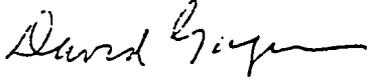


SIMON FRASER UNIVERSITY

OFFICE OF THE VICE-PRESIDENT, ACADEMIC

MEMORANDUM

To: Senate

From: D. Gagan, Chair 
Senate Committee on Academic Planning

Subject: Faculty of Applied Sciences -
Curriculum revision

Date: December 11, 1996

Action undertaken by the Senate Committee on Undergraduate Studies and the Senate Committee on Academic Planning gives rise to the following motion:

Motion:

"that Senate approve and recommend approval to the Board of Governors, the new Specialist Program in Software Engineering as set forth in S.97-2 "

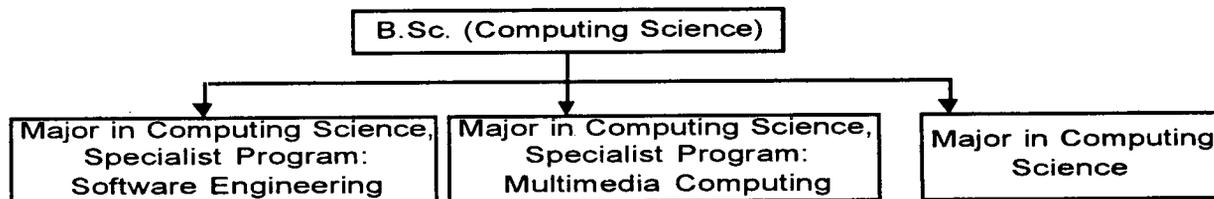
A Proposal for Specialist Program in Software Engineering

What Is a Specialist Program?

A *specialist program* is essentially an extended major program. Two specialist programs, in Software Engineering and Multimedia Computing, are being proposed. The B.Sc. degree (as well as the B.A. degree) with a major in Computing Science will continue to exist. They will be called the *general program*, as distinguished from the specialist program. The differences between the two are as follows:

1. A specialist program has at least all lower division course requirements as the general program. In case of Multimedia Computing, there are additional lower division course requirements due to its multidisciplinary flavor.
2. A specialist program has a separate list of required/elective upper division courses, in lieu of current depth and breadth requirements of the general program.
3. The requirement of liberal arts electives remains the same for general and specialist programs. In case of Multimedia Computing, the Contemporary Arts courses taken can be used to fulfill this requirement.

Students in either the general program or a specialist program will graduate with a B.Sc. (Computing Science) which is recognized in the degree diploma. They will be recognized in their transcript as majors in Computing Science. For graduands of a specialist program, the name of the specialist program will be printed on the transcript as well. In the diagram below, the wording at the top level will be shown in the diploma and that in one of the three boxes at the bottom level will be shown in the transcript.



What is Software Engineering?

We define Software Engineering (SE) in a broader sense than many people do. This encompasses the entire software development cycle, in terms of both process and techniques. This is in line with most of the SE programs in Canadian CS departments, and what the industry comes to expect from a university graduate in SE. Indeed, this broad-based definition is consistent with all engineering disciplines in universities.

Why Specialist Program in Software Engineering?

It is almost universally recognized that the computer software/hardware scene is constantly changing. What is new is that the pace of change is accelerating. These changes have profoundly impacted the development of a software system. Five years ago, it was not uncommon to find large teams of in-house programmers developing mainframe/dumb-terminal applications using traditional programming languages. Now, a typical software system runs on a

PC, is equipped with an easy-to-use graphical user interface (GUI) and accesses remote databases over the LAN/WAN. In the near future, most software systems will have to be network-enabled over a mail/messaging/telephone system and/or the Internet. A software developer has to understand the fundamentals of a slate of GUI, database, networking and other system components with which his/her application must interact.

The system development process has also changed drastically. Rapid prototyping is often the norm. Companies find it difficult to proceed with multi-year projects as it becomes next to impossible to predict short-term changes in computer industry, and indeed, the business the company is in.

Clearly we have to adapt our curriculum in view of the revolutionary changes in the development of software systems. We added a course in rapid prototyping last year. This year, two new courses are being proposed, in advanced software engineering (largely process-oriented) and networking respectively. Without a doubt, more curriculum changes in relation to SE will be forthcoming. It is therefore desirable to package these related courses for update and maintenance purposes, which is one of main reasons for establishing a specialist program in SE. In view of an unusually large number of upper division courses on the calendar, it would be difficult to keep track of them without a convenient packaging.

Visibility is another main reason. It would attract some prospective students who are interested in software engineering jobs. For those students pursuing an intense study of software engineering courses, a formal recognition as such is highly desirable.

Similar Programs in other Canadian CS departments

Many CS departments across Canada have begun to implement programs that focus on SE. Most of these programs are implemented as options for their majors/honors programs. A specialist program in SE was established by the CS department at Toronto in May 1995. It has already attracted 61 students over a period of 9 months, out of a total 290 majors (i.e. Honors in the Ontario system). University of Waterloo likewise has established an SE option in the CS department jointly with Electrical Engineering Department. At UBC, the CS department is actively recruiting more faculty in SE. Continuing Studies at UBC has been offering a certificate program in SE for several years. Computing Science department at University of Alberta has just introduced three SE courses. The CS department in University of Calgary are looking for 4 faculty members in various areas of SE in support of their NSERC industrial chair in SE. The list goes on.

Software Engineering at SFU

In this School, there have been talks from time to time about establishing a 400-level course in SE. We made SE as the top area for recruiting faculty, but the hiring freezing has put a stop to our recruitment efforts. It is unlikely we may have a SE faculty champion in place for at least another year. We can no longer afford doing nothing in the area of SE. While Engineering Science at SFU is not yet in the position to offer their own software engineering option, other BC universities will, notably the new Technical University of BC which is actively looking for unique degree programs to offer. To deliberate our SE strategies, a UCC sub-committee was set up for this purpose. We have also consulted Wolfgang Strigel, the head of Software Productivity Centre, and his colleagues Geoff Flamank and Kal Toth on SE curriculum issues.

The first priority of the Subcommittee is a full-fledged degree program in software engineering funded by new monies from the University and/or the Province. This will be jointly offered by the Schools of Computing Science and Engineering Science. Unfortunately, this is not an immediately achievable goal, especially under the current fiscal climate. There is also the question of obtaining provincial approval for such a new degree program. Under these circumstances, the

committee recommend that while we should proceed immediately with a plan to pursue a full-fledged SE program with joint CS and ES participation, we should consider a short-term, more modest action-plan, which does not entail a major relocation of resources within CS. This plan includes an addition of a 400-level course in SE and establishment of a specialist program in SE, which is focused on software, particularly systems-level software. A new networking course is being introduced at the same time, which will provide a good understanding of various aspects of modern networking applications, such as messaging systems and security. Incidentally, the CS Industrial Advisory Board has strongly recommended the establishment of this course.

Program Requirements (Upper Division):

At least 45 semester hours of CMPT upper division courses, which should include the CMPT required/elective courses and ENSC 351

Principles for selecting courses on the required/elective lists

- By the very definition of a specialist program, it should focus on its specialty and not be wide open. In the context of a software engineering specialist program, this implies that the required courses and electives must be limited to those which are directly related to the entire software development cycle, in terms of both process and technique. This is in accordance with one of the prime motivations of the program: visibility.
- On the process side, courses that are directly directed to SE are those which emphasize on SE methodologies and process.
- On the technique side, courses that are directly related to SE are those which provide basic fundamentals of modern software systems/components that applications program must interact (i.e. operating system and middle-layer system). In particular:
 - System-oriented courses are preferred. That is, courses that emphasize on the understanding of how the whole system works are more suitable than those which emphasize on design of a particular set of algorithm(s) that belong to some narrow aspects of the system.
 - Broadly based courses are preferred, in comparison with more specialized courses in the same area.

Required Courses (7):

CMPT 300-3 Operating Systems I
 CMPT 307-3 Data Structures and Algorithms
 CMPT 320-3 Social Implications of a Computerized Society
 CMPT 354-3 Database Systems I
 CMPT 363-3 User Interface Design
 CMPT 371-3 Data Communications and Networking
 CMPT 475-3 Software Engineering II (New Course)

At least five of the following electives: (at least 3 must be at 400 level)

CMPT 301-3 Information System Management
 CMPT 370-3 Information System Design
 CMPT 379-3 Principles of Compiler Design
 CMPT 383-3 Comparative Programming Languages
 CMPT 401-3 Operating Systems II
 CMPT 402-3 Operating System Software Laboratory
 CMPT 454-3 Database Systems II

CMPT 470-3 Advanced Application Development Tools
CMPT 471-3 Networking II (New Course)
CMPT 487-3 Software Engineering Tools and Environments
ENSC 351-4 Real Time and Embedded Systems

JUL 05 1996

Simon Fraser University
School of Engineering Science

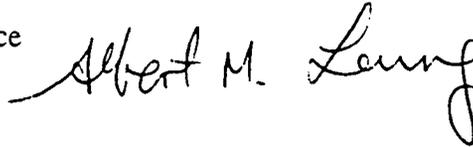
MEMORANDUM

TO: Wo-Shun Luk, Director
School of Computing Science

FROM: Albert M. Leung, Director
School of Engineering Science

DATE: July 4, 1996

SUBJECT: Proposal for Specialist Program in Software Engineering



I am writing to indicate our strong support of the proposed Specialist Program in Software Engineering. I believe this program is of significant interest to local industry, and can prepare many students for an exciting career.

Software Engineering is an area in which Computing Science and Engineering Science have a lot in common, both in interest and expertise. In addition to Professor John Dill, who is currently working with your group in the design of this new program, there are several others here who are also very interested in this initiative. I hope our collaboration will continue to grow and would like to see a strong Software Engineering Program mature in a few years time as a result of the joint effort of the two schools.

cc: John Dill