

S.281

SIMON FRASER UNIVERSITY

MEMORANDUM

SENATE PAPERS

Mr. H. Evans,

Secretary of Senate

Subject New Physics Courses

From B. L. Funt

Dean of Science

Date October 22, 1969

At its meeting of October 20th, the Faculty of Science approved the recommendation of its Undergraduate Curriculum Committee that the new course proposals from the Physics Department be accepted.

The cogent arguments for these changes are summarized in the Physics' Department Preamble which is attached to paper 25-B.

The standard new course proposal forms were completed as considered applicable for each of the course changes, and are now submitted for Senate approval.

B. L. Funt

c.c. Dr. J. F. Cochran
Acting Head, Physics

FACULTY OF SCIENCE

3. i) Report from Undergraduate Curriculum Committee
- b) New Physics Courses

The proposed Physics courses were approved by the Undergraduate Curriculum Committee and are recommended to Faculty for acceptance and submission to Senate.

B.L. Funt

Approved by the Faculty of Science at its meeting of October 20, 1969

COMMENTS ON THE PHYSICS PROPOSAL

The proposals in the Physics Dept. submissions as approved by our Undergraduate Curriculum Committee and now forwarded to Faculty for approval bring into focus the problem of definition of a unit weight in a course.

It is implicit in the new proposals that 2 courses, each of 2 units credit, are equivalent to 1 course of 4 units credit.

However, it is noteworthy that at the time when the Faculty of Arts is moving more and more towards 5 unit courses and where the Faculty of Science were essentially 3 unit courses throughout, there has been an increased tendency to re-number and re-designate courses in order to bring more 2 unit courses into play. The net effect of this is to present a program for average students which requires 7 course titles for the regular or specified program in the calendar.

It is argued that this is preferable to concentrating the work in a given subject into a 5 unit course, at a rate which a student cannot assimilate.

On the other hand, I have increasing concern based on representations by students that this degree of fragmentation of courses is difficult for the student to contend with and is not in the interest of the best educational philosophy on the trimester system.

Despite the fact that the program is recommended by the Undergraduate Curriculum Committee, I felt that it was my responsibility to Faculty to point out this new and definitive tendency which is developing in terms of course credits.

B.L. Funt

U-72511-2

SIMON FRASER UNIVERSITY

MEMORANDUM

SENATE PAPERS

| | | | |
|--------------|---------------------|-----------|----------------------------|
| To..... | Dr. B. L. Funt | From..... | J. F. Cochran, Acting Head |
| | Dean of Science | | Physics Department |
| Subject..... | New Physics Courses | Date..... | September 22, 1969 |

14733-PC

Enclosed is a paper outlining proposed physics course changes, together with the reasons for changing them at this time. This submission has departmental approval, and we wish it to go forward to the Senate for University approval with the recommendation of the Faculty of Science.

J. F. Cochran
 J. F. Cochran

JFC:eaw

Enclosure



FACULTY OF SCIENCE
NEW COURSE PROPOSALS

Physics Department

1969

PREAMBLE

We propose to change the entire structure in the first two years' courses offered in the Physics Department. For this reason the "standard" new course proposal form is inappropriate to our purpose. We have attempted to follow its form as closely as possible, deviating only when appropriate under these circumstances.

The major points of our proposal are these:

1. No new faculty is required.
2. No new facilities are required.
3. The demand placed upon students in the Science Faculty taking our courses is reduced, although the physics content is substantially the same.
4. The new program matches the high school physics program. The old program gave rise to matching problems.
5. The new program matches the community college program. The old program gave rise to matching problems.
6. The new program has courses suitable for Biology and Kinesiology students. The old program did not have such courses.

FACULTY OF SCIENCE

NEW COURSE PROPOSALSI CALENDAR INFORMATION

Department: Physics

Course Number: 233-2 Title: Introductory Physics Laboratory A

Course Number: 234-2 Title: Introductory Physics Laboratory B

Course Number: 235-2 Title: Introductory Physics Laboratory C

Credit Hours: two each Vector Description: (0-0-3)

Prerequisites: A 200 level physics course must precede or be taken concurrently. No more than six semester-hours credit may be obtained in Introductory Physics Laboratory courses.

II ENROLMENT AND SCHEDULING

Estimated enrolment: 10-60, depending on semester and student preference in timetabling.

Semester Offered: Every semester

When courses will first be offered: As soon as they are approved.

III JUSTIFICATION

A. These courses each consist of two thirds of the material required in each of the existing three-semester-hour Introductory Physics Laboratory courses, Physics 231-3 and 232-3. The latter are presently structured as project laboratories. Students choose for themselves the experiments they wish to do during the semester. A student in 233, 234, or 235 would simply be required to do fewer experiments. The course administration simply involves bookkeeping, as no new facilities are necessary, and the courses will be taught in the same rooms at the same times as the three-semester-hour courses.

B. These courses do not affect degree requirements, except that now new options are opened to students who want to take their physics laboratory in differently sized pieces.

C. The calendar would be changed so that the section presently occupied by Physics 231-3 and 232-3 will be replaced by:

Physics 231-3* Introductory Physics Laboratory I (0-0-4)

Physics 232-3* Introductory Physics Laboratory II (0-0-4)

Physics 233-2* Introductory Physics Laboratory A (0-0-3)

Physics 234-2* Introductory Physics Laboratory B (0-0-3)

Physics 235-2* Introductory Physics Laboratory C (0-0-3)

Physics 236-1* Introductory Physics Laboratory D (0-0-2)

* All Introductory Physics Laboratories: Experiments chosen from among mechanics, heat, optics, electricity, magnetism, properties of matter, atomic and nuclear physics.

Prerequisites: Permission of the Physics Department, normally granted to students sufficiently advanced in the lecture courses to undertake the laboratory. Enrollment in a student's first laboratory course is possible only if a physics course numbered 201 or higher precedes or is taken concurrently. A total of no more than six semester hours of these courses may be taken by any student.

(This includes course 236-1, discussed in an accompanying paper).

D. It is proposed that no courses be dropped from the calendar.

IV BUDGETARY AND SPACE FACTORS

A. This course will require no extra faculty because it will be run by the faculty in charge of the Introductory Physics Laboratory courses.

B. No additional space and/or equipment will be required.

APPROVAL - Faculty Undergraduate Curriculum Committee: OCTOBER 1, 1969

Faculty: OCTOBER 20, 1969

Senate:

FACULTY OF SCIENCE

PROPOSED NEW COURSESI CALENDAR INFORMATION

Department: Physics

Physics 201-2 Introductory Mechanics (2-1-0)

Vectors, statics, dynamics, kinematics, work, energy, power, simple harmonic motion, gravity.

Prerequisites: B.C. high school Physics 12, or Physics 11 with high standing, or the equivalent, or Physics 101-3. Mathematics 152-3 must precede or be taken concurrently.

Physics 202-2 Introductory Optics (2-1-0)

Geometrical and physical optics and the special theory of relativity.

Prerequisites: B.C. high school Physics 12, or Physics 11 with high standing, or the equivalent, or Physics 101-3. Mathematics 152-3 must precede or be taken concurrently.

Physics 203-2 Intermediate Mechanics (2-1-0)

Driven and damped oscillations, rigid body motion, elasticity, orbital mechanics, Lagrangian mechanics.

Prerequisites: Physics 201-2 or Physics 101-3 with a grade of B or higher. Either Mathematics 251-3 or 252-2 must precede or be taken concurrently.

Physics 204-2 Introductory Electricity and Magnetism (2-1-0)

Electrostatics, currents, resistance, capacitance, inductance, Coulomb's and Gauss' Laws, electric and magnetic fields.

Prerequisites: Physics 101-3 or Physics 12. Mathematics 152-3 must precede or be taken concurrently.

Physics 205-2 Intermediate Electricity and Magnetism (2-1-0)

Electric and magnetic fields in matter, electric circuits, Ampere's and Faraday's Laws, introduction to Maxwell's equations.

Prerequisites: Physics 204-2, or 102-3 with a grade of B or higher. Mathematics 251-3 must precede or be taken concurrently.

Physics 206-2 Introductory Thermal and Modern Physics (2-1-0)

Temperature, heat transfer, kinetic theory of gases, some classical thermodynamics, radioactivity, Rutherford and Bohr models, nuclear energy, uncertainty, statistical nature of physical law.

Prerequisites: Physics 201-2 or 101-3 with a grade of B higher, and Physics 204-2 or 102-3 with a grade of B or higher. Physics 202-2 normally precedes or is taken concurrently. Mathematics 251-3 must precede or be taken concurrently.

II ENROLMENT AND SCHEDULING

Enrolment is estimated to vary considerably depending on the semester in which a particular course is offered. Enrolments should vary between 20 and 60.

In steady-state operation (i.e. after initially phasing new courses in and old courses out) we shall offer the new courses in this pattern:

| <u>Spring Semester</u> | <u>Summer Semester</u> | <u>Fall Semester</u> |
|------------------------|------------------------|----------------------|
| 201-2 | 202-2 | 201-2 |
| 202-2 | 203-2 | 203-2 |
| 203-2 | 204-2 | 204-2 |
| 205-2 | | 205-2 |
| 206-2 | | 206-2 |

The new courses will be offered for the first time according to the following schedule:

| | | |
|-------|--------|------|
| 201-2 | Spring | 1971 |
| 202-2 | Spring | 1971 |
| 203-2 | Summer | 1971 |
| 204-2 | Summer | 1971 |
| 205-2 | Fall | 1971 |
| 206-2 | Fall | 1971 |

III JUSTIFICATION

The present offering in Physics is not broad enough to satisfy the needs of the Biologists and Kinesiologists for a six-hour introductory course on one hand, and to give a thorough, more extensive introduction to the physical science students on the other. We intend to direct Physics 101-3 and 102-3 specifically at the student who has not completed B.C. High School Physics and at the Bioscience and Kinesiology students. We find that we spend too much

time teaching mathematical techniques or trying to circumvent mathematical inadequacies in Physics 101-3 and 102-3 as they are presently taught. The physical science student will take these new courses starting no earlier than his second semester in university, and will thus be better prepared mathematically to assimilate physics.

A. The difference between these courses and courses presently offered in the department at the same level (211-3 and 221-3) is that these courses will cover the material contained in 101, 102, 211, and 221 in a slower, more thorough fashion. Part of the material of Physics 211 will be deleted since it can better be covered in Physics 411 (and since it is widely considered to be too difficult for second year students).

B. The addition of these courses will enable the department to serve the needs of all programs in the university which require physics courses in a manner superior to that which is now possible.

C. Degree requirements in all programs affected by this change can be modified in such a way that equal or superior options are available in every case.

The programs affected are:

- B.Sc. Majors and Honors Biological Sciences
- B.Sc. Majors and Honors Applied Mathematics
- B.Sc. Majors and Honors Chemistry
- B.Sc. Honors Chemical Physics
- B.Sc. Majors and Honors Kinesiology
- B.Sc. Majors and Honors Biochemistry
- B.Sc. Majors and Honors Physics

Students intending transfer to UBC Applied Science Programs
Students intending transfer to Medical, Veterinary, Architecture, and other professional schools.

D. Calendar changes necessary to reflect the addition of these courses (and deletion of those to be mentioned) are, in addition the descriptions already detailed, changes in physics course requirements for all of the above programs with the exception of Biological Sciences and Kinesiology Programs, and the Majors Biochemistry program. Options (involving the new courses) should be added to those programs when possible.

E. If these courses are approved Physics 100-3, 211-3, and 221-3 must be dropped from the calendar. The prerequisite of high school physics must be dropped from Physics 101-3, returning it to the form in which it originally appeared.

F. There is no student demand for these courses; there is a common student disappointment or dissatisfaction with the courses presently offered, particularly with Physics 211-3, and this modified offering is intended to provide a more satisfactory sequence.

G. There are several other reasons for proposing these courses. The first of these involves the students who transfer in from Junior College after one year. Such students could not be easily accommodated by giving them advance credit in, say, one or more coherent four-semester-hour courses, the form in which this proposal was originally cast. At present many of these students are obliged to start at the first-year level on entering SFU, a somewhat discouraging situation. Under the new scheme a student transferring six hours from a Junior College could be given a credit combination appropriate to his level of education.

If four- instead of two-semester - hour courses were offered then they would have to be rigidly sequential. All courses would need to be offered every semester to allow use of the summer semester by all students. Our faculty is not large enough to permit us to offer this large a range of courses.

Advantage is taken, to good pedagogical end, of the flexibility of the trimester system. While the first physics course can be delayed a semester while the student gains mathematical skills, it probably could not be delayed a full year.

Lastly, it is the opinion of those physics faculty members who matriculated in Canada that four lectures per week by one man on one subject is ineffective compared with two per week by two men on each of two subjects.

IV. BUDGETARY AND SPACE FACTORS

A. All of the present physics faculty are competent to teach all of these courses.

B. No special space and/or major equipment additions are necessitated by these changes.

C. Scheduling problems may be eased. Science students' timetables are typically slack on Tuesdays and Thursdays, on which days two-semester-hour courses conveniently fit. The popular 9:30 Monday-Wednesday-Friday slot becomes available so that a science student can more easily schedule his electives.

APPROVAL - Faculty Undergraduate Curriculum Committee OCTOBER 1, 1969

Faculty: OCTOBER 20, 1969

Senate:

FACULTY OF SCIENCE

NEW COURSE PROPOSALI CALENDAR INFORMATION

Department: Physics Course Number: 236-1
Title: Introductory Physics Laboratory D
Sub-title or Description: Experiments chosen from several in mechanics, heat, optics, electricity, magnetism, atomic and nuclear physics.
Credit Hours: one Vector Description: (0-0-2)
Pre-requisite(s): A 200 level physics course must precede or be taken concurrently. No more than six semester-hours of credit may be obtained in Introductory Physics Laboratory courses.

II ENROLMENT AND SCHEDULING

Estimated Enrolment: fewer than five
Semester Offered (e.g. Yearly, every Spring; twice yearly, Fall and Spring): Every semester
When course will first be offered: Summer semester 1970

III JUSTIFICATION

A. This course is needed so that students may make up six semester-hours of credit by using a three-, a two- and a one-semester-hour laboratory instead of being restricted to the choice of three twos or two threes. It may also prove useful to transfer students from other institutions who lack only one semester hour in an equivalent course.

B. Topics/projects are drawn from the same selection available to students in the other Introductory Physics Laboratory courses.

C. All comments pertinent to the justification of courses 233-2, 234-2, and 235-2 (q.v.) apply here as well, including calendar changes.

D. This one-semester-hour course exploits the intrinsic flexibility of both the trimester system and the project-type physics laboratory, enabling the student to plan his program of studies considerably more easily than is presently possible.

IV BUDGETARY AND SPACE FACTORS

A. This course will require no extra faculty because it will be run by the faculty in charge of the Introductory Physics Laboratory courses.

B. No additional space and/or equipment will be required.

APPROVAL - Faculty Undergraduate Curriculum Committee: October 21, 1969

Faculty: October 20, 1969

Senate:

NEW COURSE PROPOSALI CALENDAR INFORMATION

Department: Physics

Course Number: 199-3

Title: Periphysical Topics

Sub-title or Description: Selected topics from sciences closely allied with physics.

Credit Hours: three

Vector Description: (3-1-0)

Pre-requisite(s): B.C. High School Physics 11 or equivalent, and Mathematics 12.II ENROLMENT AND SCHEDULING

Estimated Enrolment: Uncertain, probably a minimum of 40
Semester Offered (e.g. Yearly, every Spring; twice yearly,
Fall and Spring): Each Fall when
arrangements can be made.

When course will first be offered: Fall 1970

III JUSTIFICATION

Because we feel that Physics students, and perhaps some others as well, will likely want to take a physics course in their first semester, we think it would be valuable to teach the following course which will not be required as part of any program. It would be accessible to many Arts and Education students as well. "Periphysical Topics" is a course in which the content would vary from semester to semester. Typical topics would be geophysics, astronomy, physical oceanography, atmospheric physics, astrophysics, and other such topics which are strongly related to physics. While some of these topics could be handled adequately by present faculty members, it is possible and desirable that visiting faculty, perhaps often from U.B.C., be commissioned to teach the course. It would be offered in the Fall semester only.

While this course is not part of any program it would be a valuable addition to our offering and an attractive course to non-science students as well. The number is not that of a so-called general education course because this course, unlike Physics 001-3, will be fairly mathematical.

IV BUDGETARY AND SPACE FACTORS

A. Which faculty will be available to teach this course?

Two from U.B.C. have indicated interest.

B. What are the special space and/or equipment requirements for this course?

None

C. Any other budgetary implications of mounting this course:

Financial support for the lecturer would usually be required.

APPROVAL - Faculty Undergraduate Curriculum Committee: OCTOBER 1, 1969

Faculty: OCTOBER 20, 1969

Senate: