureate degree program to Lake Washington Institute of Technology in the last academic year, the current 2-year degree is insufficient. The local IT industry is lack of highly-skilled workers in particular in software development and big data analysis, (which was pointed out by Washington Technology Industry Association's FullConTech 2015 conference). The proposed degree program responds to these demands from the local industry.		
b) Degree Learning Outcomes	Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?		
	Comment The degree learning objectives and outcomes 1, 2, 4, and 5 fit the requirements for training students as an entry-level software developer. For outcome #3 (identify and apply efficient algorithms required for developing software system), it should also emphasize on the best use of technologies for developing software system, since the proposed degree program includes a rich technology-oriented curriculum.		
c) Curriculum Alignment	Does the curriculum align with the program's Statement of Needs Document?		
	Comment The trend in software development includes web development linked with database management and access, mobile computing though web servers, cloud computing focusing on big data analysis and management. The curriculum well addresses these requirements.		

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 All the upper-level core courses align with needs and demands in software development. The proposal does not include any upper-level CS elective courses (rather than general education requirements), though, which I expect will be lined up in the future. I have some comments and suggestions for the following five upper-level cores: **CSD 335 Algorithms and Data Structures:** For rigorous CS education, discrete math should be included in this course. Given that, this course is full of too many items to teach, and thus should be divided into two courses I and II. **CSD 412 Web Development:** Since this course teaches client/server programming, it should require **CSD 322 Computer and Network Architectures** as its prerequisite. This is because TCP/IP, HTTP, and multi-threading are fundamentals of client/server programming. **CSD 415 Mobile Application Development:** Since this course will discuss about memory management and network techniques, it should require CSD 322 as its prerequisite. **CSD 436 Algorithmic Problem Solving:** The course contents are not academic, quite ad-hoc, and thus far from rigorous education. This kind of training for job interviews should be given as part of academic advising or as extra-curricular activities by inviting advisory board members, guest speakers from industry, future alumni, etc.. Instead of giving this special training course, you should consider to divide CSD335 into two courses, dig each topic for more details, and advise strategies for technical interviews, each related to a different topic. **CSD 480 Capstone Project:** Does this course limit its course work to on-campus projects? If so, how can two full-time faculty manage to supervise 25 students' individual projects? Maybe, off-campus internships could be considered as part of CSD480.

Applied Baccalaureate External Review Rubric

e) 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 Yes, the proposed general educations requirements are comparable to other four-year degree programs including my institution, (i.e., BS in Computer Science and Software Engineering) from both breadth and depth educations.
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 The proposed curriculum prepares future graduates for graduate program acceptance. I have two minor comments on the curriculum: (1) Make sure that CS143 should be Java as CS141 is based on this programming language. (2) CSD332 Software Project Management: why can't it be named an authentic course name such as Software Engineering? This would benefit your future graduates when they apply for a graduate program. This is because graduate admission offices and faculty can easily check your graduate students' academic preparation.
g) Faculty	Do program faculty qualifications appear adequate to teach and continuously improve the curriculum?
	Comment Two full time faculty members plus five part time faculty with software development background to teach 50 FTE students are quite a strong line-up. In particular it is notable that four out of the five part-time faculty maintain a Ph.D.. However, The proposal needs to have faculty bio enough for external reviewers to examine the faculty's qualification and improve the curriculum.

Applied Baccalaureate External Review Rubric

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 degree proposal spends 7 pages in the 19-page main description for detailing the resources to be allocated to this degree. That includes student services division, student success navigator, disability support services, employment resource center, TRiO student support, and various student programs. With these rich services, I am sure that students will be guided to a successful career path. However, the proposal does not mention about any computing laboratories, lab supports, and library services. Particularly, I would like to see how cloud-computing environments will be facilitated to students.
j) 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 Yes, the Advisory Committee has discussed about this applied baccalaureate degree program and has given some recommendations to the curriculum for Academic Year 2015-16.
k) Overall assessment and recommendations	Please summarize your overall assessment of the program.
	Comment The proposed four-year degree program well responds to demands from the local IT industry, focuses on software development in particular on cloud-related applications such as web/database management and big data analysis, and is quite feasible with the proposed faculty line-up and student resources. Yet, faculty's bios and computing/library services should be clarified.
Reviewer Bio or Resume	