Bachelor of Applied Science in Information Systems and Technology

BAS in ISIT

September 2012

Table of Contents: BAS in ISIT Full Program Proposal

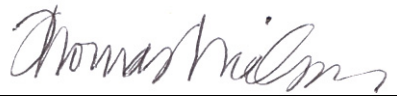
Form C: Cover Sheet New Degree Program Proposal

Program Information

Program Name: Information Systems and Technology
Institution Name: Bellevue College
Degree: BAS in Information Systems and Technology
Level: Bachelor
Type: Science
CIP Code: 11.0103

Contact Information (Academic Department Representative)

Name: Thomas Nielsen
Title: Vice President of Instruction
Address: 3000 Landerholm Circle SE, MSA202, Bellevue WA 98007-6484
Telephone: (425) 564-2442
Fax: (425) 564-6163
Email: tom.nielsen@bellevuecollege.edu



September 10, 2012

Chief Academic Officer — Date

Introduction

Bellevue College's bachelor of applied science degree in Information Systems and Technology (BAS in IST) has been designed to meet the growing demand for appropriately qualified workers in the field of information systems and technology. The entry-level credential for many information technology jobs is becoming a 4-year degree. As entry-level educational requirements rise, more current students will need to continue through the bachelor's level, and many current professionals will need additional training and education. For example, the Bureau of Labor Statistics considers a bachelor's degree as entry level education for the following IT occupations: computer programmer, computer systems analyst, database administrator, information security analyst, web developer, network architect, systems administrator and software developer.[1] Bellevue College's proposed IST degree will be designed to meet the explicit needs that employers have identified for systems administrators, security analysts, data specialists and application developers through providing a pathway to the baccalaureate for students with two-year technical degrees in IT.

Graduates of the BAS in IST will have a broad base of theoretical and technical knowledge, as well as specialized knowledge in one of four concentration areas: systems administration, security, application development or business intelligence. The concentrations were chosen based on their alignment with current roles and skills desired by employers of information technology professionals.

Concentrations and related employment

The **application development concentration** will include fundamentals of programming, object oriented programming, design patterns and practices, database applications, web technologies, and application environments, including mobile devices and the cloud.

Graduates who choose this concentration will be prepared for jobs as application developers, mobile applications developers, web developers, systems analysts and QA associates/analysts.

The **business intelligence concentration** prepares graduates for roles in data management and data analysis. The concentration includes relational database design and implementation, data interchange technologies, design and implementation of data warehousing, and skills in predictive analytics, reporting and performance management.

Graduates who choose this concentration will be prepared for jobs as database developers, business intelligence developers, data analysts/report writers, and electronic data interchange (EDI) specialists.

The **systems administration concentration** will prepare graduates to support, maintain and interoperate server operating systems and directory services. In addition to learning

[1] http://www.bls.gov/ooh/computer-and-information-technology/home.htm 04.05.12

how to install, configure and support LAN and WAN configurations, students will become proficient in cloud, virtualization and enterprise storage solutions.

Graduates who choose this concentration will be prepared for jobs such as systems administrator, network specialist, information technology specialist, local area network administrator, and more.

The **information security concentration** will prepare graduates to monitor and maintain system security solutions, including legal, regulatory, and internal compliance solutions. Graduates will be able to translate security policies and procedures into technical architectures.

Graduates who choose this concentration will be prepared for jobs such as information systems security analyst, data security administrator, information security officer, and more.

The BAS in IST will be appropriate for Bellevue College graduates of two-year technical degrees in IT, transfer students from Washington community and technical colleges who have information technology-related (IT) associate degrees, transfer students from other institutions of higher learning with appropriate credits, and incumbent workers needing to add advanced skills.

Curriculum Demonstrates Baccalaureate-level Rigor

Program Learning Outcomes

The baccalaureate in IST builds on technical skills that entering students bring from their associate degrees, adding theoretical knowledge, general education, and advanced technical skills. Successful graduates of the Information Systems and Technology degree will be able to:

- Apply a broad understanding of information systems and technology, creative problem-solving techniques and systems thinking to developing organizational solutions;
- Apply core competencies learned in the graduate's chosen concentration to function as a successful professional in the field of Information Systems and Technology;
- Work effectively in multi-disciplinary teams to apply information technology in support of organizational goals;
- Identify and analyze user needs and take them into account in the selection, creation, evaluation, implementation and administration of information technology systems;

- Work efficiently and effectively applying sound project management techniques and professional communication skills;
- Analyze the local and global impact of information technology on individuals, organizations, and society;
- Apply best practices and standards, conform to legal and regulatory standards, and apply appropriate ethical considerations including respect for privacy and intellectual property;
- Engage in continuing professional development through lifelong learning;
- Analyze and apply sustainable business practices;
- Demonstrate the breadth and depth of the educational preparation through the completion of a capstone project.

Course preparation by students transferring with technical associate degree

The BAS in IST has been designed for individuals who have earned a professional technical degree in an IT-related area. Students who hold technical associate degrees in information systems and technology, particularly those who have earned an AAS-T degree, will typically be able to complete the BAS in IST in two years of fulltime study.

Students who have completed two-year technical degrees in computer programming will be especially well-prepared for the application development and business intelligence concentrations; students who have completed degrees in systems networking and network and systems security will be especially well prepared for the security and systems administrations concentrations.

There are over 300 graduates each year from community and technical colleges in the Puget Sound region who would be prepared for transfer into the BAS in Information Systems and Technology, as shown in Table I.

Table I: 2010-11 2-year degree graduates in IT: Puget Sound Colleges							
CIP	110201	110901	111003	111004	111006	151202	
Degree Area	Computer Programming	Computer Systems Networking	Network & Systems Security	Web / Webmaster	Comp. Support Specialist	Comp. Systems Tech	All IT areas
Bates		4		4		5	13
Bellevue		25			4		29[2]
Cascadia	3	1					4
Clover Park	4		44				48
Edmonds		34	19	9			62
Green River		4	6		1		11
Highline	4	19	4				27
Lake Washington	2	39					41
Pierce		17			2		19
Renton		24					24
Seattle Central	4	2		1			7
Seattle North		13					13
Seattle South		8		1	1		10
Shoreline				1			1
Tacoma		24					24
Total Graduates	**17**	**214**	**73**	**16**	**8**	**5**	**333**

In addition to holding a technical associate degree in an IT-related area, applicants to the BAS in IST will need to meet the minimum requirements outlines in Table II, below. In keeping with the open access mission of the community college, admission requirements have been designed to provide access to many and to ensure that prospective applicants are prepared for success once they enter the program.

[2] Graduate numbers are larger for BC in table VI because data pull for system does not include additional IT degrees awarded at BC: business intelligence, database administration

Table II: Entry requirements for Bellevue College BAS in IST		
Prerequisites	**Notes**	**Credits**
Technical Associates degree in IT-related field	From regionally accredited institution.	90
Cumulative GPA of 2.0	In all college courses	
Minimum grade of 2.5 in all required courses	Courses required for associate degree in IT	
General education courses	At least 20 credits, as outlined in Table III, general education requirements	Included in 90 above

General Education Components of the Degree

General education is an important component of all applied baccalaureate degrees, providing students and graduates with a baseline of understanding in the social sciences, humanities, and sciences. Bellevue College has planned carefully to ensure that general education credits and courses meet state guidelines for general education in applied baccalaureate degrees.[3] Within the four years of an applied baccalaureate degree, general education credits must include a minimum of: ten credits of written communication skills, including English composition; five credits of quantitative skills; ten credits of humanities; ten credits of social science, including a communication studies course; and ten credits of natural science, including at least one life sciences course and one course with a lab. The graduate of the BAS in IST will have the balance and breadth of knowledge provided by 60 credits of general education as well as the technical knowledge developed throughout all four years of their degree pathway.

Typically, at least 25 general education credits are satisfied at the associate-degree level as confirmed by entrance pre-requisites, and the remaining 35 credits are satisfied at the upper division level by courses in humanities, social sciences and science. General education requirements are outlined in Table III, below. Bellevue College course numbers are used in the table; equivalent courses from other colleges fulfill the requirements.

[3] http://www.sbctc.edu/college/e_appliedbaccalaureates.aspx 08.07.2012

Table III: General Education Requirements BAS in IST			
Subject	**Credits**	**Course**	**Typical Completion**
Communication Skills (must include English composition)	10	ENGL& 101 English Composition	Associate
		ENGL& 201 Research Paper or ENGL& 235 Technical Writing	Associate
Quantitative Skills (college level math)	5	PROG 110 or other college level math	Associate
Humanities	10	PHIL 115 Critical Reasoning	BAS
		PHIL 3XX Ethical Issues in IT	BAS
Social Science	10	CMST 250 Organizational Communication	Associate
		BUS& 101 Introduction to Business	Associate
Natural Sciences (one lab, one life)	10	PHYS 109 Science for Information Technology	BAS
		Life Science, any	Associate
Other, allocate per program	15	CMST 330 Intercultural Communication for the Professional	BAS
		SOC 275 Technology in Everyday Life	BAS
		BUS 3XX The Business of IT	BAS
Total required	**60**		

Junior/senior level coursework

The BAS in IST is being designed with working professionals in mind. Courses are taught in multiple delivery modalities, including online, hybrid, and face-to-face. Students may choose to study full-time or part-time. A student attending full-time could complete the degree in six quarters; students attending part-time may choose to complete the degree over up to ten quarters. All students take the same core information systems and technology courses, as well as general education courses in philosophy, humanities and sciences. Students also choose a concentration in application development, business intelligence, security, or systems administration, which provides approximately 30 focused credits. Students may choose to take additional information-technology related or general education electives[4] as well.

Core Technical Knowledge

All graduates of the ISIT baccalaureate program are expected to have core technical knowledge across the information systems and technology space. Table IV, below, shows how a graduate would obtain that knowledge over the course of their program.

[4] A list of electives beyond the minimum credits required is included in Appendix II.

Table IV: Core Technical Requirements BAS in IST

Subject	Credits	Course	Typical completion
Broad knowledge of Information Technology	5	ISIT 101 Introduction/Overview of Computing	ISIT Baccalaureate or Associate
Database Skills	5	BusIT 103 SQL Fundamentals	ISIT Baccalaureate or Associate
Programming Skills	5	PROG 110 Introduction to Programming	Associate
Security	5	ISIT 10X Security Fundamentals	ISIT baccalaureate
Systems Analysis	5	PROG 160 Systems Analysis	Associate
Networking knowledge	5	IT 103 Intro to Networking	Associate
Total required	**30**		

Table V shows junior / senior coursework, including core information systems and technology courses, concentration courses, general education, and electives. Courses with a 3XX number are in development.

Table V: BAS in IST Junior/Senior coursework	Credits
Total Credits	**90**
Courses shared in all concentrations (general education and ISIT core)	**60 - 65**
General Education, 30-35, including the following plus electives	**30-35**
BUS 3XX Business of Information Technology: Legal, Regulatory and Political Environments	5
CMST 330 Intercultural Communication for the Professional	5
PHIL 3XX Ethical Issues in IT	5
PHYS 109 Science for information technology	5
SOC 275 Technology in Everyday Life	5
ISIT Core, typically taken during junior/senior years	**30**
Core Technology Knowledge course – varies depending on AA degree, fills any technology gaps.	5
BUS 370 Intermediate Project Management	5
ISIT 105 Problem Solving Strategies	5
ISIT 328 Information Security Essentials	5
ISIT 475 Capstone/Internship	10
Concentration Courses – Students choose one concentration	**25-30**
Application Development	**25**
ISIT 320 Developing Mobile Applications	5
ISIT 322 Advanced Web Development	5
ISIT 324 Principles of Software Testing	5
ISIT 420 Advanced Data Access Techniques	5
ISIT 422 Application Architecture	5
Business Intelligence	**25-30**
ISIT 330 Business Intelligence Applications - required	5
ISIT 332 Data Warehousing – required	5
ISIT 334 Data Visualization - required	5
BI - ISIT Electives – Choose 2 or 3 from the following for 10 - 15 credits	
ISIT 336 Advanced Data Analysis Techniques	5
ISIT 338 Predictive Analytics	5
ISIT 430 Dimensional Modeling	5
ISIT 432 Data Repositories for Analytics	5
ISIT 434 Web Analytics	5
ISIT 436 Performance Management	5
Security	**30**
ISIT 340 Network Security & Firewalls	5
ISIT 342 VoIP and Wireless	5
ISIT 350 Digital Forensics	5
ISIT 450 Network Vulnerabilities & Countermeasures	5
ISIT 452 Network Intrusion Detection and Prevention Systems	5
ISIT 454 Operating System Hardening	5
System Administration	**30**
ISIT 340 Network Security & Firewalls	5
ISIT 342 VoIP and Wireless	5
ISIT 344 Virtualization and Storage	5
ISIT 440 Administering a Linux Server	5
ISIT 442 Managing Messaging Services	5
ISIT 444 Automation / Configuration and Management	5

As noted, a student attending full-time, approximately 15 credits per quarter, is able to complete the degree in 6-8 quarters (2 years). Examples of full-time and part time student schedules are shown in Table VI, below.

Table VI: Sample Schedules

Full-time Schedule			
Fall – Year 1	Winter – Year 1	Spring – Year 1	Summer – Year 1
Core Technical Knowledge course	Core Technical Knowledge course	PHYS 109 (or life science if PHYS taken previously)	
Problem Solving	Ethics / law in IT	Intermediate Project Management	General Education, if needed
Concentration course	Concentration course	Concentration course	
Fall – Year 2	Winter – Year 2	Spring – Year 2	Summer – Year 2
Intercultural Comm. for the Professional	Capstone/Internship	Capstone/Internship	Gen Ed, if needed
Critical Thinking	Technology in Everyday Life	Business of Information Technology	
Concentration course	Concentration course	Concentration course or elective	
Part-time Schedule			
Fall – Year 1	Winter – Year 1	Spring – Year 1	Summer – Year 1
Core Technical Knowledge course	Core Technical Knowledge course	Science course	
Problem Solving	Concentration Course	Concentration Course	Gen Ed, if needed
Fall – Year 2	Winter – Year 2	Spring – Year 2	Summer – Year 2
Intercultural Comm. for the Professional	Critical Thinking	Project Management	Gen Ed, if needed
Concentration Course	Concentration Course	Concentration Course	
Fall – Year 3	Winter – Year 3	Spring – Year 3	Summer – Year 3
Concentration Course	Capstone/Internship	Capstone/Internship	Gen Ed, if needed
Ethics / law in IT	Technology in Everyday Life	Business of Information Technology	

Program faculty and the program manager will work with each student to develop an academic plan, ensuring that full-time and part-time students are able to efficiently meet their degree goals.

Program evaluation criteria and process

Program evaluation is an ongoing process at Bellevue College, and has already begun during the development of the proposal. Concepts were vetted in an extensive

employer survey, employer focus group, through individual meetings between faculty and industry partners, and through sharing the curriculum during development and making changes based on input from employers. Experts from information technology and higher education will continue to be engaged throughout the full curriculum development and implementation phases to ensure rigor of the content and learning methodologies. Details on more formal assessment by external experts are included under the heading "expert evaluation of program" on page 24.

Assessment for the proposed BAS in IST is based on the comprehensive student achievement and program assessment processes in place at Bellevue College for all programs, including associate and baccalaureate degrees. Program review occurs every five years and provides a thorough assessment of every aspect of the program. It includes strategic planning; student headcount, full-time equivalent student (FTES) and schedule trend analysis; program enrollment data, including student faculty ratios, analysis of full-time and part-time faculty ratios and other staffing indicators; student performance evaluation; an evaluation of curriculum coherency and currency, including an evaluation by the workforce advisory committee; program viability, including employment placement data and market analysis; and analysis of student demographics, program costs and revenues, retention and advising, articulation agreements, course delivery methods, and other pertinent data.

Until the first five-year program review, to evaluate the BAS in IST program's effectiveness, staff will collect and analyze data annually on student satisfaction, preparedness, and retention; faculty assessment of student preparedness; and effectiveness of courses to meet the program outcomes. Table VII summarizes the assessment mechanisms that will be used to make changes to the degree program.

Industry will engage in recommendation and review of the curriculum and program elements through the BAS in IST advisory committee. The current advisory committees, which work with the IT programs, will expand their scope to cover the baccalaureate degree. Committee members include representatives from large and small IT companies, labor unions, management and employees. Several individuals who worked on program development have expressed their desire for continued involvement with the program, including serving in an advisory capacity.

The advisory committee's role will be to advise the program as to recommended curriculum improvements; help keep the program abreast of changes in the field; assist in student recruitment and placement; and make recommendations for other changes that will keep the program current. Experts from information technology and higher education will be engaged throughout the full curriculum development and implementation phase to ensure rigor of the content and learning methodologies. External experts with experience in IT and in higher education have assessed the overall curriculum and the courses to ensure rigor, consistency and quality

Table VII: Program Assessment	
Effectiveness of curriculum/ program — continuously refines the curriculum and program design, keeping the program current, including discipline-based, general education and electives	
Course evaluations by students	• Effectiveness of curriculum & teaching methods for each course • Effectiveness of the program in skills and knowledge progression
Field studies evaluation by students and by employers	• Adequate balance of knowledge and skills, theory and practice • Effectiveness of program in meeting students' expectations • Effectiveness of program in meeting employers' expectations
Student survey and/or focus group mid-point through the program and at graduation	• Effectiveness of the program in skills and knowledge progression • Adequate balance of knowledge and skills, theory and practice • Effectiveness of program in meeting students' expectations • Effectiveness of institutional and program resources and support • Preparedness of faculty • Preparedness of students upon entering individual courses
Program statistics	• Student retention • Student course success • Student progression through program • Correlation of student success and training/ job experience prior to entry into the program
Survey of BAS in IST program faculty	• Preparedness of students upon entering individual courses • Preparedness of students upon entering the program
Graduate follow-up and industry feedback — assesses effectiveness of program in meeting career goals and employer expectations and uses findings to refine curriculum and teaching methodologies	
Survey of program graduates nine months after graduation	• Effect of program completion on career • Effectiveness of program in meeting job expectations • Wage and career progression
Survey of employers of program graduates nine months after graduation	• Effectiveness of program in meeting job expectations • Observed increased skills and performance • Perceived strengths and weaknesses of current program
Oversight by Advisory Committee – provides ongoing support and program review	
BAS in IST Program Advisory Committee	• Completeness and relevance of the curriculum to employer needs • Trends in field, technologies, practices and job markets
Survey of faculty satisfaction — assesses adequacy of program support and faculty training	
Survey of BAS in IST program faculty	• Effectiveness of institutional and program resources and support • Preparedness to teach the curriculum
Impact on two-year programs — assesses impact of BAS in IST program on existing associate degrees in IT	
Survey and/or focus group of students enrolled in two-year degree programs	• Impact of BAS on quality of 2-year degrees • Impact on faculty availability and support • Impact on overall institution and program resources and support • Impact on culture
Survey of faculty teaching the 2-year degree programs	• Impact of BAS on quality of 2-year degrees • Impact on faculty availability and support • Impact on overall institution and program resources and support • Impact on culture

Qualified Faculty

Bellevue College projects 16 FTE enrollment during the first operational year of the BAS in IST, with full enrollment by 2016 with FTE of 50. To support this number of students, the program will need one new full-time equivalent faculty (FTEF) in year one and a second FTEF no later than year 3. Faculty teaching general education courses will teach these courses as part of their ongoing load, so no additional faculty will be required in areas outside Information Technology.

Faculty teaching in the program will typically be required to hold a minimum of a master's degree. Some exceptions may be made for tech-focused systems administration courses, based on a combination of baccalaureate degree and industry experience, since the master's degree is not typically acquired by systems administrators.

Total FTEF assigned to the program will be 2.0 – faculty will teach in both the baccalaureate and associate degree programs to ensure continuity and consistency across curricula.

Table VIII: Faculty Profiles

Faculty Name	Credentials	Status	Course(s)
Sylvia Unwin	MS	FT, Program Chair	ISIT courses
Linda Rumans	MS	FT	ISIT courses
Daniel Duffy	MA	FT	ISIT courses
Rudolph Helm	BA	FT	ISIT courses
Thomas Lee	BS	FT	ISIT courses
New FTEF 1	TBD	FT - To be hired 2013	ISIT courses
New FTEF 2	TBD	FT - To be hired 2014 or 2015	ISIT courses
Frank Hatstat	MBA, JD	FT	Intermediate Project Management, Business of Information Technology
Gita Bangera	PhD	FT	Life Sciences Program Chair– science general education
W. Russell Payne	PhD	FT	Critical Thinking, Ethics, Law, Regulation in Information Technology
Lori Saffin	PhD	FT	Sociology Program Chair – Technology in Everyday Life
Staff	Varies	FT & PT	Additional electives

Student Enrollment

Articulation and transfer for community & technical college graduates

The transfer pathway into this degree will provide graduates with professional/technical associate degrees in information-technology related fields with expanded educational options. In Bellevue College's physical catchment area alone, public community and technical colleges graduate more than 125 students with IT-related professional/technical degrees each year. There is a large pool of current 2-year IT program graduates who would gain career mobility and advancement with the option of a baccalaureate degree tailored to both their previous education and their chosen career path.

Bellevue College BAS in IST faculty and Program Manager, Educational Planners, and the Center of Excellence for Information and Computing Technology will work closely with two-year colleges to ensure smooth transitions into the program for students holding technical associate degrees in IT-related fields. Below is a sample of degrees from neighboring colleges that will transfer directly, with no additional articulation required, into the BAS in IST.

Table IX: Sample two-year degrees that articulate directly into BAS in IST

College	Degree(s)	
Bellevue College	AAS-T Network Services and Computing Systems	AAS-T Information Systems
Cascadia Community College	AAS Networking Infrastructure Technology	AAS in Web Application Program Technology – Programming Emphasis
LWIT	AAS-T Computer Security & Network Technician	
Renton Technical College	AAS Computer Network Technology	AAS Computer Science
Seattle, Central	AAS-T Network Design and Administration	AAS-T Computer Programming
Seattle, North	AAS Network and Server Administration	
Seattle, South	AAS-T Network Administration	

Enrollment Projections

Based on the enrollment patterns of Bellevue College's existing applied baccalaureate programs, it is expected that about half of the students will attend full-time. Of those attending part-time, the majority will carry ten credits per quarter and finish within nine quarters.

Table X: BAS in IST Enrollment Projections					
Year	**1** **2013-14**	**2** **2014-15**	**3** **2015-16**	**4** **2016-17**	**5** **2017-18**
Headcount	21	42	61	63	63
FTES	16	33	49	50	50
IST Graduates	0	0	8	21	36

Designed for working professionals

The BAS in IST is being designed with working adults in mind. Most of the courses will be taught as hybrid courses, with much instruction and student coursework taking place online. Students will come to campus one or two days each week, depending on their course schedule. Course meetings will be scheduled at convenient times for working professionals.

Selective Admission Process Consistent with Open-Door Institution

In addition to holding a technical associate degree in an IT-related area, applicants to the BAS in IST will need to meet the minimum program requirements outlined in Table II, on page 8. These requirements include an overall college GPA of 2.0, a minimum grade of 2.5 in all courses required for the degree, and at least 25 credits of general education. In keeping with the open access mission of the community college, admission requirements have been designed to provide access to many and to ensure that prospective applicants are prepared for success once they enter the program.

Applicants to all Bellevue College baccalaureate programs complete the same general application, and are then directed to program-specific requirements as necessary.

Appropriate Student Services Plan

As a community college, one of BC's strengths is the variety of student-focused support services that help students achieve success in accomplishing their goals. Students in the ISIT program will be supported by the same high-quality student services that all students receive. As Bellevue College has added new applied baccalaureate degrees, the college has focused on integrating support for baccalaureate students across the institution. For example, additional FTE have been added in enrollment services to provide transcript evaluation for incoming applied-baccalaureate students. Similarly, program advisors for applied baccalaureate degrees assist students who wish to continue to master's degrees with transition to graduate school. All self-support

baccalaureate programs return a portion of the tuition paid to the college to provide program support to baccalaureate students. Integrated student services position Bellevue College well to add a new baccalaureate degree in Information Systems and Technology.

The following services will be those most frequently used by baccalaureate students.

Student Advising, Retention and Success: Student retention and student success are the college's top priorities.

The model that has worked well for the college's baccalaureate programs and will be used for the IST degree is an imbedded program manager who works one-on-one with students to facilitate their success. The program manager assists students with their educational planning and progress towards degree completion while supporting the program chair and faculty who conduct academic advising. Each student will have an individualized schedule and advising plan. Students in existing baccalaureate programs have appreciated having a specific person they can go to for assistance. Program faculty will work with students who need additional assistance to develop personalized student success strategies.

Students can also use internet advising services and degree planning worksheets to access their information. The online degree planning tool helps faculty advisors and students evaluate, monitor and track the student's progress toward completion of a degree.

Academic Success Center (ASC): The ASC assists students in successfully completing their college courses through one-on-one and group tutoring, workshops, classes and open labs in reading, writing and math.

Computer Labs: BC provides a wide variety of specialized computer and learning labs to enhance learning and student success as well as a 200-computer open lab.

Credentials Evaluation: Full-time credentials evaluators have extensive experience evaluating transcripts from accredited institutions. They will evaluate incoming students for compliance with admission requirements and review student records for all degree requirements when students near graduation. Program faculty will evaluate all transfer or prior learning requests for core courses.

Disability Resource Center (DRC): The DRC provides assessment and accommodations for students with documented disabilities. They provide specialized course materials; coordinate testing for students, and assist faculty to provide appropriate accommodation.

Financial Aid: The financial aid office prepares and disburses federal, state, and institutional aid for all BC students. Students can monitor the process of their application online.

Job Placement: Providing help with career advancement and job placement will be priorities for faculty and staff of the new BAS in IST. The advisory board, comprised of industry professionals, will help to identify jobs. Through the required internship/capstone course, students will develop potential job contacts. When the program chair networks with businesses to market the new degree program, it will create awareness of the program and opportunities for information on new employment. The Center for Career Connections has been successful in helping students find jobs by providing career planning and job placement assistance and conducting career fairs.

Multicultural Student Services (MCS): MCS offers advising and mentoring, tutoring, emergency financial assistance, and support for the college's multicultural student population.

Online Services: All students have online access to the book store, records and grades, registration, advising, faculty communication, and library services. The library has added extensive research databases relevant to baccalaureate degree disciplines. The distance education office provides extensive technology assistance and student services for all online students.

TRiO: Students who are first-generation college, low-income, or have documented disabilities receive academic and personal support through TRiO. Services include tutoring, study skills, advocacy, and laptop computer lending. The Department of Education has approved extension of this program to all bachelor's degree students who fit eligibility criteria.

Veteran's Administration Programs: The Veterans Affairs Office assists all eligible veterans, reservists, dependents, and VA chapter 31 students.

The bachelor's program will employ many of the practices implemented by the college's Office of Equity and Pluralism to attract a diverse student population to the college. These include:

- Recruit people of color who are BC program graduates and professionals to serve as role models, serve on the advisory committee and make presentations to currently enrolled associate degree students to encourage them to pursue the bachelor's degree;
- Engage in targeted marketing and through mailed marketing materials to encourage persons of color and from underserved populations to apply to the program;

- Coordinate program diversity efforts with the institution's office of Multicultural Student Services;
- Apply best practices for identifying potential hires from underrepresented groups;
- Work with employers and professional organizations to develop additional strategies to attract a diverse student body from workers in their employment ranks who do not have a bachelor's degree; and,
- Regularly assess recruitment/retention efforts with regard to underrepresented populations, and continually monitor and strive to improve the program's culture of appreciation and respect towards diversity.

Once the degree is approved, the Bellevue College Foundation will begin discussions with local technology companies to create scholarships to assist those that could otherwise not attend. Students will also be able to apply for existing BC scholarships that serve financially disadvantaged students and students of color.

Appropriate staff and administration

Bellevue College implemented its first applied-baccalaureate degree in 2007, a second program in 2009, and a third in 2012. We have been assessing and adjusting the model for program administration as more programs are added, which has led to the following model for program administration.

At Bellevue College, program chair responsibilities are typically filled by full-time faculty members (see Table VIII). In addition to managing the program, the ISIT baccalaureate program chair will also teach one course per quarter, providing valuable connection to and insight into many aspects of the program. Administrative responsibilities for the faculty program chair include:

- curriculum development, revision, and implementation;
- advising of students;
- marketing the program to new students;
- conducting articulation with both two-year and graduate programs;
- initiating employer outreach;
- participating in college governance; and
- engaging in ongoing program assessment to maintain the program's currency.

The advising section in the student services plan states that educational planning will be handled locally from within the program by the Program Manager. The Program Manager will also:

1. provide information about the program to prospective applicants;

2. monitor student progress;
3. guide students to other available student services to aid in their success;
4. assist students with advising or course issues.

The Program Manager is a full-time exempt position. It will also provide administrative support for the program, its chair and the faculty. This model has worked well in the college's existing baccalaureate programs.

Table XI: Program Administration and Staff

Name	Title	Responsibilities	Program Effort %
Sylvia Unwin	Program Chair	Manage program, conduct program assessment, hire faculty, oversee budget, market program, oversee admissions, implement recommendations of advisory committee (66% administration; 33% instruction)	66%
To be hired	Program Manager	Provides administrative support to chair, faculty and students Provides student services assistance to applicants and students to promote student success	100%
		Total Staff FTE	**1.66**

Commitment to build and sustain a high quality program

As noted in the statement of need, Bellevue College has committed to developing applied baccalaureate degrees, in alignment with its core instructional mission and based on community need and employment prospects for graduates. The college is committed to providing bridge funding for new baccalaureate programs until they become fully self-supporting, typically no later than the third year of operation.

While the need for IT professionals waxes and wanes with the economy as a whole and with cycles within IT, the Puget Sound region shows no sign of slowing growth within information technology or technology-heavy economic sectors. IT professionals are needed across all employment sectors: in service industries, education, retail, aerospace, transportation, etc. A baccalaureate degree that remains current with IT knowledge will produce flexible graduates who have a range of employment and career advancement options.

The BAS in IST will be funded as a self-support program. The tuition will be set at the same level as state-funded applied bachelor's degree programs, which for 2012-2013 is $245.45 per credit.

The college projects enrollment of approximately 16 FTE in 2013, with the program to be at full capacity of 50 FTE by 2016. We project the first graduates in 2015. When the program is at full enrollment, graduation rates should reach 25-35 per year.

Table XII: BAS in IST Enrollment Projections

Year	1 2013-14	2 2014-15	3 2015-16	4 2016-17	5 2017-18
Headcount	21	42	61	63	63
FTES	16	33	49	50	50
IST Graduates	0	0	8	21	36

Many of the program courses are offered as hybrid or online. Face-to-face course meetings will be scheduled at convenient times for working professionals and not during peak campus use times, so no new facilities or classrooms will be required for the program. Specialized instructional resources will include library subscriptions to periodicals and software licenses, as well as equipment for a new shared lab that will include equipment for advanced security courses, the VOiP course, and work-based project learning. Funding has been included in the budget to cover the onetime initial cost and annual expenses associated with these resources.

Table XIII: Estimated Program Expenses

	Year 1	Year 2	Year 3	Year 4	Year 5
Administrative Salaries (1 FTE)	48,500	48,500	48,500	48,500	49,955
Full-time Faculty Salaries (1 FTE year 1, 2 FTE year 3 and beyond)	57,500	58,500	119,000	121,000	123,000
Part-time Faculty Salaries	54,000	54,000	38,000	38,000	38,000
Curriculum Development Stipends	8,000	4,000	4,000	4,000	4,000
Benefits	57,120	56,100	71,230	71,910	73,085
Goods and Services	5,000	5,000	5,000	5,000	5,000
Travel	3,000	3,000	3,000	3,000	3,000
Equipment	30,000	5,000	3,000	3,000	5,000
Indirect	31,574	28,092	43,760	44,162	60,208
Total Costs	294,694	262,192	335,490	338,572	361,248

Bellevue College is fully committed to the long-term success of the new degree and will set aside funds to launch and fund the program until it collects adequate tuition to be fully self-sufficient. A high level of interest in the program has been expressed by local employers, as well as current associate degree students at BC and other system colleges, so we expect full enrollment and full self-support within three years.

Table XIV: Estimated Program Income					
	Year 1	Year 2	Year 3	Year 4	Year 5
Self-Support Tuition and Fees	172,800	356,400	529,200	540,000	540,000

Program specific accreditation

At this time, the college does not plan to seek specialized program accreditation, in large part because an appropriate accrediting organization is not available. Baccalaureate programs in applied information technology may be accredited under ABET's Computer Science Accreditation Board (CSAB):[5] however, programs accredited by ABET's CSAB these programs are typically traditional computer science programs, often housed in engineering departments, given the roots of ABET in engineering. Faculty and staff will pursue accreditation for the BAS in IST should an appropriate accrediting body be identified.

Pathway options beyond baccalaureate degree

Graduates of the BAS in IST program who are interested in obtaining a graduate degree will have at least two local options. As noted in the statement of need, BC has had initial discussions with Dr. Michael Stiber, Director of the Computing and Software Systems Program at UW-B. He suggested a pathway into a UW-B master's degree through the Graduate Certificate in Software Design and Development. Faculty advisors to students who wish to move into this pathway will advise them to take an additional calculus-based math course prior to application to UW-B. Over the next year, as curriculum details are finalized, we will continue this discussion with UW-B and create a formal articulation agreement.

Representatives from Bellevue College also conferred with Dr. Leo Irakliotis, National Director of Western Governors University's College of Information Technology, to discuss the proposed IST degree. Dr. Irakliotis expressed his support of Bellevue College developing the degree, and suggested the development of an articulation agreement into current and future masters programs offered by WGU. When detailed curriculum has been developed, this conversation will progress to concrete discussion of pathways beyond the baccalaureate for IST graduates.

[5] http://www.abet.org/ 08.13.12

Expert evaluation of program

Bellevue College selected two experts to provide external review of the proposed degree. Chan Beauvais is the Chief Data Steward for Costco Wholesale. Glenn Bowers is Vice President of North America and Europe Business Division at iSoftStone. They each have significant knowledge and educational experience in the field of information systems and technology. Their biographies are contained in Appendix III.

Summaries of their comments and proposal modifications based on their comments follow.

Mr. Beauvais commented that the topic of Data Governance, an emerging area within Information Systems and Technology, did not appear to be covered in the Philosophy course. He suggested that perhaps a separate course on Data Governance would be useful.

Faculty plan to provide an introduction to the concepts and issues surrounding data governance in lower division technical courses including Systems Analysis and Database Theory. Data governance topics will also be included in the ISIT 330 Business Intelligence Applications and other BI courses as appropriate. Faculty do not plan to add an additional separate course, because Data Governance jobs typically require significantly more work experience than most graduates from the BAS program would have. BAS graduates will be well prepared to move into jobs from which they could ultimately progress to data governance roles.

Mr. Bowers commented on several areas that could be useful to include in the curriculum: algorithms, operating systems, and general principles of accounting.

Faculty plan to infuse an understanding of algorithms in the Application Development courses, providing students with practical experience to help them understand a typically more theoretical topic. The types of application development jobs we are targeting for our students typically do not require in-depth development of algorithms. For example, upon graduation our students will likely not be developers of the internal database engine of SQL Server; rather, they will be building applications using SQL Server.

Students will be exposed to operating system principles in lower division courses. As the upper-division business course is developed, faculty will look for ways to include principles of general accounting, which could also be infused in the senior capstone/internship courses.

Appendix I: Statement of Need BAS in Information Systems and Technology

Form A: Cover Sheet for New Degree Program Proposal

Program Information

Program Name: Information Systems and Technology
Institution Name: Bellevue College
Degree: BAS Information Systems and Technology
Level: Bachelor
Type: Science
CIP Code: 11.0103
Proposed Start Date: Fall 2013
Projected Enrollment (FTE) in Year One: 15
At Full Enrollment by Year: third year - 2015
Funding Source: Self Support

Mode of Delivery

Single Campus Delivery: Bellevue College main campus, Bellevue WA
Distance Learning*:* Some courses will be hybrid, synchronous distance, or online.

Contact Information (Academic Department Representative)

Name: Thomas Nielsen
Title: Vice President of Instruction
Address: 3000 Landerholm Circle SE, MSA202, Bellevue WA 98007-6484
Telephone: (425) 564-2442
Fax: (425) 564-6163
Email: tom.nielsen@bellevuecollege.edu

Chief Academic Officer

August 10, 2012
Date

Introduction to the degree

Bellevue College proposes to develop a bachelor of applied science degree in Information Systems and Technology (IST) to meet the growing demand for appropriately qualified workers in this field. The degree will provide graduates a broad base of theoretical and technical knowledge, as well as the choice of four concentration areas: systems administration, security, application development and business intelligence. These concentrations were chosen based on their alignment with current roles and skills desired in information technology professionals.

All students will be well prepared as information and technology generalists. Students will share core learning that includes critical thinking and problem solving skills, introductory programming, basic database and data management, introductory networking, data analysis, project management, information systems architecture, security fundamentals, written and spoken communication, and soft skills. To further extend a specific area of expertise, each student will choose a concentration to enhance their strongly grounded information systems and technology knowledge.

Concentrations and related employment

The **application development concentration** will include fundamentals of programming, object oriented programming, design patterns and practices, database applications, web technologies, and application environments, including mobile devices and the cloud.

Graduates who choose this concentration will be prepared for jobs as web developers, mobile applications developers, systems analysts and QA associates/analysts.

The **business intelligence concentration** prepares graduates for roles in data management and data analysis. The concentration includes relational database design and implementation, data interchange technologies, design and implementation of data warehousing, and skills in predictive analytics, reporting and performance management.

Graduates who choose this concentration will be prepared for jobs as database developers, business intelligence developers, data analysts/report writers, and electronic data interchange (EDI) specialists.

The **systems administration concentration** will prepare graduates to support, maintain and interoperate server operating systems and directory services. In addition to learning how to install, configure and support LAN and WAN configurations, students will become proficient in cloud, virtualization and enterprise storage solutions.

Graduates who choose this concentration will be prepared for jobs such as systems administrator, network specialist, information technology specialist, local area network administrator, and more.

The **information security concentration** will prepare graduates to monitor and maintain system security solutions, including legal, regulatory, and internal compliance solutions. Graduates will be able to translate security policies and procedures into technical architectures.

Graduates who choose this concentration will be prepared for jobs such as information systems security analyst, data security administrator, information security officer, and more.

The degree will be appropriate for Bellevue College graduates of two-year technical degrees in IT, transfer students from Washington community and technical colleges who have information technology-related (IT) associate degrees, transfer students from other institutions of higher learning, and incumbent workers needing to add advanced skills.

Developing a degree in Information Systems and Technology is part of Bellevue College's plan to meet its legislative proviso, which states: *Bellevue College is authorized to offer applied baccalaureate degrees in **information technology**, health care services and management, biotechnology, and preprofessional preparation for medical fields*.

The following proposal demonstrates how the new baccalaureate degree in Information Systems and Technology supports the college's mission and goals; addresses the goals of the state's master plan for education; meets student and employer demand; addresses a skills gap, and offers general information on the new curriculum.

Relationship to institutional role, mission and program priorities

Bellevue College requires that every new program align to its mission, which states:

> Bellevue College is a student-centered, comprehensive and innovative college, committed to teaching excellence, that advances the life-long educational development of its students while strengthening the economic, social and cultural life of its diverse community. The college promotes student success by providing high-quality, flexible, accessible educational programs and services; advancing pluralism, inclusion and global awareness; and acting as a catalyst and collaborator for a vibrant region. (Approved by Board of Trustees, June 11, 2008.)

Developing baccalaureate degrees is a fully integrated component of Bellevue College's strategic planning. "Applied Baccalaureate Development" is a president's cabinet-level priority, with goals assessed annually. In addition to continuing education, certificates, professional/technical degrees and transfer degrees, baccalaureate degrees are a means through which Bellevue College provides the level of education required by local employers and citizens.

In 2009, Bellevue College was granted accreditation by the Northwest Commission of Colleges and Universities (NWCCU) to offer baccalaureate degrees. The college currently offers three bachelor's degrees: BAS in Radiation and Imaging Sciences, BAS in Healthcare Technology and Management, and BAA in Interior Design. Baccalaureate degrees play an important role in Bellevue College's commitment to provide "high quality, flexible, accessible education programs" and to strengthen "the economic…. life of its diverse community." As the entry level criterion shifts from a 2-year to a 4-year degree in multiple fields, BC plans to develop additional bachelor's degrees to meet demand for highly skilled employees, and to ensure that our area residents will have access to the education they need to succeed in their chosen fields. The college has begun this process by developing degrees in the four areas specifically authorized by the legislative proviso.

The bachelor of applied science degree in information systems and technology meets the expressed needs of community college students seeking access to a bachelor's degree. The program advances the life-long educational development of its students by offering an educational path that will also provide new career and career advancement opportunities to individuals with technical associate degrees in IT.

The degree is a direct outcome of community need for programs that strengthen the economic life of our community. BC began developing the bachelor of applied science degree in response to local and regional employer requests for a bachelor's degree program that would produce graduates for a variety of information technology jobs. The program directly responds to the specific skills gaps in IT, which is experiencing growth in many categories, including systems administrators, application developers and systems analysts.[6]

The new program supports the college's mission of providing high-quality, flexible educational programs and services that are academically, geographically, and financially accessible. Many courses will be offered in hybrid format and some will be available online, adding flexibility for students with busy schedules. Tuition set at the regional baccalaureate rate means this degree will be more affordable for students.

The BAS in Information Systems and Technology is a natural extension of the work already underway at the college in the Information Technology arenas, including the

[6] http://www.bls.gov/ooh/computer-and-information-technology/network-and-computer-systems-administrators.htm#tab-6; 04.12.12 http://www.bls.gov/ooh/computer-and-information-technology/software-developers.htm#tab-6; http://www.bls.gov/ooh/computer-and-information-technology/computer-systems-analysts.htm#tab-6 04.12.12

Institute for Business and Information Technology (IBIT) and the Center of Excellence for Information and Computing Technology. BC's reputation for delivering high quality information technology programs and as a Center for Excellence in Information Technology, combined with federal grants focused on IT from the Department of Labor and National Science Foundation, make expanding into the baccalaureate level a logical step. This new bachelor's degree builds on the college's expertise and provides an outstanding educational choice in a rapidly growing, high demand field.

Support of statewide strategic plans

The BAS in Information and Systems Technology supports the goals outlined in the State Board for Community and Technical Colleges (SBCTC) Mission Study and the Higher Education Coordinating Board (HECB) Strategic Master Plan for Higher Education. Both plans identify strategies to increase the number of baccalaureate educated adults as a means to strengthen the economy and serve workforce needs for more highly educated "locally grown" workers that will:

- Strengthen state and local economies by meeting the demands for a well-educated and skilled workforce;
- Achieve increased educational attainment for all residents across the state;
- Use technology, collaboration and innovation to meet the demands of the economy and improve student success.
-

Employer and community demand

Bellevue's Unique Position

Bellevue College is located within the Bellevue city limits on the central east side of Lake Washington. The land around Puget Sound is the most highly and densely populated area of Washington State, home to more than 50% of the state's population and four cities of over 100,000 within a 30 mile radius of main campus: Bellevue (124,798), Everett (103,019), Seattle (608,660) and Tacoma (198,397).[7]

Information technology is an economic driver in Washington, with a particular concentration and impact on the east side of Puget Sound. Large technology and technology-based companies with physical headquarters and/or strong presences in Bellevue College's eastside service area include: drugstore.com, Expedia, Microsoft, Puget Sound Energy, and T-Mobile. Numerous small to mid-size technology-driven companies, such as Detto Technologies, GoAhead Software, InfoSpace and Noetix, are also headquartered within the Bellevue city limits. Bellevue College's location on the central east side of Lake Washington, surrounded by technology companies and a

[7] http://2010.census.gov/2010census/data/ 04.12.12

growing population, makes it an excellent location for a new applied bachelor's degree in IST, which will expand the menu of certificates and two-year degrees available through the college.

Labor Market Data

Bellevue College explored and assessed current and projected employer demand through analysis of employment and occupation data at the local, regional, and state levels; advisory committee input; an extensive employer survey; queries to professional organizations within IT; social networking tools, and a focus group.

Like other job sectors, information technology suffered during the recent economic downturn and is now making a comeback. Currently, Washington state labor market data indicate that numerous job categories within Information Technology are in demand, i.e., growing at faster than average rates, including: network systems analysts, data communications analysts, and applications developers.[8] Workforce Explorer shows above average growth in several IT occupations, as noted in Table I below, which shows IT occupation data specific to King County. [9] Typically, Puget Sound's need for computer professionals is slightly higher than the state average, due to the local concentration of technology companies.[10]

TABLE I: Demand Data for King County Information Technology Occupations

Demand	SOC#	Occupation title
Demand	151199	Computer Occupations, All Other
Demand	151131	Computer Programmers
Demand	151121	Computer Systems Analysts
Demand	151142	Network and Computer Systems Administrators
Demand	151132	Software Developers, Applications
Demand	151133	Software Developers, Systems Software

The long-term employment picture for information technology jobs in King County predicts growth in all IT job categories through 2020, the date for which projections are available. Table II, below, illustrates IT employment growth for King County as predicted

[8] https://fortress.wa.gov/esd/employmentdata/reports-publications/occupational-reports/occupations-in-demand# 04.04.12

[9] http://www.workforceexplorer.com/cgi/databrowsing/?PAGEID=164 04.05.12, occupation data last updated 10.09.11.

[10] https://fortress.wa.gov/esd/employmentdata/reports-publications/occupational-reports/employment-projections 07.18.12

by the Washington Department of Employment Security.[11]

TABLE II: Long-term Employment Projections - King County					
SOC*	TITLE	Est. Emp. 2015	Est. Emp. 2020	Avg. Annual Growth Rate 2010-2015	Avg. Annual Growth Rate 2015-2020
15-1000	Computer Specialists	102,309	114,794	2.8%	2.3%
15-1121	Computer Systems Analysts	10,967	12,183	2.6%	2.1%
15-1131	Computer Programmers	10,266	11,094	2.1%	1.6%
15-1132	Software Developers, Applications	33,301	38,344	3.4%	2.9%
15-1133	Software Developers, Systems Software	14,385	16,157	2.7%	2.4%
15-1141	Database Administrators	1,774	1,928	2.6%	1.7%
15-1142	Network and computer systems architects and administrators	5,197	5,766	2.3%	2.1%
15-1150	Computer Support Specialists	10,939	12,336	2.8%	2.4%
15-1179	Information Security Analysts, Web Developers, and Network Architects	9,805	10,622	2.5%	1.6%
15-1799	Computer Occupations, All Other	5,097	5,731	3.2%	2.4%

While there are four-year information technology and computer science programs in Puget Sound, the number of graduates is insufficient to meet employer need, due to the gap between the number of graduates supplied and available jobs. According to Career Bridge, the University of Washington Computer Science program in Seattle graduates about 70 students annually.[12] Additional options for online or on ground bachelor's degrees in information technology or computer science in the central Puget Sound include: Brandman University (online), Central Washington University (online), DeVry University, and UW-Bothell and UW-Tacoma. Even if each of these institutions graduated as many students as does UW-Seattle,[13] there would still be far fewer new graduates (420 annually) than openings due to growth (about 5,000). Table III, below, shows estimated average openings for IT jobs in King County between 2010 and 2020.[14]

[11] https://fortress.wa.gov/esd/employmentdata/reports-publications/occupational-reports/employment-projections 07.18.12

[12] http://www.careerbridge.wa.gov/Home_FindEducation.aspx 07.19.12

[13] Graduation data for these institutions is not published on Career Bridge. Estimating each graduating class to be as large as those from UW-Seattle creates an artificial scenario that is useful to illustrate the gap between number of jobs available and number of graduates in the area.

[14] https://fortress.wa.gov/esd/employmentdata/reports-publications/occupational-reports/employment-projections 07.19.12

TABLE III: Estimated Annual King County IT Job Openings				
TITLE	Avg. Annual Opening Due to Growth 2010-2015	Avg. Annual Opening Due to Growth 2015-2020	Avg. Annual Total Openings 2010-2015	Avg. Annual Total Openings 2015-2020
Computer Specialists	2,677	2,497	3,983	4,356
Computer Systems Analysts	269	243	442	477
Computer Programmers	204	166	425	415
Software Developers, Applications	1,016	1,009	1,267	1,449
Software Developers, Systems Software	359	354	469	543
Database Administrators	43	31	68	65
Network and computer systems architects and administrators	114	114	188	215
Computer Support Specialists	286	279	535	599
Information Security Analysts, Web Developers, and Computer Network Architects	226	163	341	334
Computer Occupations, All Other	147	127	226	236
Totals	**5,341**	**4,983**	**7,944**	**8,689**

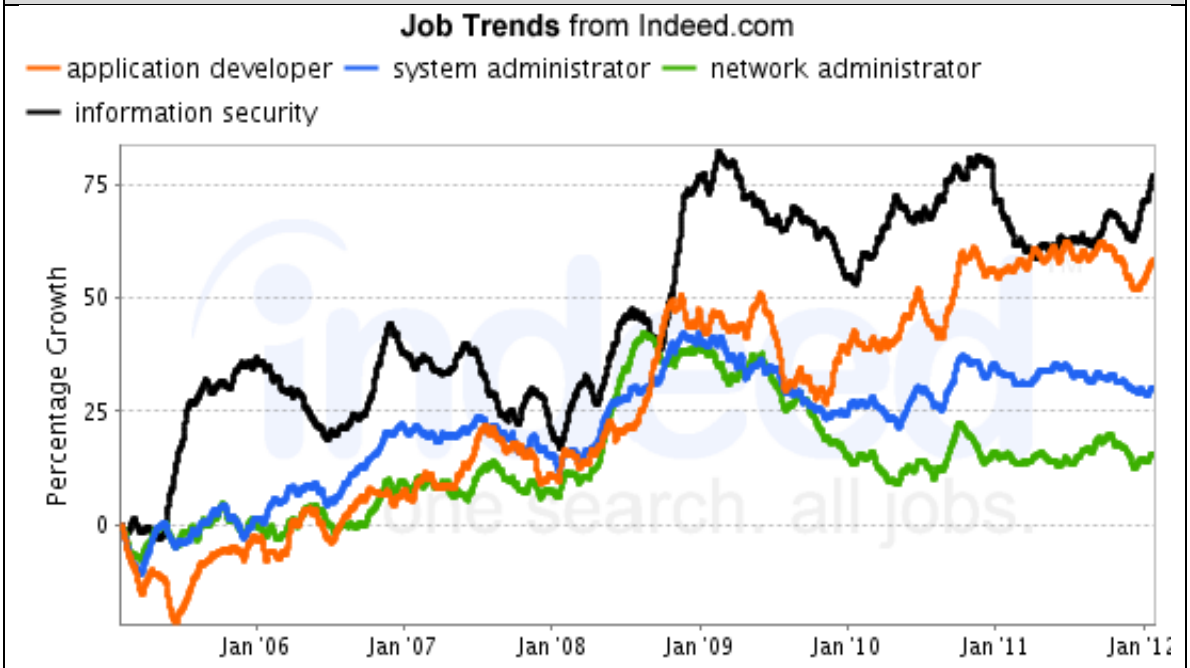
The entry-level credential for many information technology jobs is fast becoming a 4-year degree. The Bureau of Labor Statistics considers a bachelor's degree as entry level education for the following IT occupations: computer programmer, computer systems analyst, database administrator, information security analyst, web developer, network architect, systems administrator and software developer.[15] As entry-level educational requirements rise, more current students will need to continue through the bachelor's level, and many current professionals will need additional training and education. Bellevue College's proposed IST degree will be designed to meet the explicit needs that employers have identified for systems administrators, security analysts, data specialists and application developers through providing a pathway for students with two-year technical degrees in IT.

Indeed.com is a web-crawling jobs aggregator that pulls jobs from hundreds of online sources, including company websites, newspapers, online job boards, industry-specific recruiter postings, etc. The advanced search capabilities on indeed.com allow users to refine search data by salary, location, keywords, and date of posting. Searches on indeed.com shows hundreds of in-demand jobs that would be good fits for graduates of Bellevue's BAS in IST.

[15] http://www.bls.gov/ooh/computer-and-information-technology/home.htm 04.05.12

Table IV, below, shows 5-year job trends based on proposed concentration areas in the degree. Between the future projections available from Employment Security and the historical job trends data gathered from indeed.com, the long-term trend is toward growth in jobs within the IT areas targeted by the proposed degree.[16]

TABLE IV: Job Trends in IST Concentration Areas



Current local employment searches also show demand for the types of jobs for which graduates of the IST degree will be well qualified. Advanced job searches were done by keyword categories and restricted to jobs located within 25 miles of Bellevue during the second week in April, 2012. This typical week shows more than 600 jobs in just these keyword categories and location. Keywords used focused on the particular skill sets that will be emphasized in the IST degree – systems administration, security, data analysis and application development. Table V, below, shows a sampling of available jobs most closely tied to the degree – there are additional jobs that would also be well suited to IST graduates.

[16] http://www.indeed.com 05.03.12

Table V: Baccalaureate Level IST Jobs in Bellevue area - April 12, 2012		
Keywords	**New fulltime jobs past 10 days**	**Sample titles**
Application Developer	309	C# Application Developer, Mobile Application Developer, Usability Research Application Developer
Business Intelligence	157	Business Intelligence Analyst, Business Intelligence Developer
Database Administrator	45	SQL Database Administrator, Enterprise Database Administrator
Systems Administrator	100	IT Systems Administrator, System/Network Administrator
Total Jobs	**611**	

In 2011, Puget Sound area community and technical colleges awarded 333 IST-related professional/technical associate degrees.[17] Detailed information on graduates with IT technical degrees is in Table VII, which can be found on page 15. The majority of these students do not have a clear pathway to a bachelor's degree. If they were able to continue their education in a work-friendly program, Puget Sound would have an additional supply of baccalaureate-level information and systems technology professionals. Given the over 600 jobs posted **within a two-week period** in the Seattle area, there is clearly a significant gap between the number of baccalaureate-prepared individuals available to fill these jobs and the local need.

In order to assess the local market for IT professionals at the bachelor degree level, Bellevue College distributed an online employer survey through professional organizations, social networking sites, industry contacts, and the Center of Excellence for Computing and Information Technology contact list. The survey received 109 unique responses and indicated a local and regional need for more bachelor level IT professionals.[18]

When asked if they had experienced problems finding IT professionals with the bachelor's degree to fill their employment needs, 68% of question respondents stated that they had experienced problems "frequently" or "sometimes", with 24% of question

[17] SBCTC data 04.23.12

[18] See Appendix A for full employer survey results.

respondents choosing "frequently".[19] When asked why they experience difficulty hiring IT professionals, respondents stated the following reasons:

- High competition and a shortage of qualified candidates, especially in the Puget Sound area;
- Lack of candidates with the required skills or required specialization.

Eighty-five percent of respondents agreed with the statement "Currently the need for IT professionals is growing."

After analyzing survey results, the college convened an employer focus group, with hiring authorities from technology companies such as Microsoft, Google and Amazon, as well as smaller technology companies such as 3Tier and major employers of IT professionals such as mobile telecommunications companies and hospitals. The focus group participants identified strong industry trends that needed to be infused throughout the degree curriculum, including mobile and cloud computing. Focus group participants also provided feedback on proposed general content areas, specific concentrations, and overall course sequencing within the degree. Several members of the focus group are interested in future participation in curriculum development; they will be consulted as the college moves into the next phase of developing detailed program and course outcomes.

Based on local and state employment projections, as well as Bellevue College's recent employer survey and focus group, it is clear that the state needs to produce more baccalaureate graduates to meet the demand for systems, network and security administrators, software and application developers, and business and data analysts.

Collaborating to Meet Growing Need

Bellevue College is committed to working with our higher education partners to provide clear and efficient degree pathways for students. To that end, representatives from Bellevue College spoke with Dr. Michael Stilber, Director of University of Washington-Bothell's Computing and Software Systems programs, to discuss the proposed applied IST degree and ensure that it did not duplicate existing offerings at UW-B. Dr. Stilber saw the proposed degree as complementary to offerings at UW-B. He suggested a pathway into a UW-B master's degree for graduates of Bellevue's BAS in IST. This discussion will be continued as curriculum is developed.

Representatives from Bellevue College also conferred with Dr. Leo Irakliotis, National Director of Western Governors University's College of Information Technology, to discuss the proposed IST degree. Dr. Irakliotis expressed his support of Bellevue College developing the degree, as well as suggesting the development of an articulation agreement into current and future masters programs offered by WGU. When detailed

[19] See appendix A for full employer survey

curriculum has been developed, this conversation will progress to concrete discussion of pathways beyond the baccalaureate for IST graduates.

Strong foundation built on existing IST programs

The bachelor of applied science in information systems and technology will be built on the strong foundation created by Bellevue College's IST programs and projects. The college has been offering information technology programs and degrees since the 1970s. Parallel with the sweeping changes within the field of IT, programs have changed significantly over the past forty years. Currently, Bellevue College offers two information technology associate's degree programs: **Information Systems** and **Network Services & Computing Systems**. Information Systems focuses on software development, databases and analytics while Network Services & Computing Systems focuses on hardware, operating systems, security and networking. Accompanying each degree program is an array of certificate programs designed to help students efficiently acquire the knowledge they need to be successful.

Bellevue College is launching a new applied bachelor's degree in Healthcare Technology and Management, with a focus on Healthcare Information Technology, in fall 2012. Some of 300 and 400 level courses from this degree may be appropriate electives for students in the proposed Information Systems and Technology baccalaureate degree, which will not have a specific focus on healthcare.

Enrollment in Bellevue College's credit bearing IT programs has increased over the past five years, and held steady over 2010-11, even as the local economy and the IT sector outlook has improved. Detailed enrollment in IT programs since 2006 is outlined in Table VI, below.

TABLE VI: IT Enrollment 2006-2011

IT Classes; Selected Tech-Related Majors, enrollment in IT Classes by FTE, Absolute Enrollment, and Annual Headcount.

	FTES	Enrollment	Headcount	2-year IT degree graduates
2006-07	120.499	391	151	39
2007-08	178.499	554	201	29
2008-09	349.884	1103	350	22
2009-10	553.886	1740	448	33
2010-11	556.079	1732	493	42
Grand Total	**1758.847**	**5520**	**1643**	**165**

The new BAS in IST will include many new courses. While the majority of curriculum at

the 300 and 400 level will be new, upper division general education courses, such as project management, which were created for other bachelor's degrees, will be utilized.

Student demand

In 2011, system colleges in the great Puget Sound area graduated 333 two-year degree holders in information technology fields.[20] Table VII, below, details the number of IT graduates and programs from which they graduated.

TABLE VII: 2010-11 2-year degree graduates in IT: Puget Sound Community & Technical Colleges

CIP	110201	110901	111003	111004	111006	151202	
Degree Area	Computer Programming	Computer Systems Networking	Network & Systems Security	Web / Webmaster	Comp. Support Specialist	Comp. Systems Tech	All IT areas
Bates		4		4		5	13
Bellevue		25			4		29[21]
Cascadia	3	1					4
Clover Park	4		44				48
Edmonds		34	19	9			62
Green River		4	6		1		11
Highline	4	19	4				27
Lake Washington	2	39					41
Pierce		17			2		19
Renton		24					24
Seattle Central	4	2		1			7
Seattle North		13					13
Seattle South		8		1	1		10
Shoreline				1			1
Tacoma		24					24
Total Graduates	**17**	**214**	**73**	**16**	**8**	**5**	**333**

Bellevue College chose to survey both its own students and those enrolled in professional/technical IT programs at other community colleges to gain a broad

[20] SBCTC data 04.23.12

[21] Graduate numbers are larger for BC in table VI because data pull for system does not include additional IT degrees awarded at BC: business intelligence, database administration

perspective on interest in the degree.[22] The student survey received 180 responses: 150 from college students at 10 system colleges, 22 from high school students, and 8 from those who did not identify a school level.[23]

The college chose to analyze in more depth responses from students enrolled in college IT programs, as these students are closer to completing a two-year degree and their responses would give more accurate indication of near-term interest in the proposed program. Of the 150 responses, 105 college students, or 70%, indicated "yes" to the question "would you consider attending." An additional 35, or 23% indicated "maybe" and 10, or 7%, stated "no." Three-quarters of the college students who responded were from Bellevue College. The BC student responses were similar in distribution to the overall college responses, with slightly more students staying "yes" (76%) and fewer choosing "maybe" (18%). College IT student responses are detailed below.

Table VIII: Student Interest Response Detail					
College IT Student Responses **N=150**			BC IT Student Responses **N=112** (subset of 150)		
Response Distribution			**Response Distribution**		
YES	MAYBE	NO	YES	MAYBE	NO
105 /70%	35 /23%	10 /7 %	85 /76%	20 /18%	7 /6%

We consider this a very strong level of interest, particularly given that students at other system colleges were hearing about the degree for the first time through the survey instrument.

Table IX shows two-year information technology degree graduates from the three colleges in closest physical proximity to BC, since these students may be placebound and a program based on the east side of Lake Washington may be of special interest to them. Students from Cascadia Community College, Lake Washington Institute of Technology and Renton Technical College responded to the survey (N=19). Within this group, response distribution was similar to overall response distribution, with 10% or less in the "no" category and the remainder of responses in "yes" and "maybe."

[22] See Appendix B for full student survey results

[23] Response totals vary by question: not all respondents answer all questions, so N does not always equal 180

Table IX: 2011 IT Graduates in East/South Puget Sound	
College	**2-year IT graduates**
Bellevue	29
Cascadia	4
Lake Washington	41
Renton	24
Total Graduates	**98**

Student survey respondents indicated that affordability and opportunities for career advancement were among their most important reasons for considering this degree. When asked to provide information about benefits a bachelor's degree in IST might provide them, in comparison with an associate's degree, 122 students provided statements of benefit. Table X, below, outlines the most common reasons students gave to pursue the degree, as well as representative comments in each of the two areas brought up most frequently, career advancement and additional learning.

Table X: Student generated benefits of baccalaureate in IST		
Response content	**Career Advancement**	**Additional Learning**
Number[24]	80 (of 122)	20 (of 122)
Comments	Most employers prefer a bachelor's degree.	It would develop additional skills.
	Greater visibility in the job market.	A more enriched education.
	A bachelor's degree would enable me to apply for management positions.	More extensive learning and opportunity to implement classroom learning through projects.

IST degree addresses unmet student needs

Current community college students: The technical-associate pathway into this degree will provide graduates with professional/technical associate degrees in information-technology related fields with expanded educational options. In Bellevue College's physical catchment area alone, public community and technical colleges graduate more than 125 students with IT-related professional/technical degrees each year. There is a huge backlog of 2-year IT program graduates who would gain career mobility and advancement with the option of a baccalaureate degree tailored to both their previous education and their chosen career path. [25]

[24] N is not unique: some students brought up both career advancement and additional knowledge in their statements.

[25] http://www.careerbridge.wa.gov/Page.aspx?nid=19 04.12.12

Most students with professional-technical associate degrees in IT who are interested in a bachelor's degree have only two university options in Washington state where they may transfer as juniors. Central Washington University offers a management degree to graduates with technical associate degrees. This option is completely online and offers IT management, but not IT technical skills.[26] Western Governors University offers flexible online baccalaureate degrees in Information Technology. However, with the exception of network administration, all of WGU's IT degrees target experienced IT professionals rather than recent graduates of two-year technical degree programs.

Eastern Washington University offers a bachelor of applied technology in information technology on campus at Bellevue College.[27] This degree is a good fit for students who complete a technical associate's degree in IT and are interested in the management of design and manufacturing; however, it does not meet the needs of students who want to focus on analytics, application development or systems administration.

Central Washington University's applied bachelor's degree and Western Governors University IT degrees are fully online programs. Online programs such as these are good options for placebound students who have the requisite internal motivation and learning style to succeed in a fully online environment. For students who do not thrive in a fully online environment, or for those who seek different career pathways in IT, these limited educational options prevent them from continuing on to a bachelor's degree. Bellevue College's new bachelor's degree in IST, which will be delivered through a hybrid low-residency model, will augment the knowledge students have gained through their associate degrees and will provide a solid foundation in general education and advanced skills targeted to the specific needs of the information technology workforce.

The University of Washington offers degrees in Computer Science at the Seattle campus and at UW-B and UW-T. These degrees are an excellent fit for students interested in computer science, particularly those who want to do programming; however, they do not provide a transfer pathway for students completing technical associate degrees, nor do they focus on systems administration or business intelligence.[28]

The new applied bachelor's degree program will increase the number of overall bachelor's degree holders in the state who fill critical jobs by serving professional and technical associate degree holders who are otherwise limited in pursuing a bachelor's degree. It will also provide opportunities to place-bound students interested in a career in information technology. We project that the program will be at full capacity within four years of the initial year of operation, and that the proposed BAS in IST will produce a minimum of 30 graduates each year to help meet projected high growth and high vacancy rates.

---

[26] http://www.cwu.edu/~avpugrad/OnlineLearning/programs.php#bas_itam-spec 04.09.12
[27] http://outreach.ewu.edu/bellevue/degrees/applied-technology.html 04.09.12
[28] http://www.cs.washington.edu/prospective_students/undergrad/admissions/upper_division 04.09.12

Maximizing state resources: IST degree adds new option

Bellevue College's proposed bachelor of applied science in information and systems technology will provide students the opportunity to earn an affordable bachelor's degree focused on the knowledge and technical skills employers are seeking.

The degree is being designed with working adults in mind. The majority of classes will be offered in hybrid format to maximize flexibility in scheduling and access for placebound and/or working students. In addition to providing access and convenience for students, online classes allow more efficient use of resources such as classroom space, allowing more students to be served without requiring as many physical resources. Some courses with lab components, such as systems administration, will require time on campus.

As previously noted, students will have access to upper division elective and general education courses developed for baccalaureate degrees already offered at Bellevue College. Students will have increased choices, and previously developed curriculum will be more broadly utilized, creating cost efficiencies in program development.

Bellevue College will be offering this degree on a self-support model, thus further maximizing limited state resources.

Opportunities for collaboration

Bellevue College works closely with our CTC system partner colleges to provide smooth transitions for two-year technical degree graduates who wish to enter a baccalaureate program. For example, in development of the IST degree, we have had several discussions with Seattle Central Community College about elements of the IST degree and transitions for graduates of 2-year programs. During the next year, as we establish and finalize curriculum, we plan to develop articulation agreements with system colleges so that students graduating from IT programs who wish to go on to the baccalaureate will have a clear pathway into the IST degree.

Bellevue College has worked with University of Washington and other colleges and universities to ensure that students who complete the college's existing applied baccalaureate degrees have options to continue to graduate school if they want to pursue further education.

As previously outlined in this document, Bellevue College representatives have had initial discussions with UW-Bothell and Western Governors University to ensure that the proposed Information and Systems Technology degree does not duplicate existing offerings, and that graduates of the IST who wish to continue to the master's level will have appropriate accessible options. We will continue these discussions as we prepare the full program proposal for review.

Unique aspects of proposed program

Bellevue College's Bachelor of Applied Science in Information Systems and Technology will have several unique aspects, including:

Applied learning with current equipment and the most up-to-date software tools, simulating the work environment. For example, students in a network systems administration course will work with hardware and software configurations similar to what they will see in the field.

Concentrations in: applications development; business intelligence, systems administration, and security.

Current industry professionals teaching many courses. Bellevue College's location on the east side of Lake Washington means that it is in the heart of Puget Sound's information technology development. Instructors come from Amazon, Microsoft, Puget Sound Energy, independent contractors, and other small and large technology and technology-heavy companies.

Emphasis on problem-solving and critical thinking will allow IT professionals to be effective in the rapidly evolving world of technology.

Integration of core knowledge and skill sets throughout the program, so that students do not learn skill sets in isolation. For example, database skills and application development skills are taught in the same interrelated way they will be utilized in the work environment.

Team- and project-based learning, which develops the integrated soft skills technical professionals need to succeed.

Unique combination of broad and deep skillsets: the BAS will graduate IT professionals who have a broad general understanding of technology, yet are deeply skilled and job ready within their specializations.

Conclusion

Bellevue College looks forward to speaking with SBCTC system trustees about our plans for an applied baccalaureate in Information Systems and Technology. We are excited about this opportunity to build on our strong information technology projects, partnerships with businesses, and associate degree programs. The BAS in Information Systems and Technology will provide a new option for holders of technical associate degrees; meet transfer needs of community college students at BC and other systems colleges, and be tailored specifically to meet the unique employer needs of the Puget Sound region.

Appendix II: Course Descriptions for Bachelor of Applied Science in Information Systems and Technology

Information Technology Courses – Core – All students take prior to graduation

DBA 130 Database Theory – 5 credits
Develops in-depth understanding of database concepts and terminology, emphasizing the relational databases model. Develops understanding of the role of Structured Query Language (SQL), data modeling and normalization of database tables. Prerequisite: BUSIT 103 with a C- or better.

IT 101 Introduction to Information Technology – 5 credits
Presents a general overview of information systems and technology. Topics include how computers work, different types of computers, input and data storage devices, operating systems, data communications, systems analysis and design, and ethics.

ISIT 105 Problem Solving Strategies – 5 credits
This course presents a wide variety of strategies to build skill in problem solving. Students practice creative/lateral thinking techniques and communication skills to approach technical and non-technical problems.

ISIT 328 Information Security Essentials – 5 credits
This upper division class is intended primarily for BAS Software Development track students who don't take a security class in their lower division coursework. Introduces concepts and issues related to securing information systems and the development of policies to implement information security controls. Topics include security vulnerabilities, threats, defense measures and the legal and ethical issues associated with information security. Students will learn how to apply security best practices in multiple security architectures.

PROG 160 Systems Analysis and Design – 5 credits
Examines the system-development cycle in depth. Topics include problem identification, problem solving, and information-gathering techniques. Current structured tools are used to describe business rules and objects, data flow, data structures, and process flow and documentation. Creative problem solving and working in a team environment are stressed.

Application Development Concentration Courses – electives for other concentrations

ISIT 320 Developing Mobile Applications – 5 credits
This course prepares students to do mobile application development. Students will learn to design, develop, test, and deploy mobile applications for multiple types of mobile devices in multiple software environments.

ISIT 322 Advanced Web Development – 5 credits
Students will gain an understanding of the underlying protocols and practices used in designing efficient web applications across multiple browsers. Students will use design principles, acceptable protocols, and best practices in creating extensible web applications. Students will use both open source and proprietary technologies to create web sites that incorporate code elements and services from across the Internet
Prerequisite PROG 109, 117

ISIT 324 Principles of Software Testing – 5 credits
This class will present to students practical techniques and strategies to use in overall software testing and quality assurance methodologies. Students will be exposed to testing concepts and how to design, develop and document different kinds of tests.
Prerequisite: PROG 120 and English 235

ISIT 420 Advanced Data Access Techniques – 5 credits
Course Description: Students learn to develop data driven applications using both proprietary and open source environments. Students will develop applications using data from a variety of data repositories including relational databases, multi-dimensional databases and "big data" repositories. Students also learn to work with data in a variety of formats including XML.
Prerequisite: (PROG 210, PROG 260) with a C+ or better

ISIT 422 Application Architecture – 5 credits
Course Description: Students learn best practices for developing enterprise software solutions with appropriate structure for maintainability and efficiency. This course expands student knowledge of software application structure and design principles focusing on advanced object oriented techniques, service oriented architectures and cloud services.
Prerequisite: (PROG 117, PROG 210, PROG 260) with a C+ or better

Business Intelligence Concentration Courses - electives for other concentrations

ISIT 330 Business Intelligence Applications – 5 credits required
Students learn how business intelligence solutions are implemented in an organization. Students learn the components of a BI application and appropriate application architectures for a variety of scenarios. The benefits of BI in the organization and the possibilities for organizational change are discussed. Students use current BI tools to

develop realistic solutions. Current trends in BI including agile BI and real-time BI are discussed as is the growing role of "big data".

ISIT 332 Data Warehousing – 5 credits required
Students learn concepts and techniques associated with development of a data warehouse. They learn how to prepare data for consolidation and exchange. Students learn to apply ETL (Extract, Transform and Load) principles and techniques including scripting and use of current ETL tools. Students practice coding techniques for extracting, cleaning and conforming data.

ISIT 334 Data Visualization – 5 credits required
This course introduces the theory and concepts related to effective display of data with a focus on quantitative data. Students learn techniques for visualizing sets of data ranging from the typical small sets to the immense sets of data generated by current computer activities. Students learn the principles of preparing effective visualizations and the tools to create such visualizations. Students learn advanced reporting techniques and use of analytic tools to create visualizations.

ISIT 336 Dimensional Modeling – 5 credits
Dimensional modeling has been broadly accepted as one of the principle techniques for data warehouse design. Students use a sequenced series of case studies and hands-on exercises to learn effective design principles for data warehouse development.

ISIT 338 Predictive Analytics – 5 credits
Course Description:
In this course students learn to go beyond simply querying data to do predictive data mining analysis. Students learn to apply data mining algorithms to realistic organizational data to find previously undiscovered patterns, draw conclusions and then make decisions based on these patterns. Students use current software tools and hands-on exercises to learn theoretical concepts.

ISIT 338 Data Analysis Techniques – 5 credits
Course Description:
In this course students learn a variety strategies and techniques for analyzing data and making decisions based upon that data. Students use case studies to integrate their analysis and problem solving skills. Students use current software systems to do analysis and they are required to present the results of their analyses.

ISIT 432 Data Repositories for Analytics – 5 credits
Students learn to create and query analytic databases including multi-dimensional databases (cubes) and "big data" repositories. Students create business-oriented solutions for analytics.

ISIT 434 Web Analytics – 5 credits
Students learn techniques for analyzing data generated by web traffic and social media sites. Students learn the importance of such data to an organization and they learn what analytic measures are available and applicable. Students also learn how to implement web data collection and analytic tools for web-sites.

ISIT 436 Performance Management – 5 credits
Students learn how to implement organizational performance management in support of organizational change. Students learn how organizations define objectives, establish goals and measure progress. They learn how to develop metrics and key performance indicators and how to measure performance. They learn how to implement software systems including dashboards and score cards to provide information at the appropriate level to users within an organization.

System Administration concentration courses – electives for other concentrations

ISIT 340 Network Security and Firewalls – 5 credits
Course covers skills required to develop a security infrastructure, recognize threats and vulnerabilities to networks, and mitigate those threats. Emphasizes core security technologies, installation, troubleshooting and monitoring of network devices to maintain integrity, confidentiality and availability of data and services. Includes attack and defense case studies with written analysis.

ISIT 342 VoIP and Wireless – 5 credits
This course introduces and applies the concepts of design, implementation and troubleshooting of VoIP and wireless systems. Technologies include VoIP Managers, Voicemail, System Reporting, Wireless Controllers, Access Points, Relay Systems, Wireless Topologies, Wireless Security and the associated protocols for both VoIP and wireless technologies.

ISIT 344 Virtualization and Storage – 5 credits
This course introduces and applies the concepts of design, implementation, management and troubleshooting of server virtualization, network virtualization and large storage systems. Technologies include VMware with vCenter and ESXi and Storage Area Networks (SAN).

ISIT 440 Administering a Linux Server – 5 credits
Course covers essentials of Linux server administration. Students install, configure, use, secure and administer a Linux enterprise server. Topics include user access and security, process and service control, server monitoring, networks and networking services, interoperability, package management, back and recover and essential BASH commands.

ISIT 442 Managing Messaging Services – 5 credits
Course is an introduction to messaging and collaboration services for system administrators. Students will become familiar with popular messaging platforms and protocols such as POP3, IMAP, SMTP, and web services. Additional topics will include server virtualization, cloud services, system configuration, director service configuration and deploying email clients.

ISIT 444 Automation / Configuration and Management – 5 credits
Introduces the concepts and application of basic scripting to monitor and collect logs in relation to servers and the associated services. Topics include scripting, logging, automation and system management.

Security Concentration Courses – electives for other concentrations

ISIT 340 Network Security and Firewalls – 5 credits – See above

ISIT 342 VoIP and Wireless – 5 credits – See above

ISIT 350 Digital Forensics – 5 credits
Course introduces students to computer forensics, both its fundamentals and the best practices for incident response. Includes the legal aspects of computer forensics, as well as its relationship to the Information Technology field. Hands-on projects will give students the tools and techniques to perform a full computer forensic investigation.

ISIT 450 Network Vulnerabilities and Countermeasures – 5 credits
This course covers the concepts of network vulnerabilities from a hacker's perspective. Its focus is professional penetration testing and the securing of information assets. The course provides students with the knowledge to prevent, detect, and respond to network security incidents.

ISIT 452 Network Detection and Prevention Systems – 5 credits
This course focuses on the qualities that go into a sound IDS/IPS (intrusion detection/prevention system). Hands-on exercises use various network protocol analyzers to troubleshoot network problems, and IDS/IPS tools to detect, investigate and respond to network attacks.

ISIT 454 Operating System Hardening – 5 credits

Hardening a server reduces the attack surface by disabling functionality that is not required while maintaining the minimum functionality that is required. This course covers operating system hardening techniques for both Windows and Linux servers.

ISIT 490 / 491 Capstone / Internship Project – 5 credits per quarter, students take 10 credits
Students review, integrate and practice the skills and knowledge covered throughout the ISIT program. Students work in teams to complete a significant project drawn from case studies involving business and technology. Students will do a formal presentation of their work to industry professionals. Internships may be utilized to meet capstone project requirements.

General Education Courses

BUS 370 Intermediate Project Management – 5 credits
This course examines project management theory and practice, with emphasis on scientific, technical and medical applications. Uses PMI's PMBOK framework to explain the creation and management of courses in contemporary organizations. Cases and examples illustrate the application of this framework to real-world Waterfall, Iterative and Agile projects.

BUS 3XX Business of Information Technology: Legal, Regulatory and Political Environments – 5 credits
This is a working course description. Final course description may vary.
Examines the legal, regulatory, and political environment in which the IT professional works. Explores intellectual property rights, contracting issues, licensing of information and products, data protection, patents, cyberspace regulation, and privacy implications.

PHIL 3XX –Ethical Issues in Information Technology – 5 credits
This is a working course description. Final course description may vary.
Examines ethical, policy and social aspects of information technology, with an emphasis on computing technology. Covers issues related to information acquisition, access and stewardship, along with issues related to software and intellectual property. Case studies will include ethical dilemmas faced by information technology professionals.

CMST 330 Intercultural Communication for the Professional – 5 credits
Examines how a professional practitioner may positively engage in oral communication with a culturally dissimilar client or person in a variety of contexts. Students practice intercultural communication strategies and skills. Prerequisite: Acceptance to a baccalaureate program or permission of instructor.

PHYS 109 Science for Information Technology – 5 credits
Develops research and problem-solving skills in the science of modern technology, including computers and data transmission. Topics include magnetism, electricity, and microchip circuitry. Designed for information technology students, class format includes hands-on group work. Prerequisite: MATH 098 or equivalent assessment.

SOC 275: Technology in Everyday Life – 5 credits
What is the role technology plays in society and in your life? Dig deeply into the social realm of technology. Investigate how identities are created, re-created, and challenged through mediated technologies. Topics may include network societies, hyper-realities, the digital divide, and the global and social histories of technology.

Elective Courses
Students may choose from humanities and social science offerings, as well as a life science, to meet the number and distribution of general education credits for the degree. A complete list of these courses is available at:
http://bellevuecollege.edu/classes/

Students who have available space in their schedules after meeting degree and general education requirements may also choose from electives within IT and Health IT, provided they meet pre-requisite requirements. Complete list of HIT courses available at: http://bellevuecollege.edu/classes/All/HCTM

Appendix III: External Expert Reviews and Biographies

Chan Beauvais Biography

Chan Beauvais is currently a Data Steward at Costco Wholesale, where he has worked in several roles since 2000, including client server application developer, database designer, and for the last year, as the company's first data steward and a key participant in the company's data governance initiative. Chan taught fulltime in the Information Technology Program at Bellevue College between 1995 and 2000, providing him with a deep understanding of college-level teaching and learning. He was awarded the Bellevue College faculty Margin of Excellence award in 2012, and he also attained is Certified Data Management Professional credential at the Mastery level in 2012.

Mr. Beauvais has a Bachelor's degree in Political Science from University of California Santa Barbara and an AA in Information Technology from Bellevue College.

Chan Beauvais' notes on Bellevue College's draft curriculum for the BAS in IST

I see a minimal reference to the topic of Data Management in the Philosophy 3XX course. "...Covers issues related to information acquisition, access and stewardship..."

This is a relatively new discipline, but is being recognized as a key branch of Information Technology. It involves data governance, including security and retention, around structure and unstructured data. The Data Management Association (DAMA) has a body of knowledge document that covers ten core areas in I.S. I think this material needs to be infused into this curriculum in more depth than inclusion as part of the ethical issues course. Perhaps a separate course on Data Management that could be offered as an alternative to Phil 3XX?

Here are some key resources that make the case for Data Governance/Management as an IT discipline.

- SearchDataManagement – a web site devoted to all things Data Management http://searchdatamanagement.techtarget.com/
- Robert Seiner's Data Administration Newsletter – advocating 'Non-Invasive' data governance techniques. http://www.tdan.com/
- The Data Management Association - "DAMA International is a non-profit, vendor-independent, global association of technical and business professionals dedicated to advancing the concepts and practices of information and data management." Their Body of Knowledge (BOK) is a standard for data management best practices. http://dama.org/i4a/pages/index.cfm?pageid=1
- Data Governance Institute – A framework for data governance http://www.datagovernance.com/

The other comment is that I am glad to see ISIT 445 including the topics around the changing nature of database structures. While the relational model is still the predominantly implemented design pattern, other models, especially ones designed around big data are becoming more studied, scrutinized and implemented. Included in this category are columnar databases, document, graph, and key-pair systems. Hopefully these will all be included in ISIT 445 curriculum.

Glenn Bowers Biography

Glenn Bowers is Vice President in the North America and Europe Business Unit of iSoftStone Incorporated. He is responsible for the sale and delivery of consulting services for the High Tech Business Group. Mr. Bowers has over 20 years of experience in software engineering, product development, program management and consulting services across a variety of industries including public safety, health services, finance, wireless communications, biometrics/security and legal services.

Prior to joining iSoftStone, Mr. Bowers was the Chief Technology Officer at 4Care Solutions, a start-up company focused on providing a cloud based solution for mental health professionals. As a member of the executive team, Mr. Bowers was responsible for establishing the technical strategy and implementation of 4Care Solutions product line. Prior to this role, Mr. Bowers was the Director of Engineering for Zetron, Inc. where he was responsible for the management of Zetron's global engineering teams. Mr. Bowers holds a MBA degree from the University of Washington, as well as a Bachelor of Science in Computer Science from the University of Idaho.

Glenn Bowers Notes on Bellevue College's draft curriculum for the BAS in IST

Thank you for allowing me to review and comment on the new IST degrees. In general I think that you have put together a fairly comprehensive curriculum. There are a few areas that you may want to consider covering in the curriculum including:

- Operating system fundamentals
- Algorithms (introduction & advanced)
- Fundamentals of accounting. This may seem odd to include but based on my experience in the industry, over 50% of application developers will end up developing or working on some type of financial application or system. Understanding the basics of accounting is very helpful.