

S. 86-76

# SIMON FRASER UNIVERSITY

## MEMORANDUM

**To:** Senate

**From:** Senate Committee on  
Undergraduate Studies

**Subject:** Applied Physics Program

**Date:** October 22, 1986

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Action undertaken by the Senate Committee on Undergraduate Studies at its meeting of October 21, 1986 gives rise to the following motion:

**MOTION:**

"That Senate approve and recommend approval to the Board of Governors, as set forth in S.86-76, the proposed

Majors Program in Applied Physics"

**SIMON FRASER UNIVERSITY****MEMORANDUM**

**To:** W. R. Heath, Secretary  
Senate Committee on Undergraduate  
Studies

**From:** W. Wattamaniuk, Secretary,  
Senate Committee on Academic  
Planning

**Subject:** Applied Physics Program

**Date:** October 14, 1986

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I attach a proposal for a Majors Program in Applied Physics at SFU. The Senate Committee on Academic Planning at its meeting of October 8, 1986 unanimously approved the program and is so recommending to Senate, subject of course, to SCUS approval of the fine structure details.

SCUS should note that the proposal requires students in the program (estimated by the Department to be 10-15 per year) to take two upper level Computing courses; CMPT 390-3 and CMPT 391-3. Both courses currently have enrolment restrictions.

W.

SCAP 86-10

# SIMON FRASER UNIVERSITY

## MEMORANDUM

**To:** Members of Senate Committee  
on Academic Planning

**From:** W. Wattamaniuk  
Secretary, SCAP

**Subject:** Applied Physics Program

**Date:** October 2, 1986

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I attach a proposal from the Faculty of Science for a Majors Program in Applied Physics at SFU. It is before SCAP for in-principle approval prior to consideration by SCUS.

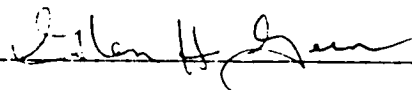
# SIMON FRASER UNIVERSITY

## MEMORANDUM

To..... Dr. ROSS SAUNDERS, Chairman  
SCUS  
.....  
Subject..... PROPOSAL FOR AN APPLIED PHYSICS  
DEGREE PROGRAM

From..... GLEN H. GEEN, Dean  
Faculty of Science  
.....  
Date..... July 9, 1986

The following course and the proposal for an Applied Physics degree program has been approved by the Faculty of Science Undergraduate Curriculum Committee and by myself as Dean. I am forwarding this to you for your consideration prior to it going to UCBC as it must in the case of a new program.

  
Glen H. Geen

/wy  
Encls.

*CL*

*[Handwritten mark]*

# SIMON FRASER UNIVERSITY

## MEMORANDUM

To.....	Dr. G. Geen	From.....	J. C. Irwin, Chairman
.....	Dean of Science	.....	Department of Physics
Subject.....		Date.....	1986 04 24

Dear Glen:

Attached are the following: a proposal for an Applied Physics degree program; Proposal Forms for a new 4th Year course in Electronics - P430-5, ~~a new introductory lab. course - P130-2; and some minor calendar description changes for P326, P331 and P134.~~



J. C. IRWIN

JCI/ml

Enclosures

c.c. Dr. P. Dobud  
Administrative Assistant  
to the Dean of Science

## Rationale

### APPLIED PHYSICS PROGRAM

The Physics Department wishes to develop a Majors degree program in Applied Physics. Our department, like many other departments in the University, has traditionally offered the same courses to both its majors and honours students. In the upper division these courses are selected and taught with the implicit understanding that the students will be going on to graduate school. They are thus designed primarily for the honours students. As a result, our prospective majors students, who in general are interested in gaining employment upon graduation rather than entering graduate school, find some of the courses irrelevant for their purpose.

The introduction of the Applied Physics Program thus represents an attempt to provide an attractive and relevant degree path for majors students who are interested in the direct practical applications of physics. An attempt has been made to introduce new courses, and select other existing courses, that will be relevant and valuable to them in their careers after graduation. The range of material presented in the proposed program should also greatly enhance and broaden their prospects for employment. To this end, an attempt has been made to develop a course structure that will emphasize material and provide training that is important in the high technology world of to-day. The graduates of the program should thus be of great interest to the ever-increasing number of local and national technologically-oriented companies.

1986 04 24

- PHYS 120-3 Physics I
- 121-3 Physics II
- 131-2 General Physics Laboratory
- 211-3 Intermediate Mechanics
- 221-3 Intermediate Electricity and Magnetism
- 233-2 Introductory Physics Laboratory A
- 234-2 Introductory Physics Laboratory B

Upper Division Courses in Science:

MATH 310-3 Introduction to Ordinary Differential Equations  
plus one other MATH course numbered 316 or greater

PHYS Minimum 30 semester hours upper division credit (courses numbered 300 and above), including a minimum 6 semester hours of upper division laboratory credit.

Non-science Electives — A minimum of 6 semester hours from the Faculty of Arts.

In addition to the courses listed above, the student must elect sufficient unspecified upper division courses to complete a minimum of 44 semester hours in courses numbered 300 and above, and further unspecified courses in any division to bring the total credit for the degree to a minimum of 120 semester hours. (See Faculty of Science Requirements).

Physics Major - Applied Physics Option

The Applied Physics Option offers a solid background in physics combined with an orientation toward the applied aspects of physics necessary for students planning careers in high technology industries after completing their B.Sc. degrees. It is recommended that students also enrol in the Co-op program in order to acquire valuable industrial experience.

Program leading to a B.Sc. degree in Applied Physics

REQUIRED RECOMMENDED COURSES FOR APPLIED PHYSICS

LOWER DIVISION COURSES: (40 semester hours) --- 51

- CHEM 104-3 General Chemistry I
- 105-3 General Chemistry II
- 115-3 General Chemistry Laboratory I
- CMPT 102-3 Introduction to Programming for Science Students
- 290-3 Introduction to Digital Systems \*
- 291-3 Introduction to Digital Circuit Design
- MATH 151-3 Calculus I
- 152-3 Calculus II
- 232-3 Elementary Linear Algebra
- 251-3 Calculus III
- 252-3 Vector Calculus
- PHYS 120-3 Physics
- 121-3 Physics II
- 131-2 General Physics Laboratory B
- 211-3 Intermediate Mechanic
- 221-3 Intermediate Electricity and Magnetism
- 233-2 Introductory Physics Laboratory A
- 234-2 Introductory Physics Laboratory B

UPPER DIVISION COURSES: (45 to 47 semester hours)  
Core 47 to 48

- CMPT 390-3 Digital Circuits and Systems \*
- 391-3 Microcomputer Hardware Workshop
- MATH 310-3 Introduction to Ordinary Differential Equations
- MACM 316-3 Numerical Analysis I
- PHYS 324-3 Electromagnetics
- 326-3 Electronics and Instrumentation
- 331-3 Electronics Laboratory
- 332-3 Intermediate Laboratory
- 344-3 Thermal Physics
- 355-3 Optics
- 385-3 Quantum Physics
- ~~421-4 Advanced Physics Laboratory I~~

430-5 Digital Electronics and Interfacing

and either

- NUSC 341-3 Introduction to Radiochemistry
- 342-3 Introduction to Nuclear Science
- 346-3 Radiochemistry Laboratory

or three of

- PHYS 365-3 Semiconductor Device Physics
- 455-3 Laser Physics
- 465-3 Solid State Physics
- 431-4 ~~432-4~~ Advanced Physics Laboratory I

Non-Science electives — A minimum of 6 semester hours of electives from the Faculty of Arts.

In addition to the courses listed above, the students must elect sufficient unspecified courses in any division to complete a minimum of 120 semester hours total credit.

NEW COURSE PROPOSAL FORM1. Calendar InformationDepartment: PhysicsAbbreviation Code: PHYS Course Number: 430 Credit Hours: 5 Vector: 2-0-4Title of Course: DIGITAL ELECTRONICS AND INTERFACING

## Calendar Description of Course:

Digital logic design with particular application to interfacing computers to physical apparatus. Construction and use of interface devices for various laboratory experiments. Computer data reduction.

## Nature of Course:

Lecture/Laboratory

## Prerequisites (or special instructions):

PHYS 326 and PHYS 331; or permission of instructor.

What course (courses), if any, is being dropped from the calendar if this course is approved: PHYS 432-4

2. SchedulingHow frequently will the course be offered? once per yearSemester in which the course will first be offered: 87-3

Which of your present faculty would be available to make the proposed offering possible?

M. Thewalt & others3. Objectives of the Course

To provide students with the skills required to design and perform computer-controlled experiments.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty	None
Staff	Part-time Laboratory Instructor (desired but not essential)
Library	None
Audio Visual	None
Space	None
Equipment	\$70,000 (microcomputers, components & diagnostic equipment)

5. Approval

Date:

April 22/86July 9/86

[Signature]  
Department Chairman

[Signature]  
Dean

[Signature]  
Chairman, SCUS



PROPOSAL - PHYS 430-5 (2-0-4)

Digital Electronics and Interfacing

Proposed course outline for a new fourth year course comprising one lab period and two hours of lectures per week.

Course Description

The course will provide a working knowledge of digital logic design with particular application to interfacing digital computers to external apparatus. While all logic families will be briefly discussed and compared, the emphasis will be on TTL logic. The course will concentrate on the construction of custom-made interfaces connected directly to the computer bus, although standardized interface protocols such as RS232 and IEEE488 will also be discussed. While interfacing concepts will be introduced at a general level, the specific examples and lab experiments will be solely concerned with the IBM PC bus. The detailed internal working of the computer will not be covered, nor will machine-language programming. By the end of the course several interface devices suitable for performing physical experiments in the lab will have been constructed and used. These experiments will also require data reduction on the computer.

Outline: (lab experiments will be coupled to these topics)

- logic families
- logic design and minimization, Boolean algebra, Karnaugh maps
- more complicated devices: counters, shift registers, decoders, etc.
- synchronous vs. asynchronous design
- standard interface protocols: RS 232, IEEE488
- interfacing to the computer bus, special LSI circuits useful in interfacing
- the IBM PC bus
- advanced interfacing: interrupts and direct memory access
- construction and use of complete hardware devices for performing physical experiments

# SIMON FRASER UNIVERSITY

## MEMORANDUM

W. Wattamaniuk  
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Director, Analytical Studies  
.....  
Subject. APPLIED PHYSICS DEGREE PROGRAM  
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R. Frindt, Acting Chairman  
From.....  
Department of Physics  
.....  
Date. September 4, 1986  
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This is in response to your memo of August 5, 1986 to the Dean of Science regarding the Applied Physics Degree Program Proposal to be placed on the SCAP agenda on September 10, 1986 where you asked for an indication of need and enrolment projections for the Applied Physics Program.

Ever since the Applied Physics program was under discussion many of our Major physics students have expressed interest in the program, and we expect that in steady-state we will have about 10 to 15 Applied Physics students graduating per year. We expect that the majority of these will be in the Co-op program.

We feel that our Applied Physics Major program is a timely response to what we perceive to be a growing need in B.C. industry for graduates who have a solid background in physical science with significant exposure to computing science, electronics and laboratory skills.

I expect to be attending the SCAP meeting on September 10, 1986.

*R. Frindt*

R. Frindt

RF/mrb

cc: Dean of Science  
Dr. J.C. Irwin

dk.02-05