FACULTY OF APPLIED SCIENCES

Academic Plan 2010-13
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1. Executive Summary

The Faculty of Applied Sciences (FAS) consists of the School of Computing Science (CS) and the School of Engineering Science (ES) that offer internationally recognized academic programs and conduct leading-edge research related to the science and technology (S&T) priority areas of Canada. As a result of the recent Faculty reorganization, FAS is now a focused unit with substantial synergy and potential to reach the highest level of excellence. FAS offers undergraduate programs in Computing Science, Software Systems, Engineering Science and Mechatronic Systems Engineering. Several joint majors, honors and minors are offered under the four undergraduate programs. Both CS and ES offer MSc and PhD programs and ES offers an MEng program. The Faculty has over 400 graduate students and attracts over $6.5M in research funding. There are 4.5 Canada Research Chairs, 3 Michael Smith Foundation scholars, one endowed research chair and 3 NSERC-DAS recipients in the Faculty.

Our main objectives over the next three years are to: 1) Innovate in teaching and learning; 2) Strengthen research and graduate programs; 3) Build Capacity at Surrey; 4) Capitalize on Globalization of Education; 5) Focus on people; and 6) Strengthen identity and partnerships. These objectives fit closely with the outcomes of the SFU Academic Plan. FAS proposes to introduce a number of new initiatives to achieve the above objectives. It recognizes that very limited new resources will be available during the planning period. The proposed new initiatives include comprehensive curriculum reviews in CS and ES; opportunities for professional skills enhancement of students; efforts to increase research funding and graduate enrolment; extension of the dual-degree program to the graduate level and new international partnerships; introduction of professional graduate programs; strengthening the Software Systems program in Surrey; recognition of outstanding efforts of faculty and staff; restructuring administrative and technical support system in the Faculty; and strengthening our relationships with industry, government agencies and alumni.

The Faculty expects to grow in selected areas during the next three years. These include the Mechatronics and Software Systems programs in Surrey, international undergraduate students, research-based graduate students and professional graduate programs. FAS would like to establish a new academic unit to offer Energy and Environmental Systems Engineering undergraduate and graduate programs in Surrey. This initiative will be our first priority for new funding provided by the province for Surrey Campus to increase its capacity.

FAS currently runs an efficient operation. It requires substantial technical staff and equipment funding to support the teaching laboratories in Computing Sciences and Engineering. It has to meet the accreditation requirements for engineering programs. A review of data published by CEAB shows that our faculty and staff ratios are well below the national average. This is mainly due to past budget cuts. The total budget cut to FAS over the past five years is $2.4M. The faculty, staff and TA salaries consume 96% of our budget. Under these circumstances, the Faculty has no room to accommodate a budget cut of 10% over the next three years. FAS plans to eliminate the vacant faculty positions due to retirements and cut the sessional lecturer budget (1%) completely in 2010.
2. Faculty Core Activities

The Faculty of Applied Sciences (FAS) consists of the School of Computing Science (CS) and the School of Engineering Science (ES). The two schools offer internationally recognized academic programs and conduct leading-edge research related to the science and technology (S&T) priority areas of Canada (i.e., information and communication technologies, health and related life sciences and technologies, environmental science and technologies, natural resources and energy). The Faculty is a priority for the Province of British Columbia and has been a beneficiary of the provincial initiatives such as 2002 DTO Program, 1986 Fund for Excellence, 2008 NRAS Endowment Fund and provincial graduate funding initiative. The two schools in FAS have developed an international reputation as stated in the external reviews of CS and ES conducted in 2006 and 2003 respectively. The external reviewers noted that there was uniform praise from students on the excellent quality of the CS undergraduate and graduate programs and overall research funding from NSERC discovery grants is very high. Similarly, the reviewers of ES recognized the unique features of the engineering program such as the open-lab format, integrated communication courses, mandatory co-op and high-tech focus of the curriculum and research. The recent decision of the Canadian Engineering Accreditation Board (CEAB) to grant accreditation to the Engineering Science program until 2014 is another evidence of the quality of the programs offered by ES. FAS has activities in both Burnaby and Surrey campuses, while the School of Computing Science offers part-time studies through the Vancouver campus as well. Following is a summary of the core activities in FAS.

Undergraduate Programs:

CS offers major, honors, minor and certificate programs in Computing Science leading to a B.Sc. or B.A. degree. A new major in Software Systems (SoSy) was introduced at SFU Surrey in 2008. The School also offers joint major programs with the Departments of Linguistics, Mathematics, Molecular Biology and Biochemistry and Philosophy and the Faculty of Business Administration. Joint honors programs are offered with the Departments of Molecular Biology and Biochemistry, Philosophy and Mathematics. In addition, CS contributes to the Cognitive Science and Management and Systems Sciences programs. A BSc program (major and honors) in Geographic Information Science is offered jointly by CS and Department of Geography. The above joint programs demonstrate the extensive linkages CS has developed with other SFU academic units. The School offers a very successful dual degree program leading to B.Sc. in Computing Science with Zhejiang University (ZU) in China. A post-baccalaureate diploma in Computing Science is offered to students who already possess a university degree, and a certificate in computing studies is offered to students who are interested in understanding the fundamentals of computers and programming.

ES offers BASc and BASc (Honors) programs in Engineering Science with options in Biomedical Engineering (with Department of Biomedical Physiology and Kinesiology), Computer Engineering, Electronics Engineering, Engineering Physics (with Department of Physics) and Systems. The above programs are fully accredited by the Canadian
Engineering Accreditation Board (CEAB). In 2007, ES started a new undergraduate program in Mechatronics Systems Engineering (MSE) based in Surrey. A double-degree program in MSE and Business is also offered in Surrey. ES offers a minor in Computer and Electronics Design to non-engineering students. The School has limited opportunities for collaboration with other SFU academic units at the undergraduate level due to various CEAB requirements including professional engineering registration of the faculty teaching upper division core courses.

FAS strongly encourage students to participate in the Co-operative education (Co-op) option to gain valuable work experience, and Co-op is mandatory for engineering undergraduate students. ES has its own Co-op staff to support the mandatory program and the Co-op experience in engineering is closely integrated with the overall curriculum and professional skills development. CS uses the central Co-op Office to administer its Co-op option.

The total undergraduate enrolment for 2008/09 was 1101 AFTE. The AFTE target for the planning period is 1133.

Graduate Programs:

CS offers MSc and PhD programs with research specialization in the areas of theoretical computing science; artificial intelligence; database systems and data mining; computational biology; computer graphics and multimedia computing; networking; parallel and distributed computing; operating systems; programming languages and systems; computer vision; and medical imaging. MSc students may choose between a thesis, project or course-based program of study. PhD and MSc thesis students are provided with guaranteed financial support during their studies, through teaching assistantships, research assistantships from faculty members, NSERC fellowships and university/Faculty awards. The School also offers interdisciplinary graduate studies opportunities through the Graduate Diploma in Bioinformatics (partnered with Molecular Biology and Biochemistry) and through the Graduate Certificate program in Modeling of Complex Social Systems.

Two Ph.D. graduates from Computing Science have been awarded Canada Research Chairs.

ES offers MEng, MASc and PhD programs with specialization in communications; microelectronics; intelligent systems and control; biomedical engineering; and mechatronics. MEng is a course-based degree with a project that is normally directed to practicing engineers. Both MASc and PhD programs include a coursework component and a thesis. As in the case of CS, a majority of the graduate students in ES receives financial assistance from research grants and other sources.

The total graduate enrolment in FAS for 2008/09 was 277 AFTE and the target for the planning period is 338.
Research:

All faculty members holding professorial rank appointments in FAS are involved in research. There are clusters of excellence in algorithms and complexity theory, optimization algorithms, natural language processing, computer vision, data mining, multimedia networking, visualization, communications, microelectronics, robotics, biomedical technologies, health informatics and intelligent systems/mechatronics. The annual research income for 2007/08 was $3.5M for CS and $3.0 M for ES. This corresponds to approximately $80,000 per professorial faculty. The primary source of funding is NSERC. Out of the sixteen NSERC discovery accelerator grants in Computer Science awarded over the past two years, three awards were received by CS faculty members. This is an outstanding accomplishment at the national level. An increasing trend is noted in industry-oriented research and interdisciplinary research involving collaborations within and outside SFU. There are 4.5 Canada Research Chairs in the Faculty with one vacant Tier 1 Chair in ES. In addition, ES has an endowed chair supported by Sierra Wireless. Three faculty members in FAS (two in ES and one in CS) hold Michael Smith Foundation career awards and several faculty members hold NSERC strategic and CHRP grants.

Specialized Services and Requirements:

Faculty’s academic programs and research require substantial technical support and operating expenses for laboratories and computing infrastructure. Our specialized micro-fabrication facility including its clean room is unique and used to offer the only credit course in micro-fabrication in BC. In addition, the teaching laboratories in ES require regular upgrading and technical support to meet the accreditation standards. CS hosts the largest number of servers and workstations required for teaching and research compared to any other academic unit on campus. The Network Support Group (NSG) of the old FAS allowed us to provide an adequate amount of computing support to CS and ES but the recent decision to temporarily place NSG under the CIO is a serious concern. The Mechatronics program under development at Surrey requires specialized technical support, new laboratory equipment for teaching and additional research space including areas with a strong concrete floor to accommodate heavy equipment.

3. Planning Assumptions

This plan is based on the following assumptions:

- Enrollment Plan: The undergraduate and graduate AFTE enrollment targets specified by the university for FAS are 1133 (958 domestic funded and 175 unfunded international) and 338 respectively. FAS would like to increase the international student enrollment to 240 AFTE by 2013. This requires a revised AFTE target of 1198.
- A revenue sharing arrangement that allows FAS to receive a portion of the international tuition fees when the international enrollment exceeds 113 AFTE (10% university-wide target).
• A budget cut of up to 10% over the period 2010-2013. Availability of the vacant faculty and staff slots due to retirements (early and regular), resignations, etc. to contribute towards anticipated budget cuts.
• Continuation of the funding commitment to the Mechatronics program.
• Return of the budget and staff of NSG to FAS.
• Reorganization of the Faculty and School administrative and technical support structures.

4. Strategic Influences

1. Opportunities

The recent Faculty reorganization provides FAS with an excellent opportunity to define its strategic goals and support the vision and outcomes described in the University Academic Plan. The Faculty is now focused and there is good synergy in our core activities. It should be more responsive to the needs of the students, professions and industry sectors it serves.

• Undergraduate Curriculum – The recent faculty reorganization offers an opportunity to review our undergraduate curricula, identify synergies between the schools and rebrand our programs to make them more distinctive from our provincial competitors. In this regard, both CS and ES have an opportunity to review their curricula while taking into consideration the modern trends of teaching and learning (e.g. project-based learning, integrated core courses, teaching technology, etc.), industry expectations and professional skills development as an integral part of the curriculum.

• Research and Graduate Programs – As a result of the DTO funding and current Mechatronics initiative, a substantial number of faculty members joined the two schools since 2003 to support the growth of the programs. The broad research base available in the schools can be further exploited to strengthen the identity and stature of the graduate programs; build new research collaborations within and outside the Faculty; strengthen industry interactions; form interdisciplinary teams to pursue major funding opportunities; and further increase the overall research productivity.

• Professional Graduate Programs – A very limited number of professional graduate programs in Computing Science and Engineering are offered by the BC universities. A healthy demand for such programs exists from various industry sectors and new immigrants. FAS should exploit this opportunity to offer programs targeted to selected industry sectors (e.g. Mechatronics and Health Informatics).

• Internationalization – The Faculty has been a leader in international programs through the unique dual degree program with Zhejiang University. Both CS and ES programs have strong demand from foreign students. A number of universities in the Asia-Pacific region have expressed interest in developing joint undergraduate programs with FAS. There are also opportunities to develop joint graduate programs with reputable universities in Asia and Europe.
• **Collaboration within SFU** – The Faculty should pro-actively exploit opportunities for collaboration with the Faculties of Environment (GIS, environmental modeling); Health Sciences (Biomedical Engineering and Health Informatics); Business (Information Systems, Entrepreneurship and Innovation); Science (Micro/Nano-technology, Complex Systems Modeling); Communications, Arts and Technology (Visual Analytics); Arts and Social Sciences (Cognitive Science); and Education (Computing/IT Education) through joint programs, research chairs and major grant applications.

• **Surrey Campus** – Greater Surrey region has the highest population growth and provides an excellent opportunity for the Faculty to selectively expand its programs. FAS should develop linkages to selected industries in the Surrey region and play a key role in technology transfer.

• **Faculty Administration** - As a result of the recent reorganization, FAS has an opportunity to streamline and increase the efficiency of its administrative and technical support structure. A careful review of the current staff duties including NSG staff and administrative needs of FAS should be conducted to provide optimum support for teaching and research activities in Burnaby and Surrey.

2. **Threats**

• **Declining Resources** – CS has lost $1.65M and ES has lost $767K in base budget cuts, and $184K and $226K respectively in carry forward funds over the past five years. In addition, the recent Faculty reorganization removed all resources held at the Dean’s level from DTO funding. As a result no funds for contingencies and strategic initiatives exist in FAS. There are serious concerns with respect to TA funding (a major part of both CS and ES TA funding flow from unfilled faculty and staff positions) and laboratory equipment renewal.

• **Future of Network Support Group** – This group was funded through the 1986 Funds for Excellence initiative of the province and was a part of the Centre for System Sciences (CSS). It provided specialized computing and networking support for CS, ES and CSS. Over 90% of the NSG work under the old FAS was directed to CS and ES. The Software Systems program in Surrey is seriously short of technical support with only one full time technical staff supporting all research, teaching, and administrative computing – a total of nearly 200 workstations and servers across three major platforms. Under these circumstances, the rationale for temporary transfer of NSG to ITS is not clear.

• **Retention of Faculty** – This is a growing concern since the ICT sector is now offering attractive employment opportunities.

• **Salary Inversion** – SFU faculty salary structure requires substantial changes to reflect the market realities and reward merit in a nationally competitive manner. The current system of retention awards/market differentials is not an effective long-term solution to the problem.

• **Competition for Undergraduate Students** – BC has created several new universities and there is potential to start new programs in Engineering, Computing Science and
Information Technology. The Faculty should be aware of the increasing competition for high quality undergraduate students and the need to be innovative in its programs, recruitment strategy and partnerships.

- **Competition for Graduate Students** – Graduate students in Computing Science and Engineering are offered very competitive funding packages by other universities. It is becoming increasingly difficult to recruit Canadian students or top-notch foreign students due to limited TA funding and university-supported incentives. The Faculty of Graduate Studies should develop a more effective strategy for recruitment of NSERC scholarship recipients, and for foreign students who have received awards to study abroad.

- **Program Accreditation** – Mechatronics program has to go through its first accreditation review in 2011 and there are a number of areas of concern (e.g., laboratory and research space, equipment funding, and faculty and staff complement). The Engineering Science program is due for accreditation in 2012 and has lost several technician positions since the last accreditation visit in 2006. It also lacks continuing funds for undergraduate laboratory equipment renewal. A review of the national accreditation data show that average (FTE total UG student)/ (FTE total faculty), (FTE total staff)/ (FTE total faculty) and (Total space)/ (FTE total UG and PG student) ratios for engineering programs in Canada are 13.2, 0.8 and 9.4 respectively. The corresponding ratios for SFU Engineering are 18.2, 0.6 and 6.4.

- **Competition for International Partnerships** – While the SFU-ZU dual-degree is a unique program with a two-way student exchange, many other North American universities are aggressively pursuing such partnerships. ZU and FAS are interested in extending this partnership to the graduate level. Although FAS is currently seen as a leader in international partnerships its position will be weakened if adequate resources are not provided to promote new partnerships and strengthen the existing ones.

5. **Self Assessment**

1. **Strengths**

**Teaching:**

As recognized by the past external reviews, all programs have a high reputation in terms of teaching and student quality, academic rigor and exposure to experiential learning. The capstone design project, laboratory experience in the upper level courses and mandatory co-op with integrated communication courses are notable strengths of ES. In addition, a dedicated Co-op office in ES offers more than job placement service to students. There are opportunities in ES for undergraduates to get involved in research through co-op; capstone project course; special project laboratories; directed studies; NSERC USRA Program; and the BASc thesis. In addition, many students are attracted to research through the J.L. Wighton Development Fund which was set up to promote undergraduate students’ participation in research and laboratories studies. The CS undergraduate program is well-regarded. One continuing showcase is the School's
annual top-ten placement in the ACM Pacific Region Programming Contest, competing with many strong teams from Stanford, Berkeley, and U. of Washington, among others. Three times in the last 5 years, SFU has advanced to the World Finals, on the basis of a top 3 placement among competing schools. The Dual Degree Program offers strong training in a combination of technical and international skills. The School’s Bachelor’s degree includes a diversity of focused and joint programs, including six concentrations, two specialist programs, and five joint programs. CS plans to unify and simplify these offerings under a new degree, the Bachelor of Computing Science (BCS). The BCS will provide a simple structure for joint programs with a variety of other departments.

The student demand for ES and MSE program has been high and CS enrolment is increasing. The MSE program is one of the most popular programs at Surrey Campus and the only degree program in Mechatronics in Western Canada. CS plans to emphasize the distinct features of the Software Systems program and expect it to become a substantial draw for the Surrey campus. We plan to continue with the four undergraduate degree programs as they are essential to fulfill our mission and contribute to the economic development of the province. FAS graduate programs are also very successful with over 350 students (156 doctoral students) enrolled in 2008 and give us probably the highest number of research-based graduate students per professorial faculty. The hi-tech and interdisciplinary focus of the graduate program is another strength, and FAS graduate students and researchers are actively collaborating with the SFU research centres such as IRMACS and 4D Labs.

Research:

The research programs in the Faculty are very strong with over $6.5 M of research funding attracted in 2008. The international stature of the faculty members are reflected in their service as editors and editorial board members of many leading journals. Three FAS faculty members have been recipients of Manning Awards and several others have received BCIC Awards. There are 4.5 CRC chairs (one vacant Tier 1 in ES) and one endowed research chair in FAS. The Faculty identifies the following as strategic research areas based on its established strengths and potential for increased funding from granting agencies and industry.

- Intelligent Systems – The Faculty is very strong in this area of research with a large number of excellent researchers and a strong graduate enrollment. There are clusters of excellence in natural language processing, computational logic and reasoning systems, data mining, sensors and sensor networks, robotics, controls, mechatronics, computational vision, visualization, microelectronics and advanced instrumentation. Our micro-fabrication facility is unique and plays a critical role in training, research and specialized services to industry. The researchers have access to modern facilities available at Canadian Microelectronics Corporation.

- Information and Communication Technologies – The two schools has a very strong group of researchers in this area covering multimedia, wireless communications,
RF/microwave communications, microelectronics as applied to information and communication technologies, network systems and modeling, algorithms and natural language. There is evidence of strong interactions with industry and efforts are currently in progress to develop a formal collaboration with the Communications Research Centre in Ottawa. Several local industry partners (Sierra Wireless, Business Objects, and Nokia) are working with the FAS researchers.

- Biomedical Technologies and Health Informatics – This is a growing area of research within FAS and fits well with the university’s strategic research plan. Current research focus areas are medical imaging, biomechanics, biomedical optics, medical devices, assistive technologies, micro/nanotechnologies for medical applications, bioinformatics, computational biology and medical information systems.

2. Weaknesses

Teaching:
Continued devotion of resources to the TechOne Program in Surrey is a major concern for the Faculty. The program is poorly matched to the needs of both MSE and SoSy programs. Further experiments in the evolution of this program also represent a significant threat, so long as the program itself is given priority over the needs of the four-year degree programs it purports to support.

The roll-out of the Software Systems program at Surrey is threatened by competitive software-oriented specializations and concentrations at the Burnaby campus. While the Software Systems program was developed in response to the external review report of CS submitted in 2006, the School needs to support this program through a rationalization of its offerings at Burnaby.

The curriculum of the Engineering Science program was originally developed as an elite honors program. It has not undergone a comprehensive review since the introduction of DTO. Overall, ES requires a comprehensive curriculum review to address the student workload, student fit and retention, emerging trends of engineering education and new CEAB criteria for accreditation.

Research:
The Faculty needs a more pro-active approach to strengthen its industrial relations and attract more funding from industry for research. It also needs to pro-actively pursue major CFI or other grants by forming strong interdisciplinary teams. The Research Resource Group (RRG) that was in the old FAS was moved to VPR Office following the Faculty reorganization. There is concern that FAS needs a dedicated staff person to develop and implement a research strategy, cultivate strong relationships with industry
to attract funding, facilitate transfer of technology and generate revenues through contracts.

6. Faculty Objectives

Over the past few months, five working groups looked into matters related to undergraduate education; graduate education; research and industry relations; internationalization and professional programs; and faculty and staff career development. These working groups considered the SFU Academic Plan, current status of the Faculty and opportunities created by the recent Faculty reorganization. Following objectives are identified based on the deliberations of the working groups and discussions within the Faculty leadership team. The relevant VPA goals described in SFU Academic Plan are identified in parenthesis.

Innovate in Undergraduate Teaching and Learning:

The Faculty plans to substantially strengthen undergraduate student experience. Our goal is to create a learning environment that is built on inspiring teaching, innovative curricula, academic rigor, state-of-the-art facilities and opportunities for students to acquire professional and entrepreneurial skills. In this regard, we will undertake a comprehensive review of the undergraduate curricula in both schools and make necessary changes to achieve the above goals. FAS plans to support the introduction of new pedagogies; increase project courses in all programs; identify the synergies between the schools to increase teaching efficiency; raise resources to upgrade teaching laboratories; promote and support student-led initiatives that enrich student life through a professional activities fund; and increase opportunities for international exchanges and research (4.1 and 4.2). ES plans to undertake a comprehensive review of its curriculum; streamline options by making the first 2-years of Engineering Science common to all students; allow for more course sharing between Burnaby and Surrey; and look into issues such as overall student workload, student recruitment strategy and fit, teaching pedagogy and engineering design experience. CS plans to undertake a substantial restructuring of its curriculum through the introduction of a Bachelor of Computing Science degree with three or four principal options, including a refined Software Systems major at the SFU Surrey campus. The School also plans to introduce a strong experiential learning component through project opportunities in collaborative open-source software development.

A challenge facing many Canadian universities, particularly in the science and technology disciplines, is very low participation of Canadian students in graduate studies. In this regard, FAS proposes to introduce a research project course that allows selected undergraduate students to work with a professor following the completion of the second-year and mentor them towards graduate studies (4.1 and 4.2). FAS will ensure its faculty members are strongly committed to teaching and plan to actively
support curriculum innovation and the development of new pedagogy by raising new resources as well as redirecting existing resources (4.3 and 4.5).

The Faculty will pay significant attention to students’ extracurricular involvement and leadership development skills (4.2). In this regard, the Faculty plans to encourage students’ participation in national and international competitions, establishment of active student chapters of professional societies and efforts to create a vibrant student life within FAS and SFU. FAS will develop a series of short courses and seminars delivered by computing and engineering professionals including our alumni to strengthen the leadership and entrepreneurial skills of students.

**Strengthen Research and Graduate Programs:**

The Faculty will continue to pursue leading-edge research focusing on both fundamental and applied topics and attract top-quality graduate students (4.3). Our research has an excellent fit with Canada’s S&T priority areas and the provincial research priorities. Research in intelligent systems; information and communication technologies; biomedical technologies and health informatics; and energy and environmental technologies are considered strategic to FAS. There are opportunities to collaborate with other faculties (e.g., Health Sciences, Environment, Science and Business) in the above strategic research areas. FAS would like to fill the vacant CRC Tier 1 in ES as early as possible to support its strategic research initiatives. The Faculty plans to pursue two NSERC industrial research chairs and a multi-million dollar CFI application to develop a research centre dedicated to intelligent systems technology and commercialization (4.3). Our goal is to reach a target of $8.5M/yr research income, 500 research-based graduate students and 50 professional graduate students by 2013 (4.5). To achieve these targets we will be requesting a full-time grant facilitator for FAS from the resources moved to VPR Office from the old FAS (4.4 and 4.5).

Graduate Program Committees of the two schools will review a number of issues related to their programs and introduce several new initiatives over the next three years. These include strengthening and streamlining graduate course offerings; developing measures to monitor and increase the quality of graduate student experience; reviewing program guidelines to further enhance research quality and impact; increasing graduate student recruitment especially our share of NSERC-funded students; developing partnerships and linkages with reputable foreign institutions to attract externally funded graduate students; and developing a professional skills enhancement program for graduate students through an NSERC-CREATE application (4.1, 4.2 and 4.3).

A new graduate program in Biomedical Technologies will be established in the Faculty with the participation of the two schools (4.1, 4.2 and 4.3). We have a sufficient number of faculty members in FAS to offer a strong graduate program in Biomedical Technologies. Partnerships will be developed with the Faculty of Health Sciences, Department Biomedical Physiology and Kinesiology and Fraser Health Authority to support this initiative.
FAS will develop professional graduate programs directed to selected industry sectors (4.1, 4.2 and 4.6). We can provide unique professional programs by exploiting the synergies between CS and ES. The income generated through these premium-fee programs will be directed to TA support, enrich undergraduate student activities and increase industry collaborations (4.2 and 4.5) The School of Computing Science will take the lead in developing new professional graduate programs.

**Build Capacity at Surrey:**

The Mechatronics program offered in Surrey is very successful and the Faculty should build on its strengths. FAS should develop a long-term strategy for strengthening and expanding computing science related activities in Surrey. The Faculty will submit a proposal to the university in due course to establish undergraduate and graduate programs in Energy and Environmental Systems Engineering in Surrey (4.1 and 4.2). FAS hopes to lead BC’s educational and applied research efforts related to green energy technology including green IT R&D and environmental systems engineering (4.3 and 4.6). The Faculty hopes to collaborate with the Faculty of Environment on this initiative.

A funding application to establish a research centre dedicated to intelligent systems technology and commercialization will be submitted to the next round of CFI competition in collaboration with the Faculty of Business, SFU Venture Connection and City of Surrey (4.1, 4.3 and 4.6). FAS plans to work closely with the City of Surrey, industry and business sectors and other partners such as Powertech and Fraser Health Authority to develop the advanced technology R&D base of Greater Surrey region (4.6).

The Faculty will put resources including a part of the NSG into the Center for Open Software Technology and Applications Research to create a critical mass of technical support at the Surrey campus for support of open-standards, open source and open content technologies (4.4).

**Capitalize on Globalization of Education:**

Globalization of education and economy has a direct impact on computing science and engineering. A substantial part of the manufacturing and software development base in North America has been outsourced over the past decade. As a result, we will be required to integrate into our programs international experience, ability to work with ‘virtual’ global teams, ability to communicate using technology, ability to work in multi-ethnic teams, etc. The development of these skills will be considered an integral part of our undergraduate programs (4.2). The Faculty plans to seize the global demand for high-quality computer science and engineering education. We would like to reach a target of 20-25% international undergraduate AFTE by 2014 and encourage the university to develop a revenue sharing arrangement (4.5 and 4.6). FAS has already shown leadership in international activities through its unique dual-degree program in Computing Science with Zhejiang University in China. Over the next three years, FAS will build further collaborations with China and selected institutions in Asia-Pacific countries (4.6). The Faculty will start a consultation process with the CEAB to extend
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the collaboration with Zhejiang to Engineering Science and develop a 1+3 program (4.6). FAS will work with Fraser International College to develop entry programs for Engineering Science, Mechatronics and Software Systems (4.5 and 4.6).

**Focus on People:**

FAS considers its people (students, faculty and staff) the most valuable resource. A student advisory committee will be established to provide feedback to the Faculty leadership on academic programs and student interests and issues (4.4). The Faculty also plans to support student-led activities promoting community building and enrichment of student life through its development efforts (4.2). FAS has hired a substantial number of new faculty members over the past six years. We are strongly committed to the career development of new faculty and to make them outstanding scholars in due course. A mentoring program for junior faculty that is flexible and meets the individual needs will be introduced in 2010 (4.3). The Faculty plans to establish annual awards to recognize excellence in teaching, research and service for faculty members and outstanding efforts of staff members (4.3). In addition, FAS will pro-actively promote excellence through national/international award nominations and other efforts such as endowed/research chairs (4.3). FAS will develop an administrative and technical support structure that is efficient and provides skills enhancement, training, and career advancement opportunities for staff (4.4). All staff positions in FAS will be reviewed and a new structure that is based on a centralized system for computer support, student recruitment, industry relations and research facilitation will be established (4.4 and 4.5).

**Strengthen Identity and Partnerships:**

The restructured FAS provides a better identity to its activities and we plan to further enhance the Faculty reputation by building partnerships with the external community and raising resources. Both CS and ES require substantial resources to provide students with outstanding experience including access to leading-edge technology in teaching and research laboratories. The Faculty intends to appoint an External Advisory Council to provide advocacy, strategic guidance and assist in building partnerships with industry, government agencies and professional organizations (4.6). The projects that will receive priority over the next five years are a LEEF Chair in multimedia communications (either visual analytics or medical imaging), two NSERC industrial research chairs, scholarships and bursaries for students, a centre for professional skills development, a major CFI application and the establishment of undergraduate and graduate programs in energy and environmental engineering at Surrey (4.3 and 4.5). FAS will work proactively to strengthen its collaborations with the communications, information technology, advanced manufacturing, energy, and biomedical technology industry sectors (4.6). The Faculty has had limited interaction with its alumni and plans to get them actively involved in raising its profile in the community (4.6).
7. **3 Year Growth Scenarios** (also see 9.1)

The areas for growth are Mechatronics, Software Systems, professional graduate programs, research-based graduate students and undergraduate international students. The Mechatronics undergraduate program plans to hire several new faculty members over the planning period. The program needs at least 15 faculty members to meet the accreditation requirements and teaching obligations. The research program in Mechatronics is under development and falls under the broad theme of Intelligent Systems.

The Software Systems program needs two additional research faculty to reach critical mass.

The professional graduate programs will be developed as premium-fee programs. Our target is to have 50 students enrolled in the professional programs by 2013.

There is room in FAS to increase the number of research-based graduate students. We will work over the next three years to attract more graduate students by pursuing NSERC scholarship recipients, additional research grants and international students with funding. Our target is 400 AFTE graduate students by 2013.

The Faculty would like to increase and sustain its international undergraduate enrolment. This requires a revenue sharing arrangement based on international tuition income to cover the expenses associated with additional teaching, administrative and recruitment work and to ensure that international student enrolment is neither supported nor perceived to be supported by diversion of resources for domestic students.

8. **Worst Case Scenario for 2010/11** (also see 9.2)

The Faculty has only two schools offering four degree programs. Both Mechatronics and Engineering Science programs have met the enrolment targets (ES enrollment has increased over 200% since DTO) and student demand is high. The DTO enrollment target for CS was artificially high but the School has a healthy enrollment compared to other Canadian schools. Its enrollment currently shows a considerably increasing trend as a result of the recovery of IT sector. We will be making efforts to consolidate our activities in Surrey and streamline the administrative and technical support system in Burnaby and Surrey to increase efficiency and better service to students and faculty. Computing Science will create critical mass at Surrey by assigning Vancouver campus and open software technical support to that campus. Approximately 96% of our budget is tied to faculty, staff and TA salaries. Limited current resources; the past budget cuts and loss of resources during the Faculty reorganization; and the small number of degree
programs offered by FAS leave limited differential cut options other than closing one of its four undergraduate programs.

9. Financial Plan

1. Growth Scenario:

Expected growth is only in the current commitment of funding for the Mechatronics Program at SFU Surrey. Professional graduate programs will generate new revenue after start-up expenses are covered. An increase in the undergraduate international students will bring additional revenue to the university revenues and FAS would like to receive a portion of this income to cover related expenses, increase TA support and upgrade laboratory equipment.

If FAS receives a budget increase of 2%, this will be used to increase the TA budget, for laboratory equipment maintenance and upgrading, for increasing professional skills development activities for students and to hire two technicians for undergraduate laboratory support.

2. Worst Case Scenario (-10%)

Distribution of the current budget can be found in Appendix A. The first chart indicates budgeted line item allocations. The second chart shows the actual program expenses and how funding is re-distributed in order to cover TA and other expenses. We spend 96% of the budget on salaries. The majority of the TA budget in both CS and ES is covered by unfilled faculty and staff positions, and faculty salary releases (e.g., leave of absence); however, this is not a sustainable practice with positions, once vacant, now returning to the VPA. A realistic budget for TA support based on the actual expenses should be allocated by moving funds from the unfilled faculty and staff positions.

CS and ES have met previous budget cuts ($2.4M over the past 5 years) by eliminating several staff positions, not filling vacant faculty positions and reducing TA funding; however, there is no longer any flexibility within FAS to reduce support further without harming the integrity and quality of its programs. There are three retirements in this year, amounting to $431,937 (2.2%) which will contribute to the 10% cut. We will not hire sessional lecturers and thereby reduce expenses by 1%. It is clear that the remaining 6.8% (nearly $1.4M) budget cut requires some drastic measures. There is no room to reduce staff positions but we plan to increase efficiency by centralizing several support services at the Faculty level. Furthermore, the CEAB data shows that Engineering is well below the national average in terms of support staff. The remaining cut can be accommodated only by reducing faculty and staff positions.
10. Communication

The Faculty initiated a planning process in June 2009. The two planning sessions held in June were attended by the Faculty leadership and relevant administrative staff. A framework for planning was identified during these sessions. Five working groups with representatives from faculty staff and students were set up to formulate the strategic goals and initiatives in the areas of undergraduate education; graduate education; research strategy and industrial relations; internationalization and professional programs; and career development of faculty and staff. In addition, a thorough review of the resources was conducted by the Faculty leadership.

FAS is in the process of setting up a student advisory committee to provide input to the Dean and Directors. This committee will be the main communication channel for students. An open forum for faculty, staff and student leaders was held on October 9th. FAS will hold two more open forums over the next six months to update faculty and staff.
APPENDIX

APPLIED SCIENCES ALLOCATED EXPENSES BASED ON TOTAL BUDGET

- Professors: 67%
- Lecturers: 9%
- Professional Staff: 11%
- Support Staff: 7%
- TA Funding: 2%
- Non-Salary: 4%

Total Budget