August 14, 2009

Vice Chancellor Beth Rushing
University of Washington, Tacoma
Box 358430

Dear Beth:

Based upon the recommendations of the Faculty Council on Academic Policy, the Faculty Council on Tri-Campus Policy has recommended approval of a Bachelor of Science in Information Technology degree. A copy of the proposal is attached.

I am writing to inform you that the Institute of Technology program is authorized to specify these requirements beginning autumn quarter 2009 and thereafter.

The new requirements should be incorporated in printed statements and in individual department websites as soon as possible. The *General Catalog* website will be updated accordingly by the Registrar's Office.

Sincerely yours,

Mark A. Emmert
President

Enclosure

cc: Ms. Kim Davenport (with enclosure)
        Mr. Robert Corbett (with enclosure)
        Dr. Deborah H. Wiegand (with enclosure)
        Mr. Todd Mildon, J.D. (with enclosure TINST-20080701)

UNIVERSITY OF WASHINGTON
CREATING AND CHANGING UNDERGRADUATE ACADEMIC PROGRAMS

After college/school review, send a signed original and 8 copies to FCAS, Box 355850.

For information about when and how to use this form: http://depts.washington.edu/uwcr/1503instructions.pdf

College	Department or Unit	Date
UW Tacoma	Institute of Technology	7/1/08

New Programs

☑ Leading to a Bachelor of __Science__ in __Information Technology and Systems__ degree.

☐ Leading to a Bachelor of _____ degree with a major in _____.

☐ Leading to a _____ Option within the existing major in _____.

☐ Leading to a minor in _____.

Changes to Existing Programs

☐ New Admission Requirements for the Major in _____ within the Bachelor of _____.

☐ Revised Admission Requirements for the Major in _____ within the Bachelor of _____.

☐ Revised Program Requirements for the Major in _____ within the Bachelor of _____.

☐ Revised Requirements for the Option in _____ within the major in _____.

☐ Revised Requirements for the Minor in _____.

Other Changes

☐ Change name of program from _____ to _____.

☐ New or Revised Continuation Policy for _____.

☐ Eliminate program in _____.

Proposed Effective Date:

Quarter: ☑ Autumn ☐ Winter ☐ Spring ☐ Summer **Year:** 20 __09__

Contact Person	Contact's Phone	Contact's Email
Orlando Baiocchi	253 — 693 —4727	baiocchi@u.washington.edu

EXPLANATION OF AND RATIONALE FOR PROPOSED CHANGE

For new programs, please include any relevant supporting documentation such as student learning outcomes, projected enrollments, letters of support and departmental handouts. *(Use additional pages if necessary).*

See attached proposal documenting the needs, student learning outcomes, proposed curriculum, enrollments and other details.

UoW 1503 (12/05)

Catalogue Copy as currently written. Include only sections/paragraphs that would be changed if you request is approved. Please cross out or otherwise highlight any deletions.

(see attached)

Reflecting requested changes (Include exact wording as you wish it to be shown in the printed catalog. Please underline or otherwise highlight any additions. If needed, attach a separate, expanded version of the changes that might appear in department publications)

Chair/Program Director	_Baciocchi_	Date 08-22-08
Dean	_Beth Rushing_	Date 7/2/08
College Committee	_Michael C Ratton_	Date 7/11/08
Faculty Council on Academic Standards	_George Mohur_	Date 1/29/09

UoW 1503 (12/05) REVERSE

RESET FORM

New Degree Program Proposal for
Bachelor of Science in Information Technology and Systems (ITS)

Institute of Technology
University of Washington Tacoma

> The technology-based industry in Washington State continues its important role in the growth and development of the state economy. Technology industries, based on innovation in information technology, bio-science, nanotechnology, and other fields, generate new companies with products and services that are gaining domestic and foreign markets, generating many high-wage jobs, and creating significant wealth. These industries have a bright future in Washington if the appropriate conditions are created or improved. - *Quoted from Washington State Technology Alliance Benchmarking report executive summary 2006.*

1. Relationship to Institutional Role, Mission, Program Priorities

The technology initiatives at the University of Washington Tacoma are playing a key role to foster the future growth of technology leadership and innovation in our region. The mission of University of Washington Tacoma (UWT) is to serve the educational needs of students in the South Puget Sound. As part of this mission, the Institute of Technology in particular is charged with enhancing the computing program opportunities for students in the South Sound.

While the existing programs in Computing and Software Systems (CSS) and Computer Engineering Systems (CES) address these needs for a part of the student population, there continues to be demand for a technical degree program whose intellectual focus is different from developing the technology pieces to determining how technology is part of the wider multi-domain information systems in order to solve real-world problems. The degree program in Information Technology and Systems (ITS) is proposed to address this gap in higher education opportunities in the Puget Sound. In this context the unique mission of the ITS degree program will be to provide students with advanced concepts and skills to plan, analyze, integrate, maintain, and manage information systems using information technology. Also, this is the key differentiation of this program compared to any other computing programs in the region.

Across the nation, institutes and colleges within numerous universities are charted with a similar mission to offer a variety of computing programs with significant variance in the types of graduates they produce; ranging from traditional computer scientists with general software development skills, computing technology consultants who focus on specific technology areas, to computing professionals who design and maintain large systems.

Most of these programs are synergistic within the university system and significantly enhance that university's brand as a driver for technology innovation in respective regions.
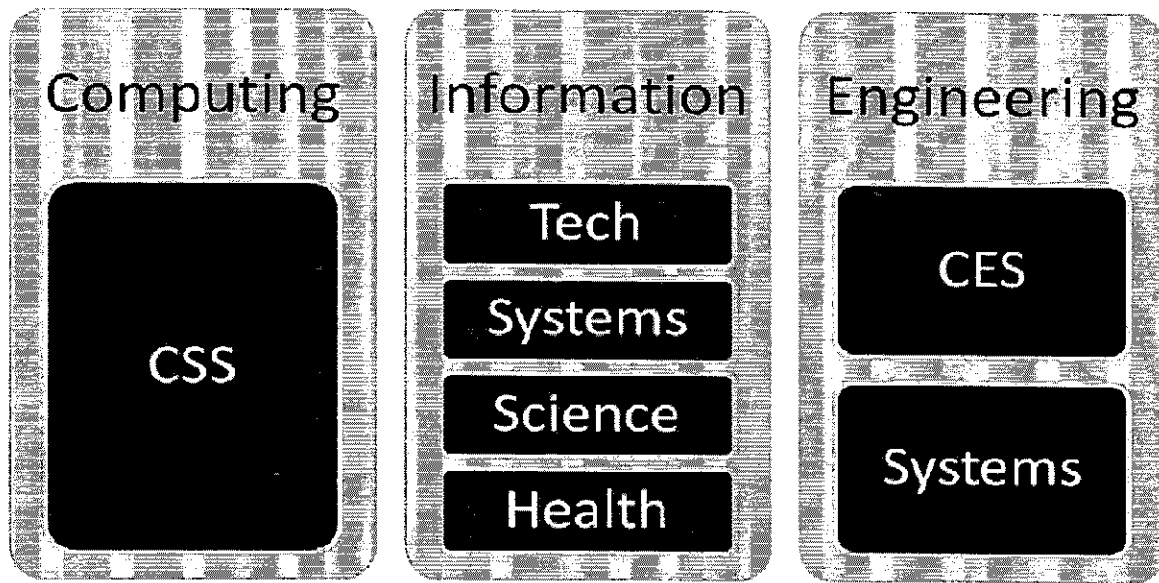

Figure 1: Diversity in Computing Programs is needed at the Institute of Technology, UWT.

The current programs in Computing and Software Systems[1] (BS in CSS), and BS in Computer Engineering and Systems[2] (BS in CES) within the Institute of Technology, address the need in their respective areas. In addition to this, the increasingly technology savvy student population, local community, specialized computing industry, and local government have expressed significant interests for greater diversity in technical education to produce multi-disciplinary computing graduates.

As seen in Figure 1, the proposed degree in Information Technology and Systems is a major step towards addressing this need for diversity in computing education while creating a new program that will be significantly different from, yet synergistic with other institute-wide and campus-wide computing initiatives. Its intellectual differentiation is in the track-structure of the proposed program where it is envisioned that eventually tracks involving Information Technology, Information Systems, Interactive Media Technologies, and others will evolve over the coming years as demands for specialized yet diversified technology education grows in Washington state. By providing this framework for

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[1] Bachelor of Science in Computing & Software Systems at University of Washington, Tacoma.
 http://www.insttech.washington.edu/internal.php?section=3&subsection=7&page=221
[2] Bachelor of Science in Computer Engineering & Systems at University of Washington, Tacoma.
 http://www.insttech.washington.edu/internal.php?section=3&subsection=7&page=220

potential growth, the ITS program meets the vision and mission of the Institute of Technology[3] of being part of a unique public-private partnership in the higher education.

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3 Mission and Vision of the Institute of Technology at University of Washington, Tacoma
   http://www.insttech.washington.edu/internal.php?section=1&subsection=4&page=1

2. Need for the Program

High-Technology manufacturing and management industries are key contributors to economic growth in the United States and around the world. The global market for high-technology goods is growing faster than that for any other manufactured goods. Over the last 10 years, the US high-technology manufacturing industry accounted for more than 40% of the global value added in this sector whereas the European Union added 18% and Japan about 12%[4]. In particular, the knowledge-intensive services industries are considered to be the key contributors to this growth around the world. Sales in this sector of the high-tech industry itself exceeded $14 trillion in 2003; the most recent year for which statistics are currently available. Within the services sector, business services which include information processing services, was the largest growth-sector accounting for almost 35% of the revenues. These services not only include production of information processing systems but also include services that manage, and keep these information systems operational. Clearly, the role of Information Technology and Systems as a combined discipline that would feed the workforce needs of this sector cannot be undermined. In an article on the size of the IT job market that appeared in the Communications of the ACM April 2008 issue, Litecky et. al report on the importance of systematic study of the IT job market in an environment of global outsourcing[5]. They compare the relative size of the market pre and post global outsourcing and demonstrate that of late the domestic market has more than tripled and quadruple from its low point in early 2002. They cite factors such as critical and complex systems development and maintenance continues to be done on site rather than be outsourced.

Here is a quote from the Seattle Times Editorial Dt. October 31, 2006 *High-demand employment requires high-caliber education* by Rick Bender, David Tang and Susannah Malarkey. *"Employers in Washington are among the most technologically advanced in the world. Not surprisingly, the people who work here are also among the best-educated. We lead the nation in per-capita employment of engineers, and are in the top 10 states for per-capita employment of computer scientists, life scientists, technology workers and many other advanced fields. Unfortunately, according to the National Science Foundation, Washington is 36th out of the 50 states in per-capita production of bachelor's degrees. Even worse, we're 38th in graduating students in science and engineering fields, the very fields we lead the nation in employing. And when it comes to graduate students in these fields, we rank 42nd out of the 50 states."* As a result we must import talent into the state to satisfy the needs of local employers whereas our own potential students either must leave the state to pursue degrees in high-technology areas, or choose other career paths. Our proposed ITS program provides an alternative educational pathway for students who want to enter the technology area but do not seek a career in a traditional computer science or computer engineering disciplines. It also provides a broadening experience for students in application areas who

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[4] Science and Engineering Indicators 2006 Report from the National Science Foundation, Division of Science Resource Statistics.

[5] Litecky, C., Prabhakar, B., and Arnett, K. 2008. The size of the IT job market. Communications of ACM 51, 4 (Apr. 2008), 107-109. DOI= http://doi.acm.org/10.1145/1330311.1330331

want to use technology in innovative ways to solve systemic issues for large, medium, and small organizations.

Between years 2007 and 2014, Washington's Employment Security Department predicts that 47 percent of the openings in our state that require a bachelor's degree will come in the fields for computer technologists, engineers, medical researchers, life scientists, nurses and secondary teachers. Yet, only approximately 14 percent of the students graduating from our schools are earning degrees in these fields. This can be observed from the shortfall between demand and supply of computer professionals as seen in Figure 2. The state predicts nearly 3,900 computer-specialist job openings each year alone; yet colleges and universities in Washington annually produce only about 635 graduates in this field. The proposed information technology and systems program intends to fuel this diversification by attracting more students to enter technology degrees programs.
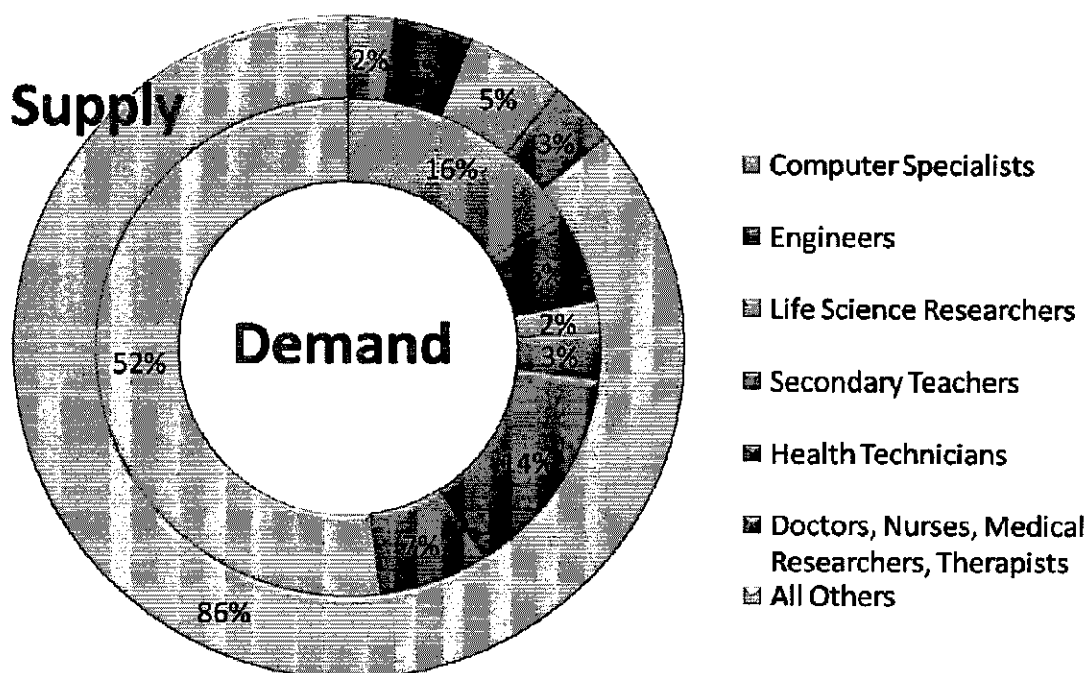
Figure 2: Projected demand (inner circle) vs. supply (outer circle) for professionals in Washington State by year 2014

Computing professionals across the nation and specifically in our region are increasingly being engaged in a variety of roles that go above and beyond the scope of education provided by traditional computing degrees. There is an urgent need of professionals/specialists who study and develop new uses for information technology and systems. In particular, we need professionals who understand the importance of information workflows: how to use existing systems and tools to gather, manipulate, store,

retrieve, and manage information in all types of settings. They are required to use information technology to solve human problems, though they need not be builders of the technology itself.

People working in information technology and systems can apply their technical skills to diverse subject areas like telecommunications, navigation systems, commercial banking, and more, but many specialize in the use of technology in business management, software program management, technical writing, technology services in multiple sectors including finance, industrial manufacturing, non-profits, government, hospitals, software manufacturing, general back-office management, etc. and eventually will be working on solving problems in information systems in diverse domains through the use of technology.

The 2006 consultants report compiled by GSM consultants on the future of the UWT Institute of Technology and its role as a catalyst for newer technology programs concluded that information related programs such as Information Systems, Informatics, and Information Assurance, rank very favorably with the area's high-technology employers as well as major employers that need technology graduates with an inter-disciplinary focus. On a rating of 1-10 with 10 being the highest, information-focused programs scored an average of 7.8, ranking ahead of other technology programs such as energy systems and graphics/media.

Table 1: Fastest growing occupations and occupations projected to have the largest numerical increases in employment between 2004 and 2014, by level of postsecondary education or training.

Education or training level	Fastest growing occupations	Occupations with the largest numerical job growth
Bachelor's or higher degree, plus work experience	Education administrators, preschool and childcare center/program	General and operations managers
	Computer and information systems managers	Management analysts
	Training and development managers	Financial managers
	Actuaries	**Computer and information systems managers**
	Medical and health services managers	Sales managers
Bachelor's degree	**Network systems and data communications analysts**	Elementary school teachers, except special education
	Physician assistants	Accountants and auditors
	Computer software engineers, applications	**Computer software engineers, applications**
	Computer software engineers, systems software	Computer systems analysts
	Network and computer systems administrators	Secondary school teachers, except special and vocational education

Similarly, Table 1 displays a list of fastest growing disciplines based on projected job demand between years 2004-2014. Evident from the table is the unprecedented demand

for information technology and systems professionals that will be produced by this degree that include, network computer systems administrators, systems analysts, information scientists, and information system managers. Notice also the high demand for synergistic programs that co-exist at UWT to produce computer software engineers for both systems software and application software.

The need for Information Technology and Systems is further justified by the opportunities it will provide new students entering the workforce. Students graduating from our information focused programs will be able to choose many different jobs; becoming IT and IS consultants, project planners, project managers, interface designers, information systems researchers, web developers, systems analysts, and filling other similar roles. To emphasize, consider some of the general tasks that an information technology and systems specialist is likely to perform depending on where she works:

- Providing technical and decision support for decision making and analysis as an information analysis consultant,
- Figuring out how users interact with computers and the world wide web for effective human-computer interaction design,
- Ensuring the reliability, accuracy, and accessibility of data sources,
- Developing and administering data standards, policies, and procedures,
- Provide consulting help to deploy and manage large information acquisition frameworks,
- Training staff to use their databases,
- Develop complex web and service oriented architecture deployment scenarios,
- Identifying needs for policies on data privacy and security,
- Developing information assurance scenarios and solutions.

Furthermore, education in the fundamental concepts of information technology and systems provides a broad and flexible educational experience that can be applied across subject areas as conditions and roles of the individual after entering the workforce inevitably change.

We see this program as playing a catalytic role in the Puget Sound by bringing together students with traditional technical backgrounds (e.g. computer science and computer engineering majors) with students having expertise and interest in various application domains (viz. community college students, UWT majors). By providing the ITS educational core, we hope to broaden the technical perspective of various computing communities. The ITS program we are proposing is distinct in its capacity to evolve as new tracks get defined. There are no identically structured technology programs in existence though a variety of academic programs offer course level curricular similarities in their programs. The proposed tracks within the ITS program also find distinction by being part of the wider program and alignment with existing accreditation bodies. Programs similar to the proposed one are often termed Information Systems, Information Technology, Information Schools, Informatics, and Information Assurance programs. Key distinctions between these programs are:

- Many Information Systems programs are typically management programs and emphasize the flow of information (and related technologies) through financial organizations. Often these programs stress upon management and technology issues, and do not emphasize data analysis and interaction issues. We see wider applicability for our program, in that we will work on identifying and teaching core principles that can involve a wider audience.
- Information Technology programs are different, in that they maintain the primary focus on deployment and maintenance of computing infrastructures. They often lack the view that technology education when combined with systems education provides a better means to facilitate the use of information in any organization.
- We studied a variety of Information Schools and find similarity with some of our goals, but they are much more societal and broader in structure compared to our program. We feel that the technical focus is critical for building a program that can evolve over time without significant resource requirements at startup. Moreover we derive our breadth by adding tracks that are verticals rather than provide a very broad foundation with narrower concentrations which is typical of most informatics programs. Moreover, Informatics programs stress the interaction between data processing and particular subject areas (e.g. bio-informatics), again not stressing the track-independent core that will lead to a technology focused educational experience.
- There are a growing number of programs centered on Information Assurance and Cybersecurity. While Information Assurance is an important component in our program, we feel that the area is best taught as complementary to and supportive of the larger information systems rather than as a topic area studied in isolation as a program.

Differentiation from CSS and CES at the Institute of Technology: Significantly different from the existing CSS and CES programs, the ITS program emphasizes a practicum and interest based specialization oriented degree. The program actively responds to emerging technology trends and diversifications in information systems. Another distinguishing feature of the ITS program is its emphasis on real-world education experiences. As part of this program, enrolled students will be expected to gain in-the-field experience by engaging in industrial co-op which is unlike the CSS/CES program where such experiences are encouraged but not mandatory for graduation. Another key differentiation between the ITS and CSS/CES program is the type of students that enroll in the program. These students will be active learners, passionate about current trends in technology, and capable of achieving the goals of managing, and supporting the information technology systems programmed by the CSS and CES majors. At the end of the program, the ITS students will combine the skills obtained in the formative years, concepts learned from their specific track, and their industrial co-op experience towards completing a Senior Project which signifies the culmination of their bachelor's education experience.

Different from the CSS/CES graduates who invariably look for software development engineer positions, the ITS graduates will be in the market for different jobs found in industry, government, business, and the service sector. ITS students will likely apply and look for positions with job titles including web designer or content developer, program

manager, network or systems administrator, , technical user support specialist, database developer or administrator, multimedia developer, systems analyst, application developer, interface design specialist, software testing and quality assurance specialist, instructional designer, or technical marketing representative to name a few.

In addition, it is important to recall the advice given in the Computing Curricula 2005 report by the ACM, *"Computing itself will continue to evolve. In addition, new computing-related fields are likely to emerge."* Due to this evolutionary nature of computing, it often becomes difficult to articulate to traditional computer scientists the intellectual rigor and academic acceptance of emerging technologies into traditional degree programs. Nationwide, IT and IS programs often categorically provide a home to such technology focused academics. Therefore the emergence and rise of highly specialized tracks such as game development, and network and systems administration from now almost traditional IT programs comes as no surprise[6].

The ACM CAC report states that post-1990s computing world presents several meaningful curricular choices described in Figure 3. Computer science, software engineering, and even computer engineering each include their own perspective on software development. These three choices imply real differences: for CE, software attention is focused on hardware devices; for SE, the emphasis is on creating software that satisfies robust real-world requirements; and for CS, software is the currency in which ideas are expressed and a wide range of computing problems and applications are explored. Naïve students might perceive that all three disciplines share an emphasis on software and are otherwise indistinguishable. Similarly, in the pre-1990s world, a primary area for applying computing to solve real-world problems was in business, and information systems was the home for such work. This has significantly changed in the post-1990s era. The scope of real-world uses of information has broadened from business to organizations of every kind, and students can choose between information systems and information technology programs. While the IT and IS as disciplines both include software and hardware technologies and systems, neither discipline emphasizes the need for understanding their role in the context of the organization; rather, they both use technology as an instrument for addressing organizational needs without emphasizing on the skills required to assess or design new technology solutions. Needless to state, the capability of the organizations to consequently maintain, upgrade and retool its stakeholders to use the solution is never emphasized. Computing students and practitioners alike are often unaware of these important differences and see only that IS and IT share a purpose in using computing to meet the needs of technology-dependent organizations. They often consider IS programs to reside in business schools and technology programs to reside in computing schools. The fact is; while IS focuses on the generation and use of information, IT focuses on ensuring that the organization's infrastructure is appropriate and reliable. Several universities house their CIS (computer Information systems) and CIT (computer information technology) programs in the same

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[6] Rochester Institute of Technology which has one of the leading technology programs in the country recently introduced two additional degree programs in game design and in network and systems administration which were previously branches/tracks in the IT degree program.

school or college. The proposed program in ITS takes this one step further to integrate the two into a single program with two track offerings with a common core. The idea is to evolve the two tracks together providing the students an opportunity to gain wider exposure through the amalgamation of the two disciplines while keeping the focus on information generation, information usage and information infrastructures.
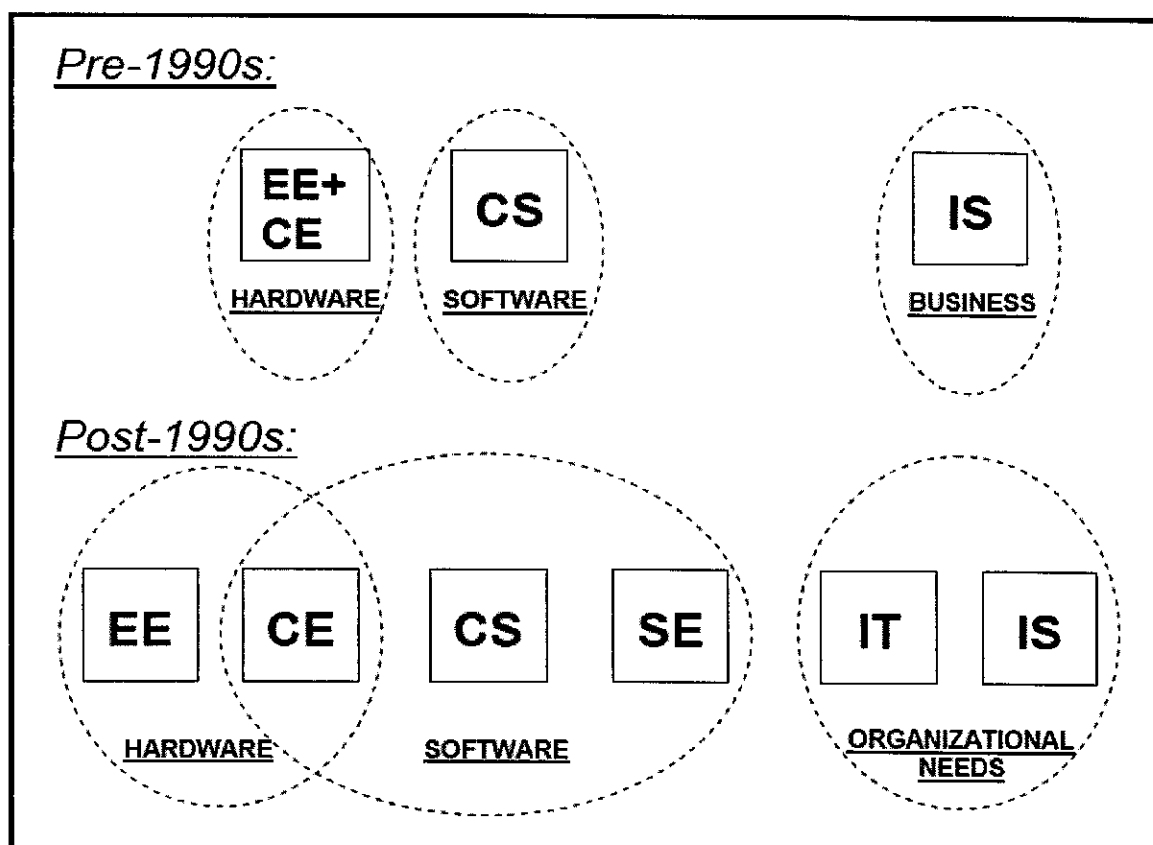
Figure 3: The landscape of computing degrees pre and post 1990s (ACM CAC2005-March06 Report)[7].

As shown in Figure 4 below, the diagram depicts the landscape/scope of various computing sub-disciplines today. Its focus is on what students in each of the disciplines typically do after graduation, not on all topics a student might study. Some individuals will have career roles that go beyond the scenarios described by these snapshots.

Figure 5 depicts the computing landscape for CS and CE degrees. These degrees are the closest to our existing CSS and CES degree programs.

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[7] Source: ACM CAC2005-March06 Report.

Figure 4: Thinking computing programs graphically. The X-axis denotes the range of development opportunities from purely theoretical to applied computing. The Y-axis denotes the various sub-fields that comprise computing. Source: ACM CAC 2005 report. (ACM CAC2005-March06 Report)

Figure 5: CS and CE on the computing landscape. (ACM CAC2005-March06 Report)
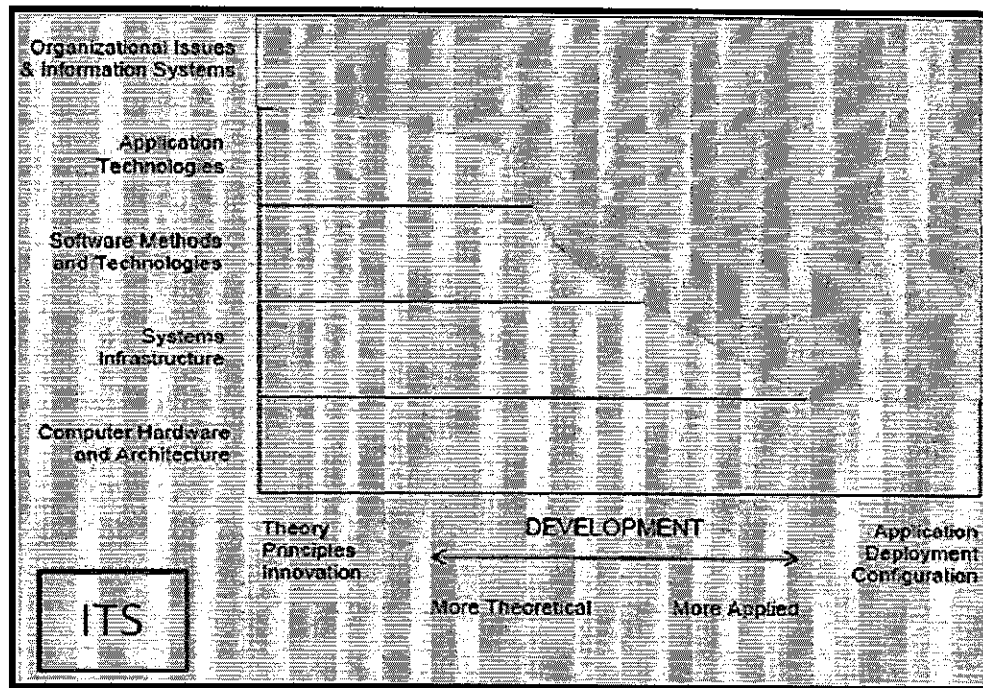
Figure 6: Proposed ITS degree on the computing landscape. (ACM CAC2005-March06 Report)

Figure 6 depicts the proposed ITS degree program on the computing landscape. As can be seen from the figures 5 and 6, the ITS progra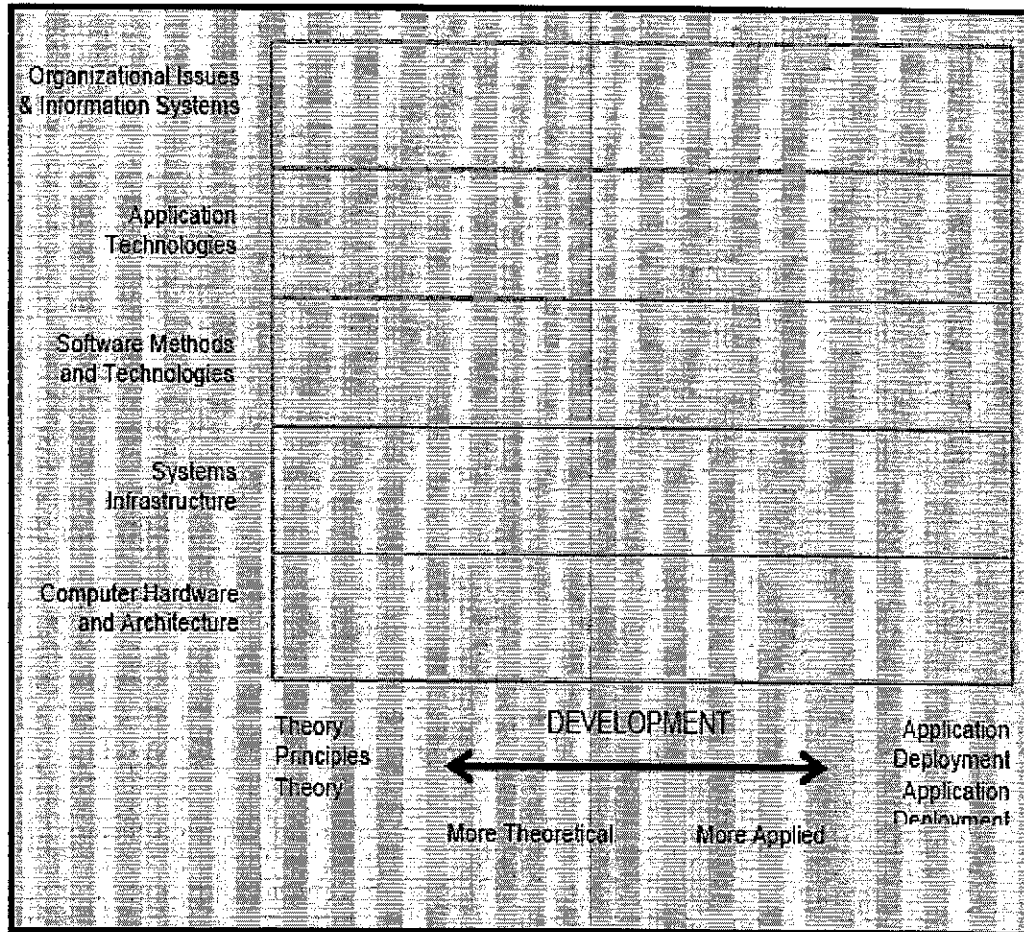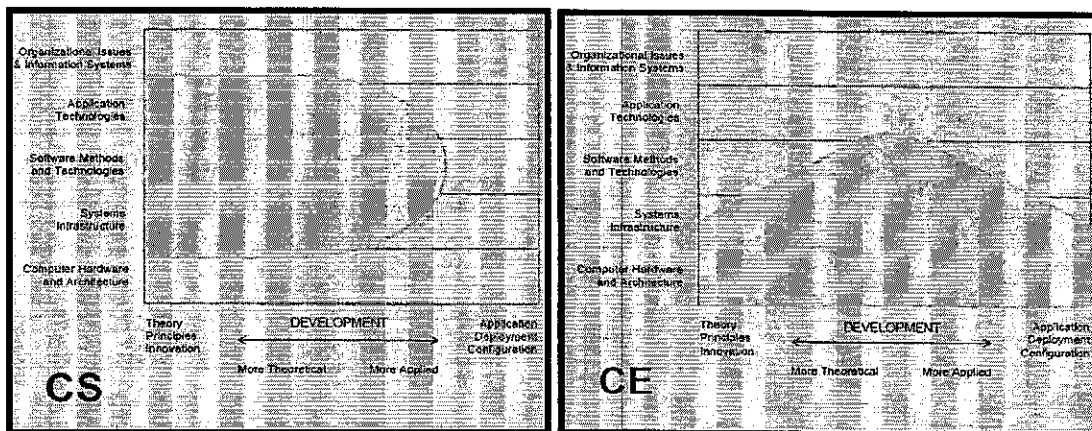m has a distinct focus and students clearly perform distinctively different tasks after graduation. The CAC2005 report describes the shaded area as follows:

"The shaded area extends across most of the top-most level because IS graduates are concerned with the relationship between information and the organizations it serves, extending from theory and principles to application and development. Many IS professionals are also involved in system deployment and configuration and the training of users. The area covered by IS dips downward, all the way through partially software development and systems infrastructure in the right half of the graph. This is because IS specialists often tailor application technologies (especially databases) to the needs of the enterprise, and they often develop systems that utilize other software products to suit their organizations' needs for information. IT shaded area extends down most of the right edge as it focuses on the application, deployment, and configuration needs of organizations and people over a wide spectrum. Across this range (from organizational information systems, to application technologies and down to systems infrastructure), their role has some overlap with IS, but IT people have a special focus on satisfying human needs that arise from computing technology.

In addition, the IT shaded area goes leftwards from application towards theory and innovation, especially in the area of application technologies. This is because IT people often develop the web-enabled digital technologies that organizations use for a broad mix of informational purposes, and this implies an appropriate conceptual foundation in relevant principles and theory. Because IT is a very new discipline, its focus has been on developing educational programs that give students a foundation in existing concepts and skills. Many in the community of IT faculty assert that research in their field will grow to create and develop new knowledge in relevant areas. When that happens, an appropriate snapshot would feature a shaded area that extends significantly further to the left."

Structurally, the proposed ITS program differs significantly from its other computing counterparts. Students will complete (a) 20 credits for program prerequisites, which can be considered general education credits, (b) 40 credits including math requirements as program specific core, (c) 30 credits for respective tracks, (d) 10 credits of internship-based senior project, and (e) 10 credits of free electives. There will be two track of study available to the students; the Technology track and the Systems track. Tracks have the ability to share courses to allow for breadth of study and uniqueness of a blended program experience. The core includes coursework in programming, information management, web design, information assurance, systems analysis, IT business principles for project management, etc. Individual track requirements are further outlined to provide a structured evaluation of the various curricular components that lead to specialization in a particular area.

We plan to adopt a phased approach to developing the eventual degree program in ITS. In the initial stages, we plan to limit the resource requirements by starting with only two potential tracks (a) information technology, and (b) information systems. In accordance with the increase of the student enrollment and diversity in interest, we plan to add more tracks in related fields. Initial launch of the program may be done through starting only the Information Technology track.

Local community and technical colleges are an important component of the state's education system and greatly contribute to developing technical associates in various disciplines. This program provides new opportunities for both Community and Technical College (CTC) students who seek a transition beyond their two-year technical education into a four-year college degree in the Information Technology and Systems areas. The ITS program is designed to encourage transitioning of several major courses from a related program at a community or technical college to University of Washington. The fall of 2006 marked a new beginning for undergraduate education at UW Tacoma. This was the first time that freshmen were admitted to the Tacoma campus. Currently, the freshmen are required to take 90 units of lower division preparation courses to prepare for the upper division courses that constitute the ITS degree program. With the addition of lower division courses at UW Tacoma, it will be easier for transfer students who have not met all the prerequisites for the program, but are otherwise qualified for admission, to be admitted, and to complete their lower division classes in conjunction with enrolling in some of the junior level courses. While designing this program we are also enthused by the fact that the ITS program- IT track is one that is nationally recommended to be a part of the computing curriculum in addition to both Computer Science and Computer Engineering programs by

our main curriculum standards body, The Association for Computing Machinery (ACM) Special Interest Group for Information Technology Education (SIGITE).

Table 2 shows ITS related programs of 11 CTC in the Southern Puget Sound area from 34 CTC of Washington State Board for Community and Technical Colleges (SBCTC)[8]. Most of community and technical colleges provide IT related degree programs that cannot be directly transferred to a 4-years university experience at this time. The ITS program can attract new students from local community and technical colleges by addressing this unmet need. For example, according to Washington Higher Education Coordinating Board (HECB)'s State and Regional Needs Assessment Report[9], Pierce County, where UW Tacoma is located, is the second largest county in the state with one-tenth of population and 5 public two-year community/technical colleges. However, the upper-division participation rate of the colleges is significantly below average.

Table 2: Partial IT-Related Degrees from Local Community and Technical Colleges

	CTC	Type	IT Related Programs	Degree
1	Bates Technical College http://www.bates.ctc.edu/	T	✓ Computer Networking Systems Technician ✓ Database Management & Development ✓ Information Technologies Specialist ✓ Software Development ✓ Web Developer ✓ Wireless and Advanced Communications Technology	✓ AT
2	Bellevue Community College http://bellevuecollege.edu/	C	✓ Information Systems ✓ Network Services & Computing Systems ✓ Technical Support	✓ AA
3	Cascadia Community College http://www.cascadia.ctc.edu/default.asp	C	✓ Network Technology ✓ Software Programming Technology ✓ Web Technology	✓ AAS-T
4	Centralia Community College http://www.centralia.edu/	C	✓ Computer Science ✓ Computer Science Technology	✓ AA ✓ AAS-T
5	Clover Park Technical College http://www.cptc.edu/	T	✓ Computer & Information Systems Security ✓ Computer Information Technology ✓ Computer Networking Technology ✓ Telecommunications	✓ AAS-T or AAT
6	Green River Community College http://www.greenriver.edu/	C	✓ Computer Systems Administration ✓ IT Information Assurance	✓ AAS
7	Highline Community College http://www.highline.edu/home/		✓ Web/Database Developer ✓ Network Specialist	✓ AAS

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[8] Washington State Board for Community and Technical Colleges (SBCTC). http://www.sbctc.ctc.edu/

[9] Washington Higher Education Coordinating Board (HECB). State and Regional Needs Assessment. Report. October 2005. p. 67-71. http://www.hecb.wa.gov./research/issues/documents/AnalysisandRecommendations.pdf

			✓ Data Recovery/Forensics	
8	Olympic College http://www.olympic.edu/		✓ Computer Information Systems ✓ Information Systems Specialists ✓ Network Implementation & Support	✓ ATA
9	Pierce College http://www.pierce.ctc.edu/programs/depts.php3		✓ Programming ✓ Technical Support ✓ Database Management & Design	✓ A
10	South Seattle Community College http://www.southseattle.edu/		✓ Network Administration ✓ Network Technician ✓ Software Engineering ✓ Web Media & Technology ✓ Business Information Technology	✓ AAS or AAS-T
11	Tacoma Community College http://www.tacomacc.edu/		✓ Computer Science ✓ Computer Applications Developer ✓ Network Administration and Support	✓ AS ✓ AAS-T ✓ AAS

Legend:
- Type
  - C: Community College
  - T: Technical College
- Degree
  - A: Associate
  - AT: Associate of Technology
  - AA: Associate in Arts
  - AAS: Associate of Applied Science
  - AAS-T: Associate in Applied Science Transfer
  - AAT: Associate of Applied Technology
  - AS-T: Associate in Science-Transfer
  - ATA: Associate in Technical Arts

Despite the importance of computing to Washington and its economy, Washington IT-oriented students who want to advance their knowledge and skills in computing cannot find a viable bachelor's degree program offered at either of the University of Washington campuses or other public/state universities. Table 3 shows local universities that support direct transfer program from CTC. Except local private institutions such as DeVry University, University of Phoenix, and Seattle Pacific University, only three regional universities such as Central Washington University, Eastern Washington University, and Evergreen College, offer a transfer. However, even they do not have anything similar to the proposed ITS program with ABET-CAC accreditation capabilities (Accreditation Board for Engineering and Technology (ABET) Computing Accreditation Commission (CAC)).

Table 3: Four-Year Universities Holding IT Related Degree in Washington State

	4-Year University	IT Related Programs	Degree
1	Central Washington University http://www.cwu.edu/~itam/	✓ Information Technology and Administrative Management	✓ BAS ✓ BS
2	Eastern Washington University http://www.cascadia.ctc.edu/default.asp	✓ TECH course work	✓ BS in Technology
3	Evergreen State College http://www.evergreen.edu/	✓ Upside Down degree program	✓ BA
4	Seattle Pacific University http://www.spu.edu/depts/profstudies/	✓ Professional Studies Program	✓ BA ✓ BS

3. Program Description and Curriculum

3.1. Program Mission

The Information Technology and Systems program will educate students to analyze, design, integrate, and manage information systems using information technology.

3.2. Program Tenets

We strive to maintain an educational environment to ensure that the graduates of the ITS undergraduate program can prepare for meaningful professional careers in information technology and systems to serve their local, state and national communities. In accordance, we pledge to meet and exceed the expectations of our students and communities through the continuation of the development of an outstanding curriculum in information technology and systems.

3.3. Program Objectives

The intent of the Information Technology and Systems program is to produce graduates who are able to achieve the following objectives:

Broad ITS Program Objectives:
(a) Fundamental knowledge regarding technical concepts and practices in information technology and information systems.
(b) A broad background across fundamental areas of information technology along with a depth of understanding in a particular area of interest within the domain of information systems.
(c) Demonstrate independent critical thinking and problem solving skills, with an ability to analyze the impact of technology on individuals, organizations and society including ethical, legal and public policy issues.
(d) Collaborate in teams to accomplish a common goal by integrating personal initiative and group cooperation;
(e) Gain skills to communicate efficiently with technical and nontechnical people in the information technology field and effectively with clients, users, coworkers, and managers using written and oral communication as well as gain skills and strategies for facilitating group projects and activities in collaboration with peers.
(j) Identify and evaluate current and emerging technologies and assess their applicability to address the users' needs and recognize the need for continued learning throughout their career.
(k) Determine how information is inferred from data, and how decisions are made rationally on the basis of that information and ensure that data integrity and privacy is maintained as the organization processes information and acts on it.
(l) Prepare for graduate studies in information security, information systems, telecommunications, and other related information technology areas.

3.4. Curriculum Development Strategies

We used the following references during the curriculum design:

o ACM Computing Curricula Information Technology Volume 2005: The standard curriculum model recommended by the well-known standardization body in computing.

o ABET CAC Criteria for Computing Programs – Information Technology and Self-Study Questionnaire: The Computer Information Technology Program is being designed to inherently incorporate the new ABET 2007 Outcomes Assessment principles.

o Statewide Transfer Initiatives In Washington[10]: The program builds upon the new "Major Ready Pathways (MRP)" to ensure that the program will articulate well with all of the state's Community and Technical Colleges' technology programs.

o Example Curriculum: Since Rochester Institute of Technology became the first university in North America to offer a complete degree program in information technology in 1992, RIT curricula in BS in Information Technology[11], New Media Interactive Development[12], Applied Networking and System Administration[13], and Information Security and Forensics[14] are heavily referenced.

We considered the following objectives as important during the program design:

o Optimizing the number of new courses that will need to be initially developed at startup;

o Sharing curricula with the BS/BA courses in CSS, CES, and Applied Computing, and the Institute service courses where applicable.

o Strongly supporting Major Ready Pathways (MRP) by articulating UWT ITS's core courses with CTC's major courses.

o Allowing students a better opportunity to explore their choice of degree particularly in the junior year.

o Managing the ITS program as a cohort model to allow the program to be launched cost effectively with a minimum expectation of 10 students.

o Organizing the new courses so as to be able to use existing faculty expertise.

o Leverage CSS laboratories located in Cherry Parks and Science buildings when possible.

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[10] State Transfer Initiatives in Washington. September 2005.
http://www.washingtoncouncil.org/icrc/resources/documents/statewidetransferinitiatives.pdf
[11] BS in Information Technology Student Handbook. http://www.it.rit.edu/it/undergrad/itbs/BSIT_Handbook.pdf
[12] BS in New Media Interactive Development Student Handbook.
http://www.it.rit.edu/it/undergrad/newmedia/NM_Handbook.pdf
[13] BS in Applied Networking and System Administration Student Handbook.
http://www.nssa.rit.edu/~nssa/nssa/undergrad/netsyshandbook.pdf
[14] BS in Information Security and Forensic Student Handbook.
http://www.nssa.rit.edu/~nssa/nssa/undergrad/ISFhandbook.pdf

o   Leverage campus-wide classrooms, and wireless technologies to minimize the new facility costs and utilize the benefits of mobile computing.

3.5. Curriculum

The curricular guidelines mandated by the ABET CAC accreditation body that cover the ITS spectrum requires students have course work or an equivalent educational experience that includes:

(a) Coverage of the fundamentals of -
   1. The information systems and technologies including the topics of database design and modeling, human computer interaction, information process management, programming, networking, web systems and computer based communication technologies.
   2. Information assurance and security.
   3. Information systems analysis and administration.
   4. Information system design, integration and architecture planning.
(b) Technical project management, policy and governance, and understanding of various roles in a technology environment.
(c) Advanced course work that builds on the fundamental course work to provide conceptual and technical depth.

The ITS program combines the benefits of studying systems oriented technology and consists of the Information Technology and Information Systems tracks beyond the foundational coursework. The program consists of (a) 20 credits for program prerequisites, which can be considered general education credits, (b) 40 credits including math requirements as program specific core, (c) 30 credits for respective tracks, (d) 10 credits of internship-based senior project, and (e) 10 credits of free electives. Tracks have the ability to share courses to allow for breadth of study and uniqueness of a blended program experience.

3.5.1. General Education (90 credits)
Any undergraduate student at UW Tacoma must fulfill 90 credits of undergraduate requirements:

- VLPA (Visual, Literary, and Performing Arts, 10 credits)
- I&S (Individuals & Societies, 10 credits)
  o   TBUS 310 Effective Managerial Communications (5) is strongly recommended and can be used for I&S/VLPA/W credits
- NW (The Natural World, 10 credits)
- C/W (Composition/Writing, 15 credits)
  o   TCSS 325 Computers, Ethics, and Society is strongly recommended and can be used for I&S/VLPA/W credits
- Free Electives (45 credits)

3.5.2. Program Prerequisites (20 credits)

20 credits for program prerequisites, which can be considered general education credits, are required to prepare for the two ITS tracks. All ITS students should be competent in oral and written communication. They need effective programming skills. Students are expected, to have the skills, concepts, and capabilities necessary to effectively use information technology, including logical reasoning, managing complexity through the operation of computers and networks, and contemporary applications such as email, word processing, WWW, etc. They should be able to apply both quantitative and qualitative data analysis techniques. They should have a basic understanding of the main functional areas of an organization and should have been exposed to the role technology plays in a global society.

- o One English Composition or Technical Writing (5 credits)
  - TCSS 325 Computers, Ethics, and Society (5 credits, Strongly recommended, Can be used for W credits)
- o Basic Programming Skills (5 credits)
  - TINFO 200 Programming I for Information Professionals (5 credits, can be used for NW or Quantitative & Symbolic Reasoning (QSR) credits)
    - Replaceable with TINST 310 Computational Problem Solving (5 credits)
    - Replaceable with TCSS 142 Introduction to Object-Oriented Programming (5 credits)
- o Technical Skills, Concepts, and Capabilities (5 credits)
  - TINST 100 Fluency in Technology (5 credits, can be used for I&S credits)
    - Students may not receive credit for TINST 100 taken after TCSS 142. Therefore, TINST 100 will be waived for students who have already completed TCSS 142 or equivalent. If TINST 100 is waived, students make up the 5 credits by taking additional elective credits in the major.
- o Mathematics requirement (5 credits, one of the following math courses can be taken to satisfy the ITS program math requirement.)
  - TINFO 201 Discrete Math for Information Professionals (5 credits)
  - TQS 124 Calculus with Analytic Geometry I (5 credits)
  - TQS 301 Mathematics: A Quantitative Reasoning Approach (5 credits)

3.5.3. ITS Program Core (40 credits)

For core course number scheme, the following guidelines are employed:
- The core courses start at 300 level.
- The unit digit 0-7 is related to the ACM IT body of knowledge:
  0 - Programming Fundamentals (PF),
  1 - Information Management (IM),
  2 - System Administration and Maintenance (SA) and Platform Technologies (PT),
  3 - Web Systems (WS) and Integrative Programming Technologies (IPT),
  4 - Information Assurance and Security (IAS),
  5 - Networking (NET),
  6 - System Integration and Architecture (SIA),
  7 - Social and Professional Issues (SP).

- TINFO 300 Programming II for Information Professional (5 credits)
  - Advanced programming skills
- TINFO 301 Foundations of Information Management (5 credits)
  - Replaceable with TINST 311 Database Management and Data Analysis (5 credits)
- TINFO 302 Foundations of Hardware and Software Systems (5 credits)
- TINFO 303 Foundations of Web Design and Programming (5 credits)
- TINFO 304 Foundations of Information Assurance (5 credits)
- TINFO 305 Foundations of Information Networking (5 credits)
  - Replaceable with TINST 312 Computer Networks and the Internet (5 credits)
- TINFO 306 Foundations of Information Systems Analysis and Design (5 credits)
- TINFO 307 Business for Information Professionals (5 credits)
  - Replaceable with TINST 475 Entrepreneurship in Computing and Software Systems (5 credits)

3.5.4. Program Tracks (30 credits)

There are two tracks available for ITS majors: the Information Technology track and the Information Systems track. Students are encouraged to declare their track at the end of their junior year. Elective courses are selected by the student and approved by the student's advisor. Students must select at least 3 courses from their declared track to graduate in that track. They may choose 3 courses from the other track or choose additional courses from within their own track to complete the coursework requirements of 30 credits.

For track course number scheme, the following guidelines are employed:
- The elective courses start at 400 level.
- The unit digit of IT track electives is a number between 1 and 4.
- The unit digit of IS track electives is a number between 6 and 9.
- The unit digit of shared IT/IS track electives is 0 if the IT track offers it. Otherwise, it is 5 and the course is offered by the IS track
- The 10th place digit refers to the related ACM IT Body of Knowledge:
  0 - Programming Fundamentals (PF),
  1 - Information Management (IM),
  2 - System Administration and Maintenance (SA) and Platform Technologies (PT),
  3 - Web Systems (WS) and Integrative Programming Technologies (IPT)
  4 - Information Assurance and Security (IAS),
  5 - Networking (NET),
  6 - System Integration and Architecture (SIA),
  7 - Social and Professional Issues (SP).
  8 - Human Computer Interaction (HCI)

- Shared IT and IS tracks courses (4 courses)
  - TINFO 420 Systems Administration (5 credits)
  - TINFO 445 Digital Forensics (5 credits)
  - TINFO 460 Enterprise Information Systems (5 credits)

- o TINFO 485 Human & Computer Interactions (5 credits)

- IT Track (10 courses)
  - o TINFO 411 Database Client/Server Connectivity (5 credits)
  - o TINFO 421 Enterprise Systems Administration (5 credits)
  - o TINFO 431 Server Side Web Programming (5 credits)
    - Replaceable with TCSS 460 Client/Server Programming for Internet Applications (5 credits)
  - o TINFO 432 Web Portal Design, Implementation, and Administration
  - o TINFO 441 Network Security (5 credits)
    - Replaceable with TCSS 431 Network Security (5 credits)
  - o TINFO 442 Computer Security (5 credits)
    - Replaceable with TCSS 481 Computer Security (5 credits)
  - o TINFO 451 Routing and Switching (5 credits)
  - o TINFO 452 Network Services (5 credits)
    - Replaceable with TCSS 430 Networking and Distributed Systems (5 credits)
  - o TINFO 453 Wireless Data Networking (5 credits)
  - o TINFO 461 Programming for Enterprise Information Systems (5 credits)

- IS Track (10 courses)[15]
  - o TINFO 416 Data Warehousing and Mining (5 credits)
  - o TINFO 417 Information Search, Retrieval, & Presentation (5 credits)
  - o TINFO 446 Information Assurance Policies (5 credits)
  - o TINFO 447 Database Security (5 credits)
  - o TINFO 456 Global Communication Networks (5 credits)
  - o TINFO 466 Information System Theory (5 credits)
  - o TINFO 467 Requirements Engineering (5 credits)
    - Equivalent to ex-TCSS 350 Managing Technical Teams (5 credits)
  - o TINFO 468 IS Project Management (5 credits)
  - o TINFO 471 Medical Information Systems (5 credits)
  - o TINFO 472 Geographic Information Systems (5 credits)

3.5.5. Special Topic Course
- TINFO 490 Special Topics in Information Technology and Systems (5 credits)

3.3.6. Internship and Senior Project (10 credits)
- TINFO 497 Internship in ITS (5 credits)
- TINFO 498 Senior Project in ITS (5 credits)

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[15] TINFO 471 Medical Information Systems (5 credits), TINFO 472 Geographic Information Systems (5 credits) are two additional courses that may be developed in the IS track depending on faculty interest and expertise and may require changes to the ITS core. Hence, we keep them only as placeholders in the current proposal.

3.5.7. Others (2 credits, Maximum 6, Credit/no credit only. Does not carry credit toward the ITS degree)

- TINFO 396 ITS Workshop (2 credits)
  - o Required for students who do not meet the ITS competency. Must take a minimum of 2 and maximum of 6 credits of ITS Workshop.
- TINFO 496 Advanced IT Workshop (Minimum 2 and maximum 6 credits)
  - o Recommended for students with weak ITS competency to improve their competency level in a specific area.

3.6. Description of ITS Courses

TINFO 200 Programming I for Information Professionals
Catalog Description: Basic programming-in-the-small abilities and concepts including procedural programming (methods, parameters, return values), basic control structures (sequence, if/else, for loop, while loop), file processing, arrays and an introduction to defining objects.
Prerequisites: *TINST 100*
Credits: 5
Course Type: Prerequisite

TINFO 201 Discrete Mathematics for Information Professionals
Catalog Description: This course is an introduction to topics of discrete mathematics for students of Information Technology and Systems, including number systems, sets and logic, counting, matrices, relations, Boolean algebra, graph theory and regular sets.
Prerequisites: *TINST 100*
Credits: 5
Course Type: Prerequisite

TINFO 300 Programming II for Information Professionals
Catalog Description: Continuation of 200. Examines programming using traditional and visual development environments to learn event-driven, object-oriented design.
Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 301 Foundations of Information Management
Catalog Description: Covers fundamental data modeling and database implementation concepts. Topics include: data modeling process, basic relational concepts, normalization, relational algebra, SQL, and guidelines for mapping a data model into a relational database. Students model a relational database problem and implement it on a single machine using a commercially available database package.
Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 302 Foundations of Hardware and Software Systems
Catalog Description: Introduction to hardware and software systems functions. Topics include: CPU, memory, registers, addressing modes, busses, instruction-sets, multi processors versus single processors; peripherals: hard-disks and storage, display, device controllers, input/output; operating systems functions and types; process, memory and file system management; examples and contrasts of hardware architectures and operating systems.
Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 303 Foundations of Web Design and Programming
Catalog Description: Topics should include basic HTML, CSS and DHTML programming. Provide an overview of web design concepts, including usability, accessibility, in the context of the web. Address browser compatibility, object reusability (bandwidth issues), and various scripting environments. Emerging client-side web technology such as AJAX is explored. Programming is required.
Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 304 Foundations of Information Assurance
Catalog Description: Organizations need to be prepared to handle security violations. In this course, students will study the need for information security policies, standards , and procedures. Topics include: trust models, security policy design and incident response, tools and techniques to defend against, react to and recover from a cyber attack.
Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 305 Foundations of Information Networking
Catalog Description: Explores computer networking and telecommunications fundamentals including LANs, WANs, intranets, the Internet, and the WWW. Data communication concepts, models, standards, and protocols will be studied. Installation, configuration, systems integration and management of infrastructure technologies will be practiced in the laboratory'.
Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 306 Foundations of Information Systems Analysis and Design
Catalog Description: Study system design and integration methods, including structured analysis and object oriented approaches. Topics include: software life cycles, requirements analysis, and functional, physical, and operational architectures. Introduce software tools for systems design, architecture and integration. Team projects provide opportunity for design of information systems to solve a given problem.

Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 307 Business for Information Professionals
Catalog Description: The process of developing an information service in the field of Information Technology and Systems is studied. Student will prepare a plan for commercialization, and implement that plan. Includes lectures by information professionals who have experience and success in starting, and managing technology focused organizations.
Prerequisites: *TINFO 200 and a required math course (TINFO 201, TQS 124, or TQS 301)*
Credits: 5
Course Type: Core

TINFO 396 ITS Workshop
Catalog Description: ITS juniors enhance their competency and skills. Topics and approaches to achieve this may include lectures and lab sessions. Enrollment restricted to ITS students. Credit/no credit only. Cannot carry credit toward the ITS degree.
Prerequisites: *Permission of instructor required*
Credits: 5
Course Type: Elective for both IT and IS tracks

TINFO 411 Database Client/Server Connectivity
Catalog Description: Students learn to establish, configure, and test client-server and inter-server communications multiple database servers and multiple external clients. Similarities and differences among commercially available connectivity packages will be explored. Low-level data and file structures used in the implementation of databases and database indexing will be explored. Programming exercises are required.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 416 Data Warehousing and Mining
Catalog Description: This course provides an introduction to data warehousing and mining techniques. Topics include: OLAP, OLTP, Data Cubes, Data integration, Web Analytics, Market-Basket Analysis, Classification techniques, and Clustering. The students learn by engaging in problem solving on real-world public domain datasets and applying appropriate warehousing and mining strategies throughout the quarter.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IS track only

TINFO 417 Information Search, Retrieval, & Presentation
Catalog Description: Introduction to information needs, database and information organization and structure, Web and database searching and browsing, and information

presentation. Examination of underlying principles in knowledge representation, indexing, record structures, online search process, search strategies and tactics, assessment of user needs, reference interviewing, post-processing, organization and presentation of information.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IS track only

TINFO 420 Systems Administration
Catalog Description: System Administration topics focused on platform integration, active directory, authentication, and user support services are explored. Topics will include security issues, user and group administration, directory services, electronic system update and maintenance, backup and restoration strategies and techniques, integrated mass storage technologies and alternative client technologies.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for both IT and IS tracks

TINFO 421 Enterprise Systems Administration
Catalog Description: The management of information technology services in enterprise environments involves a high degree of complexity due to issues of scale and heterogeneity. This course enhances understanding of these issues by building enterprise context around technologies. Students explore technologies available for enterprise-scale environments, including virtualization of services, computing grids, and clusters.
Additional Description: Students will also discuss issues related to the role of information technology in large organizations and the facilitation of that role by system administrators through the use of policies and procedures, project planning, budgeting and financial analysis, disaster planning, and incident response.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 431 Server Side Web Programming
Catalog Description: The World Wide Web is no longer static html documents linked together. Pages are dynamically generated to interact with a user on the fly, validate user inputs and entertain. This course is an overview of several forms of programming that are used in the creation of such interactive and dynamic Web content.
Additional Description: This course provides a practical overview of programming in the context of the World Wide Web. It will enable students to develop Web pages and Web sites that incorporate both client-side and server-side programming by installing and modifying existing scripts as well as writing new scripts. Investigates a service-oriented computing paradigm for use with the Internet, web services. Includes service oriented architecture, web services concepts, web services technologies, service compositions, business process design and execution, service-oriented programming, service directory and broker, service consumer, and service producers. Programming is required.

Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 432 Web Portal Design, Implementation, and Administration
Catalog Description: Standard portal technologies such as WSRP and JSR are introduced. Topics include: organizing information in an intuitive, coherent manner, creating a modular, adaptable framework for application integration, developing robust, scalable architectures, improving search and navigation, and implementing collaborative content management. Emphasize industry best practices. Programming assignments required.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 441 Network Security
Catalog Description: Covers cryptographic methods including public and private key algorithms. Examines protocols that utilize such methods, such as secure email, digital signatures, authorization, e-voting, and electronic cash. Examines the fundamentals of security issue arising from computer networks, such as DoS. Includes lab component for demonstration of security techniques such as firewalls, intrusion detection systems, and virtual private networks.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 442 Computer Security
Catalog Description: Discusses the theoretical and practical issues surrounding computer security and data protection. Explores formal models of encryption and authentication. Examines operating system and program security with vulnerabilities analyses.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 445 Digital Forensics
Catalog Description: This course investigates the many facets of computer and network security and forensics. Students gain an understanding of intrusion detection, evidence collection and presentation, network auditing, network security policy design and implementation. The issues and facilities available to the intruder and data network administrator will be examined using hands-on laboratory exercises.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for both IT and IS tracks

TINFO 446 Information Assurance Policies
Catalog Description: This course focuses on the formulation of effective and implementable security policy. The course acquaints students with many issues involved with privacy and

security policies as outlined by various national and international governmental and industrial bodies. Topics include: Information Assurance, Cyber-Security, Economics of Cyber Crime, Privacy policies, and Legal Issues.

Additional Description: The course will be highly interactive, and student presentations will be involved, as will case study analysis. A term paper is expected.

Prerequisites: *Completion of ITS core courses.*

Credits: 5

Course Type: Elective for IS track only

TINFO 447 Database Security (5 credits)

Catalog Description: Covers fundamental database security concepts with a focus on the confidentiality and integrity requirements for database management systems. Topics include: access control, database vulnerabilities and defenses, multilevel security, privacy and legal issues, and security in data mining applications. Students will learn the implementation of database security on modern business databases through hands-on projects.

Prerequisites: *Completion of ITS core courses.*

Credits: 5

Course Type: Elective for IS track only

TINFO 451 Routing and Switching

Catalog Description: This course is a laboratory-based course on the establishment of a data stream across the Internet. The focus is on providing a TCP/IP data stream for higher level services to operate over. It is primarily concerned with the network layer and below. Protocol suites other than TCP/IP may be studied. Students will learn how to connect together computers in a network, and then how to connect the separate networks together to form an inter-network. Bridging and switching concepts are investigated (such as the resolution of bridging loops through the appropriate algorithms). Routed and routing protocols and algorithms are studied and implemented.

Prerequisites: *Completion of ITS core courses.*

Credits: 5

Course Type: Elective for IT track only

TINFO 452 Network Services

Catalog Description: An investigation of the tasks of selecting, configuring and administering services in an internetworking environment. Topics include the TCP/IP protocol suite, service administration including DHCP, DNS, SSH, and Kerberos. Students completing this course will have experience in administering an inter-network of computers with a variety of these services as well as an understanding of the similarities and differences between protocols in the TCP/IP suite (TCP and UDP).

Prerequisites: *Completion of ITS core courses.*

Credits: 5

Course Type: Elective for IT track only

TINFO 453 Wireless Data Networking

Catalog Description: This course is designed to provide students with an understanding of the principles and concepts of radio and optical communication as they apply to wireless data networking for local area networks and peripherals. Topics will include an examination of modulation techniques, measurement standards, nomenclature, equipment and theory behind transmissions in this portion of the electromagnetic spectrum, WLANs, wireless network operation, network integration, construction and network design.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 456 Global Communication Networks
Catalog Description: The concentration of media ownership is a topic of heated debate in global media politics. The ability of transnational television networks to reach viewers across national boundaries creates much anxiety among various national governments who feel foreign programming corrupts local cultures. Several media scholars and national elites feel that the objective of the mass media in the age of globalization has shifted from creating a public sphere of information-seekers to creating a public sphere of consumers. Topics include: Global news and information flow in the Internet age, Communication and culture, The Global Implications of the Internet: Challenges and Prospects, and role of information dissemination systems.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IS track only

TINFO 460 Enterprise Information Systems
Catalog Description: This course focuses on advanced systems support issues for Enterprise Resource Planning (ERP) systems. Students learn how to manage the operating system(s), database(s), and applications software within a large ERP system used to support a global organization with multiple sites/companies. Concepts, issues, current trends, decision-making, and troubleshooting are addressed through a multi-layered view of the system.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for both IT and IS tracks

TINFO 461 Programming for Enterprise Information Systems
Catalog Description: Introduction to the basic ABAP/4 programming language. Skills needed to create and maintain ABAP software programs. There will be opportunity to produce ABAP/4 code for real world implementation and use. Topics include ABAP/4 syntax, table processing in ABAP/4, ABAP/4 data types, structures, and ABP/4 Open SQL.
Additional Description: The student will demonstrate acquisition of skills through class exercises, tests and quizzes, and practical programming assignments using the ABAP/4 programming language.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IT track only

TINFO 466 Information Systems Theory
Catalog Description: Students will be exposed to information theory and its implications on Information Systems. Topics include: Information measures and their properties- entropy, divergence, mutual information, channel capacity. Shannon's fundamental theorems for data compression and coding for noisy channels with applications in telecommunications, statistical inference, informatics and computing are explored.
Additional Description: Application of these theories to the successful implementation and design of information flows in organizations and to the roles of management, users, and IS professionals are presented.
Prerequisites: *Completion of ITS core courses.* **TQS 124[16] or TQS 301[17].**
Credits: 5
Course Type: Elective for IS track only

TINFO 467 Requirements Engineering
Catalog Description: The purpose of the course is to introduce the students to the basic concepts of requirements engineering, and the phases and methods used in developing and managing software systems. Topics include: Software requirements elicitation, analysis and documentation, team process infrastructure and resource estimation to support appropriate levels of quality, and software architectural design.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IS track only

TINFO 468 IS Project Management
Catalog Description: An introduction to project management, with an emphasis on the integrative nature of the process. Topics include: Project environment and organization, Project life cycle definitions, Major elements in the project management process from selection to termination, Project manager roles in the organization, Cost/Benefit Analysis, Task dependency network (PERT/CPM), Schedule development, Resource requirements and impacts.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for IS track only

TINFO 485 Human and Computer Interactions
Catalog Description: Human Computer Interaction (HCI) covers how humans interact with software and hardware interfaces. This course focuses on theories of human information processing, human behavior and their implications for user-centered design of interfaces. Topics include: HCI history, cognitive psychology, user analysis, task analysis, and requirements analysis in the usability engineering process.
Prerequisites: *Completion of ITS core courses.*

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[16] TQS 124 Calculus with Analytic Geometry I
[17] TQS 301 Mathematics: A Quantitative Reasoning Approach

Credits: 5
Course Type: Elective for both IT and IS tracks

TINFO 490 Special Topics in Information Technology and Systems
Catalog Description: Examines current topics and issues associated with Information Technology and Systems.
Prerequisites: *Completion of ITS core courses.*
Credits: 5
Course Type: Elective for either IT or IS tracks

TINFO 496 Advanced IT Workshop
Catalog Description: It is a service course for ITS senior students to enhance competency in skills. Topics and approaches vary. Includes lectures and lab sessions. Enrollment restricted to ITS students. Credit/no credit only. Does not carry credit toward the ITSS degree.
Prerequisites: *Must be a senior. Permission of instructor required.*
Credits: 5
Course Type: Elective for both IT and IS tracks

TINFO 497 Internship in ITS
Catalog Description: Project as outlined in a contract between student, faculty advisor, and community sponsor. The topics should be carried to senior project in ITS.
Prerequisites: *Completion of ITS core courses. Permission of instructor required.*
Credits: 5
Course Type: Elective for IS track only

TINFO 498 Senior Project in ITS
Catalog Description: Under ITS coordinator supervision, each student or team prepares a plan for a senior project with an advisor from the industry. This plan includes project definition, project requirements, preliminary design, and work schedule. Requirements and design shall address human factors, safety, reliability, maintainability, and customer cost. Oral and written updates and reports are required.
Additional Description: Students may do the project in teams of 3-5. Interested faculty members may participate as advisors/facilitators for projects.
Prerequisites: *TINFO 497*
Credits: 5
Course Type: Elective for IS track only

3.7. Coursework Dependency
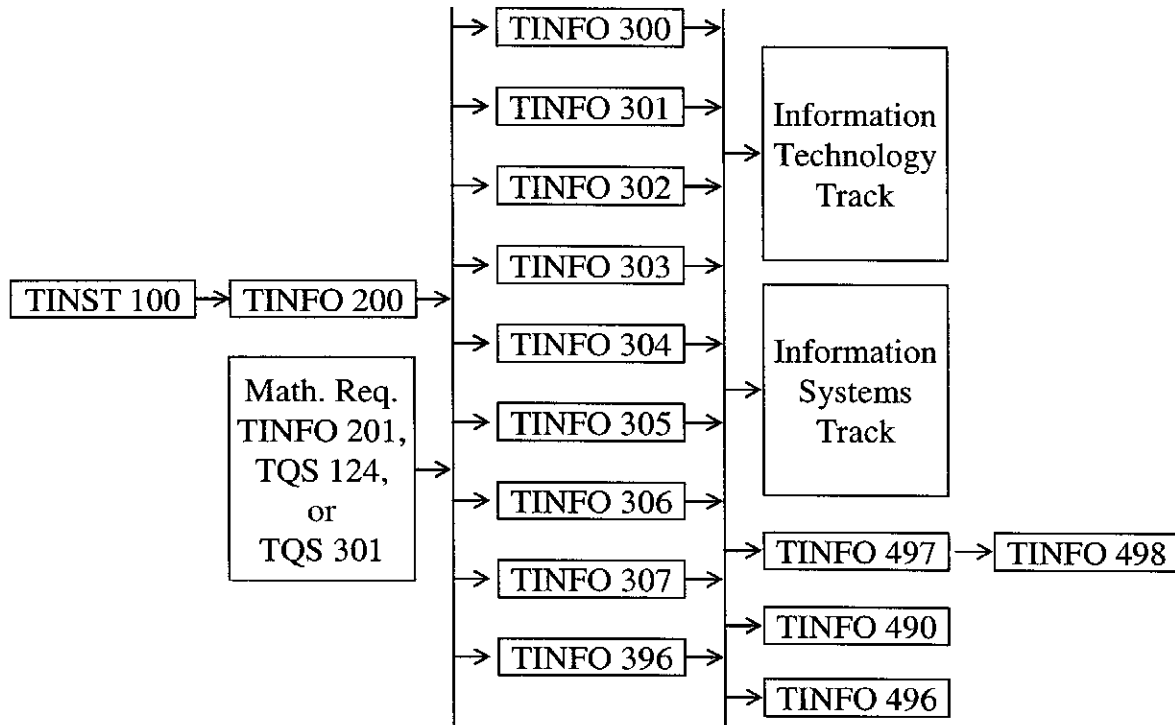
Figure 7: Course Dependency for ITS Program

The dependency between various ITS courses is seen in Figure 7. Incoming freshmen can take TINST 100[18] course, which is a service course offered in the Institute of Technology to explore computing. Then, a student interested in the ITS degree program needs to take a programming course and fulfill the math requirement in their sophomore year: i.e. TINFO 200[19] and one of the math requirement courses such as TINFO 201[20], TQS 124[21], or TQS 301[22]. The student should then take three (autumn and winter quarters) or two (spring quarter) other core courses during his or her junior year, totaling to 8 courses, following the cohort model we suggest. If the student does not have enough competencies in skills in junior year, the student may take TINFO 396[23] to enhance his or her skills during junior year. This course does not earn credit towards the ITS degree. After earning a broad spectrum of concepts and skills in ITS through eight common core courses, the student must declare his or her interest in either the Information Technology or the Information Systems tracks as shown in Figure 8. The student then files a degree plan with their advisor, and takes 6 electives. The student must complete at least 3 electives from their

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[18] TINST 100 Fluency In Information Technology
[19] TINFO 200 Programming I for Information Professionals
[20] TINFO 201 Discrete Math for Information Professionals
[21] TQS 124 Calculus with Analytic Geometry I
[22] TQS 301 Mathematics: A Quantitative Reasoning Approach
[23] TINFO 396 ITS Workshop for Internship and Senior Project

selected track. The student can select the other 3 courses either from another track or from within their declared track. Each track as currently outlined has a choice of 9 or 10 elective courses providing significant diversity and scope for exploration. A few of these electives are common to both the tracks: TINFO 420[24], 445[25], 460[26], and 485[27]. Since electives in each track may be offered only during specific quarters, it is important for the student to discuss their degree plan with their advisor. If a senior student needs additional skills for comprehending the advanced topics, the student may take TINFO 496[28]. TINFO 496 does not earn credit towards the ITS degree. The student may take an internship course TINFO 497[29] during the summer of their junior year and then take the senior project course TINFO 498[30] in the following spring quarter of the senior year.

Information Technology Track	Information Systems Track
TINFO 420	TINFO 420
TINFO 445	TINFO 445
TINFO 460	TINFO 460
TINFO 485	TINFO 485
TINFO 411	TINFO 416
TINFO 421	TINFO 417
TINFO 431	TINFO 446
TINFO 432	TINFO 446
TINFO 441	TINFO 447
TINFO 442	TINFO 466
TINFO 451	TINFO 467
TINFO 452	TINFO 468
TINFO 453	TINFO 471
TINFO 453	TINFO 472

Figure 8: IT and IS track courses available after the common program core

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[24] TINFO 420 Systems Administration
[25] TINFO 445 Digital Forensics
[26] TINFO 460 Enterprise Information Systems
[27] TINFO 485 Human & Computer Interactions
[28] TINFO 496 Advanced IT Workshop for Internship and Senior Project
[29] TINFO 497 Internship in ITS
[30] TINFO 498 Senior Project in ITS

3.8. Sample Degree Plans

Two sample degree plans for an undergraduate student in the ITS program are shown in Table 4. Up to junior year, all ITS students share the same degree plan. Once they choose their track during the senior year, students can have different degree plans for their own track. Also, each student can have flexibility in taking his or her internship.

Table 4: Degree Plan Model for BS in ITS Program

	FRESHMAN YEAR			Equivalent
Course No.	Title	Autumn		
	English Composition I (UWT Cohort)	5		
	Humanities (VLPA) (UWT Cohort)	5		
	Free Elective	5		
			Winter	
	Social Science (I&S) (UWT Cohort)		5	
	Free Elective		5	
	Free Elective (UWT Cohort)		5	
				Spring
TINST 100	Fluency in Technology			5
	Free Elective (UWT Cohort)			5
	Free Elective			5
	TOTAL UNITS	**15**	**15**	**15**

	SOPHOMORE YEAR			Equivalent
Course No.	Title	Autumn		
	English Composition II or Technical writing	5		
	Free Elective	5		
TINFO 200	Programming I for Information Professionals	5		TINST 310
			Winter	
	Humanities (VLPA)		5	
	Free Elective		5	
	Free Elective		5	
				Spring
TINFO 201	Discrete Math for Information Professionals			5	IT Track
TQS 301	Mathematics: A Quantitative Reasoning Approach			5	IS Track
	Social Science (I&S)			5	
	Free Elective			5	
	TOTAL UNITS	**15**	**15**	**15**

	JUNIOR YEAR			Equivalent
Course No.	Title	Autumn		
TINFO 300	Programming II for Information Professional	5		
TINFO 302	Foundations of Hardware and Software Systems	5		
TINFO 303	Foundations of Web Design and Programming	5		
TINFO 396	ITS Workshop	2		
			Winter	

TINFO 301	Foundations of Information Management		5		*TINST 311*
TINFO 306	Foundations of Info. Systems Analysis & Design		5		
TINFO 307	Business for Information Professionals		5		*TINST 475*
TINFO 396	ITS Workshop		2		
				Spring	
TINFO 304	Foundations of Information Assurance			5	
TINFO 305	Foundations of Information Networking			5	*TINST 312*
	Free Elective			5	
TINFO 396	ITS Workshop			2	
	TOTAL UNITS	**17**	**17**	**17**	

	SENIOR YEAR (IT Track)				*Equivalent*
Course No.	Title	Autumn			
TINFO 420*	Systems Administration	5			
TINFO 445*	Digital Forensics	5			
TINFO 452	Network Services	5			*TCSS 430*
TINFO 496	Adv. ITS Workshop	2			
			Winter		
TINFO 431	Server Side Web Programming		5		*TCSS 460*
TINFO 441	Network Security		5		*TCSS 431*
TINFO 496	Internship in ITS		5		
				Spring	
TINFO 442	Computer Security			5	*TCSS 481*
	Free Elective**			5	*TCSS 325*
TINFO 498	Senior Project in ITS			5	
	TOTAL UNITS	**17**	**15**	**15**	

*This course will be shared with the IS track.
**TCSS 325 Computers, Ethics, and Society course is strongly recommended.

	SENIOR YEAR (IS Track)				*Equivalent*
Course No.	Title	Autumn			
TINFO 420*	Systems Administration	5			
TINFO 445*	Digital Forensics	5			
TINFO 416	Data Warehouse and Mining	5			
TINFO 496	Adv. ITS Workshop	2			
			Winter		
TINFO 466	Information System Theory		5		
TINFO 468	IS Project Management		5		
TINFO 496	Internship in ITS		5		
				Spring	
TINFO 417	Information Search, Retrieval, & Presentation			5	
	Free elective*			5	
TINFO 498	Senior Project in ITS			5	
	TOTAL UNITS	**17**	**15**	**15**	

* This course will be shared with the IT track.
**TCSS 325 Computers, Ethics, and Society course is strongly recommended.

3.9. Sample Course Launch Plan

Two sample course launch plan for 2009-2010 and 2010-2011 academic years are shown in Table 5 and 6, respectively. We assume that two current faculty members (Dr. Sam Chung and Dr. Ankur Teredesai), two new ITS faculty (New ITS 1, and ITS 2), and two adjunct faculty (Adjunct 1 & 2) are available. Also, UW Tacoma and the local Community and Technical Colleges (CTC) have articulation agreements to teach TINFO 201 at CTCs.

Table 5: Sample Course Launching Plan for 2009-2010

Course No.	Title	A	W	S	Instructor
TINFO 300	Programming II for Information Professional	5			New ITS 1
TINFO 302	Foundations of Hardware and Software Systems	5			Ankur
TINFO 303	Foundations of Web Design and Programming	5			Sam
TINFO 396	ITS Workshop	2			Sam
TINFO 200	Programming I for Information Professionals	5			TINST 310
TINFO 301	Foundations of Information Management		5		New ITS 1
TINFO 306	Foundations of Info. Systems Analysis & Design		5		Ankur
TINFO 307	Business for Information Professionals		5		TINST 475
TINFO 396	ITS Workshop		2		Sam
TINFO 304	Foundations of Information Assurance			5	New ITS 1
TINFO 305	Foundations of Information Networking			5	New ITS 1
TINFO 396	ITS Workshop			2	Sam
TINFO 201	Discrete Math for Information Professionals			5	CTC
	Free elective			5	UWT
TINST 100	Fluency in Technology			5	INSTTECH
	TOTAL UNITS (Credits (# of courses, # of overlapping courses))	**22(5, 1)**	**17 (4, 1)**	**27(6, 2)**	

A: Autumn, W: Winter, S: Spring

Table 6: Sample Course Launching Plan for 2010-2011

Track	Course No.	Title	A			Instructor
IT/IS	TINFO 420	Systems Administration	5			*New ITS 1*
IT/IS	TINFO 445	Digital Forensics	5			*New ITS 2*
IT	TINFO 452	Network Services	5			*TCSS 430*
IS	TINFO 416	Data Warehouse and Mining	5			*New ITS 2*
	TINFO 496	Adv. ITS Workshop	2			*Ankur*
	TINFO 300	Programming II for Information Professional	5			*New ITS 1*
	TINFO 302	Foundations of Hardware and Software Systems	5			*Ankur*
	TINFO 303	Foundations of Web Design and Programming	5			*Sam*
	TINFO 396	ITS Workshop	2			*Sam*
	TINFO 200	Programming I for Information Professionals	5			*TINST 310*
				W		
IT	TINFO 431	Server Side Web Programming		5		*New ITS 1*
IT	TINFO 441	Network Security		5		*New ITS 2*
IT/IS	TINFO 496	Internship in ITS		5		*Sam*
IS	TINFO 446	Information System Theory		5		*New ITS 2*
IS	TINFO 417	Information Search, Retrieval, & Presentation		5		*New ITS 1*
	TINFO 301	Foundations of Information Management		5		*Ankur*
	TINFO 306	Foundations of Info. Systems Analysis & Design		5		*Ankur*
	TINFO 307	Business for Information Professionals		5		*TINST 475*
	TINFO 396	ITS Workshop		2		*Sam*
					S	
IT	TINFO 442	Computer Security			5	*New ITS 2*
IS	TINFO 468	IS Project Management			5	*Ankur*
IT/IS	TINFO 498	Senior Project in ITS			5	*Sam*
	TINFO 304	Foundations of Information Assurance			5	*New ITS 1*
	TINFO 305	Foundations of Information Networking			5	*New ITS 1*
	TINFO 396	ITS Workshop			2	*Sam*
	TINFO 201	Discrete Math for Information Professionals			5	*CTC*
		Free elective for juniors			5	*UWT*
		Free elective fro seniors			5	*TCSS 325*
	TINST 100	Fluency in Technology			5	*INSTTECH*
		TOTAL UNITS (Credits (# of courses, # of overlapping courses))	**43(10, 2)**	**42(9, 1)**	**47(10, 2)**	

A: Autumn, W: Winter, S: Spring

4. Students

In this section, we first describe the expected number of student enrollment at UWT in the ITS program over its initial five years and provide an analysis of these estimates. Freshmen, transfer students, and community college graduates make up the student population of the proposed ITS program. The options for students to take upper division majors in technology areas of four-year universities in western Washington are very limited. The ITS program caters to three possible student pathways as we briefly mentioned earlier. The student advising system is an important constituent of the program, providing the students opportunities for interaction with faculty as advisors and we briefly describe it here. We also plan to develop possible articulation agreements between related technology programs of local community and technical colleges.

4.1. Student Enrollment Target

Table 7 illustrates our anticipated FTE and headcount growth over the first five years.

Table 7: The expected student enrollment target during the first five years

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
	2009-2010	*2010-2011*	*2011-2012*	*2012-2013*	*2013-2014*
Head count(FTE)	10	20	40	80	80
SCH*	450	900	1800	3600	3600

*SCH= Annual number of credit hours that this program will generate. A full-time student will take 15 credits per quarter and total 45 credits during an academic year.

Pathways toward ITS degree program: To fulfill the expectation of UW Tacoma on this new BS in ITS degree program, we first analyze three pathways to its degree program: freshmen, transfer, and post-associate students. The ITS program can attract new freshman students who are more interested in application of information technologies and systems to real word problems with heavy human relations. Instead of being serious software developers or computer scientists who are interested in about how computers work "under the hood", the ITS students tend to care more about how people use computers. They approach technology from the user's perspectives rather than from the computer's ones. The computer is just a powerful tool for doing a great many things to the IT professionals. Approximately 188 students were accepted into the first freshman class in 2006 and 8% of them (15 students) had enrolled in CSS program as their major. This figure shows that a certain amount of students will show their interests in this new ITS program.

Also, since most of community and technical colleges provides IT related degrees such as Associate in Science or Technology that may not be directly transferred to a 4-years college, the new ITS program can provide another transfer opportunity for community college students who have difficulty in transferring their credits to upper-division major courses. UW Tacoma conducted a survey in June 2007 to find how much students of a local community college is interested in any of the new majors proposed. The recent survey based study of three community colleges, which is shown in Table 8, indicated that:

- Out of 229 respondents at Pierce College 52 responded that they'd join the ITS program at UWT (22.71%, it was ranked as the fourth choice).
- Out of the 77 respondents at Tacoma Community College 17 responded that they'd join the ITS program at UWT (22.08%, it was ranked as the fourth choice).
- Out of the 65 respondents at South Puget Sound Community College 25 responded that they'd join the ITS program at UWT (38.46%, it was ranked as the first choice).

Table 8: UW Tacoma Community College Survey (June 2007)

Q	New Major	Pierce			Tacoma			South Puget Sound		
	# of responses	229			77			65		
	# of non-responses	18			9			5		
		F	P	R	F	P	R	F	P	R
1	Biology BS	46	20.09%		46	20.09%		10	15.38%	
2	**Computer Information Technology and Information Science BS**	52	22.71%	4	52	22.71%	4	25	38.46%	1
3	Education BA	57	24.89%	3	57	24.89%	3	15	23.08%	4
4	Fine Arts BA	30	13.10%		30	13.10%		4	6.15%	
5	Health BS	69	30.13%	2	69	30.13%	2	18	27.69%	3
6	History BA	36	15.72%		36	15.72%		6	9.23%	
7	Human Rights BA	23	10.04%		23	10.04%		5	7.69%	
8	Non-profit Management BA	27	11.79%		27	11.79%		5	7.69%	
9	Psychology BS	77	33.62%	1	77	33.62%	1	22	33.85%	2
10	Systems Engineering BS	26	11.35%		26	11.35%		9	13.85%	
11	Other:	37	16.16%		37	16.16%		11	16.92%	

F: Frequency, P: Percentage, R: Rank

Also, the survey indicates that 18.8% of total 371 students, 94 students, showed their interest in the new ITS program. According CSS 2005-2006 statistics, out of 312 inquiries, 20% of them, 63 students, enrolled the CSS program. If we follow this trend, it is anticipated that 18.8 students may enroll this new program which is a sufficiently large number to motivate the consideration of this new program.

In addition, this program will encourage many IT professionals who are working in IT industry after receiving their associates or bachelors degree. Although they are familiar with modern information technologies and have professional working experience, they have to pursue a 4-year degrees (many times from scratch) since their earned credit cannot be directly transferred to the existing CSS or CES programs at UW Tacoma. Contrary to this, the ITS program is more suitable to these types of students. During 2005-2006, among 63 students actually enrolled in CSS program, 22% of them already have an Associates or Bachelors degree with work experience. The ITS program aims to provide a pathway for such students to study at UW Tacoma.

4.2. Student Advising

ITS students need timely advising about the program's requirements and their career alternatives by qualified individuals. The ITS students can get valuable guidance on how to complete the program through (a) the ITS recruiter, (b) their ITS academic advisor, (c) their ITS faculty advisor,(d) the ITS internship coordinator, and (f) their ITS senior project advisor and coordinator:

- ITS recruiters advise perspective students on admission requirements and articulation agreements between the various regional CTC IT and IS related programs and this UW Tacoma ITS program.
- An academic advisor is a professional staff member to guide formal processing of student admission and credits for graduation. The ITS academic advisor guides enrolled students to take proper courses to meet graduation requirements and check whether each student has direct contacts with his or her faculty advisor. The ITS academic advisor will prepare a list of students advisees for each faculty member.
- An ITS faculty advisor helps the ITS student prepare his or her degree plan. All faculty members of the ITS program will advise a group of students they are assigned and meet with them regularly. . All students are required to meet their faculty advisor before their course registration at every quarter. Through such faculty advising, the students can receive feedback on their choices for track selection and career preparation.
- The ITS internship coordinator guides a student to prepare for internships to gain industry experience. Typically, the internship coordinator is a member of professional staff that has strong relationships with the ITS degree program and the IT industry.
- The senior projects are managed by the senior-project coordinator and project advisors. The designated senior-project coordinator runs the senior project courses which require a 1 hour mandatory meeting each week. In addition, each senior project needs its project advisor who is an ITS faculty member.

4.3. Articulation

One of the benefits of the ITS program at UW Tacoma is to encourage many local and regional Community and Technical College (CTC) students to transfer to the ITS program if they wish to continue on a four year pathway towards a bachelorette degree. By allowing major courses in Applied Science and Technology degree programs that the students earned to be transferred to this program, a transfer student can focus on advanced studies in their major, and on the university experience and requirements that they did not obtain at the CTC.

5. Faculty and Administration

5.1. Faculty and Administration Requirements

In order to estimate the faculty and administration requirements for the new program over the first five years, we begin by estimating the number of courses that is required to be offered in the program. These estimates are derived from the targeted student FTE for the course of first five years as outlined in the previous section. In addition to student FTE, the following assumptions are made to arrive at the estimates: (a) Each full time faculty offers 6 courses each year, (b) Only upper division students, juniors and seniors, are considered for coursework computation. (c) We assume that all junior students will be promoted to senior status each year, (d) All courses are provided by the ITS program unit. Hence, although some courses may be borrowed from other program units, it needs strong articulation between these program units. (e) Three prerequisite courses are provided for freshmen and sophomores. (f) The maximum classroom size for a junior course is 30. If the number is bigger than 30, the course requires two sections be opened, and (g) the recommended classroom size for a senior course is 15.

Table 12 shows the estimated faculty size based upon the predicted student enrollment. Also, the role of administration and staff is critical to the ITS program right from the beginning as described in Table 13.

Table 12: Faculty Size and Workload

	Year1	Year2	Year3	Year4	Year5
FTE	10	20	40	80	100
SCH	450	900	1800	3600	4500
# of headcounts	10	20	40	80	100
# of new enrollments (or juniors)	10	10	30	50	50
# of seniors	0	10	10	30	50
Prerequisite (# of courses (# of credits))	3(15)	3(15)	3(15)	3(15)	3(15)
Core (# of courses (# of credits))	8(40)	8(40)	16(40*2)	16(40*2)	16(40*2)
Electives IT Track (# of courses (# of credits))	0	3(15)	3(15)	3(15)	6(30)
Electives IS Track (# of courses (# of credits))	0	3(15)	3(15)	3(15)	6(30)
Internship (# of courses (# of credits))	0	1(5)	1(5)	2(5*2)	2(5*2)
Senior Project (# of courses (# of credits))	0	1(5)	1(5)	2(5*2)	2(5*2)
ITS Workshop (# of courses (# of credits))	1.2(6)	1.6(8)	1.6(8)	1.6(8)	1.6(8)
Total (# of courses (# of credits))	12.2(61)	20.6(103)	28.6(143)	30.6(153)	36.6(183)
Faculty FTE Requirement	2.5	3.5	5.5	5.5	6.5

Table 13: Faculty Loads in the ITS program

	Degree	Rank	Status	Year1	Year2	Year3	Year4	Year5
Ankur Teredesai	Ph.D.	Associate	Fulltime	50%	50%	50%	50%	60%
Sam Chung	Ph.D.	Associate	Fulltime	50%	50%	67%	67%	67%
Open	Ph.D.	Assistant Associate	Fulltime	100%	100%	100%	100%	100%
Open	Ph.D.	Assistant	Fulltime	-	100%	100%	100%	100%
Open	Ph.D.	Assistant	Fulltime	-	-	-	-	100%
Open	M.S.	Senior Lecturer	Part-time Full-time	-	-	100%	100%	100%
Open	M.S.	Lecturer	Part-time Full-time	50%	50%	67%	100%	100%
Open	M.S.	Lecturer	Part-time	-	-	67%	17%	33%
Total Course Load	-	-	-	15	21	33	33	39
FTE Faculty Load	-	-	-	2.50	3.50	5.51	5.34	6.6

Table 14 below shows the estimated administrative load for the first five years. The ITS program requires continued effort to manage the tracks and develop new electives in the tracks, defining the role for track coordinators. Cross-track collaboration and program management will be overseen by the program director and IT/IS coordinators. In order to advertize the new program and meet prospective students, the efforts of a recruiter are required at startup. Since several key components of the ITS program focus on hands-on learning in the labs and studio classrooms, it needs system support from a qualified systems administrator. A mandatory internship-based senior project is part of the ITS program experience. It needs a person to coordinate student internships with industrial partners.

Table 14: Administration and Staff Requirements of the ITS program

Title	Name	Year1	Year2	Year3	Year4	Year5
Office Assistant II			25%	25%	50%	50%
Program Director	Orlando Baiocchi	10%	10%	10%	10%	10%
Associate Program Director	Larry Wear	10%	10%	10%	10%	10%
IT Program Coordinator	Sam Chung	17%	17%	17%	33%	33%
IS Program Coordinator	Ankur Teredesai	17%	17%	17%	33%	33%
Program Administrator	Open	10%	10%	10%	10%	10%
Recruiter	Elizabeth Jeffrey	40%	60%	60%	60%	60%
Advisor (Entry Level)	Open	10%	40%	40%	40%	40%
System Administrator	Stephen Rondeau	50%	50%	100%	100%	100%
Internship Coordinator	Andrew Fry	0%	17%	33%	50%	50%
Administration FTE		163%	256%	322%	396%	396%

5.2. Faculty Expertise

Table 15 lists the various ITS courses and the faculty currently affiliated with the University of Washington that are experts in teaching them. The table also demonstrates the variety of expertise available through the Institute of Technology to offer a broad track based ITS program. There are some courses that the ITS program borrows from existing programs. The ITS student body taking these courses will be different, and we expect that the courses will include hands-on exposure to newer technologies and topics delineating them from their traditional CSS versions. Hence, the idea is to bootstrap the courses initially for the first 3-5 years of program startup but eventually it is envisioned that these courses will evolve separately from their current versions and lists of topics covered, and teaching methodology there by reducing the overlap between faculty members covering courses for both programs.

Table 15: Faculty Expertise Available for Various ITS and Related Course-work[31].

	ITS Courses	Equivalent or Related Courses	Faculty	Program
P	TINST 100 Fluency in Information Technology	TINST 100 Fluency in Information Technology	Lou Ann Banks	INST
	TCSS 325 Computers, Ethics, and Society	TCSS 325 Computers, Ethics, and Society	Donald Chinn, Josh Tenenberg, Ankur Teredesai	CSS, INST
	TINFO 200 Programming I for Information Professionals	TINST 310 Computational Problem Solving	Sam Chung	INST
	TINFO 201 Discrete Math for Information Professionals		Peter Horak Sam Chung	IAS ITS
		TQS 124 Calculus with Analytic Geometry I		IAS
		TQS 301 Mathematics: A Quantitative Reasoning Approach		IAS
C	TINFO 300 Programming II for Information Professional		Sam Chung, Ankur Teredesai	ITS/CSS ITS/CSS
	TINFO 301 Foundations of Information Management	TINST 311 Database Management and Data Analysis	Lou Ann Banks	INST
	TINFO 302 Foundations of Hardware and Software Systems		Stephen Rondeau Sam Chung Ankur Teredesai	INST ITS/CSS ITS/CSS
	TINFO 303 Foundations of Web Design and Programming		Sam Chung	ITS/CSS
	TINFO 304 Foundations of Information Assurance		Barbara Endicott-Popovsky	CIAC
	TINFO 305 Foundations of Information Networking	TINST 312 Computer Networks and the Internet	Don McLane Sam Chung	INST ITS/CSS
	TINFO 307 Business for	TINST 475 Entrepreneurship	Andrew Fry	INST

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[31] P: Prerequisite, C: Core, ITS: ITS Elective, IT: IT Elective, and IS: IS Elective
   CSS: Computing and Software Systems, Institute of Technology, University of Washington Tacoma
   CIAC: Center for Information Assurance and Cybersecurity, University of Washington Seattle
   INST: Applied Computing, Institute of Technology, University of Washington Tacoma
   ITS: Information Technology and Systems

	Information Professionals	in Computing and Software Systems		
ITS	TINFO 420 Systems Administration		Stephen Rondeau	INST
	TINFO 445 Digital Forensics		Barbara Endicott-Popovsky	CIAC
	TINFO 460 Enterprise Information Systems		Sam Chung, Ankur Teredesai	ITS/CSS ITS/CSS
IT	TINFO 411 Database Client/Server Connectivity		Sam Chung	ITS/CSS
	TINFO 421 Enterprise Systems Administration		Sam Chung	ITS/CSS
	TINFO 431 Server Side Web Programming	TCSS 460 Client/Server Programming for Internet Applications	Sam Chung	ITS/CSS
	TINFO 432 Web Portal Design, Implementation, and Administration		Sam Chung	ITS/CSS
	TINFO 441 Network Security	TCSS 431 Network Security	Don McLane Sam Chung	CSS ITS/CSS
	TINFO 442 Computer Security	TCSS 481 Computer Security	Don McLane Sam Chung	CSS ITS/CSS
	TINFO 452 Network Services	TCSS 430 Networking and Distributed Systems	Don McLane Sam Chung	CSS ITS/CSS
	TINFO 453 Wireless Data Networking		Don McLane Sam Chung	CSS ITS/CSS
	TINFO 461 Programming for Enterprise Information Systems		Sam Chung	ITS/CSS
IS	TINFO 416 Data Warehouse and Mining		Ankur Teredesai, Isabelle Bichindaritz	ITS/CSS CSS
	TINFO 417 Information Search, Retrieval, & Presentation		Ankur Teredesai	ITS/CSS
	TINFO 446 Information Assurance Policies		Barbara Endicott-Popovsky	CIAC
	TINFO 456 Global Communication Networks	TCOM 430: Global Networks, Local Identities	Divya McMillin Ankur Teredesai	IAS ITS/CSS
	TINFO 466 Information Systems Theory		Ankur Teredesai	ITS/CSS
	TINFO 467 Requirements Engineering	ex-TCSS 350 Team Management for Computing Professionals	Andrew Fry	INST
	TINFO 468 IS Project Management		Ankur Teredesai	ITS/CSS
	TINFO 485 Computer & Human Interactions	TINST 450 Human Computer Interaction	Josh Tenenberg Ankur Teredesai	CSS ITS/CSS

5.3. Faculty Qualifications

Faculty expertise is available to provide leadership for this program. The Institute has faculty with interest and expertise in Information Technology and Systems. Prof. Ankur

Teredesai (former faculty member of Computer Science at RIT) and Prof. Sam Chung have developed and taught several of the courses in the proposed program. Prof. Larry L. Wear (former professor and Chair of ECE, California State University at Chico), is a qualified administrator with experience in the systems and engineering domain. Prof. Bichindaritz has a background in health informatics. Institute Director & Professor Orlando Baiocchi has formerly managed the SUNY-IT program. Dr. Chung has published research papers in applying information technologies to real world problems by directing his research group called Intelligent Service-Oriented Computing (ISOC). Dr. Teredesai has computing and information systems program development experience. He has served as contributing member for curriculum redesign of the Masters program at RIT and development of new an interdisciplinary Ph.D. program in Computing and Information Systems at RIT. Dr. Baiocchi was a Professor and Chair of ECE departments in both California and North Dakota. He was also the Dean at SUNYIT where he started the Electrical and Computer Engineering programs. Dr. Teredesai, Dr. Chung and Dr. Wear all have recent industry and consulting experience in their areas of expertise..

6. Facilities and Operations

Institutional facilities including the library, other electronic information retrieval systems, computer networks, classrooms, and offices must be adequate to support the educational objectives and outcomes of this ITS degree program. Computing resources must be available, accessible, systematically maintained and upgraded, and otherwise adequately supported to enable students to achieve the program's outcomes and to support faculty teaching needs and scholarly activities. Students and faculty need to receive appropriate guidance regarding the computing resources and laboratories available to the program.

6.1. Classrooms, Labs, Hardware, and Software

In order to reduce the need for "specialized space" for teaching, the ITS program uses the "nomadic computing" paradigm where applicable. Since most of the ITS courses emphasize practicum in conjunction with theory, the students are encouraged to have a hands-on experience inside and outside the classrooms. Also, students need to download sample code, tutorials, demos, videos, etc. Thus the program needs specialized computer based instruction enabled smart classrooms.

Since, the nomadic computing approach can reduce the demand of having designated computer based classrooms some ITS classes can be conducted in regular smart classroom equipped with wireless networks and laptops. By using the computer network infrastructure of UW Tacoma, students can access the Internet easily through wireless or wired networks. Also, since the performance and quality of mobile computing platforms (such as laptop computers) is getting better, we will procure laptops that allow the students to borrow the laptop for at least two quarters. Table 16 shows this estimated equipment need.

Table 16: The estimate of personal laptops for mobile computing on and off campus

Item	Unit Price	Cost (in thousands) | Number of Units										Total Cost
		Year1		Year 2		Year 3		Year 4		Year 5		
New Enrollments		10		10		30		50		50		
Notebook PC, 64-bit Turion X2, 4GB RAM	$1,500	$10,500	7	$10,500	7	$31,500	21	$52,500	35	$52,500	35	$159,105
eSATA Expresscard enclosure, 160GB+ SATA disk	$150	$1,050	7	$1,050	7	$3,150	21	$5,250	35	$5,250	35	$16,005
		$11,550		$11,550		$34,650		$57,750		$57,750		$175,110

Many electives in each track need lab-space. Space is needed as both server rooms and labs. The Institute has already developed laboratories with most of the facilities needed to begin offering the ITS program. It is the policy of the Institute that equipment and facilities acquired by the institute with funds provided by the State and donors is shared by the various programs. Presently there is some capacity available.

A specific concern is the research laboratory space for the one-quarter, senior project classes. A facility needs to be created for use by students working on their projects. Ideally, this facility would have no scheduled classes and would be available throughout the day for student project use. There are currently two rooms in the Pinkerton (PNK) facility that would satisfy this need. As the Institute's programs grow in number and size, additional equipment and supplies will be required. Also, we anticipate the need for additional office space for 6 new faculty and 2 staff members over the next 6 years.

Table 17 shows that we need to first upgrade existing labs by summer 2010. And then, we show the plans of infrastructure and lab servers by 2011 in Table 18 and 3 new lab rooms with networking features by 2012 in Table 19. The server room will support 6 knowledge areas for both IT and IS tracks such as Database Development and Administration, System Administration, Web Systems and Technologies, Information Assurance and Cyber Security, Network Administration, and Enterprise Information Systems. Since the new software will require support for students using it, a system administrator of the ITS program will be hired eventually. The ITS students make extensive use of the computer labs and a centralized server room to master at least the 6 knowledge area. Over time, we consider some classes will be delivered online. It is anticipated that classes in the ITS program will make use of Moodle or Blackboard online course management systems. Some electives will make use of blogs, wikis and discussion boards. The students require training on collaboration and productivity applications including MS Office and software such as database servers, Web servers, Application Servers, etc. The ITS faculty members will provide necessary training for the students through ITS workshop series.

Table 17: The Anticipated Facilities Upgrade of Labs (by Summer 2010)

Item	QTY	Unit Price	Sub Total
Oracle Academic Initiative (annual)	1	$500	$500
2GB RAM upgrade for Dell 360	50	$126	$6,300
2GB RAM upgrade for Dell 370	45	$100	$4,500
2GB RAM upgrade for SCI113 computers	32	$87	$2,784
Networking equipment (racks, routers, cabling; copper and fiber)	1	$30,000	$30,000
eSATA PCI card	50	$30	$1,500
eSATA enclosure, 160GB+ SATA disk	25	$90	$2,250
		Total	$47,834

Table 18: Infrastructure/lab servers, storage, backup & room; classroom support (by Summer 2011)

Item	QTY	Unit Price	Sub Total

Item	QTY	Unit Price	Sub Total
1000 sq ft room, 10 sep. circuits, raised floor, ventilated, 1Gb network (Server Room with interior windows)	1	$500,000	$500,000
Physical access control (key card) for server room	2	$2,500	$5,000
Virtualization Server, 4x2.6Ghz, 16GB, SAS RAID, LVD, VI +3yr maintenance	3	$26,500	$79,500
Per-two concentrations + research 4-server(w/SAS) cluster	7	$8,000	$56,000
Server cabinet, one shelf, one fan, casters	8	$1,200	$9,600
Uninterruptible Power Supply (UPS)	11	$1,000	$11,000
Remote IP KVM Switch	8	$1,000	$8,000
KVM Switch, 8 port	8	$300	$2,400
Gb Network Switch, 8 port, managed	10	$240	$2,400
LCD Monitor, 17"	8	$200	$1,600
Operating Systems (Windows, if not bundled with each server)	29	$200	$5,800
Tape Autoloader, 1x7 LTO-4, LVD (Tandberg Magnum)	2	$5,500	$11,000
Tape Backup Software and 1 yr maintenance (CA Brightstor ARCserve)	2	$800	$1,600
Tape Backup Windows agent and 1 yr maintenance	29	$116	$3,364
Tape Backup Library and 1 yr maintenance	2	$460	$920
Tape Backup Database agent and 1 yr maintenance	3	$600	$1,800
Tapes	25	$110	$2,750
Storage area network (SAN), iSCSI/NAS/Fibre (Dell NX1950)	2	$15,000	$30,000
20-pack, 15.5K RPM, 300GB SAS disks (about 2.5TB per SAN)	1	$20,000	$20,000
Notebook computer, 64-bit Turion X2, 4GB RAM	25	$1,500	$37,500
eSATA Expresscard, enclosure, 160GB+ SATA disk	25	$150	$3,750
eSATA PCI card	50	$30	$1,500
Network PTZ camera (security)	2	$1,000	$2,000
		Total	$797,484

Table 19: New lab rooms, furniture and equipment (by Summer 2012)

Item	QTY	Unit Price	Sub Total
Per-knowledge area 1200 sq ft room, network (20 workstations)	3	$300,000	$900,000
Research 600 sq ft room, network (10 workstations)	1	$200,000	$200,000
Physical access control to labs	8	$2,500	$20,000
SAP	1	$9,000	$9,000
Additional software	1	$5,000	$5,000
Workstation computer, quadcore, 64-bit, 4GB+ RAM, eSATA	70	$2,000	$140,000
eSATA enclosure, 160GB+ SATA disk	35	$90	$3,150

20" LCD Monitor (2 monitors per workstation)	140	$250	$35,000
Workstation furniture, wheeled, no shelves	70	$600	$42,000
Printer and table	4	$1,500	$6,000
Data projector and screen	4	$2,000	$8,000
Whiteboard, mobile	11	$300	$3,300
Network PT camera (security)	4	$500	$2,000
Lockers	7	$500	$3,500
		Total	$1,376,950

6.2. Library

The ITS program needs library resources such as journals, books, databases, magazines, and videos. The primary subject areas covered in the new program proposal are information technology, information system, and information science. Since the UW library has well established services in these domains, the new ITS program can leverage the resources provided for CSS at initiation. For example, one of the ITS journals International Journal of Web Services Research, is available already through the UW library system. The IEEE Explore and ACM Digital Library are also needed and currently available. However, since new technologies are emerging and existing technologies are being renovated, new books and journals, in Information Technology, Systems and Science will require subscription. Several publishers now also provide professional books for new systems and emerging technologies as well as hand-on training texts. Such publishers include Prentice Hall Professional, Addison-Wesley Professional, Cisco Press, Exam Cram, IBM Press, Que Publishing, Microsoft Press, and Sams Publishing.

Table 20: Library Acquisitions

	Year 1	Year 2	Year 3	Year 4	Year 5
Library Acquisition Cost	$10,000	$12,000	$14,400	$17,280	$20,736

7. Accreditation

The proposed ITS program needs intellectual rigor and academic acceptance among its peers and with the more established disciplines. These two important issues can be addressed by working towards earning accreditation from the Accreditation Board for Engineering and Technology (ABET)[32]. Accreditation of Information Technology programs is relatively new. However, there do exist nationally well-recognized and successfully accredited IT programs at 4-year universities in the USA. Here are a few of those that we could consider as our models:

- BS in Information Technology. Golisano College of Computing and Information Sciences. Rochester Institute of Technology. http://www.it.rit.edu/it/index.maml
- BS in Networking, Security, and Systems Administration. Golisano College of Computing and Information Sciences. Rochester Institute of Technology. http://www.nssa.rit.edu/nssa/index.maml
- Information Technology. College of Information Technology. Georgia Southern University. http://cit.georgiasouthern.edu/itdept/
- Information Technology. School of Technology. College of Engineering and Technology. Brigham Young University. http://it.et.byu.edu/

Since the ITS program has been designed with accreditation in mind, meeting ABET's requirements, although time consuming and rigorous difficulties a motivation. Since ABET requires that a degree program have graduates before receiving accreditation, there will be time to make adjustments needed to satisfy the accreditation requirements prior to applying for accreditation.

Also, the Institute of Technology has several faculty members who have the accreditation experiences in other computing disciplines and can help the accreditation process of the ITS program: Dr. Baiocchi and Dr. Wear are both trained ABET program evaluators and Dr. Wear has been on two accreditation teams that have used the ABET 2000 criteria for accreditation. In addition, Dr. Wear directed the successful accreditation efforts for both an electrical/electronic engineering program and a computer-engineering program. Dr. Baiocchi led accreditation efforts for engineering programs at both the University of North Dakota and SUNYIT. Dr. Crum led the development of an accredited computer-engineering program at Wright State University and managed it through two accreditation reviews. He was a member of the IEEE Computer Society committee that advised ABET on the original computer engineering accreditation standards. He has also been a member of several accreditation visit teams and led an accreditation visit team for the Computer Science Accreditation Board, which partners with ABET in accreditation.

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[32] Accreditation Board for Engineering and Technology (ABET). http://www.abet.org/

8. Program Assessment

Knowing from the beginning that assessment was critical to the programs success, we have designed the program and curriculum with assessment in mind. The following paragraphs describe how we will assess the program and student educational outcomes.
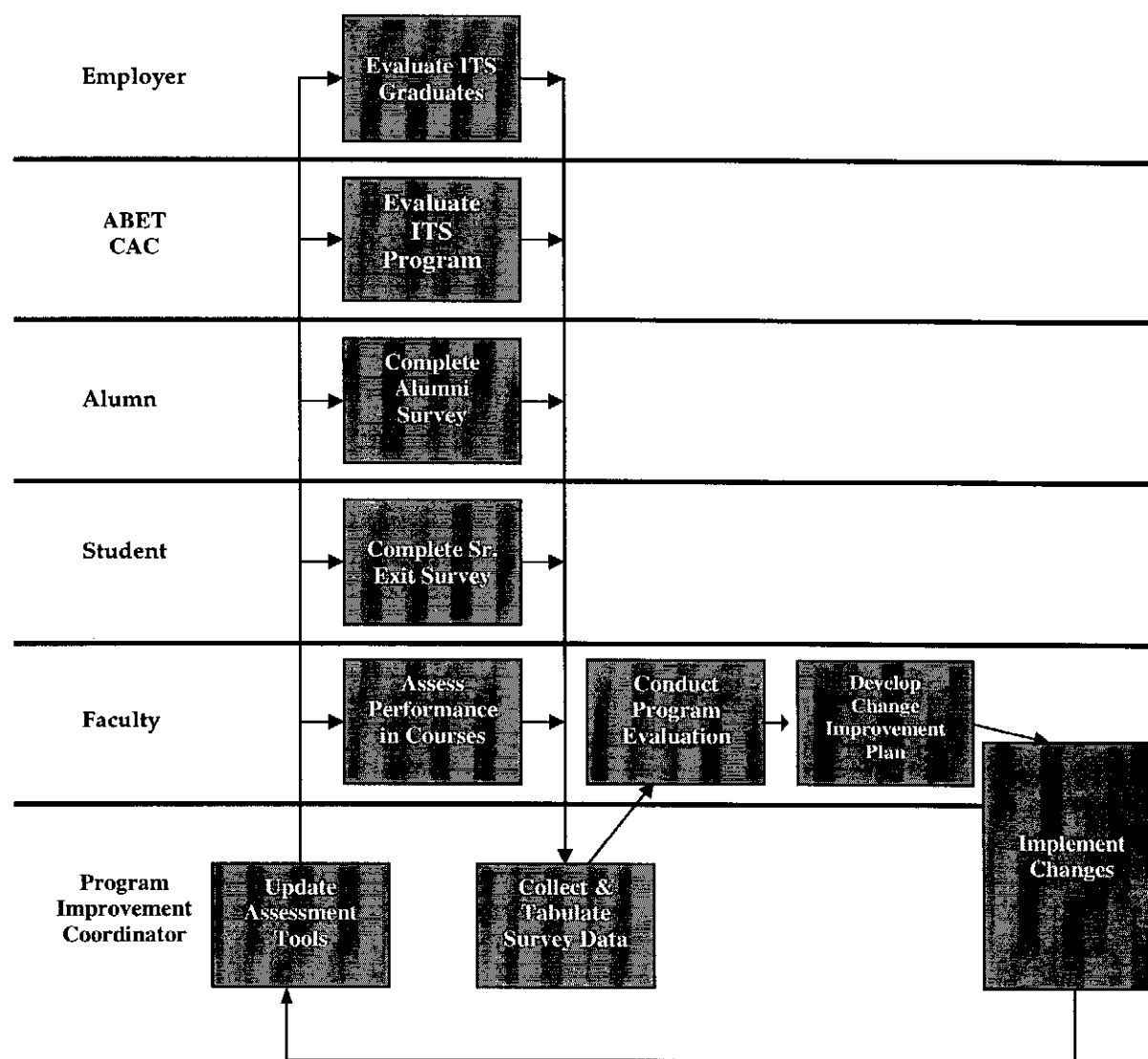

Figure 9: ITS Program Improvement Process (PIP)

8.1. Program and Course Assessment Plan

The most objectives of the ITS program in Section 3.3 are in line with the program outcomes for accrediting Information Technology degree program by ABET CAC. There are total 15 objectives. To verify that a program meets its objectives, it is necessary to

constantly evaluate and, if necessary, improve the program. To that end, the ITS program has adopted a repeatable and manageable Program Improvement Process (PIP) that has been employed for CES degree program at UW Tacoma. The PIP is executed once each year, but there is a different set of inputs each year. The ITS PIP is depicted in the Figure 9.

The process in Figure 9 begins each year with a review of the assessment tool(s) that will be used to gather that year's data. Based on past results, the faculty may choose to update or replace a given assessment tool. When the assessment tool has been chosen, data is gathered from one or more of the sources (employers, Industrial Advisory Board (IAB), alumni, students, and faculty). The faculty to determine what, if any, changes should be considered then reviews the data. If needed, a Change Improvement Plan is developed. Based on the plan, changes are implemented.
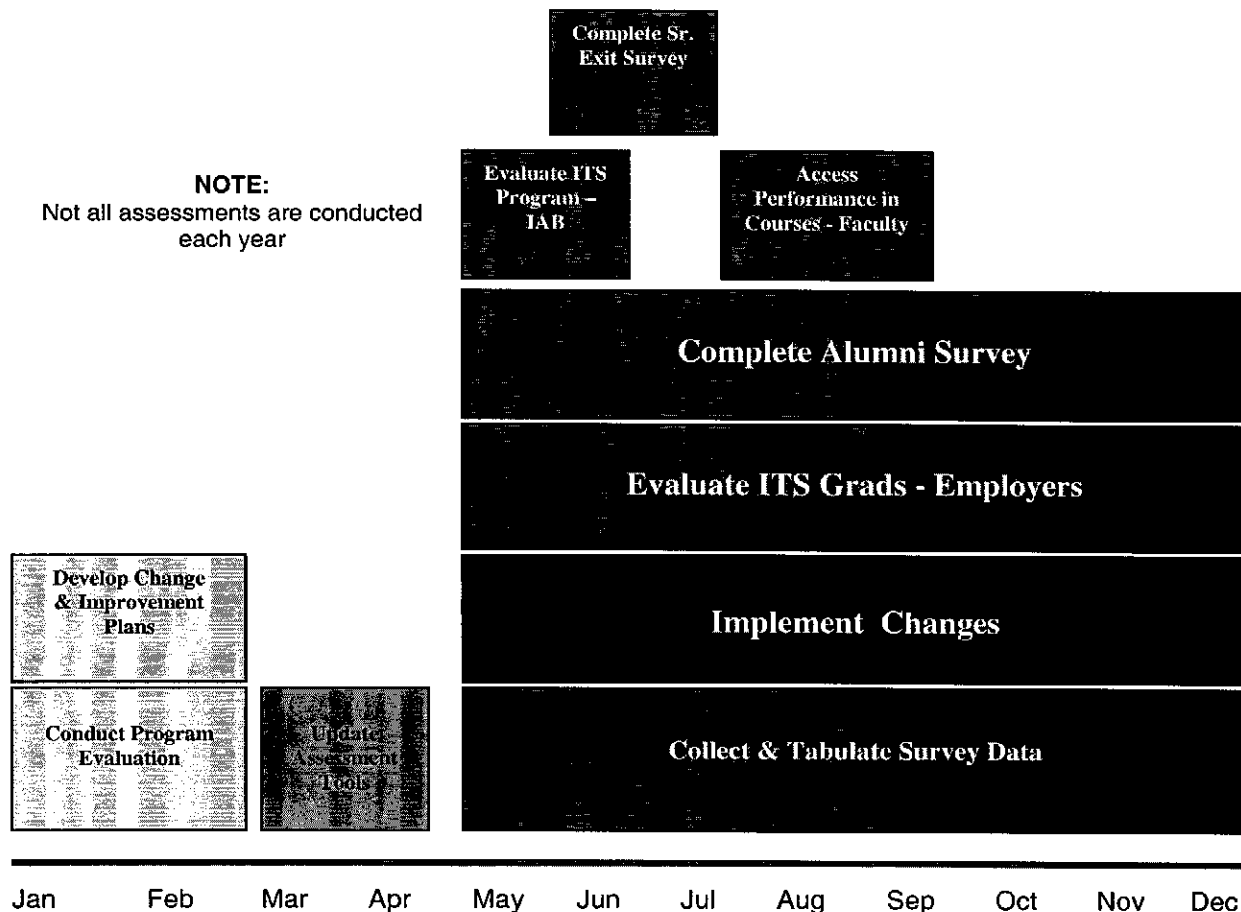

Figure 10: Timeline for ITS Program Improvement Process Activities

The timeline for the program improvement activities is shown in Figure 10. As can be seen, each January and February change plans are developed, if needed; changes are implemented during the following year. Alumni data collection via the web page survey

actually happens continuously throughout the year. Other data collection activities, such as employer surveys and senior exit surveys, take place at specific times.

The six-year cycle of assessment activities is shown below in Table 21. As shown, senior exit surveys are the only form of assessment that takes place each year. The other assessment methods are distributed throughout the six-year cycle so that assessment activities are not excessive in any one year. The faculty feels that this distribution makes the assessment activities manageable over a period of years.

Table 21: Six-Year Assessment Cycle

Yr	Alumni Surveys	Senior Exit Surveys	Faculty Course Assessment	IAB Recommendations	Employer Surveys	ABET CAC Self-Study
1	1-2 yr graduates	X		X		
2		X	X			X
3	3-7 yr graduates	X		X	X	
4		X	X			X
5	8+ yr graduates	X				
6		X				

The process described about will be used when the program has reached "steady state." For the first few years a modified version will be used. During the startup phase, Senior Exit surveys and Faculty Course Assessments will be conducted each year. The IAB will also be consulted on any proposed changes to the program during this time. After graduates have been in the field for two years, Alumni and Employer Surveys will be added to the process. Even before the first ABET accreditation visit, the self-study questionnaires of the ABET CAC will be conducted on the program for self-evaluation. After the first ABET accreditation visit, the assessment process will be in steady state and the process described in the preceding paragraphs will be followed.

Determining that each student has met all of the elements of the Program Educational Objective cannot be fully determined until after graduation and the graduates' ability to function as an IT professional can be evaluated. Student educational outcomes, on the other hand, can and should be measured by the time the student graduates.

8.2. Student Educational Outcomes Assessment Plan

For the ITS Program we have defined an assessment plan that will ensure that all graduates have successfully met each of the ABET learning outcomes that all graduates of information technology programs must meet. The assessment plan for student education outcomes uses both direct and indirect forms of assessment. The combination of direct and indirect assessment described will ensure that all students will demonstrate mastery of each educational outcome by the time of graduation

Indirect Outcome Assessment - Senior Exit Survey: Indirect assessment relies on a senior student exit survey that enables us to collect data on how well students feel they have met the educational outcomes. Students are asked a series of questions related to each outcome a)-o), which were mentioned in Section 3.3. Responses are on a scale of 1 to 5 where a response of 1 indicates the student feels poorly prepared to meet the objective and a response of 5 indicates the student feel very well prepared to meet the objective. The faculty has decided that the average response should be 3.75 or greater and if it is not, there is a problem that should be examined.

Direct Outcome Assessment in terms of Knowledge Area Covered and Competency Earned: Although indirect assessment can provide useful data, ABET has stated that outcome assessment must not rely solely on indirect assessment. Because of this, we have developed two direct forms of assessment that are embedded in individual classes based upon the Information Technology Body of Knowledge of ACM Computing Curricula Information Technology Volume 2005[33]. Two orthogonal components of outcomes, theory and practicum, are accessed in terms of the Information Technology Body of Knowledge covered in each course and the skill competency that students earned from each course. This form of direct assessment requires that students demonstrate an ability to perform specific tasks in certain relevant courses.

Table 22 below shows how the learning outcomes from a) through o) will be measured in courses. A couple of courses are measured as examples. If a student does not satisfactorily demonstrate the ability of his or her knowledge to achieve the outcome, he or she will fail the course.

Table 22: Direct Outcome Assessment in terms of Knowledge Area Covered

Course	Outcome	Knowledge Area Covered
TINFO 303 Foundations of Web Design and Programming	b; c; d; e; f; h; i; j; k	WS. Web Systems and Technologies (21 core hours) WS1. Web Technologies (10) WS2. Information Architecture (4) WS3. Digital Media (3) WS4. Web Development (3) WS5. Vulnerabilities (1)
TINFO 304 Foundations of Information Assurance	b; c; d; h; i; j; k;	IAS. Information Assurance and Security (23 core hours) IAS1. Fundamental Aspects (3) IAS2. Security Mechanisms (Countermeasures) (5) IAS3. Operational Issues (3) IAS4. Policy (3) IAS5. Attacks (2) IAS6. Security Domains (2) IAS7. Forensics (1) IAS8. Information States (1) IAS9. Security Services (1) IAS10. Threat Analysis Model (1)

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[33] The Information Technology Body of Knowledge. ACM Computing Curricula Information Technology Volume 2005. p. 56

		IAS11. Vulnerabilities (1)
TINFO 411 Database Client/Server Connectivity	b; c; d; e; f; g; h; i; j; k	IM. Information Management (34 core hours) IM1. IM Concepts and Fundamentals (8) IM2. Database Query Languages (9) IM3. Data Organization Architecture (7) IM4. Data Modeling (6) IM5. Managing the Database Environment (3) IM6. Special-Purpose Databases (1)
TINFO 498 Senior Design Project in ITS	a; b; c; d; e; f; g; h; i; j; k	SIA. System Integration and Architecture (14 core hours) SIA1. Requirements (6) SIA4. Project Management (3) SIA5. Testing and QA (3) SIA6. Organizational Context (1) SIA7. Architecture (1) SP. Social and Professional Issues (17 core hours) SP1. Professional Communications (5) SP4. Teamwork Concepts and Issues (3) SP5. Intellectual Properties (2) SP6. Legal Issues in Computing (2) SP7. Organizational Context (2) SP8. Professional and Ethical Issues and Responsibilities (2) SP9. Privacy and Civil Liberties (1)

The competency assessment will be used to check how many skill-related outcomes can be demonstrated: the outcome a) for current technical practices, the outcome e) for emerging technologies, and the outcome g) for best practices and standards. Each track has its own competency levels of each course, which is shown in Table 23. Since technologies evolve constantly, the expected competency types and levels are regularly checked by each track individually.

Table 23: Direct Outcome Assessment in terms of Competency Earned

Course	Languages	Frameworks	Tools	Engines	Protocols	Methodology
TINFO 300	C# (I)	.NET (I)	Visual Studio (I)	CLR	N/A	eXtreme Programming (B)
TINFO 303	XHTML (I) CSS (I) JavaScript (I)	DOM (I) AJAX (B)	Visual Studio (I)	IIS Server (B)	HTTP (B)	eXtreme Programming (B)
TINFO 411	C# (I)	ADO .NET (I)	Visual Studio (A)	MySQL (I) MS SQL (I)	ODBC (I) JDBC (I)	eXtreme Programming (A), ER modeling (I), UML Modeling (I)

- Expected Competency Level: Beginner (B), Intermediately (I), and Advanced (A)
- TINFO 300 Programming II for Information Professional
- TINFO 303 Foundations of Web Design and Programming
- TINFO 411 Database Client/Server Connectivity

9. Budget

The projected program expenses and revenues are shown in Table 24. The total accumulated cost for 5 years, which is not escalated for inflation, is $6,719,452. The accumulated cost consists of four main budget items:

1) The accumulated cost of personnel for 5 years: $3,514,524
2) The accumulated cost of operation for 5 years: $124,135
3) The accumulated cost of equipment and infrastructure:
   (equipment: $795,518 and infrastructure: $1,674,416) $2,469,934
4) The accumulated cost of indirect expenses: $610,859

The total accumulated revenue for 5 years is $4,615,250. This total program revenue can support the accumulated costs of personnel and operation for next 5 years ($3,638,659 = $3,514,524 + $124,135). The remainder $976,591 (=$4,615,250 - $3,638,659) can be used for equipment purchases and requisite building infrastructure. However, the program needs fundraising ($2,104,202) for the accumulated costs of equipment & infrastructure ($1,493,343 = $2,469,934 - $976,591) and indirect expenses ($610,859).

Table 24: Projected Program Expenses and Revenues

Program Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Total Yr (1-5)
Administrative Salaries & Benefits @ 29.5%	$140,686	$ 173,511	$ 181,544	$ 219,668	$ 224,061	$ 939,471
Faculty Salaries and Benefits @ 30.5% and 24.5%	$289,670	$ 407,513	$ 523,500	$ 526,483	$ 670,011	$2,417,177
TA/RA Salaries And bents						
Clerical Salaries & Benefits @ 32%	$ -	$ 10,029	$ 10,230	$ 20,869	$ 21,286	$ 62,415
Other Salaries & Benefits @ 12%	$ 10,282	$ 20,862	$ 21,164	$ 21,470	$ 21,685	$ 95,462
The accumulated personnel cost for 5 years						*$3,514,524*
Financial Aid specific to the program						
Contract Services	$ 5,915	$ 6,192	$ 6,949	$ 7,572	$ 8,223	$ 34,851
Goods and Services	$ 5,400	$ 6,120	$ 17,384	$ 19,421	$ 21,665	$ 69,990
Travel	$ 2,408	$ 3,615	$ 3,950	$ 4,110	$ 5,210	$ 19,293
The accumulated operation cost for 5 years						*$ 124,135*
The accumulated personnel and operation costs for 5 years						**$3,638,659**
Equipment	$ 11,550	$ 59,384	$ 332,134	$ 334,700	$ 57,750	$795,518
Lease or Acquisition (attach form III.a)						
Other (infrastructure for new labs with network and library)	$ 10,000	$ 12,000	$ 514,400	$1,117,280	$ 20,736	$1,674,416
An accumulated cost of equipments and infrastructure						**$2,469,934**
Indirect (if applied to the program)	$ 47,591	$ 69,923	$ 161,126	$ 227,157	$ 105,063	**$ 610,859**
Total Costs (By Year)	**$523,502**	**$ 769,149**	**$1,772,381**	**$2,498,731**	**$1,155,689**	**$6,719,452**
Program Revenue						
General Funds: State Support	$150,000	$ 300,000	$ 600,000	$1,200,000	$1,500,000	
Tuition and Fees(total)	$ 21,010	$ 42,020	$ 84,040	$ 168,080	$ 210,100	
Corporate Grants/Donations	$ 50,000	$ 65,000	$ 75,000	$ 75,000	$ 75,000	
Internal Reallocation *						
Other Fund Source (specify)						
Total Program Revenue	**$221,010**	**$ 407,020**	**$ 759,040**	**$1,443,080**	**$1,785,100**	**$4,615,250**
*If revenues are projected through internal reallocation, please attach and explanation of the impact of the reallocation would have on other departments or programs.						
Expected Fundraising Amount						
A fundraising amount for equipments and infrastructure						$1,493,343
A fundraising amount for indirect						$ 610.859
Total Fundraising Amount						**$2,104,202**
Total Revenue						**$6,719,452**

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Tacoma: Bachelor of Science in Information Technology and Systems degree (TINST-20080701))

<u>Tri-Campus Review Comments:</u>

Comment by delb made 10/29/2008 11:31:07 PM
I fully support this initiative and believe it is important for our prospective students and for the future business needs of our state.

Mark Del Beccaro, MD
Professor and Vice Chair for Clinical Affairs
Department of Pediatrics, UW School of Medicine
Pediatrician in Chief and Chief Medical Information Officer
Seattle Childrens

Memo

To: Beth Rushing

From: Orlando Baiocchi

Date: 1/20/2009

Re: ITS Program Proposal

This proposal had been posted as Catalyst Peer Reviews. The review ended November 17, 2008. You can access the Peer Review by selecting the ITS degree proposal at:

http://www.washington.edu/students/reg/tricampus.html

There was only one **short** comment received from the Tri-Campus review process:

"Comment by delb made 10/29/2008 11:31:07 PM I fully support this initiative and believe it is important for our prospective students and for the future buisiness needs of our state. Mark Del Beccaro, MD Professor and Vice Chair for Clinical Affairs Department of Pediatrics, UW School of Medicine Pediatrician in Chief and Chief Medical Information Officer Seattle Children "

This comment was very positive and supportive of the Information Technology Systems proposal. I do not feel any adjustments need to be made to our original proposal as a result of that review.

UNIVERSITY CAMPUSES UNDERGRADUATE PROGRAM REVIEW PROCEDURES**

CHECKLIST

Title of Proposal: Bachelor of Science in Information Technology and Systems degree

Proposed by (unit name): Institute of Technology

Originating Campus:

___UW, Seattle

___UW, Bothell

_X_ UW, Tacoma

I. **Phase I. Developed Proposal Review** (to be completed by Originating Campus' Academic Program Review body)

    A. Review Completed by: (list name of program review body)

     Chaired by:

     07/11/08 Date proposal received by originating campus's review body

     10/24/08 Date proposal sent to University Registrar

     10/24/08 Date proposal posted & email sent to standard notification list

     01/29/09 Date of originating campus's curriculum body approval
                (Note: this date must be 15 business days or more following date of posting)

    B. __1__ Number of comments received. Attach the comments and a summary of the

consideration and responses thereof: (1-2 paragraphs)

II. **Phase II. Final Proposal Review** (to be completed by FCTCP)

    A. Review Completed by:
     x ___ FCTCP subcommittee
     ___ FCTCP full council
     Chaired by: Janet Primomo, UW Tacoma

     2/6/09 Date request for review received from University Registrar
     2/13/09 Date of FCTCP report

    B. Review (attached)

    YES NO

_x_ ___ Was notice of proposal posted on UW Website for 15 business days?
_x_ ___ Was notice of proposal sent to standard mailing list 15 business days in advance of academic program review?
_x_ ___ Were comments received by academic program review body?
_x_ ___ Was response to comments appropriate? (explain, if necessary)
_x_ ___ Was final proposal reviewed by FCTCP within 14 days of receipt?
_x_ ___ Was there adherence to the University Campuses Undergraduate Program Review Process? (explain, if necessary)

C. Recommendation

Summary:
The FCTCP Curriculum Review Sub-Committee completed the Phase II review of this proposal. The Sub-committee noted that all procedures were followed. The proposal generated 1 positive comment.

The FCTCP sub-committee is pleased to have the Registrar forward the final proposal to the President for final action and transmit the information to the UWT Chancellor. Thank you.
Janet Primomo, Chair, FCTCP

_X_ Forward for final approval
___ Forward to Provost because of University issues (Explain)
___ Return to campus council because of insufficient review (Explain).

**Endorsed by Faculty Senate Executive Committee, 1/10/05, modified 1/31/06; These procedures apply to new undergraduate degrees, majors, minors (and certificates) and substantive changes to same

STATE OF WASHINGTON

HIGHER EDUCATION COORDINATING BOARD

917 Lakeridge Way SW • PO Box 43430 • Olympia, WA 98504-3430 • (360) 753-7800 • FAX (360) 753-7808 • www.hccb.wa.gov

July 29, 2009

Dr. Patricia Spakes
Chancellor
University of Washington Tacoma
Box 358430
Tacoma, WA 98402-3100

Dear Dr. Spakes:

The Higher Education Coordinating Board reviewed University of Washington Tacoma's request to establish a Bachelor of Science in Information Technology and Systems at its July 28 meeting.

Resolution No. 09-10 (copy enclosed) was adopted by the Board and grants approval to the University of Washington to initiate offering the degree program effective Fall 2009. CIP code 11.0103 has been assigned to this program.

We have also forwarded a copy of this approval letter to our Veteran's Affairs Approval Unit, the State Approving Agency.

We wish you success with the new program.

Sincerely,

Randy Spaulding, Ph.D.
Director of Academic Affairs

cc: Ann Daley, Executive Director
   Mike Ball, Associate Director, State Approving Agency

JESUS HERNANDEZ
CHAIR

ANN DALEY
EXECUTIVE DIRECTOR

STATE OF WASHINGTON
HIGHER EDUCATION COORDINATING BOARD
917 Lakeridge Way SW • PO Box 43430 • Olympia, WA 98504-3430 • (360) 753-7800 • FAX (360) 753-7808 • www.hecb.wa.gov

<u>RESOLUTION 09-10</u>

WHEREAS, The University of Washington Tacoma proposes to offer a Bachelor of Science in Information Technology and Systems; and

WHEREAS, The program would support University of Washington Tacoma's mission and the Strategic Master Plan for Higher Education; and

WHEREAS, The program would respond to student, employer and community need and would not duplicate existing programs; and

WHEREAS, The program would have strong diversity and articulation plans; and

WHEREAS, The program's students would study a high quality curriculum carefully designed with program-specific accreditation in mind; and

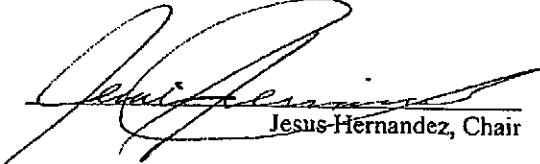**WHEREAS,** The program has strong support from external reviewers; and

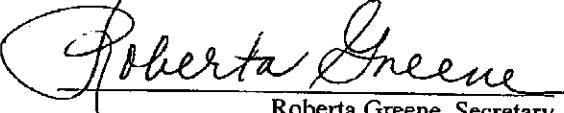**WHEREAS,** The program would be offered at a reasonable cost;

THEREFORE, BE IT RESOLVED, That the Higher Education Coordinating Board approves the Bachelor of Science in Information Technology and Systems at the University of Washington Tacoma, effective July 28, 2009.

Adopted:

July 28, 2009

Attest:

Jesus-Hernandez, Chair

Roberta Greene, Secretary