S.87-30

FOR INFORMATION

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: Senate

FROM: J.W.G. Ivany, Chair, SCAP

SUBJECT: Faculty of Applied Sciences
School of Engineering Science
Reference: SCUS 87-10
SCAP 87-6

DATE: Nov.19, 1987

Acting under delegated authority, SCAP/SCUS approved minor modifications to the option requirements in the Common Core and in Engineering Physics; editorial changes to degree requirements and editorial changes to course descriptions for ENSC 195-0, ENSC 429-4, and ENSC 498-3 as set out in S.87-30.

FOR INFORMATION

SIMON FRASER UNIVERSITY
M E M O

To: Faculty of Applied Sciences Undergraduate Curriculum Committee

From: Dr. D.A. George, Director
School of Engineering Science

Date: September 17, 1987

Subject: Curriculum Changes

The following are curriculum changes submitted for consideration by the FAS Undergraduate Curriculum Committee.

1. Editorial Changes to Course Descriptions:

   (a) ENSC 195-0 Job Practicum I
   - Internship Co-ordinator has been added to indicate credit is not based on just the employer's evaluation.

   (b) ENSC 429-4 Discrete Time Systems
   - The description is expanded to provide more details on the course content.

   (c) ENSC 498-3 Engineering Science Thesis Proposal
   - The first sentence has been deleted as a result of changes approved last year.

2. Editorial Changes to Degree Requirements:

   (a) Industrial Internship
   - The wording has been changed to simplify and clarify this aspect of the degree requirements.

3. Changes to Option Requirements:

   (a) Common Core
   - Chemistry courses replaced to reflect changes made by Chemistry Department.
   - Computer Engineering does not require PHYS 221 as a prerequisite.

   (b) Engineering Physics (Electronics)
   - Two required Physics courses replaced by science electives to give the students more options.

Thank you for your consideration.

Donald A. George
Attachments

cc - for information:
Faculty of Science, U.C.
Faculty of Arts, U.C.
Faculty of Education, U.C.

FOR INFORMATION 1 (a)

ENSC 195-0 Job Practicum I

This is the first semester of work experience in the Industrial Internship program available to engineering students. Credit is given as Pass/Withdraw (P,W) only, based on the employer's and Internship Coordinator's evaluations of the student's work during the semester and of the work report submitted at the end of the work session.
Prerequisite: Students must register with the School Internship Co-ordinator by end of the third week of the semester preceding the work semester.

ENSC 429-4 Discrete Time Systems

Discrete time signals and systems, sampling and quantization. The Discrete Fourier Transform and fast transforms. Digital filters, IIR and FIR, design procedures and implementations. Quantization noise in digital filters and transforms. Random signals, the response to linear systems to random signals. Introduction to adaptive systems. Introduction to system architectures for digital signal processing. Laboratory work includes familiarization with digital signal processing software packages.
Prerequisite: ENSC 327-4

FOR INFORMATION

ENSC 498-3 Engineering Science Thesis Proposal

The student's time in this course is devoted to supervised study, research and development and work leading to a formal proposal for the project work in ENSC 499. This activity can be directly augmented by other course work and by directed study. The locale of the work may be external to the University or within a University laboratory, or may bridge the two locations. Supervision may be by the company sponsoring the internship or by faculty members, or through some combination. A plan for the student's ENSC 498 activities must be submitted to the School at least one month prior to the start of the semester in which the course will be taken. Preparation of the undergraduate thesis project proposal is the formal requirement of this course and the basis upon which it is graded. Grading will be on a Pass/Fail basis.

Prerequisite: ENSC 396 or permission of the Director

2(a)

FOR INFORMATION

September, 1987

The B.A.Sc. Program in Engineering Science

Students who study Engineering Science develop skills in systems design along with a high level of scientific knowledge. The program is demanding and is aimed at the superior student. The goal of the program is to produce well educated, innovative engineer/scientists who have entrepreneurial skills and attitudes and who are oriented to the new technologies. Entry to the program is on a competitive basis and once admitted to Engineering Science, students must maintain a cumulative grade point average of 3.0 ('B') to remain in the program.

To obtain the degree, students undertake a basic core program of pure, applied and engineering sciences followed by studies in a specialized option.

The School of Engineering Science began offering courses in September, 1983. The overall plan for the School is to have three major areas of concentration. They are:

Core A - Computing, microelectronics and communications.
Core B - Industrial automation, control and robotics and computer-aided design and manufacturing.
Core C - Chemical and biochemical processing and biotechnology.

At present, Core A is fully operational and the first students have just been enrolled in Core B. Core C will be phased in over the next few years.

In all Engineering Science courses, computers receive major emphasis as tools for learning, conceptualization, design and analysis. Built into the program are courses on social impacts of technology, finance, management, design methods and entrepreneurship intended to complement scientific studies. A special, integrated communications course taken throughout the eight academic semesters ensures that all S.F.U. Engineering Science graduates have the communication skills necessary to be effective as engineers.

Industrial Internship

Every student in the Engineering Science program must complete an internship involving at least three work semesters and a thesis project. This results in a combination of work in an appropriate industrial or research setting with study in the chosen option. In the final phase of the program intensive specialized study is coupled with a project under the direction of a practicing engineer or scientist.

Typically, following the sixth academic semester, the student will be given the opportunity for placement in a job appropriate to his/her stated interests to work on a major project. In the seventh semester the student will take courses to help complete work on that project and prepare a formal thesis proposal. The thesis is written in the final semester of the program when the student will be taking classes part-time and working part-time on the thesis project. When appropriate, other patterns of work and study can be adopted.

The School also offers the opportunity to participate in additional work semesters throughout the program to give students further valuable experience and the chance to investigate their career choices. The internships will be

administered through the School Internship Co-ordinator whose responsibility is to find and maintain appropriate work placements.

Requirements for the Bachelor of Applied Science Degree

1. A minimum of 160 semester hours credit in basic science, general studies, engineering science, specialized engineering and science, plus project and laboratory work.

2. A Graduation Grade Point Average of at least 3.0 calculated on the required 160 semester hours, or on the 80 semester hours of upper division credit.

3. Completion of an internship. This consists of at least three semesters of practical experience in an appropriate industrial or research setting leading to a project under the technical direction of a practicing engineer or scientist. The internship may take place within the University but in most cases the work site is remote from the university. A member of the external organization and a faculty member from the School jointly supervise the project.

   ENSC 498-3 Engineering Science Thesis Proposal is normally taken during the seventh academic semester. During ENSC 499-9 the student engages in supervised study and practical work in research, development or advanced engineering. A project thesis based on this activity must be submitted.

4. A specialized program of study must be completed in one of six options: Electronics Engineering, Computer Engineering, Engineering Physics, Biomedical Engineering, Robotics & Control Engineering and Manufacturing systems Engineering. These are listed below on a semester-by-semester basis although there is no strict requirement to follow the sequence of these typical programs. However, any semester's registration less than 15 semester hours must be approved by the Director and students departing from these sequences must be careful about scheduling and prerequisite problems they may face in subsequent semesters.

5. General Studies - This section of the program is made up of non-technical courses intended to broaden the student's education and develop an awareness of general social, economic and managerial factors which affect engineering and scientific work. All units of the engineering communication course must be completed. One course must deal with the interaction of science and technology with society. The other complementary studies courses may also deal with this subject or may be chosen from the areas of administration, arts, humanities or social sciences. Particular course requirements are:

	semester hours
ENSC 101 to ENSC 108 Engineering Communications	6
ENSC 300 Engineering Design & Management	3
ENSC 301 Engineering Economics	3
ECON 200 Principles of Economics - Microeconomic Principles	3
a course dealing with the interaction between society and technology	3
a three course sequence in complementary studies	9

3(a)

FOR INFORMATION

ENGINEERING SCIENCE COMMON CORE

COURSES AND TYPICAL SCHEDULE

SEMESTER ONE

CHEM 102-3	General Chemistry I for Physical Sciences
CHEM 115-2	General Chemistry Laboratory I
Cmpl I-3	first complementary studies elective
*CMPT 101-4	Introduction to High Level Programming Language
*ENSC 101-0	Engineering Communications I
*MATH 151-3	Calculus I
*PHYS 120-3	Physics I

18 semester hours credit

SEMESTER TWO

CHEM 103-3	General Chemistry II for Physical Sciences
*CMPT 105-3	Fundamental Concepts of Computing
*ENSC 102-1	Engineering Communications II
*ENSC 125-5	Basic Electronics Engineering
*MATH 152-3	Calculus II
*PHYS 121-3	Physics II
*PHYS 131-2	General Physics Laboratory

20 semester hours credit

SEMESTER THREE

Cmpl II-3	second complementary studies elective
*CMPT 290-3	Introduction to Digital Circuit Design
*ENSC 103-1	Engineering Communications III
*ENSC 222-5	Electronic Design I
*MATH 232-3	Elementary Linear Algebra
*MATH 251-3	Calculus III
*Scie I-3	first science elective(1)

21 semester hours credit

SEMESTER FOUR

*CMPT 201-4	Data and Program Organization
*CMPT 390-3	Digital Circuits and Systems
ECON 200-3	Principles of Economics I - Microeconomic Principles
*ENSC 104-1	Engineering Communications IV
*ENSC 280-5	Systems Dynamics
Math I-3	first Mathematics elective(2)
*MAtH 272-3	Introduction to Probability and Statistics I

22 semester hours credit

* course which should be taken at this point in the program (consequences of deviations from this schedule are the responsibility of the student).

(1) For Electronics Engineering, Engineering Physics and Biomedical Engineering PHYS 221-3 is a required prerequisite and should be taken here. For Manufacturing Systems Engineering, MATH 262-4 should be taken here.

(2) For Electronics Engineering and Engineering Physics, MATH 252-3 is a required prerequisite and should be taken here.

FOR INFORMATION

ENGINEERING PHYSICS (ELECTRONICS)

COURSES AND TYPICAL SCHEDULE

SEMESTER FIVE

Cmpl III-3	third complementary studies elective
*CMPT 391-3	Microcomputer Hardware Workshop
*ENSC 105-1	Engineering Communications V
ENSC 300-3	Engineering Design and Management
*ENSC 327-4	Communication Systems
Math II-3	second Mathematics elective
*PHYS 211-3	Intermediate Mechanics

20 semester hours credit

SEMESTER SIX

*ENSC 106-1	Engineering Communications VI
ENSC 301-3	Engineering Economics
*ENSC 321-4	Electronic Design II
*PHYS 324-3	Electromagnetics
*PHYS 344-3	Thermal Physics
*PHYS 355-3	Optics
*PHYS 385-3	Quantum Physics

20 semester hours credit

SEMESTER SEVEN

Ensc I-4	first Engineering Science elective(4)
Ensc II-4	second Engineering Science elective(4)
*ENSC 107-1	Engineering Communications VII
*ENSC 382-4	Control System Design
*ENSC 495-1	Introduction to Microelectronic Fabrication
ENSC 498-3	Engineering Science Thesis Proposal
Scie II-3	second science elective (5)

20 semester hours credit

SEMESTER EIGHT

Cmpl IV-3	fourth complementary studies elective
ENSC 108-0	Engineering Communications VIII
Ensc III-4	third Engineering Science elective (4)
ENSC 499-9	Engineering Science Undergraduate Thesis
Scie III-3	third science elective (5)

19 semester hours credit

TOTAL 160 semester hours credit

(3) An approved course in a basic, applied or mathematical science

(4) Chosen from:

ENSC 423-4	ENSC 429-4	ENSC 439-4
ENSC 425-4	ENSC 435-4	ENSC 480-4
ENSC 426-4	ENSC 436-4	CMPT 495-3
ENSC 428-4	ENSC 438-4	CMPT 496-4

With permission, one or more Directed Studies courses may be chosen in this elective category.

(5) Chosen from: PHYS 365-3, PHYS 455-3, PHYS 465-3