Applied Baccalaureate Degree Program

Program Proposal:

BAS in IT Networking

Whatcom Community College

February 26th, 2015

COVER SHEET
NEW DEGREE PROGRAM PROPOSAL

Program Information

Institution Name: Whatcom Community College

Degree: IT Networking   CIP Code: 11.1001

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

Degree: Associate in Science (AS) – Computer Information Systems   CIP Code: 11.1006   Year Began: 2000

Degree: AAS-T Cybersecurity   CIP Code: 11.1003   Year Began: 2013

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

Proposal Criteria: *Please respond to all eight (8) areas listed in proposal criteria*
        Page Limit: 30 pages

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_____   2/26/2015
Chief Academic Officer   Date

NEW DEGREE PROGRAM PROPOSAL

WHATCOM COMMUNITY COLLEGE

Program overview

Whatcom Community College (WCC) proposes to build upon its current Computer Information Systems (CIS) degree by developing and offering a Bachelor of Applied Science (BAS) degree in IT Networking, including courses infused with security topics and required core courses in Industrial Control Systems (SCADA) and Mobile and Cloud Technologies. WCC is a National Center of Academic Excellence in Information Assurance 2-Year Education (CAE2Y) and the lead institution for CyberWatch West – a National Science Foundation regional center for cybersecurity education. WCC will use these unique resources and expertise in developing this new degree that leads to jobs supporting IT infrastructure, a fundamental cornerstone for virtually all organizations, and a needed economic development building block in Northwest Washington.

The national, state, and regional demand for a well-trained IT networking workforce, particularly with skills in emerging areas, is illustrated by the tremendous growth of the field – for instance the burgeoning "internet of things" (the expansion of internet connectivity to consumer devices). There is a lack of opportunity, however, to earn an affordable four-year degree in this field in Washington State. Community college students currently can complete an associate's degree in CIS or IT-related topics at many two-year institutions, but their options for continuing their education are severely limited by a variety of factors including cost, location, and capacity at state universities. In Washington State, the advent of BAS degrees offers a solution, but in the Northwest portion of the state (within an approximate 80-mile radius) where WCC resides, no IT-related BAS options currently exist. Consequently, many two-year graduates are not able to earn a bachelor's within their chosen field, and the employment gap for qualified IT networking personnel to fill open positions is expanding.

Washington State data shows that employers are primarily hiring – and strongly preferring to hire – personnel with four-year IT networking-related degrees. There is significant urgency for increasing the number of degree-seekers and completers in this field to provide sufficient highly qualified personnel for positions in business and government, particularly with training in growing areas of embedded systems, cloud, and mobile technologies. This proposed BAS program in IT Networking offers a solution.

Criteria 1: Curriculum demonstrates baccalaureate level rigor

The proposed BAS program is rigorous in its design, and will be so in its implementation slated for fall of 2017. The proposed program is fully supported by the College's Board of Trustees and on January 27th, 2015 also received the College's Curriculum Committee's recommendation to proceed with the proposal process.

Program learning outcomes

This degree will prepare students for common networking administration challenges as well as those that occur in key industry sectors that require specific focused expertise. Graduates will be prepared to enter the workforce as network administrators and related job categories, such as computer and information systems manager or computer network architect.

Graduates from WCC's proposed BAS in IT Networking degree will be able to:

1. Explain network topologies, including protocols, ports, addressing schemes, routing, and wireless communication standards.
2. Apply network design principles to meet client needs.
3. Perform the basics of computer and network security.
4. Communicate professionally with customers and co-workers.
5. Install and configure network devices.
6. Implement and administer information technologies and systems to help an organization achieve its goals.

Program evaluation criteria and process

At the foundation of WCC's new proposed bachelor's degree lies a strong program evaluation focus led by its office of assessment and institutional research. In 2011, the College developed a program/discipline improvement process (PIP/DIP), and subsequent refinements have created a meaningful, cyclical, and reflective process to support and continuously improve academic programs. This process will be similarly applied to the new BAS program.

All programs and disciplines are formally reviewed on a five year cycle and are provided with data – on enrollments and staffing, student demographics, course completion rates, and retention and graduation rates – upon which the program leader is asked to reflect in written and verbal format. Annually, all programs and disciplines are provided with five years of data for their own internal review. The information gathered and reported in this process informs program/discipline plans for improvement in curricular, instructional, student achievement, and budgetary areas. The PIP/DIP provides a systematic structure for using data to regularly evaluate the effectiveness of academic programs and set goals, and ensures WCC will continue to offer high-quality programs, degrees, and certificates serving its students and the community. The consistency of information gathered, summarized, and reviewed by program and instructional leaders provides a basis for year-to-year individual program comparison as well as across programs. Program data is also shared as appropriate with program advisory committees to inform conversations about program and curriculum improvements or needed change.

WCC uses three types of data – direct indicators, indirect indicators, and institutional data – to assess program effectiveness and student learning at the college, program, and course levels. Direct indicators require students to demonstrate their learning through, for example, essays, capstone projects, demonstrations, and presentations. Indirect indicators ask students to reflect on their learning through surveys, focus groups, and interviews. Institutional data do not directly indicate student learning; rather, they reflect the overall condition and effectiveness of

the College and may include course completion, retention, and graduation rates and enrollment trends.

The following three products of BAS program evaluation will be maintained and applied to improve student success in the IT Networking program:

1. Direct indicators of student learning (outcomes assessment)
    a. Core learning abilities (CLAs)[1]
    b. Program outcomes
    c. Course outcomes

2. Indirect indicators of student learning
    a. Graduation surveys
    b. Alumni surveys
    c. Other student surveys that capture students' perceptions of their learning and educational experiences (e.g., Community College Survey of Student Engagement (CCSSE), student opinion surveys, etc.)
    d. Interviews or focus groups of students
    e. Employer surveys
    f. Interviews or focus groups of employers
    g. Advisory committee/internship feedback

3. Institutional data
    a. Enrollment data
    b. Course completion data
    c. Retention data
    d. Graduation data

Institutional data will be disaggregated – by variables such as part-time/full-time enrollment status, veteran status, age, ethnicity, and gender – in order to determine the program's student audience, whether their needs are being met, and whether there are potential gaps in the student population mix. This data will indicate who is enrolling in, progressing through, and successfully completing the program. It will also inform additional elements such as marketing, scheduling, advising, and when to launch hybrid courses to meet student needs and demand.

Systems to gather most of the BAS program evaluation measures are already in place: processes are institutionalized to assess learning outcomes at the course, program, and college (CLA) levels; most of the surveys are implemented on a regular cycle; and all institutional data is already being generated (most is displayed in interactive dashboards, which are accessible on WCC's public website).

In addition, employers of graduates are regularly surveyed and the CIS Program Advisory Committee provides continual input and review of the CIS Program. This committee will be tapped regularly to provide feedback and make recommendations on the proposed BAS in IT Networking program at WCC. The Technology Alliance Group for Northwest Washington (a 600 member technology industry membership association), which the CIS Program also works with regularly, will provide both valuable input and industry connections to continuously improve

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[1] Core learning abilities (CLAs) are overarching skills that are emphasized throughout many courses in all programs at WCC; they define the skills the College expects its students to develop by the time they graduate (with a certificate or degree).

the program and will identify additional resources for input on specialized curriculum, internships, and student projects. Furthermore, a curriculum mapping effort has already been completed to ensure coursework addresses program outcomes as defined (see Appendix A).

Lastly, the proposed BAS program has undergone external review by two expert program faculty leaders in the field. Please see external evaluation Criteria 8 for further information..

Course preparation by students transferring with technical associate degrees

All students graduating from two-year IT programs in Washington State will be eligible to apply to pursue the BAS in IT Networking degree at WCC. Applicants who hold 2-year IT-related degrees granted by institutions in other states, as well as applicants who have not yet earned 2-year degrees, will be reviewed on a case-by-case basis.

Students who meet admittance criteria will be welcome to join the BAS program in a manner consistent with the College's open door policy. Students will be required to have maintained a 2.0 GPA overall in their 2-year degree coursework. The foundational curriculum-equivalent requirements from a 2-year degree are shown below in Table 1:

Table 1. Foundation Requirements from Associate's Degree for BAS in IT Networking Degree		
Subject	**Credits**	**Course**
Computer Information Systems	5	CIS 105 - Computer Operating Systems I
	5	CIS 106 - Open Source Operating Systems
	3	CIS 110 - Intro. to Computer Security
	3	CIS 116 - Virtualization
	5	CIS 205 - Computer Operating Systems II
	5	CIS 206 - Computer Support I
	5	CIS 214 - Network Security I
	5	CIS 215 - Network Security II
	5	CIS 216 - Network Security III
	5	CIS 225 - Computer Forensics
	5	CIS 226 - Cisco Networking I
	5	CIS 227 - Cisco Networking II
	5	CIS 228 - Cisco Networking III
	5	CIS 229 - Cisco Networking IV
Total required	**66**	

The proposed BAS program builds off of WCC's popular 2-year CIS program (described at: http://www.whatcom.ctc.edu/home/showdocument?id=1582). This is an example of an IT-related 2-year degree that would feed into WCC's BAS program, although, as stated, all students graduating from two-year IT programs in Washington State will be eligible to apply to pursue this BAS degree at WCC. According to a 2012 report by the Center of Excellence for Information and Computing Technology in Bellevue, WA (CoE for ICT), 28 Washington State community and technical colleges offer 2-year IT networking-related degrees or certificates,

supporting that the pool of likely eligible students for WCC's proposed BAS program is significant. WCC will work closely with area colleges in particular, including Bellingham Technical College, Northwest Indian College, and Skagit Valley College, to provide access to students from local two-year IT programs, and an efficient, seamless transfer to the proposed BAS degree at WCC.

General education components

The general education components of the BAS degree, shown below in Table 2, meet SBCTC's general education requirements for BAS degrees as follows: communication skills (10 credits), quantitative/symbolic reasoning (5 credits), humanities (10 credits), social sciences (10 credits), natural sciences (10 credits), plus 15 additional credits distributed in a manner appropriate to the BAS program, as shown below.

In total, 60 general education credits are required. Students will likely earn approximately 20 of these general education credits as part of their 2-year IT-related degrees, and the remainder will be earned as part of the BAS program. Credits earned at other institutions with different course numbering systems that are equivalent in content will be accepted pending WCC registrar's evaluation and approval.

Table 2. General Education Requirements BAS in IT Networking			
Subject	**Credits**	**Course**	**Typical Completion**
Communication Skills	5	ENGL& 101 - English Composition	Associate
	5	ENGL 230 - Technical Writing	BAS
Quantitative/Symbolic Reasoning Skills	5	MATH 146 - Statistics	BAS
Humanities	10	From distribution list	Associate or BAS
Social Sciences	5	BUS 301 Professionalism and Professional Ethics	BAS
	5	BUS 302 Project Management	BAS
Natural Sciences	10	Physical, Biological or Earth Science class from distribution list	BAS
		Life Science lab class	BAS
Additional	5	CMST 145 Organizational Communication	Associate
	5	CS 140 Computer Programming I	Associate or BAS
	5	BUS 303 Compliance and Auditing	BAS
Total required	**60**		

Junior/senior level coursework

The BAS in IT Networking degree includes 65 upper division credits, 15 of which are junior and senior level Business general education courses (Professionalism and Professional Ethics, Project Management, and Compliance and Auditing), as shown in Table 2. In total the degree will include at minimum 180 credits, including several elective credits.

The BAS degree will serve the needs of many student types, and in particular place-bound, working adults. While classes will initially be offered in person in the new BAS degree program, new online/hybrid classes will be added as the program develops. Currently the CIS program serves many working adults, and one-quarter of enrollees take advantage of online/hybrid options offered as part of the program. The BAS program will be available to part-time as well as full-time students.

Core BAS coursework needed at the junior and senior level is shown in Table 3. Students will complete three embedded certificates (also made available independently), described in greater detail below, by satisfying BAS coursework requirements.

Table 3. BAS in IT Networking Core Coursework		
Subject	**Credits**	**Course**
Core	5	CIS 301 - Database Management Systems
	5	CIS 320 - Web Development
	5	CIS 306 - Enterprise Linux
	5	CIS 499 - Capstone
Total	**20**	
Certificate Industrial Control Systems - SCADA	5	CIS 316 - Embedded Systems
	5	CIS 416 - ICS Architecture
Total	**10**	
Certificate Cloud Computing	**5**	CIS 305 - Cloud Computing I
	5	CIS 405 - Cloud Computing II
Total	**10**	
Certificate Mobile Technologies	5	CIS 308 - Mobile and Wireless Technologies
	5	CIS 406 - Supply Chain
Total	**10**	
Total required	**50**	

WCC's current 2-year CIS degree will serve as the basis for constructing the IT Networking BAS degree. To ensure that students are trained in robust cybersecurity/information assurance content critical to securing IT networks, WCC will incorporate key cybersecurity content into the degree by mapping the new IT networking curriculum to specific focus areas defined by the National Security Agency/Department of Homeland Security as part of their Center of Academic

Excellence (CAE) program (WCC has a CAE2Y designation from the NSA/DHS (2Y = 2 Year)). Curriculum will further build off the National Initiative for Cybersecurity Education's (NICE) Cybersecurity Workforce Framework, available through the National Initiative for Cybersecurity Careers and Studies (NICCS). In developing the curriculum, faculty will consult the Department of Labor's (DOL) Cybersecurity Competency Model, which, by design, includes competencies identified in the NICE/NICCS Cybersecurity Workforce Framework. These materials have informed the development of the degree's own Competency Model, shown in Figure 1.

As a result of completing required coursework, students will simultaneously complete three certificates (10 credits each): 1) Industrial Control Systems – **SCADA**, 2), **Cloud Computing** and 3) **Mobile Technologies.**

Figure 1. BAS IT Networking Competency Model			
			Go To Detail View

Tier Name	Tier Block			
FOUNDATION 1 **Personal Effectiveness**	Interpersonal Skills and Teamwork	Integrity	Professionalism	Initiative
	Adaptability and Flexibility	Dependability and Reliability	Lifelong Learning	
2 **Academic Competencies**	Reading	Writing	Mathematics	Science
	Communication	Critical and Analytical Thinking	Fundamental IT User Skills	
3 **Workplace Competencies**	Teamwork	Planning and Organizing	Innovative Thinking	
	Problem Solving and Decision Making	Working with Tools and Technology	Business Fundamentals	
INDUSTRY 4 **Industry-Wide Technical Competencies**	Principles of Information Technology	Databases and Applications	Networks, Telecommunication, Wireless, and Mobility	Software Development and Management
	User and Customer Support	Digital Media and Visualization	Compliance	Risk Management, Security, and Information Assurance
5 **Advanced NetworkingTechnical Competencies**	Industrial Control Systems - SCADA	Cloud Computing	Mobile and Wireless Technologies	

BAS program in IT Networking - Course descriptions and outcomes

BUS 301 – PROFESSIONALISM and PROFESSIONAL ETHICS

Upon successful completion of the course, students will be able to describe the codes of practice, standards of conduct, professional responsibilities and regulatory aspects associated with common professional business positions including CEOs, COOs, HR, and IT administrators. Students will be able to describe the rationale for having professional standards, and the potential consequences of deviating from professional codes and standards. In addition, students will be able to list and describe the expected professional behaviors that correspond with these positions in a business setting, while on business travel or as an employee.

Outcomes:
- Describe the codes of practice, standards of conduct, professional responsibilities and regulatory aspects associated with common professional business positions including CEOs, COOs, HR, and IT administrators;
- Describe the rationale for having professional standards, and the potential consequences of deviating from professional codes and standards;
- List and describe the expected professional behaviors that correspond with these positions in a business setting, while on business travel or as an employee.

BUS 302 – PROJECT MANAGEMENT

Upon successful completion of the course, students will be able to describe the various project management approaches that are considered when tackling a project, and the various frameworks, processes, and steps involved in executing a project. Students will be able to describe the rational for when one approach is typically selected over another, the issues that typically impact projects positively or negatively, and to propose adjustments. Students will be able to describe various project control systems and methodologies.

Outcomes:
- Describe the various project management approaches that are considered when tackling a project;
- Describe the various frameworks, processes, and steps involved in executing a project;
- Describe the rational for when one approach is typically selected over another in project management;
- Describe the issues that typically impact projects, and propose adjustments;
- Describe various project control systems and methodologies;
- Produce a completed project.

BUS 303 – COMPLIANCE and AUDITING

Upon successful completion of the course, students will be able to identify and explain the standard rules, regulations, and issues related to business management compliance with applicable laws and regulations. Students will be able to list and explain the

applicable laws for compliance for a given standard business situation or area (such as employment, IT, accounting), describe and explain what the laws mandate and where they apply, and describe how to conduct audits to determine compliance.

Outcomes:
- List the applicable laws for compliance for a given situation;
- Describe what the laws mandate and where they apply;
- Perform an audit and produce and audit report.

CIS 301 – DATABASE MANAGEMENT SYSTEMS

Upon successful completion of the course, students will be able demonstrate the ability to utilize database management systems (DBMS) to solve specific problems. They will be able to: list the most common structures for storing data in a DBMS; configure a commodity DBMS for secure access; describe alternatives to relational DBMS and their unique security issues; describe the role of a database, a DBMS, and a database server within a complex system supporting multiple applications; demonstrate basic SQL proficiency for table creation, data insertion and data query; describe DBMS access controls and privilege levels and apply them to a simple database; and develop and explain a database structure for a specific system/problem.

Outcomes:
- List the most common structures for storing data in a DBMS;
- Configure a commodity DBMS for secure access;
- Describe alternatives to relational DBMSs and their unique security issues;
- Describe the role of a database, a DBMS, and a database server within a complex system supporting multiple applications;
- Demonstrate basic SQL proficiency for table creation, data insertion and data query;
- Describe DBMS access controls and privilege levels and apply them to a simple database;
- Develop a DB structure for a specific system/problem.

CIS 320 – WEB DEVELOPMENT

Upon successful completion of the course, students will be able to demonstrate the ability to develop and maintain a web site, incorporate e-commerce and database components into a web site, and employ appropriate security measures. Students will demonstrate the ability to create scripts/programs to automate and perform operations. They will be able to describe, explain and implement basic security practices in developing scripts/programs (e.g., bounds checking, input validation). Topics include: basic security , bounds checking, input validation, program commands, program control structures, variable declaration, debugging, scripting language (e.g. PERL, Python, BASH,), and basic boolean logic/operations.

Outcomes:
- Develop and maintain web sites;
- Incorporate e-commerce and database components into a web site;
- Employ security measures for a web site;
- Create scripts/programs to automate and perform operations.

CIS 316 – EMBEDDED SYSTEMS

Upon successful completion of this course, students will be able to describe, explain, and demonstrate the ability to configure cyber physical systems including embedded system architectures, real time OS issues including concurrency and synchronization, and real time resource management.

Outcomes:
- Describe embedded system architectures;
- Describe real time OS issues such as concurrency and synchronization;
- Describe real time resource management.

CIS 416 – ICS ARCHITECTURE

Upon successful completion of this course, students will be able to list, describe, and explain elements of telecommunications services and link protocols. This will include the ability to describe, explain, design, plan and implement (using available hardware): local area networks in the master station and in the field; principles of the TCP/IP architecture; reliability, redundancy and safety issues; features of the RTU; PLCs and industrial computers; instrument and equipment interfaces; features of the MTU/HMI; security; data historian/back end systems; and planning and managing SCADA projects.

Outcomes:
- Set up and configure RTUs and PLCs from several vendors
- Design, plan, and implement an Industrial Control Systems network
- Address security issues within an ICS network

CIS 308 – MOBILE and WIRELESS TECHNOLOGIES

Upon successful completion of this course, students will be able to list, describe, and explain the hardware, communications, management, and programming environments associated with mobile technologies. Students will be able to describe how a mobile device maintains connectivity to the network while in motion, including passing off from one node to the next. They will also be able to explain the weaknesses of various encryption technologies and how these have been addressed, and discuss the tradeoffs associated with bandwidth data rate, modulation, complexity, acceptable BER, and signal spreading. Students will be able to describe and explain coordination, energy efficiency, self-organization, and security within a wireless sensor network and be able to identify methods for isolating and/or obfuscating RF transmissions.

Outcomes:
- Describe how a mobile device maintains connectivity to the network while in motion, including passing off from one node to the next;
- Describe the tradeoffs associated with bandwidth data rate, modulation, complexity, acceptable BER, and signal spreading;
- Describe coordination, energy efficiency, self-organization, and security within a wireless sensor network;
- Identify methods for isolating and/or obfuscating RF transmissions.

CIS 406 – SUPPLY CHAIN
Upon successful completion of this course, students will be able to design and explain a supply chain including all of the components. They will be able to describe security issues associated with building complex systems out of third party components of unknown origin. Students will be able to describe, list, and/or explain issues related to outsourcing hardware and/or software development and/or integration, methods to mitigate these issues, transport and logistics of components, and evaluation of third party development practices.

Outcomes:
- Describe the components of a supply chain;
- Design a supply chain;
- Describe security issues related to supply chains;
- Describe the issues related to outsourcing hardware and/or software development and/or integration;
- Describe methods to mitigate outsourcing issues.

CIS 305 – CLOUD COMPUTING I
Upon successful completion of this course, students will be able to describe and explain the various technologies and services that enable cloud computing, different types of cloud computing models, and the security and legal issues associated with cloud computing. They will be able to describe each type of service/model of cloud computing and be able to compare and contrast local resource requirements, local controls, networking requirements, and security.

Outcomes:
- Describe each type of service/model of cloud computing;
- Describe cloud storage systems;
- Describe cloud infrastructure;
- Describe resource requirements;
- Describe cloud security risks and mitigation techniques.

CIS 405 – CLOUD COMPUTING II
Upon successful completion of this course, students will be able to design and implement a cloud infrastructure and manage storage services. Topics covered include: cloud based storage, virtualization, service oriented architecture (SOA), high availability, scaling, mobile devices, the role of open source cloud software such as Hadoop, OpenStack, and others.

Outcomes:
- Describe common technical complexities of cloud computing;
- Describe the interactions between the various components of a cloud infrastructure;
- Build a working cloud infrastructure;
- Apply security measures to the cloud infrastructure.

CIS 306 – ENTERPRISE LINUX

Upon successful completion of this course, students will be able to describe and explain how to install, administer, configure, and upgrade a Linux system in enterprise environments. Students will be able to describe the tools and explain the concepts needed to build and manage a production Linux infrastructure, including how to integrate the infrastructure into a Windows environment.

Outcomes:
- Describe and explain how to administer, configure, and upgrade a Linux system;
- List tools needed to build and manage a production Linux infrastructure;
- Describe concepts needed to build and manage a production Linux infrastructure;
- Describe how to integrate the Linux infrastructure into a Windows environment.

CIS 499 – CAPSTONE

Upon successful completion of this course, students will be able to describe and explain how they took a concept taught in the IT Networking BAS program, as well as how they developed additional expertise and knowledge through an approved work experience or through conducting an approved project.

Outcomes:
- Describe and explain work experience or project and how it related to BAS course work;
- Describe and explain additional learning gained through this activity, and the activity's potential importance to a network enterprise.

Criteria 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

Faculty will be overseen by the proposed IT Networking Program Coordinator, Corrinne Sande (who is also the current CIS Program Coordinator and Principal Investigator of CyberWatch West). Current CIS faculty and planned hires specifically for the IT Networking program (2 FTE faculty and one part-time adjunct) will teach BAS coursework. Faculty in the CIS Program all have work experience in the field and are required to earn and keep current specialized certifications for the classes or content they are teaching. These certifications augment their professional degrees. These faculty members also attend workshops and other trainings to keep current in this ever-evolving field.

General education course will be taught be existing faculty where appropriate (e.g. for current, already existing and ongoing courses). The entirely new junior and senior level general education business courses (Professionalism and Professional Ethics, Project Management, and Compliance and Auditing) will be taught by Tom Burke from WCC's Business Program.

Table 4 details the courses for which anticipated faculty, both full-time and adjunct, are qualified to teach.

Table 4. BAS in IT Networking Program Faculty			
Faculty Name	**Credentials**	**Status**	**Qualified to Teach:**
Corrinne Sande	Master of Liberal Studies in Information Networking and Telecommunications; Certifications: SANS GIAC Certified Incident Handler (GCIH); CompTia Security + Certified Professional; Cisco Certified Network Professional (CCNP); Cisco Certified Academic Instructor (CCNA and CCNP); Cisco Certified Network Associate (CCNA); CompTia A+ Certification	CIS full-time faculty	Lower and upper division
Travis McEwen	Bachelor of Science, IT – Security Emphasis; master's degree in progress; Certifications: CompTia A+, Network+, and Security+ Certifications; Cisco CCNA Security Certification; Cisco CCENT Certification; Cisco CNSS 4011 Certification; Cisco CCNA and Cisco CCAI (Cisco Certified Academic Instructor); CIW Database Design Specialist Certification; CIW JavaScript Specialist Certification	CIS full-time faculty	Lower and upper division
Christy Saunders	Bachelor of Science, IT – Security Emphasis; master's degree in progress; Certifications: CCAI, Cisco Certified Academic Instructor; CompTia Linux +; LPIC – 1; CompTia Security + ce; SUSE Certified Linux Administrator (SUSE CLA); CIW Web Design Specialist; Cisco Certified Entry Networking Technician (CCENT); Project +; CIW Database Design Specialist	CIS adjunct faculty	Lower and upper division
Brady Todhunter	Bachelor of Science, IT – Security Emphasis (in progress); Certifications: Cisco CCNA and CCNA Security Certification; Cisco Certified Academic Instructor (CCAI); CIW Web Design Specialist Certification; CIW JavaScript Specialist Certification; working toward CompTIA Linux+	CIS adjunct faculty	Lower division
Gary O'Dell	Bachelor of Arts – Interdisciplinary Studies; Associate of Science – Computer Information Systems; Certification: CompTia A+ Certification	CIS adjunct faculty	Lower division
Tom Burke	Bachelor of Science in Law; Master of Business Administration; Juris Doctor; Doctorate of Business Administration	Business faculty	Upper division
Kumar Ramesh	Bachelor of Technology in Electrical Engineering; Master of Business Administration in Computer and Energy Management; Master in Information Systems	Computer Science adjunct faculty	Upper and lower division
New FT Faculty 1	Bachelor's degree and certifications, or master's degree	Full-time faculty (to be hired in Year 1)	Lower and upper division
New FT Faculty 2	Bachelor's degree and certifications, or master's degree	Full-time faculty (to be hired in Year 3)	Lower and upper division
Part-time Adjunct	Bachelor's degree	Adjunct faculty (to be hired in Year 2 only)	Lower and upper division

Based on projected increases in enrollment and staffing needs over time as the BAS program rolls out and gains momentum, WCC plans to hire a full-time faculty member in Year 1 (in time to start teaching in fall of 2017) and an additional full-time faculty member in Year 3 (fall of 2019). Before the additional full-time faculty member is hired in Year 3, a part-time adjunct faculty member will be hired in Year 2 (in time to start teaching in fall of 2018) for that year only.

WCC realizes the importance of providing and hiring high quality faculty for the proposed BAS program. WCC has strict hiring procedures to ensure faculty are qualified for their positions, have appropriate preparation and teaching experience, and possess pertinent discipline-related experiences.

Provide the total faculty FTE allocated to the program

The total new faculty FTE allocated to the program will be as follows: Year 1: 1.0 FTE; Year 2: 1.5 FTE; Year 3: 2.0 FTE; Year 4: 2.0 FTE; and Year 5: 2.0 FTE. In addition, the program will employ a part-time BAS instructional lab technician (to augment a full-time position of this kind that already supports the CIS associate degree program). The IT Networking Program Coordinator, Corrinne Sande, will oversee BAS instruction.

Professional and Technical Certifications

WCC will ensure that all faculty and administrators responsible for technical program courses meet certification requirements for professional and technical administrators and instructors in the Washington Administrative Code.

Criteria 3: Selective admissions process consistent with an open door policy institution, if used for the program

Selection and admission process

Students who meet BAS program admittance criteria detailed in Table 5 will be welcome to join the BAS program in a manner consistent with the College's open door policy. Admission will be on a first-come, first-served basis, given enrollment capacity, for those who meet admissions criteria, with WCC CIS associate degree graduates receiving first priority once program enrollments reach capacity.

WCC will work closely with area colleges in particular, including Bellingham Technical College, Northwest Indian College, and Skagit Valley College, to provide access to students from their two-year IT programs and an efficient, seamless transfer to the proposed BAS degree at WCC. As stated, all students graduating from two-year IT programs in Washington State (and others, pending admissions review) will be eligible to apply to pursue the BAS degree at WCC.

Table 5. Admission Criteria for BAS in IT Networking	
Criteria	**Comments**
Graduation from a 2-year IT-related degree program totaling 90 credits in Washington State.	Applicants who hold 2-year IT-related degrees granted by institutions in other states, as well as applicants who have not yet earned 2-year degrees, will be reviewed on a case-by-case basis.
Overall 2.0 GPA	In 2-year degree coursework
Minimum grade of 2.0	In each CIS/IT courses from 2-year degree
Completion of BAS application form for IT Networking program	Applicants will also need to apply to WCC if they have not already done so.
Resume	Applicants are encouraged to describe any relevant work experience (paid or unpaid), internships, or work shadow.
Transcripts	From 2-year institution and others, as appropriate
Personal statement (1 page)	Only required if applicant does *not* meet one or more criteria above. This will enable review of the applicant's potential for employability after graduation.
Reference letters and informational interview	Only required in the event of a tie-breaker situation. The BAS program will run on a first-come, first-served basis, given enrollment capacity.
Review of relevant disciplinary action (e.g. judicial conduct)	Judicial conduct in particular may be taken into account in the admissions process.

Efforts that will be used to assure that the program serves as diverse a population as possible

The BAS program will work, through efforts and policies described below, to ensure it serves as diverse a population as possible.

In accordance with the College's *Affirmation of Inclusion*:

"Whatcom Community College is committed to maintaining an environment in which every member of the College community feels welcome to participate in the life of the College, free from harassment and discrimination. We welcome people of all races, ethnicities, national origins, religions, ages, genders, sexual orientations, marital status, veteran status, abilities and disabilities. Toward that end, faculty, students and staff will:

Treat one another with respect and dignity;

Promote a learning and working community that ensures social justice, understanding, civility and non-violence in a safe and supportive climate;

Influence curriculum, teaching strategies, student services and personnel practices that facilitate sensitivity and openness to diverse ideas, peoples and cultures in a creative, safe and collegial environment."

To ensure equitable access to and participation in the BAS program, WCC will use multiple formats, mechanisms, and venues to accommodate differing learning styles and issues of information accessibility. For example, BAS application materials and program announcements will be available in print format (bulletin boards, brochures, publications, etc.) as well as in electronic format (e-mail, social media, website, list serves, etc.). Marketing will target diverse student populations in area high schools and colleges, will include closed-caption video promotions on WCC's web site, and WCC will reach out to 2-year CIS program graduates and to area employers with an IT focus or needs. The BAS Program Director, the IT Networking Program Coordinator, and the CIS Program Advisory Committee will work proactively to support and achieve these aims.

In addition, the BAS Program Director will be responsible for reaching out to colleges across the state to develop articulation agreements for efficient transfer to WCC's BAS, to ensure transfer information is readily available to two-year IT program students, and will work with WCC's IT Networking Program Coordinator to identify any needed mediation issues or support for students who are not sufficiently prepared to enter the BAS program.

Once students are enrolled, the College will provide assistance and reasonable accommodations to BAS students through ESL courses, tutoring, and other services (described in greater depth in the subsequent section), including through its established office of access and disability, intercultural center, and veterans services office.

In hiring faculty and staff for BAS positions, WCC will, in accordance with its *Policy Statement on Affirmative Action/Fair Employment Practices*, "avoid any discrimination in its recruitment, hiring, training, retention and promotion and all other personnel actions of qualified persons because of their race, religion, color, national origin, gender, marital status, age (except where gender or age is a bona fide occupational qualification), handicap due to sensory, mental, or physical reasons or veteran status, which includes Vietnam era and/or disabled veterans."

Criteria 4: Appropriate student services plan

Services that will be needed by the students admitted to the degree program, and the college plan for providing those services

Putting students first is the "Whatcom Way." BAS students will receive high quality support and services as all students do at WCC. The College offers a range of existing services and resources beyond those described and proposed specifically for the BAS program in Criteria 5 (dedicated BAS Program Director, dedicated half-time Advising/Student Support person, BAS library resources, and more) to help students succeed in classes and achieve their educational goals.

WCC is committed to student success – proven by the outstanding resources made readily available to each and every student. Student support services and academic resources are comprehensive and include: access and disability services, admissions, advising and registration, age "50+" support, counseling, degree audit, eLearning training and support, online registration, enrollment verification, education planning, financial aid, the LGBTQ student success initiative, transcript services, placement testing, and veterans services. BAS

students will also enjoy such campus resources including athletic facilities, tutoring services, the bookstore, dining services, the student access lab, the intercultural center, experiential learning, computing resources, the cybersecurity center, library services, the career and transfer center, the writing center, the testing center, the online math center, and the learning center. In addition, WCC Student Life offers opportunities for engagement in student leadership, student activities and clubs, and athletics.

All of these services complement the instructional programs to assist students in achieving their academic and career goals. Classrooms are well maintained and equipped with teaching stations that support presentations, video, and internet access. BAS students will also have courses held in newly remodeled, state-of-the-art dedicated classrooms and networking labs (see details below).

Select student services that BAS students in particular are anticipated to use are described in greater detail below:

Career and Transfer Center

WCC's Career and Transfer Center advisors provide career and academic plans using different advising tools and resources for effective and timely degree completion for graduation.

Intercultural Center

The Intercultural Center supports educational equity and academic achievement for diverse student populations by providing access to resources and a safe place to connect through a culture of inclusion and respect.

Veterans Services

WCC welcomes veterans and recognizes and appreciates their service. WWC's services to veterans are designed to provide the tools and resources necessary for a successful educational experience at WCC. As part of these efforts, the Veterans Safe Zone Program, developed by WCC students and staff, was enthusiastically implemented on campus in 2008. This is an ongoing commitment of support to WCC's veterans and current military.

Access and Disability Services

The office of access and disability services values the diversity students with disabilities bring to WCC's campus community. Through intentional programs, services, and reasonable accommodations, the office ensures students with disabilities equal access to WCC and encourages the development of independence and self-advocacy skills while supporting the learning experience.

Whatcom Library

The WCC Library, located on the main and top floors of the Heiner Center, has 46 computers for student use, with the same software as in the student computer lab. The library serves the research needs of students, faculty, and staff, and has services for community members. More than 1,500 people pass daily through the doors. The library offers information literacy classes, research computers, graphing calculators, reference help, and a collection of over 40,000 books, DVDs, and CDs. Pending state funding, a new Learning Commons could open as early as fall 2017, which would provide expanded library and computer services.

CIS/Cybersecurity Labs

The CIS/Cybersecurity program's labs and classrooms in Baker Hall have undergone a major remodel, which has more than doubled their size to approximately 6,000 sq. ft. The upgraded facilities includes two lecture spaces, three enlarged labs, a new networking/server room, and a new instructional support/testing area. The new lab layouts allow for increased and improved interaction among instructors and students, and the expanded lab space is equipped with additional computers, a Cisco router package, and network infrastructure equipment.

Cybersecurity Center

WCC has developed a Cybersecurity Center to provide access to Information Security and Information Assurance (IA) resources. http://www.whatcom.ctc.edu/about-the-college/cybersecurity-center. WCC was initially designated a Center of Academic Excellence in Information Assurance Education (CAE2Y) in 2011 and in 2014 was awarded a new designation through 2021. WCC earned this honor from the US Department of Homeland Security and the National Security Agency. This designation means that our security curriculum has met standards set by these agencies.

IT Professionals Student Club

The mission of the IT Professionals Student Club is to allow students interested in the information technology field to interact together and further explore common interests along with educational and career opportunities. Club members provide staffing for an IT help desk that is free to students, faculty and staff and invites presentations by speakers.

Financial aid services and academic advising for students admitted into the program

Financial Aid Services

BAS students will participate in mandatory financial aid advising as part of the program's mandatory advising requirement, described in greater detail below. Students admitted to the BAS program will be required to meet the same financial aid deadlines as other WCC students and will benefit from the College's helpful financial aid services, as well as workshops and financial aid literacy tools. For example, the College recently implemented an online tool (SALT) to help students develop their financial and economic literacy. SALT is a comprehensive online platform with relevant and useful financial literacy tools.

WCC provides an effective and accountable financial aid program consistent with its mission, student needs, and resources. The financial aid staff awards federal, state, private, institutional grants, loans, scholarships, and agency support in accordance with state and federal guidelines. Policies and procedures that guide the disbursement of state and federal aid are reviewed annually in accordance with federal and state regulations and are updated as necessary. The financial aid staff uses a variety of training tools to ensure that the information and procedures are effective, consistent, accurate, and in compliance.

Financial aid application forms and procedures, eligibility requirements, and satisfactory academic progress requirements are provided in the catalog, quarterly class schedules, advising materials, and on WCC's website. Financial aid information is presented to new students and their parents during new student orientation sessions before the start of each quarter. A major

focus of the financial aid office is timely communication with students. The financial aid portal, available on the college website, provides students with access to their real-time financial aid information. This supports easy access for students to view their budget, tuition costs, verify that forms have been received, identify and download missing forms, and view their financial aid award.

Academic Advising

The BAS program will fund a half-time Advising/Student Support position to specifically meet the needs of BAS students as they navigate the BAS program application process, WCC admissions, course selection, scheduling, and other aspects of their journey toward completing the BAS program in IT Networking at WCC. Advising will be required of all BAS students in the program. Prior to admission, prospective applicants will receive BAS program information, and the Advising/Student Support person will be available 20 hours per week (starting in spring of 2017 prior to program launch in fall of 2017) to help answer questions interested students might have about the application process and program requirements.

Once admitted to the BAS program, BAS students will participate in orientation (mandatory for students transferring in from other 2-year programs), called the Whatcom Wave. Orientation outcomes include knowledge of campus resources, an awareness of academic advising and decision-making processes, an understanding of college expectations, familiarity with the physical layout of the campus, familiarity with opportunities for student involvement in student clubs and activities, and a personal connection with faculty, staff, and students. From that point forward, BAS students will meet regularly with the BAS Advising/Student Support person who will assist them with education program advising and any course issues, help monitor their progress (in concert with the BAS Program Director), and guide them to other available student services, described above, to aid in their success both during BAS program enrollment and during employment search upon graduation.

Criteria 5: Commitment to build and sustain a high quality program

Financial plan for the first five years of program operation

Below we have detailed a financial plan for the first five years of the BAS in IT Networking program at WCC. The College commits to sustaining a high quality program and looks forward to further strengthening and building the IT networking infrastructure and workforce in the region and in Washington State through implementation of this unique applied baccalaureate program.

Types of funds to be used to support the program

Tuition is the long-term anticipated funding source for the BAS program, based on enrollment projections explained and shown in Table 6 on the following page; however, the College is committed to funding the proposed BAS program regardless of whether tuition covers program expenses or not (within a reasonable period of years).

Based on current Washington State BAS program enrollment trends, WCC enrollment trends, and feedback from a late 2014 survey of BAS interest among CIS current students and recent program graduates, it is anticipated that roughly 60% of enrolled BAS students will aim to complete the program in 2 years, while the rest might be expected to take more time, perhaps 3 or 6 years, given preferences, work schedules, and other responsibilities.

While classes will be offered in person initially in the new BAS degree program, new hybrid classes will be added as the program grows, expanding accessibility. Currently the CIS program serves many working adults, and one-quarter of enrollees take advantage of hybrid options offered as part of the program. Student survey results demonstrate need for a hands-on BAS degree at WCC with a hybrid component that serves the needs of working adults.

With these estimates in mind, we have assumed three cohorts: a cohort taking 15 credits per quarter graduating in 2 years, a cohort taking 10 credits per quarter graduating in 3 years, and a cohort taking 5 credits per quarter graduating in 6 years. These enrollment projections, shown in Table 6, assume a 10% drop out rate.

Table 6. Enrollment Projections for BAS in IT Networking at WCC					
Cohort			**Year**		
	Year 1 2017-18	Year 2 2018-19	Year 3 2019-20	Year 4 2020-21	Year 5 2021-22
1st cohort 2 year	15	14			
1st cohort 3 year	5	4	4		
1st cohort 6 year	4	4	3	3	3
2nd cohort 2 year		20	18		
2nd cohort 3 year		6	5	4	
2nd cohort 6 year		4	4	4	3
3rd cohort 2 year			30	27	
3rd cohort 3 year			9	8	7
3rd cohort 6 year			6	5	5
4th cohort 2 year				40	36
4th cohort 3 year				12	11
4th cohort 6 year				9	8
5th cohort 2 year					50
5th cohort 3 year					10
5th cohort 6 year					15
Total students	**24**	**52**	**79**	**112**	**148**

The enrollment estimates are based on expected student FTE that mirrors the growth of the CIS program over time. WCC's CIS program has grown, on average, 20% annually for the last five years. In fact, the program grew by one-third in just the last year alone.

Projected revenue based on these enrollment estimates is shown in Table 7.

Table 7. Revenue Projections for BAS in IT Networking					
Tuition by Cohort	**Year**				
	Year 1*	Year 2**	Year 3	Year 4	Year 5
	2017-18	2018-19	2019-20	2020-21	2021-22
Annual Tuition @ 15 Credits	6,729	6,729	6,729	6,729	6,729
Annual Tuition @ 10 Credits	5,343	5,343	5,343	5,343	5,343
Annual Tuition @ 5 Credits	2,671	2,671	2,671	2,671	2,671
# Students enrolled 15 cr/qtr	11.3	29.5	48	67	86
# Students enrolled 10 cr/qtr	3.8	8.8	18	24	28
# Students enrolled 5 cr/qtr	3.0	7.0	13	21	34
Projected Revenue	**103,747**	**264,183**	**453,871**	**635,143**	**818,284**

* Assumes 75% of enrollment projection fulfilled.
** Assumes 88% of enrollment projection fulfilled.

These revenue projections assume that full enrollment is not achieved until Year 3. This conservative assumption aims to strike a balance in consideration that it will take time to build full enrollment, and that while the current CIS program achieves an 88% fill rate, the proposed BAS program is expected to be quite popular and draw from a broader geographic base including fewer competitive program options.

The tuition basis for these estimates reflects the breakdown and proportion of upper and lower division courses put forth in this new degree program proposal. Tuition here includes operating fees only and uses current tuition rates for the lower and upper division courses as set by SBCTC. In accordance with tuition requirements for BAS programs, students will be charged per credit for upper division courses and lower division courses up to the full-time maximum tuition allowed for comprehensive regional universities.

Projected program expenses

Projected program expenses are shown in Table 8. This includes 'Year 0' expenses for 2016-17, considered the start-up year for the BAS program. During this time, the College will hire the BAS Program Director, begin funding other BAS positions described below, develop BAS program curriculum, and market the new degree broadly. The proposed BAS in IT Networking program is slated to begin in fall of 2017.

As can be seen in Table 8, the program is expected to begin generating some (but limited) revenue in Year 2, and fully begin sustaining itself in Year 3.

Table 8. Expense Projection for BAS in IT Networking						
Expense	**Year**					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
BAS Program Director	55,000	55,000	55,000	55,000	55,000	55,000
Full-time Faculty	0	50,000	50,000	55,000	55,000	55,000
Additional Full-time Faculty	0	0	0	55,000	55,000	55,000
Adjunct Faculty	0	0	25,189	0	0	0
Curriculum Development	10,000	10,000	3,000	3,000	3,000	3,000
Advising/Student Support	11,588	23,871	24,587	25,325	26,085	26,868
BAS Instructional Lab Tech	2,467	10,359	10,877	11,421	23,413	24,584
IT Networking Program Coordinator	7,290	7,290	7,290	7,290	7,290	7,290
Benefits	27,056	50,706	51,070	72,448	74,093	74,559
Equipment (work stations; computers)	45,600	3,200	0	39,200	0	0
Equipment (maintenance)	0	0	5,000	5,000	5,000	5,000
Library resources	0	8,000	5,000	5,000	5,000	5,000
Materials & Supplies	4,000	4,000	4,000	4,000	4,000	4,000
Marketing	10,000	5,000	5,000	5,000	5,000	5,000
Travel/Conferences/Prof Dev't	10,000	10,000	10,000	10,000	10,000	10,000
Total Expenses	**183,000**	**237,426**	**256,013**	**352,684**	**327,881**	**330,301**
Revenue Projection (from tuition)	0	103,747	264,183	453,871	635,143	818,284
BAS Program Income	(183,000)	(133,679)	8,170	101,188	307,261	487,983

Below is a detailed explanation of each expense category projection:

BAS Program Director (full-time)

This person will be responsible for:
- Leading and being the face of the BAS in IT Networking program;
- Providing information about the program to prospective applicants monitoring student progress;
- Being the point of contact for students enrolled in the BAS program;
- Initiating employer outreach for input to the program and graduate employment;
- Marketing the program to new students and conducting outreach to other CTC's for articulation of 2+2 models;
- Engaging in ongoing program assessment to maintain the program's currency.

This position is full time and will be compensated at a rate of approximately $55,000/yr depending on experience. Hire date targeted for fall of 2016.

FT Faculty (Instruction; full-time)

This person is responsible for:
- Teaching upper and lower division level BAS courses;
- Curriculum revisions to existing courses as needed to the program once it is implemented.

This position is full time and will be compensated at a rate of $48,000 - $50,000 depending on experience. Salary will increase to $55,000 in Year 3, depending on experience. This person should be hired in time to start teaching in fall of 2017 with a second, additional faculty member being added in time to start teaching in fall of 2019 based on projected increases in enrollment and staffing needs.

Adjunct Faculty (part-time in Year 2 only)

This person is responsible for:
- Teaching courses at the lower division level in support of CIS Program capacity increase in Year 2.

Compensation will be paid out at $24.22/hr. This person would be hired at half-time to work in Year 2 only before the additional full-time faculty member is hired in Year 3.

Curriculum Development (Subject Matter Experts & Adjuncts)

These people are responsible for:
- Developing the curriculum for each new course in the BAS in IT Networking program;
- Updating course curriculum as needed to ensure students are learning the most current industry standards and requirements.

Compensation will be paid out at $1,000 per course as stipends. It is estimated that there will need to be 8-10 new courses developed before the first year cohort of students enter the program and 8-10 new courses before the second year of this program begins. Therefore, we have allocated $10,000 for fall 2016 and $10,000 for fall 2017 for this purpose. There is also $3,000 per year allocated for potential updating or additional courses being added. It is anticipated that Subject Matter Experts (SME's) may be needed to address emerging topics.

Advising/Student Support (1/2 time)

This person is responsible for:
- Providing information about the program to prospective applicants;
- Assisting IT Networking students with educational program advising or course issues;
- Monitoring student progress (coordinated effort with BAS Program Director);
- Guiding students to other available student services to aid in their success both before and during enrollment, and during employment search upon graduation.

This position would be half time, starting in spring 2017, paying approximately $23,176 per year with an estimated increase of 3% increase per year.

BAS Instructional Lab Technician (1/4 time in Yrs 1-3; then 1/2 time)

This person is responsible for:
- Open lab and classroom support to faculty and students.

This position would be one-quarter time, starting in summer 2017, and paid at or around $9,396 per year with a 5% increase per year factored in. The position would increase to half-time in Year 4.

IT Networking Program Coordinator (1 person month for Corrinne Sande)

Corrinne Sande, CIS Program Coordinator, will also serve as IT Networking Program Coordinator and will be responsible for:
- Overseeing the BAS program in IT Networking;
- Being the instructional subject matter expert guiding overall program content and curriculum;
- Providing valuable connections, resources, and insight into many aspects of the program;
- Resolving any unanticipated issues that arise during implementation;
- Ensuring the continued improvement of the program.

This position would be compensated at the equivalent of one month's salary, estimated to be around $7,290.

Equipment (purchases/replacements)

Five new work stations will be needed at $3,200 each for the following positions:
- BAS Program Director (in Year 0);
- Advising/Student Support (in Year 0);
- BAS Instructional Lab Tech (in Year 0);
- FT Faculty (in Year 1);
- Additional FT Faculty (in Year 3);

New computers for the computer lab in the amount of $36,000 (30 @ $1,200 each) in summer 2017 is budgeted along with replacement computers in the same amount budgeted in summer 2020, as well as approximately $5,000 each year for updates to equipment, license, or other specialty equipment as needed.

Library Resources

$8,000 has been allocated in fall of 2017 towards the purchase of an additional library database and other resources needed in the first year of implementation of this program. $5,000 has been allocated for each successive year for ongoing purchases or license renewals. Instructional library resources are described in greater detail below.

Materials & Supplies

$4,000 is budgeted each year for materials and supplies. This will include, but is not limited to, paper, pens, printer ink, folders, highlighters, post-its, etc.

Marketing

Marketing funds will allow for the purchase of radio, print, video, social networking or other advertising mediums needed to inform the community about the new BAS in IT Networking opportunity being offered. $10,000 is budgeted starting in summer 2016 and $5,000 in each successive year after that.

Travel/Conference/Professional Development

$10,000 each year is budgeted to cover the costs of travel, conferences, and professional development courses that are needed to maintain faculty's currency with evolving content as well as costs associated with required faculty certifications to maintain program standards.

Appropriate facilities to be used

WCC is committed to providing appropriate facilities for its programs. In September of 2014, the College completed a major CIS program expansion project in Baker Hall. As described previously, the expansion of dedicated labs and classrooms for WCC's nationally acclaimed CIS program included renovation and remodel of approximately 6,000 sq. ft. of the south wing of the building. The remodeled space opened to students fall quarter of 2014. The most significant improvements include three enlarged labs, two lecture spaces, a new networking/server room, and a new instructional support/testing area. The new lab layouts allow for increased and improved interaction among instructors and students. The expanded lab space is equipped with additional computers, a Cisco router package, and network infrastructure equipment. The improvements further support WCC's status as a national leader in CIS and Cybersecurity.

The proposed BAS program will use this state-of-the-art facility until such a time that additional space might become needed in the future. WCC places a high value on effectively maintaining and developing its campus facilities to meet the highest expectations for cleanliness, safety, functionality, aesthetics, and customer service with a focus on continuous innovation and improvement. To this end, the College's Institutional Master Plan will expand campus buildings to address increased enrollments and demand for new types of learning facilities.

Equipment, technology, and instructional resources needed for the program

The BAS program will leverage the current – and recently upgraded – CIS 2-year degree program equipment, technology, and instructional resources, and it will also provide 30 new computers for students in the summer of 2017 when the BAS program launches. Since it is anticipated that these computers will need to be upgraded rather frequently to keep current with changing technology, the BAS program has budgeted for an additional 30 new computers to be installed in the summer of 2020. The BAS in IT Networking students need to stay abreast of current technology so that they are competitive in their field.

Lab fees, while not considered as part of BAS program revenue, are collected from students in all CIS courses ($5/credit) and will help to offset equipment replacement costs for the BAS program. In addition, $5,000 in program expenses has been budgeted each year for updates to equipment, license, or other specialty equipment as needed.

The College has also budgeted $8,000 in Year 1 and $5,000 per year thereafter to provide library resources – subscriptions for electronic databases and license fees – for the BAS in IT Networking program. For example, the ITPro collection with desktop video collection, comprising 13,000 eBooks as well as online, streaming "how-to" videos, would provide a specialized resource for BAS students. It is a subscription model that would be regularly refreshed with front list titles.

The College's library is dedicated to fulfilling the information needs of students, faculty, and staff. The library provides space, instruction, resources, access, and the guidance to use library resources effectively. Guided by the College's mission, the library focuses on developing the information literacy competencies of students. The library houses multimedia equipment, and its collection of print and multimedia materials includes more than 40,000 items. Research computers are available with productivity software for student use. They offer access to the library's article and reference databases through networked and wireless internet connections.

The online resources are accessible 24x7 with student accounts allowing for remote authentication. The library's licensed databases provide access to over 10,000 journals and more than 132,000 eBooks, as well as to reference works and to multi-media materials. The library's OneSearch discovery product helps make nearly all of this valuable online content and physical collection findable through one interface.

The College's ability to sustain the program over time

WCC is fully committed and able to sustain the proposed BAS in IT Networking degree for the long term. As evidence of WCC's long-range thinking and commitment to this endeavor, WCC recently applied for a new NSF capacity building grant to fund the development and implementation of the proposed new BAS degree in IT Networking. If awarded, the three-year NSF grant would fund the following aims: 1) degree and pathway development; 2) degree advising, outreach and marketing; and 3) industry participation and evaluation. The three-year proposal would fund half of the salary for the new BAS Program Director, the half-time Advising/Student Support position, and the Instructional Lab Tech. Support for new course/curriculum development by faculty would also be provided, in addition to half of the marketing and supply costs and all of the projected travel and professional development costs.

Whether or not the NSF proposal is successful, WCC is committed to funding BAS degree development and implementation. Whatcom will also continuously look for additional funding resources to maintain and update the program, as well as to support scholarships for students. If grant funds are not available, institutional funds will be used. This program aligns with WCC's strategic plan and mission by expanding opportunities for students to achieve their potential and by contributing actively to the vitality of Whatcom County. This proposal is a direct result of the College's 2014-15 Work Plan, to be an active partner in economic development, and is supported by the College's Board of Trustees.

Criteria 6: Program specific accreditation

Indicate whether the institution will seek specialized program accreditation

The proposed BAS degree at WCC requires Substantive Change approval by the Northwest Commission on Colleges and Universities (NWCCU) because it would be the first baccalaureate degree offered at WCC.

Although not an accreditation per se, WCC will incorporate key cybersecurity content meeting nationally recognized standards into the degree by mapping the new IT networking curriculum to specific **focus areas** defined by the National Security Agency/Department of Homeland Security as part of their Center of Academic Excellence (CAE) program (WCC has a CAE2Y designation from the NSA/DHS (2Y = 2 Year)).

WCC will apply to NSF/DHA to add the following focus areas to its CAE2Y designation: Industrial Control Systems – SCADA Security (including embedded systems), Secure Cloud Computing, and Secure Mobile Technology. These focus areas include a number of Knowledge Units (for example, Embedded Systems) to which existing CIS courses are not currently mapped. The new

curriculum proposed for the BAS program has been explicitly designed with these new focus area Knowledge Units in mind. Adding specialty focus areas will bolster WCC's CIS program and distinguish the proposed BAS from others both in Washington State and nationally.

If so, describe plans for accreditation and identify appropriate accrediting body

WCC will submit a Substantive Change Proposal to NWCCU to offer the new baccalaureate degree level, which is not currently listed for WCC in the NWCCU Directory. WCC expects to achieve candidacy by Fall 2016 to offer the new degree level.

Criteria 7: Pathway options beyond baccalaureate degree

Opportunities and articulation agreements for the place-bound BAS graduates to continue their education onto a graduate (Master's) degree program

WCC has worked with several universities to ensure students who complete WCC's proposed BAS in IT Networking degree will be able to pursue master's degree programs. WCC has paid particular attention to ensuring its place-bound BAS graduates will have opportunities to continue their education onto the graduate level. WCC has also ensured its proposed BAS program is not only rigorous, but also of added value to its students as they pursue graduate school, by mapping curriculum to national standards, including a capstone course, and providing three high level specialty certificates.

In December 2014, WCC faculty and staff spoke with Dr. Natalie Lupton, Central Washington University's (CWU's) Associate Dean for the School of Graduate Studies, and Associate Professor of Information Technology and Administrative Management (ITAM), a one-year program offered online. Articulation agreement opportunities were discussed, and CWU was highly supportive of the proposed BAS program and graduate pathway options for WCC's BAS graduates at their institution. In his external evaluation described in greater detail below, Dr. Robert Lupton, who chairs CWU's ITAM program, expressed his desire to work with WCC to develop an articulation agreement with CWU's program. Dr. Robert Lupton described it as "an ideal pathway." In terms of admissions requirements, BAS students must meet the same requirements as other students for entering the university. CWU is welcoming of partnering with BAS programs overall in Washington State, and Dr. Natalie Lupton has indicated that CWU would be willing to cross-advertise BAS programs with their online CWU master's degree programs. She also suggested the idea of marketing BAS programs as 4+1 opportunities (bachelor's on to master's).

Western Governors University (WGU) offers three online master's programs in IT: a Master of Science in Information Technology Management, a Master of Science in Information Security and Assurance, and a Master of Business Administration in Information Technology Management. WGU's IT management master's program requires that applicants hold a bachelor's degree from a regionally or nationally accredited institution and that they demonstrate IT networking experience through at least one of the following methods: a bachelor's degree in information systems or information technology with an emphasis or coursework in advanced IT networking; and/or submission of a resume for review showing

recent certifications and significant IT networking experience. BAS graduates from WCC's proposed IT Networking program will meet this requirement and will also be eligible to sit for several certifications should they choose to pursue them. WGU, founded by 19 governors and support by major businesses, is regionally accredited by the NWCCU.

City University of Seattle offers an online Master of Science in Information Security and an online Master of Science in Computer Systems. The Center for Information Assurance Education at City University of Seattle has been designated by the NSA and DHS as a National Center of Academic Excellence (CAE) in Information Assurance/Cyber Defense. In addition, students entering the Master of Science Information Security with a degree from any other CAE designated undergraduate program are eligible to have four courses waived: ISEC 500, ISEC 505, ISEC 510, ISEC 515. WCC is a National Center of Academic Excellence in Information Assurance 2-Year Education (CAE2Y). City University partnered with Whatcom Community College and others to form the Colloquium for Information Systems Security Education (CISSE) North West Chapter, for which Dr. Corrinne Sande serves as vice president. Students in the Master of Science in Computer Systems program at City University have the option to pursue specific emphasis tracks such as cloud development and embedded systems. Given their close association and alignment to CAE standards, WCC will pursue a coordinated articulation with City University. The two institutions are the only ones in Washington State with the new 2014 CAE/CAE2Y designation.

Although located in Tacoma and not offered online, the Institute of Technology at the University of Washington, Tacoma (UW-T) offers a Master in Cybersecurity and Leadership program. The program requires applicants to successfully complete a baccalaureate degree from an accredited institution with a minimum GPA of 3.0 attained for the final 90 quarter credits. The program does not specifically require an IT degree. The program's recruiter, Morgan Zantua, has emphasized that the program seeks applicants with not only a 4-year degree, but also significant work experience. It is anticipated that many WCC BAS graduates would meet this expectation. WCC already is developing a model for articulation with UW-T upon which to build; through an NSF CIS capacity building grant, WCC worked with UW to design a 2-year Associate of Applied Science – Transfer degree at WCC that will soon articulate to the UW's three campuses.

In addition, the BAS program's capstone course (CIS 499) will further prepare students for master's degree programs and enrich their experience through the development of additional expertise and knowledge through an approved work experience or through conducting an approved project. Master's degree programs look for this preparation in prospective students, and the BAS program will work with its partners, with the CIS Program Advisory Committee, and with the Technology Alliance Group for Northwest Washington to ensure the capstone course is of high value to BAS students and provides important linkages to area employers.

Lastly, WCC's BAS program offers three high level certificates that will distinguish program graduates when applying to graduate school. As a result of completing required BAS coursework at WCC, students will simultaneously complete three certificates comprised of entirely upper division courses in emerging industry topics: 1) Industrial Control Systems – SCADA, 2), Cloud Computing and 3) Mobile Technologies.

Criteria 8: External expert evaluation of program

The institution will select two external experts to review the program

WCC has selected two well respected external experts in the IT field to review the proposed BAS in IT Networking program. Dr. Robert Lupton is Professor and Chair of Central Washington University's Information Technology and Administrative Management (ITAM) Department. Dr. Corey Schou is University Professor of Informatics and Professor of Information Systems as well as Associate Dean for Idaho State University's College of Business.

The evaluators were provided with the program outcomes, curriculum outline, course descriptions, and curriculum map. They were asked to provide feedback on the following specific questions below, as well as any general feedback on aspects of the proposed curriculum and outcomes:

1. If the curriculum appears to meet the requirements of an IT Networking baccalaureate degree.
2. If there are any major elements missing.
3. If this Baccalaureate degree will prepare students adequately to apply for a Master's degree program.
4. If we have included any courses that you think are unnecessary or excluded any necessary courses.

In a separate document, provide copies of external evaluators' reports or letters

Please see Appendix B.

Summarize the institution's responses and subsequent modifications to the proposal based upon evaluator's recommendations

Response to Dr. Robert Lupton's Recommendations

Dr. Robert Lupton found the proposed curriculum to be "complete, current, and relevant" and especially robust considering the embedded certificates proposed. While he wondered how the three business-related upper division general education courses would add value to the networking student, he did state that these courses would help provide some of the soft skills needed for all networking graduates. He suggested that WCC develop pathways with masters programs such as his that accept BAS degrees so that program graduates "can continue to develop their management acumen…." As shown in this New Degree Program Proposal, WCC has explored such pathways and is actively building relationships with such graduate programs to further provide its future BAS students with management and business skills, which will build upon the foundation provided by the three upper division business general education courses proposed. Dr. Robert Lupton went on to caution that while program graduates may not be best suited for 'traditional' graduate programs, they would be ideally suited for university graduate programs with strong IT management programs that will allow students to build upon their "in-depth tech BAS degrees." CWU's ITAM program is an excellent example of just such a graduate program, and, as this proposal shows, WCC is already identifying other relevant IT management-focused graduate programs to which its future BAS students can pursue. Lastly, he suggested adding more security-related curriculum tied to building and managing a web site.

Security content will be infused in WCC's BAS Web Development course, and, overall, a strong security focus is integrated into the BAS program design and coursework.

Response to Dr. Corey Schou's Recommendations

Dr. Schou expressed enthusiasm for the curriculum and its three embedded certificates. He stated that it was obvious that care was taken in mapping curriculum to national standards. While he said that this program would articulate with many master's degree programs, he did recommended more math (calculus) and statistics for students interested in pursuing graduate studies. While WCC feels that requiring such coursework is not necessary for this networking degree proposed and the kind of work that networking graduates would be doing, BAS students will be advised in a manner that best suits their future educational and career goals. Students will have the option to take additional math and statistics coursework if they so desire to meet their goals. Dr. Schou also suggested the idea of forging cooperative relationships with a national laboratory for the industrial control system focus and with private communications companies for the mobile and wireless components of the program. WCC appreciates these recommendations and will explore such partnerships after the BAS program is approved and initial implementation is underway. Finally, he suggested that WCC use internationally recognized certifications and, in the future, cloud security certification for assessment as the curriculum matures. WCC will explore these possibilities as the program progresses.

Attach a short bio of the evaluators

Dr. Robert Lupton

Dr. Robert Lupton is Professor and Chair of Central Washington University's Information Technology and Administrative Management (ITAM) Department. ITAM offers high demand programs online and on campus using multi-modal deliveries. Dr. Lupton's professional business experiences include Fortune 100 companies such as Honeywell Inc. and Warner-Lambert Company along with retailers such as Kmart, 7-11, and Daylight Donuts, giving him a strong foundation for both teaching the ITAM student and leading the ITAM department. His research has been featured in publications such *as Journal of Education for Business*, *International Journal of Educational Management*, and *Journal for Global Business Education*, among others, in areas such as music in the workplace with impact on productivity and morale; brand loyalty, retail social networking and digital download; IT ethics; and industrial marketing.

Dr. Corey Schou

Corey Schou is University Professor of Informatics and Professor of Information Systems as well as Associate Dean for Idaho State University's College of Business. Dr. Schou is the director of the National Information Assurance Training and Education Center (NIATEC) and the Simplot Decision Support Center (SDSC). These are two key components of the Informatics Research Institute. Under his leadership, the Information Systems program was designated the National Center of Excellence in Information Assurance Education. His research and publication interests include information security and privacy, ethics, collaborative decision making, the impact of technology on organization structure, and the application of technology to managerial decision making. His work has resulted in over 200 monographs, books articles and formal presentations. He also serves as the editor of two journals and is the Information Assurance Series editor for a major publisher.

Appendix A: Program Outcomes Curriculum Map – BAS IT Networking

List program outcomes below: Students will be able to…	Required CIS courses										Required BUS courses		
	CIS 301	CIS 305	CIS 306	CIS 308	CIS 316	CIS 320	CIS 405	CIS 406	CIS 416	CIS 499	BUS 302	BUS 301	BUS 303
	database mgmt	cloud computing I	enterprise linux	mobile & wireless	embedded systems	web devt	cloud computing II	supply chain	ICS architecture	capstone	project mgmt.	prof ethics	compliance & auditing
1. Explain network topologies, including protocols, ports, addressing schemes, routing, and wireless communication standards.		R		R	I		R		R	A			
2. Apply network design principles to meet client needs.	R	R	R	R	I	R	R		R	A	R		
3. Perform the basics of computer and network security.		R	R	R	I	R	R	R	R	A			
4. Communicate professionally with customers and co-workers.	I	R	R			R	R	R		A	R	R	R
5. Install and configure network devices.		R		R	I		R	R	R	A			
6. Manage information in a variety of ways.	I									A	R		
7. Use scripting or programming languages to automate tasks.	I								R	A			

Note: Enter only one letter (i.e., "I", "R", or "A") per box.
"I" (introduced): Indicates the main courses in which each program outcome is introduced.
"R" (reinforced): Indicates the main courses in which each program outcome is reinforced.
"A" (assessed): Indicates the <u>one</u> course in which each program outcome is formally assessed (i.e., each program outcome should have only 1 course designated with an "A").

Appendix B: External Evaluators' Reports

1. **Dr. Robert Lupton, Central Washington University**

2. **Dr. Corey Schou, Idaho State University**

External Evaluation: WCC's proposed Bachelors of Applied Science (BAS) degree in IT Networking curriculum

Thank you for your willingness to review Whatcom Community College's (WCC's) draft curriculum for our proposed Bachelors of Applied Science (BAS) degree in IT Networking. The program outcomes, curriculum outline, course descriptions, and curriculum map are attached.

As our External Evaluator, we welcome your comments on aspects of the proposed curriculum and outcomes. We are particularly interested to know:

1. If the curriculum appears to meet the requirements of an IT networking baccalaureate degree.

The lead networking faculty at the CWU ITAM department reviewed the networking curriculum and found the courses to be complete, current, and relevant. The networking curriculum is robust especially when adding the upper division credits in the three certificate areas: Certificate Industrial Control Systems – SCADA, Certificate Cloud Computing, and Certificate Mobile Technologies. Together, these IT classes offer an applied area of study meeting a specialized industry needed. It is noted that the 60 hours of general education are included (as required by SBCTC) which will be important as WCC builds pathways to Washington State graduate programs.

2. If there are any major elements missing.

It is hard to gauge how the 15 electives of business related courses will add value to the networking student. The networking curriculum has depth, however, the WCC networking graduates will eventually be called upon to be leaders and managers.   Ideally, WCC will develop pathways to schools that will accept BAS degrees so the networking graduate can continue to develop their management acumen and job opportunities.

3. If this Baccalaureate degree will prepare students adequately to apply for a Master's degree program.

The BAS degree by design may not best prepare the graduate to be successful at traditional graduate programs. Those universities who develop strong IT Management programs that cater to BAS programs will have the graduate level curriculum necessary for students to build upon their in-depth tech BAS degrees.

As a note, the Central Washington University Graduate School and the Information Technology and Administrative Management (ITAM) Department Masters of Science both accept BAS degrees. The ITAM degree recognizes the nature of the BAS curriculum and

adds value to those graduates through IT Management graduate courses and programs. The CWU graduate program is an ideal pathway to move those technical networking students with limited business content to the next level of leadership, supervision, and management.   Something to consider in the near future would be an articulation agreement with CWU graduate programs to foster the WCC pathway.

I can't speak to other higher education institutions and their interest in accepting graduates of BAS programs.

4. If we have included any courses that you think are unnecessary or excluded any necessary courses.

I am assuming the web and database classes in the core are meeting the program goal #6: "Implement and administer information technologies and systems to help an organization achieve its goals." The 15 business electives help provide some of the soft skills needed for all networking graduates. Since these are listed as electives so students have flexibility when taking a particular classes, I think it is important to have strong advising. Students need to take courses that will give them a foundation for management.

I wonder how the CIS 320 Web Development course adds value to the networking area. Perhaps more security related curriculum tied to building/managing a web site would add that value and meet the "industry wide standards".

NIATEC

Informatics
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Integrity, Confidentiality and Privacy Through
Awareness, Training and Education
-- There is no patch for ignorance --

February 5, 2015

To Whom It May Concern   Re: WCC's proposed Bachelors of Applied Science
                                                          (BAS) degree in IT Networking curriculum

I have been asked to comment on aspects of the proposed curriculum and outcomes. At your request, I have focused on the following:

- If the curriculum appears to meet the requirements of an IT Networking baccalaureate degree.
- If there are any major elements missing.
- If this Baccalaureate degree will prepare students adequately to apply for a Master's degree program.
- If we have included any courses that you think are unnecessary or excluded any necessary courses.

Overall the curriculum meets both academic curriculum and industry needs for a Networking baccalaureate. I have taken the liberty of sharing the overall design with members of my board of advisors. They identified no significant shortcomings.

It is obvious that care was taken to ensure this curriculum maps closely to the NICE and CAE standards.

This baccalaureate degree will articulate with many masters degree programs; however, if I were advising students who were interested in a masters, I would recommend more mathematics (calculus) and statistics. For example, students interested in network security may not only find descriptive statistics, probability, and confidence intervals useful but with one additional course they could have a working knowledge of hypothesis testing including one and two sample z/t-tests, chi-square and ANOVA. linear and multiple regression, forecasting and statistical process control. Emphasis on use of statistical software; written and oral communication of statistical information.

One might wish to use internationally recognized examinations as part of independent summative assessment. For our program at Idaho State University, we have chosen to use the $(ISC)^2$ SSCP examination since it provides our graduates with DoD-8570 qualified credentials. We have signed an MOU with $(ISC)^2$ and use some of their training materials in our courses.

It is exciting to see that the curriculum has leads to separate certifications in Industrial Control Systems – SCADA, Mobile and Wireless Technologies, and Cloud Computing. For ICS/SCADA, one might wish to develop a cooperative relationship with the Idaho National Laboratory which has a large test bed for control systems. We have found both Verizon and ATT cooperative in supporting our mobile and wireless program. Finally, the Cloud Security Alliance and $(ISC)^2$ have announced that they will be providing certification in cloud security; I would recommend that this examination be used for assessment as the curriculum matures. https://www.isc2.org/pressreleasedetails.aspx?id=10366.

Sincerely,

Professor Corey D. Schou, PhD, HCIPP
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