

SIMON FRASER UNIVERSITY

MEMORANDUM

S. 337
SENATE PAPERS

To..... Mr. H. Evans
..... Secretary of Senate
Subject..... New Undergraduate Courses

From..... B. L. Funt
..... Dean of Science
Date..... February 11, 1970

At its meeting of February 9, 1970, the Faculty of Science approved the following courses:

Physics 399-2
Chemistry 416-3
Chemistry 463-3

The Physics course is a special one in a series being given by Professor Montroll. It is to be offered in the Fall 1970 semester only and is not part of a continuing program.

Chemistry 416-3 is a laboratory course in analytical methods. The Department of Chemistry reports that the removal of some prerequisites will now permit a freer scheduling of the senior level courses and a lower frequency of offering. The Department reports that no new faculty will be required as a result of this change in frequency of presentation.

The Chemistry 463 course represents a revision of the Physical Chemistry offering in order to ensure that the material of similar character is brought together under the same course title. It is also intended to relieve some of the strain from Chemistry 261, which is reported by students and faculty as being too severe a course for the time and credit allocated to it.



B. L. Funt

c.c. Dr. L. M. Srivastava

FACULTY OF SCIENCE

- i) Report of the Undergraduate Curriculum Committee
- a) Physics 399-2

The Physics Department wish to mount a course suitable for third year students in Physics and Chemistry during the Fall semester of this year while Dr. Montroll is on campus.

The course has been approved by the Faculty of Science Undergraduate Curriculum Committee at its meeting of February 4th, 1970

B. L. Funt

Approved by the Faculty of Science at its meeting of February 9, 1970

FACULTY OF SCIENCE

NEW COURSE PROPOSAL

I CALENDAR INFORMATION

Department: Physics

Course Number: 399-2

Sub-title or Description: Physics of Technology

Credit Hours: Two

Vector Description: (2-0-0)

Pre-requisite(s): fifth semester (60 semester hours) standing including Physics 101-3 and Physics 102-3 or the equivalent, and Mathematics 232 and 352.

II ENROLMENT AND SCHEDULING

Estimated Enrolment: 30

Semester Offered: Fall 1970 only

III JUSTIFICATION

- A. What is the detailed description of the course including differentiation from lower level courses, from similar courses in the same department and from courses in other departments in the University? What is the range of topics that may be dealt with in the course?

History, physical principles, state of the art, and direction of probable development in the fields of computer hardware, communications systems, propulsion methods, new materials, and energy sources and power generation methods. This course will overlap no other courses offered in this University.

- B. How does this course fit the goals of the department?

We wish to allow our students to take advantage of Dr. Montroll's presence on our campus this Fall.

- C. How does this course affect degree requirements?

It does not.

- D. What are the calendar changes necessary to reflect the addition of this course?

NONE

- E. What course, if any, is being dropped from the calendar if this course is approved?

NONE

- F. What is the nature of student demand for this course?

Suitable for Chemistry and Physics third year students.

- G. Other reasons for introducing the course.

In graduate course format it would be difficult for us to be able to offer this valuable course to our students.

IV BUDGETARY AND SPACE FACTORS

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

Dr. Elliott W. Montroll

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

One classroom for three weeks, one hour per day.

- C. Any other budgetary implications of mounting this course:

A teaching assistant must be hired to supervise student projects.

APPROVAL -

Faculty Undergraduate Curriculum Committee: **FEBRUARY 4, 1970**

Faculty: **FEBRUARY 9, 1970**

Senate:

FACULTY OF SCIENCE

i) Report of the Undergraduate Curriculum Committee

c) Chemistry 416-3

This course was approved by the Faculty of Science Undergraduate Curriculum Committee at its meeting of February 4, 1970.

B. L. Funt

Approved by the Faculty of Science at its meeting of February 9, 1970

FACULTY OF SCIENCE

NEW COURSE PROPOSAL

I CALENDAR INFORMATION

Department: Chemistry

Course Number: 416

Modern Methods of
Title: Analytical
Chemistry

Sub-title or Description:

Instrumentation, techniques and scope of application of analytical methods based on optical properties, electrochemical phenomena and interphase separations. Applications to problems in pure and applied Chemistry and Biochemistry.

Credit Hours: 3

Vector Description: 2-0-4

Pre-requisite(s):

II ENROLMENT AND SCHEDULING

Estimated Enrolment: 8

Semester Offered (e.g. Yearly, every Spring; twice yearly, Fall and Spring):

Every Fall

When course will first be offered: 70-3

III JUSTIFICATION

- A. What is the detailed description of the course including differentiation from lower level courses, from similar courses in the same department and from courses in other departments in the University?

See description above. This is a senior level "instrumental analysis" course; certain other of our courses employ similar instrumentation but not for the purposes of developing an understanding of their use in analytical procedures. This course is the only one required for Am. Chem. Soc. accreditation that we lack.

- B. What is the range of topics that may be dealt with in the course?

Emphasis will be on the application and relative limitations of analytical methods based on physical measurements, rather than on the principles of these measurements themselves.

In addition to optical spectrophotometry and the various electrometric methods, some mention will be made of X-ray methods, chemical microscopy, and interphase separation techniques of analysis. See appended course outline for details.

- C. How does this course fit the goals of the department?

This course would plug the major existing gap in our chemistry program - the lack of any course in modern analytical chemistry. Such a course is particularly important for students who do NOT intend to pursue graduate work since these techniques are widely used in industry.

- D. How does this course affect degree requirements?

This will be an elective course, not a part of the "core" program. There will be no change in degree requirements.

- E. What are the calendar changes necessary to reflect the addition of this course?

Insertion as per 1 on Page 1 of this form.

- F. What course, if any, is being dropped from the calendar if this course is approved?

None

- G. What is the nature of student demand for this course?

The lack of such a course has been criticized by a number of students who feel that their preparation in this area has been completely inadequate.

- H. Other reasons for introducing the course.

IV

BUDGETARY AND SPACE FACTORS

- A. Which faculty will be available to teach this course? S. K. Lowe and possibly B.D. Pate. Changes in the prerequisites for Chem. 361, 362 and 462 would allow a lower frequency of offering of these courses and therefore free faculty.

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

1. Space: Can fit in very well to the new Physical Chemistry teaching laboratory, since the facilities required will be of a similar nature.
2. Equipment: Will make use of much of our present research apparatus; some new purchases will be required to cover areas (such as electrochemistry) that are not of current research interest in the Department.

C. Any other budgetary implications of mounting this course:

It should be noted that the Department was granted about \$30,000 for the establishment of this course three years ago, and then deferred it indefinitely in order to conserve University funds at that time. The amount required to get the course going now will be much less than this, in that the present research equipment will be utilized for this course.

APPROVAL -

Faculty Undergraduate Curriculum Committee: FEBRUARY 4, 1970

Faculty: FEBRUARY 9, 1970

Senate:

Outline is based on two lectures and one laboratory period per week. Because all instrumental methods cannot possibly be covered in a single course of reasonable size, the philosophy stated above vis-a-vis existing courses is somewhat compromised; NMR, mass spectrometry, and infrared techniques are left to Chem 457, and radioisotopic procedures are not covered. Thermogravimetry and DTA have been left out. Individual instructors will no doubt have their own feelings as to details of what should be included and what can be left to other courses. I would propose that the laboratory exercises cover methods and techniques that are not used at all in existing courses; the lectures and problem sets could cover the entire outline content at a consistent level of thoroughness.

PART I: OPTICAL METHODS		
Lecture No.	Lecture Topics	Lab. Topics
1	Introduction to optical methods; sources of radiation, monochromators, photometry.	Lab. 1
2	Visible and u.v. absorption spectrometry; absorbency, Beer's law, photometric accuracy, Ringbom plots. Isobestic points, Job's law plots, difference spectra. Photometric titrations, reflectance spectra.	Lab. 2
3		
4		
5	Fluorimetry and phosphorimetry. Fluorescence, energy transfer, quenching. Applications to trace analysis.	Lab. 3
6	Arc emission and flame spectroscopy; atomic absorption and atomic fluorescence. Some applications of atomic absorption.	
7	X-ray methods; X-ray absorption, diffraction and emission analysis; electron microprobe analysis.	Lab. 4
8		
9	Polarized light; polarimetry and ORD; circular dichroism.	Lab. 5
10	Optical crystallography and chemical microscopy. Applications to geochemistry.	

PART II. ELECTROCHEMICAL METHODS		
11	Introduction: electrodes, cell reactions, standard potentials. Reversibility, polarization, overvoltage.	Lab. 6
12.	Potentiometry; potentiometric titration, non-aqueous solvent techniques, constant-potential titrations.	
13. 14	Voltammetry and polarography. Cyclic voltammetry, amperometric titrations, chronopotentiometry.	Lab. 7
15 16	Electrodeposition and coulometry; controlled-potential electrolysis, electrography, mercury-electrode electrolysis, coulometric titrations, stripping analysis.	Lab. 8
17	Conductimetry, high-frequency titrations.	Lab. 9
PART III. INTERPHASE SEPARATIONS		
18	Solvent extraction, countercurrent separation, fractional distillation	Lab. 10
19, 20	Gas chromatography	Lab. 11
21 22 23	Liquid chromatography; absorption and partition chromatography, molecular sieves and gel permeation methods, ion-exchange chromatography.	Lab. 12
24	Electrophoresis and electrochromatography.	

FACULTY OF SCIENCE

i) Report of the Undergraduate Curriculum Committee

d) Chemistry 463-3

This course has been approved by the Faculty of Science Undergraduate Curriculum Committee at its meeting of February 4, 1970.

B. L. Funt

Approved by the Faculty of Science at its meeting of February 9, 1970

FACULTY OF SCIENCE

NEW COURSE PROPOSAL

I CALENDAR INFORMATION

Department: Chemistry

Course Number: 463 Title: Physical
Chemistry of
Solutions

Sub-title or Description:

Credit Hours: 3

Vector Description: 3-1-0

Pre-requisite(s): Chemistry 261

II ENROLMENT AND SCHEDULING

Estimated Enrolment: 5 to 10 initially

Semester Offered (e.g. Yearly, every Spring; twice yearly, Fall and
Spring):

Yearly

When course will first be offered:

Fall '70

III JUSTIFICATION

- A. What is the detailed description of the course including differentiation from lower level courses, from similar courses in the same department and from courses in other departments in the University?

This course will deal primarily with thermodynamics of non-ideal solutions, and kinetics of solution reactions. The introduction of non-ideal solutions will be deleted from Chem 261 and presented in considerably expanded form. Solution kinetics as such are not presently taught.

- B. What is the range of topics that may be dealt with in the course?

Activity, fugacity and their determination; properties of electrolyte solutions; Debye-Hückel theory; kinetics of solution reactions; diffusion-limited reactions; cage effect; relaxation methods; enzyme kinetics.

C. How does this course fit the goals of the department?

It provides a course in an area of chemistry not presently adequately covered but of considerable importance to all branches of chemistry, including biochemistry.

D. How does this course affect degree requirements?

It provides an additional upper level chemistry elective.

E. What are the calendar changes necessary to reflect the addition of this course?

Addition of this course.

F. What course, if any, is being dropped from the calendar if this course is approved?

None

G. What is the nature of student demand for this course?

Shortage of upper level chemistry electives.
No systematic treatment of solution physical chemistry.

H. Other reasons for introducing the course.

It is necessary to remove some material from Chem 261 as this course is too long for a 3-1-0 course.

IV

BUDGETARY AND SPACE FACTORS

A. Which faculty will be available to teach this course? Drs. Voigt, Sherwood & Gay

Changes in the prerequisites for Chem. 361, 362 and 462 would allow a lower frequency of offering of these courses and therefore free faculty.

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

None

- C. Any other budgetary implications of mounting this course:

None - faculty requirement can be met with present staff.

APPROVAL - Faculty Undergraduate Curriculum Committee: FEBRUARY 4, 1970

Faculty: FEBRUARY 9, 1970

Senate: