SIMON FRASER UNIVERSITY
MEMORANDUM

To: Senate

From: J.M. Munro, Chair
Senate Committee on
Academic Planning

Subject: Curriculum Changes -
Faculty of Science

Date: November 8, 1991

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 curriculum revisions for the Faculty of Science as set forth in S.91-58 as follows

i)	S.91-58a	Department of Chemistry
ii)	S.91-58b	Department of Mathematics and Statistics
iii)	S.91-58c	Department of Physics
iv)	S.91-58d	Management and Systems Science Program

Department of Chemistry
Curriculum Changes

SCUS Reference: **SCUS 91-15; SCUS 91-50; SCUS 91-51; SCUS 91-52**
SCAP Reference: **SCAP 91-39a**

i) **New Minor in Environmental Chemistry** (pp. 1 - 15 incl.) including calendar description, schedule of studies and
New Courses:
CHEM 316 Introductory Instrumental Analysis
CHEM 317 Analytical Environmental Chemistry
CHEM 371 Chemistry of the Aqueous Environment
CHEM 372 Chemistry of the Atmospheric Environment
CHEM 415 Selected Topics in Analytical Chemistry
CHEM 417 Advanced Instrumental Analysis
Deleted Course:
CHEM 416 Modern Methods of Analytical Chemistry

ii) **Changes to the Chemistry Core Program and to various Honors, Major and Minor Programs,** (pp. 16 - 23 incl.) including curriculum revisions and
Course Deletions:
CHEM 251 Organic Chemistry
CHEM 252 Organic Chemistry II
CHEM 256 Organic Chemistry Laboratory I
CHEM 356 Organic Chemistry Laboratory II

iii) **Changes to the Inorganic Chemistry Program,** (pp. 24 - 31 incl.) including curriculum revisions and
New Courses:
CHEM 331-3 Practical Aspects of Inorganic Chemistry
CHEM 433-3 Mechanistic Inorganic Chemistry
CHEM 439-3 Special Topics in Inorganic Chemistry

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: R. Korteling, Chair
DUGSC

FROM: L.K. Peterson,
J. D'Auria and S. Holdcroft
Dept. of Chemistry

SUBJECT: **Analytical/Environmental Chemistry**

DATE: 26 November 1990
File: ANALPROP.CHM
(Revised Feb. 8/91/ACO)

Introduction

Analytical techniques are among the essential tools that allow chemists to make rational enquiries into chemical systems of interest to them. Although academic chemists take pride that they are individually knowledgeable in the application of techniques relevant to their work, few actually develop new methods of analysis. The last two decades have seen an explosion in the discovery and development of new methods of analysis. The incorporation of microcomputer chip technology and enzyme coated electrodes are but two of the innovations that can be cited as responsible for a myriad of new analytical methods and devices.

A university department that expects to train well rounded undergraduate chemists and biochemists is certainly required to count among its faculty not only masters of the application of existing techniques to important problems, but also the inventors of new analytical techniques. The latter usually consists of the creative marriage of several known phenomena into a system that specifically measures a key compound in a soup of related substances.

Amongst its faculty, the Department of Chemistry at SFU has a small group of chemists (inorganic, physical, nuclear) who have mounted courses in analytical chemistry outside of their immediate areas of expertise. These two analytical courses were obviously limited to the introductory aspects and to the most commonly used techniques of the discipline. Growth in the sophistication, power and diversity of analytical techniques, and the demand by society for more information about the human impact upon the environment, have placed strains on the ability of the department to meet the increasing need for more instruction in the area. These stresses can be relieved only by expansion in the department with faculty who have expertise in the specialty, and the mounting of additional analytical chemistry courses. The department has coupled its desire to expand its course offerings in this area with its desire to offer courses in environmental chemistry and thus provide a program in environmental chemistry.

The Department of Chemistry perceives that employment opportunities will be excellent for students with enhanced knowledge in analytical methods and techniques, and/or with a minor in environmental chemistry. Their skills and knowledge are needed to deal with chemical analyses in general, and environmental problems in particular.

The Proposal

It is proposed to establish a set of new and revised courses to form the basis of two new streams in the Departmental curriculum. One stream will allow a student to obtain a proper foundation in the area of analytical chemistry. The second stream will allow the student to obtain a solid background in environmental chemistry and to obtain a Minor in Environmental Chemistry. This program will complement the present Minor in Environmental Toxicology in the Department of Biological Sciences. As proposed by the recent task force of the Faculty of Science on Environmental Science and Toxicology (see appended summary page of the final report of the task force), these would be the flagship programs within the Faculty in the area of environmental science, and would support the establishment of an Institute of Environmental Science.

A. Details of the Proposal

Course to be deleted:

1. Chem 416-3, Modern Methods of Analytical Chemistry, [2-0-4]
   (material transferred to and expanded upon in Chem 316 and 417)

Courses to be added:

1. Chem 316-3, Introductory Instrumental Analysis, [2-0-4]
   (essentially a revised version of current Chem 416, [2-0-4])
2. Chem 317-2 Analytical Environmental Chemistry, [0-0-4]
3. Chem 372-3, Chemistry of the Atmospheric Environment, [3-1-0]
4. Chem 415-3, Selected Topics in Analytical Chemistry [3-0-0]
5. Chem 417-3, Advanced Instrumental Analysis, [2-0-4]

Course title change:

1. Chem 371-3 old title: Chemistry of the Environment I
   new title: Chemistry of the Aqueous Environment

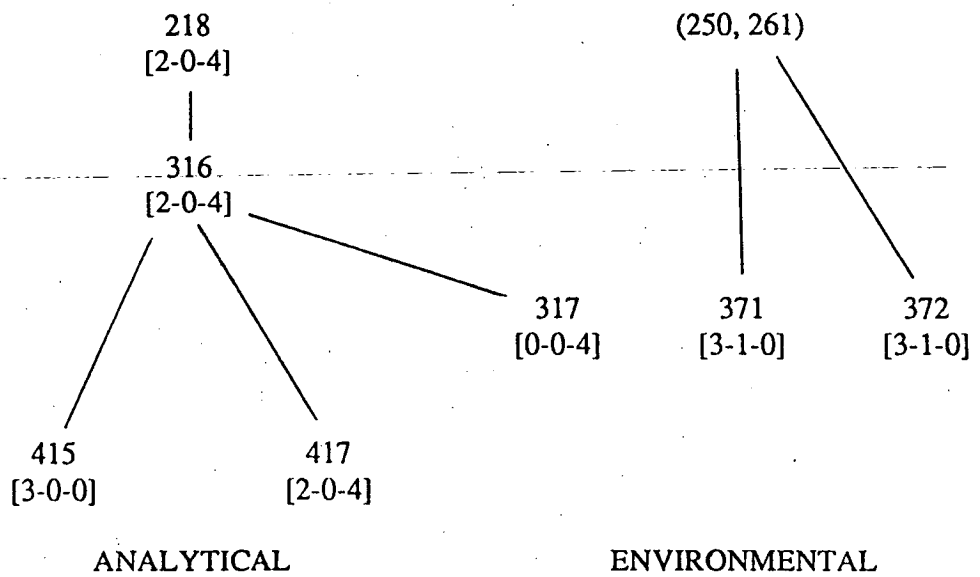
The Department feels that the complement of proposed courses in Chemistry and related fields (in other departments) will provide a sound Minor in Environmental Chemistry. It is felt that the new and modified Chemistry courses will have appeal to students in Biology, Geography and to some extent, Physics and Archaeology. A further consideration is that the strengthening of our course offerings in analytical chemistry will enhance our Chemistry Major B.Sc. degree in the eyes of the Canadian Society of Chemistry, which recommends that Canadian Chemistry Departments increase their analytical offerings from previously accepted norms of one semester to one year or greater. A survey of the practices in other Universities has been done and is summarized in Appendix A. The general conclusion is that most institutions have or are in the process of moving to a requirement of at least one year of analytical chemistry in the major and honor degree programs.

Implementation of this proposal will require the appointment of two new faculty to provide the needed expertise and to mount the proposed courses. The given descriptions of the new courses are therefore somewhat brief because of the current lack of expertise within the department and

to allow new faculty to have a greater say in the details of the program. Expansion of the faculty complement by the addition of new faculty with research interests in analytical chemistry is a top priority for the Department in 1991 and 1992. During the next decade this component of our faculty is expected to grow to be one of three major areas of concentration.

If only one appointment at the faculty level is forthcoming, it will be possible to offer a modified version of this proposal that would entail reduced frequency of offerings. Without additional faculty, the suggested new courses cannot be offered.

B. Diagram of Course Sequences/Prerequisites



C. General description of courses

C.1 Analytical Chemistry Courses - Chem 218, 316, 415, 417.

Chem 218-3 (Introduction to Analytical Chemistry) [2-0-4] is an essential lab/lecture course, in which the students are expected to achieve competence in bench skills, such as weighing and volume measurement. There is one gravimetric assignment. Titrimetry receives emphasis and covers the main methods of end point determination. In addition, several experiments involve spectrophotometric determinations. The chemical principles of solubility, acid-base, redox and complexometric equilibria are taught, as are the elementary aspects of data analysis. As an introductory course, the content and format of the present Chem 218 are appropriate. A minor change will involve the use of "environmental" samples in the spectrophotometric assignments.

Chem 316-3 (Introductory Instrumental Analysis) [2-0-4] is a lab/lecture course that will introduce the students to basic instrumental techniques involving spectroscopy, chromatography, and electrochemistry. In addition, the students will advance their laboratory skills by preparing samples for analysis from complex matrices (e.g. ores, biological samples, alloys). The instrumentation deemed appropriate for this course are:

a) for spectroscopy, atomic absorption/emission spectrometers, and fluorometers;

b) for chromatography, both GC and HPLC techniques; and
c) for electrochemistry, the use of ion selective electrodes.

The principles of each method, and the range of applications to environmental problems, will be covered in detail in the lectures. A large portion of this course is taken from our present Chem 416, which will be deleted. A detailed description is given in Appendix B.

Chem 417-3 (Advanced Instrumental Analysis) [2-0-4] is a lab/lecture course designed for students wishing to pursue analytical chemistry beyond the levels presented in Chem 218 and Chem 316. The spectroscopic and electroanalytical techniques introduced in Chem 316 are extended and elaborated in depth, and the techniques of radio-tracer and isotope tracer analysis are introduced. The topics covered in this course are:

a) emission spectroscopy, (including X-ray fluorescence spectroscopy, plasma spectroscopy and plasma-mass spectroscopy);
b) electroanalytical techniques, (including polarography and anodic stripping voltammetry); and
c) radio and isotope tracer analysis.

Again the principles and environmental applications will be covered in detail in the lectures.

The lecture course **Chem 415-3** (Special Topics in Analytical Chemistry) [3-0-0] will provide options to deal with modern and more esoteric and emerging analytical techniques, such as chemical sensors, square-wave voltammetry, and laser excited luminescence.

C.2 The Minor in Environmental Chemistry

Required courses:

* Chem 316-3 Introductory Instrumental Analysis [2-0-4]
* Chem 317-2 Analytical Environmental Chemistry [0-0-4]
  Chem 371-3 Chemistry of the Aqueous Environment [3-1-0]
* Chem 372-3 Chemistry of the Atmospheric Environment [3-1-0]

plus at least one of:

  Chem 357-3 Instrumental Methods of Identification of Organic Compounds [2-0-4]
* Chem 415-3 Selected Topics in Analytical Chemistry [3-0-0]
* Chem 417-3 Advanced Instrumental Analysis [2-0-4]

* Indicates new course.

Supplementary courses, relevant to environmental studies:

BiSc 312	Environmental Toxicology I
BiSc 313	Environmental Toxicology II
BiSc 414	Limnology
BiSc 432	Chemical Pesticides and the Environment
Geog 314	Climatology II
Geog 315	Regional Ecosystems
Geog 419	Mass Transfer in the Biosphere
Kin 480	Human Factors in Working Environments

NuSc 341	Introduction to Radiochemistry
NuSc 344	Nucleosynthesis/Distribution of Elements
Phys 346	Energy Sources and Energy Conversion

Chem 371-3 (Chemistry of the Aqueous Environment) [3-1-0] is a revised version of the current lecture course having the same course number and vector description. The chemistry of the aqueous environment which remains in this course will be developed more fully. The environmental chemistry of the atmosphere (previously in Chem 371) is now dealt with in detail in **Chem 372-3** (Chemistry of the Atmospheric Environment) [3-1-0]. Together, Chem 371 and 372 provide a comprehensive coverage of the environmental chemistry of the biosphere. (See Appendix B)

Chem 317-2 (Analytical Environmental Chemistry) [0-0-4], is proposed as a laboratory component to Chem 371 and 372. Chem 317 will deal specifically with problems that are unique to environmental sampling, sample preparation and analysis. Many (but not all) of the appropriate analytical techniques are covered in Chem 316, which therefore becomes a prerequisite to this course. Thus the principles and skills learned in some of the techniques in Chem 316 will be applied to authentic environmental analytical problems. (See Appendix B)

C.3 Outline of Course Frequencies and Teaching Schedule

(NF (1) and NF (2) = new faculty; additional faculty will participate on occasion)

	218	316	317	371	372	415	417
Fall	MH	LKP	-	SKL	-	-	NF(2)
Spring	MH	NF(1)*	NF(1)	-	NF(2)	SH, NF(2)	-
Summer	NF(1)	-	-	-	-	-	-

* Assuming that Chem 316 becomes a core course.

D. Additional Requirements needed for the Programs

D.1 Equipment requirements

1. Atomic Absorption Spectrometer (AAS) upgrade (furnace, autosampler, hydride generator)
2. X-Ray Fluorescence (XRF) upgrades (new detector system)
3. Gas, High Performance Liquid and Ion Chromatographs (GC, HPLC, IC)
4. Perchloric acid fumehood
5. Mass spectrometer
6. Electroanalytical equipment

Approximate total cost: $280,000

D.2 Laboratory space

With the proposed increase in the number of analytical course offerings, appropriate laboratory

space assigned to the teaching of analytical chemistry will be required. Space will be needed for additional instrumentation, as well as appropriate fumehood facilities for sample preparation. On completion of the South Science Building, laboratory space in the Chemistry Department will be rearranged and locations for Chem 316, 317 and 417 will become available in labs (C9013 and C9014) that are to be vacated.

D.3 Faculty and Staff

In order to mount the analytical/environmental chemistry programs as outlined above, two additional faculty and one technician will be required. A partial program could be implemented with the addition of one new faculty member. It is recognized that analytical chemists are in high demand and that a diligent search will be required to hire an outstanding faculty member with research interests in this area. Universities that have recently expanded their analytical teaching include UBC, Saskatchewan, Toronto, Waterloo and York. The hiring of analytical faculty to allow the mounting of this program is the top priority for expansion in the faculty complement of the Department in 1991-1992.

Comment on Course Outlines

The course outline forms submitted with this proposal provide the widely accepted general descriptions of the content of courses in analytical chemistry. For the courses where expertise currently exists within the department, detailed descriptions are given in Appendix B. For other courses, the expertise of new faculty in selected areas of analytical chemistry is required in order to develop the detailed course content.

Appendix A

Summary of Analytical Chemistry Courses at Canadian Universities (1991)

The Table below gives a very cursory summary of courses in analytical chemistry at various Canadian Universities. It must be emphasized, however, that approaches to the teaching of analytical chemistry vary widely among the listed institutions. The "Introductory" course(s) may appear in second or third year, and may span one or two semesters. Lecture/lab combinations vary considerably, in duration, content and credit. Relevant material (e.g., spectroscopy, separation methods, statistics) often appears in other organic or physical chemistry courses. Courses in Environmental Chemistry usually have strong analytical chemistry components. The amount of analytical chemistry that is required in majors and honours degree programs is quite variable; several respondents commented upon the weakness of their own offerings, and/or mentioned the moves being taken to strengthen this area, "--- given the rising prominence of this discipline in the light of environmental concerns" (Reinsborough).

The listed institutions (18 out of 45 contacted) provided information, in response to my written request, in a number of different ways. My generalized summation, which refers in the main to majors programs, may therefore contain an occasional error of interpretation. The courses consist of lecture + laboratory combinations, unless otherwise noted, of 1 semester (= half year, approx.) or 2 semester (= full year, approx.) durations. Several departments provide strong upper level teaching - seven courses at Alberta, six at Dalhousie, five at Calgary, McGill and Waterloo, four at Toronto and Regina, as well as graduate courses in analytical chemistry. Most of the remaining chemistry departments, with three or less upper level offerings, provide graduate courses that are to some extent accessible to undergraduates. In conclusion, it is apparent that institutions with a substantial number of Chemistry faculty are providing much more analytical chemistry teaching than SFU, at both the undergraduate and graduate levels.

11th February, 1991.

L. K. Peterson.

University	Introductory course(s)	Instrumental methods (3rd/4th year)
UBC	2 sem (req, 3rd? yr)	352 (for chem. eng.); 415A (req); plus grad courses and 2 environ. chem. courses;
SFU	1 sem (req)	416;
Alberta	2 sem (req)	313 (recom), 413; lectures+some lab in 415, 417, 419, 421, 532;

Appendix A (contd.)

Calgary	2 sem (req, 3rd? yr)	515 (req); 513; lectures in 611, 615, 617; plus grad courses;
Lethbridge	1 sem (req)	2 courses, (one req);
Regina	2 sem (req)	310 & 312 (both 2 sem & req).
Manitoba	1 sem (req)	2 sem(req); plus grad courses;
Brandon	1 sem(req)	3 courses (one req);
Toronto	? sem(req)	4 courses(one req);+ grad courses;
Waterloo	220(req); 221(60 hrs lab, req)	5 courses (some with lab);
York	1 sem(double lab)(req)	3 courses, plus one grad course.
Lakehead	1 sem(req)	1 sem(req);
McGill	217A,B; 257D; 277B(req);	5 courses, 2 reqd.
Laval	Of four courses offered, <u>three</u> are required.	
Dalhousie	1 sem(req)	two 3rd & four 4th year courses, (2 req); plus grad courses;
Saint Mary's	2 sem(req)	One 3rd (2 sem) & one 4th year course; + spectroscopy courses;
St. Francis Xavier	1 sem(req)	2 sem(req) + two 1 sem courses;
New Brunswick	2 sem(req)	? sem(req);
Mount Allison	1 sem(req)	1 sem(req); (only 8 faculty here!);

8.

TASK FORCE ON ENVIRONMENTAL SCIENCE AND TOXICOLOGY

SUMMARY PAGE

Terms Of Reference

The task force was struck by Dr. Colin Jones, Dean of Science in June 1989 to review possible directions for development in the area of Environmental Science and Toxicology (EST). We are to take a broad view in our approach and consult with other Faculties. A proposal for the establishment of a program will emerge which need not necessarily be linked to the Fraser Valley Initiative, although such a link is not excluded.

In developing this report the committee (1) reviewed the existing programs related to Environmental Science and Toxicology, & Environmental Studies at SFU, (2) talked with interested members of the Departments of Biology, Chemistry, Mathematics and Statistics, Communications, Geography, Kinesiology and the Natural Resources Management Program, (3) reviewed calendar descriptions of Environment Science, Toxicology and Environmental Studies programs in Canada, U.S.A., and England (4) and made site visits to the Universities of California Davis, Waterloo, Guelph, and Toronto to examine their programs. A draft version of this report was distributed to members of the Departments of Biological Sciences, Chemistry, Physics, and Mathematics and Statistics for comments. These comments were considered by the committee and appropriate revisions were made to arrive at the final report contained herein.

Final Recommendations

1. Consolidate and strengthen the environmental toxicology programs (BSc minor and post baccalaureate diploma) that currently exist in Biological Sciences. This will require new resources.

2. Develop a comparable BSc minor in the Chemistry Department which focuses on toxicant analysis and environmental monitoring. This will require new resources.

3. Create an Institute of Environment Science and Toxicology (IEST) which has a director, a budget, the ability to hire and promote faculty and has as its objectives to (a) develop a core of focussed and vigorous research on environmental problems and their solutions, (b) train graduate students in traditional MSc and PhD degree research, (c) act as a pool of advisors with expertise in environmental matters at the local, provincial and federal levels, and (d) develop an inventory of environmentally related projects, courses and interests at SFU. This will require new resources.

4. Establish a professional graduate training program in environmental science and toxicology at the masters level (MENTOX). This will require new resources.

5. Interface the Environmental Science and Toxicology program with existing programs related to the environment within the Faculty of Science and across the campus (e.g. BERG, MPM and NRM). This would be the responsibility of the director of IEST.

6. Use the Environmental Science and Toxicology program at SFU as a template for the Fraser Valley Campus to ensure compatibility and optimum utilization of resources. This could be the responsibility of the director of IEST.

7. Use the Institute as a future base for a Western Canada Centre for Environmental Science and Toxicology.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information — Department: Chemistry

Abbreviation Code: CHEM Course Number: 316 Credit Hours: 3 Vector: 2-0-4

Title of Course: Introductory Instrumental Analysis

Calendar Description of Course: Principles and applications of basic analytical instrumentation based upon spectroscopy, chromatography and electrochemistry, in analytical chemistry.

Nature of Course: A lab/lecture course

Prerequisites: (or special instructions) Chem 218
Students who have taken Chem 416 cannot obtain credit for Chem 316.

What course (courses), if any, is being dropped from the calendar if this course is approved? (Chem 416)

2. Scheduling
How frequently will the course be offered? Twice per year
Semester in which the course will first be offered: 92-3
Which of the present faculty would be available to make the proposed offering possible?
L. K. Peterson, new faculty.

3. Objectives of the Course
To provide the student with (i) the skills required to prepare samples from complex matrices for analysis; (ii) the ability to operate and perform reliable analyses using an atomic absorption emission spectrometer, an ultraviolet/visible fluorometer, a gas chromatograph, a high performance liquid chromatograph, and the ion selective electrode equipment; (iii) a detailed understanding of the principles involved in each analytical method; and (iv) a knowledge of the application of analytical techniques to environmental problems.

4. Budgetary and Space Requirements (for information only)
What additional resources will be required in the following areas?

Faculty	New faculty
Staff	Technician
Library	
Audio Visual	
Space	Lab space available in C9013/9014 in 1992.
Equipment	Atomic absorption spectrometer upgrade (furnace, hydride generator); gas chromatograph; high performance liquid chromatograph.

5. Approval

Date: Feb 12, '91.	March 12 91	Oct. 29/91
Department Chair	Dean	Chair SCUS

10.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information — Department: Chemistry

Abbreviation Code: CHEM Course Number: 317 Credit Hours: 2 Vector: 0-0-4

Title of Course: Analytical Environmental Chemistry

Calendar Description of Course: Principles and applications of the methodologies of analytical chemistry employed in the determination of substances in terrestial (air, water, soil) samples, with particular emphasis upon sampling and sample preparation.

Nature of Course: Laboratory course

Prerequisites: (or special instructions)
Chem 316 and Chem 371. Chem 372 would normally be taken concurrently.

What course (courses), if any, is being dropped from the calendar if this course is approved? None

2. Scheduling

How frequently will the course be offered? Once per year
Semester in which the course will first be offered: 93-1
Which of the present faculty would be available to make the proposed offering possible?
New faculty. J. D'Auria (part)

3. Objectives of the Course

To provide the student with the skills required to obtain valid environmental samples from air, water and soil sources, and to analyse such samples by the appropriate technique; (i) spectroscopic (atomic absorption, atomic emission, X-Ray fluorescence) (ii) chromatographic (gas, high performance liquid, and ion chromatographs), (iii) electrochemical (ion selective electrode; voltammetry), or (iv) colorimetry.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas?

Faculty	New faculty
Staff	Technician
Library	
Audio Visual	
Space	Lab space available in C9013/9014 in 1992.
Equipment	Ion chromatograph; X-Ray fluorescence spectrometer upgrade

5. Approval

Date: Feb 12, '91	March 12 91	Oct. 29/91
Department Chair	Dean	Chair SCUS

11.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. **Calendar Information** **Department:** Chemistry

Abbreviation Code: CHEM Course Number: 371 Credit Hours: 3 Vector: 3-1-0

Title of Course: Chemistry of the Aqueous Environment

Calendar Description of Course: An introduction to chemical processes in the environment with particular emphasis on the aqueous environment. Quantitative treatment of the variables determining the composition of natural systems. Chemistry of aqueous toxic agents, wastewater treatment, and related matters.

Nature of Course: Lecture course

Prerequisites: (or special instructions)

Chem 250 and Chem 261.

What course (courses), if any, is being dropped from the calendar if this course is approved? (Modification of existing Chem 371).

2. **Scheduling**
How frequently will the course be offered? Once per year
Semester in which the course will first be offered: currently being offered.
Which of the present faculty would be available to make the proposed offering possible?
S. Lower.

3. **Objectives of the Course**

To provide the student with a quantitative understanding of the physical and chemical processes occurring in the environment, particularly the aqueous environment.

4. **Budgetary and Space Requirements** (for information only)
What additional resources will be required in the following areas?

Faculty
Staff
Library
Audio Visual
Space
Equipment

5. **Approval**

Date: Feb 12, '91	March 12 91	Oct 29/91
R Hoetzlein	Chris. Jones	A R Blackmore
Department Chair	Dean	Chair SCUS

12.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. **Calendar Information** **Department:** Chemistry

Abbreviation Code: CHEM Course Number: 372 Credit Hours: 3 Vector: 3-1-0

Title of Course: Chemistry of the Atmospheric Environment

Calendar Description of Course: Quantitative treatment of chemical and physical processes in the atmospheric environment. Chemistry of air pollution. Environmental radioactivity, its detection and effects. Specific case studies.

Nature of Course: Lecture course

Prerequisites: (or special instructions) Chem 250 and Chem 261.

What course (courses), if any, is being dropped from the calendar if this course is approved? None.

2. **Scheduling**
How frequently will the course be offered? Once per year
Semester in which the course will first be offered: 93-1
Which of the present faculty would be available to make the proposed offering possible?
T.N. Bell, S.K. Lower, new faculty member, J. D'Auria.

3. **Objectives of the Course**
To provide the student with a quantitative understanding of the physical and chemical processes in the environment, particularly the atmospheric environment. To explore in detail the implications of environmental radioactivity.

4. **Budgetary and Space Requirements** (for information only)
What additional resources will be required in the following areas?
Faculty New faculty
Staff
Library
Audio Visual
Space
Equipment

5. **Approval**
Date: Feb 12, '91 Nov 12 91 Oct 29/91

Department Chair	Dean	Chair SCUS

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information — **Department:** Chemistry

Abbreviation Code: CHEM Course Number: 415 Credit Hours: 3 Vector: 3-0-0

Title of Course: Selected Topics in Analytical Chemistry

Calendar Description of Course: Applications and principles of emerging chemistry techniques in Analytical Chemistry.

Nature of Course: Lecture course

Prerequisites: (or special instructions) Chem 316.

What course (courses), if any, is being dropped from the calendar if this course is approved? None.

2. Scheduling

How frequently will the course be offered? Once every two years
Semester in which the course will first be offered: 93-1
Which of the present faculty would be available to make the proposed offering possible?
S. Holdcroft, J. D'Auria, new faculty.

3. Objectives of the Course

To inform the student of emerging techniques which are likely to play a significant role in the future development of analytical chemistry.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas?

Faculty	New faculty
Staff	
Library	
Audio Visual	
Space	
Equipment	

5. Approval

Date: Feb 12, '91	March 12 91	Oct 29/91
Department Chair	Dean	Chair SCUS

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. **Calendar Information** **Department: Chemistry**

Abbreviation Code: CHEM Course Number: 417 Credit Hours: 3 Vector: 2-0-4

Title of Course: Advanced Instrumental Analysis

Calendar Description of Course: Applications and principles of advanced analytical techniques based upon electrochemistry, nuclear spectroscopy, plasma spectroscopy and mass spectroscopy.

Nature of Course: A lab/lecture course

Prerequisites: (or special instructions) Chem 316

What course (courses), if any, is being dropped from the calendar if this course is approved? None

2. **Scheduling**
How frequently will the course be offered? Once per year
Semester in which the course will first be offered: 93-3
Which of the present faculty would be available to make the proposed offering possible?
New Faculty, J. D'Auria (part); S. Holdcroft.

3. **Objectives of the Course**
To provide the student with a detailed understanding of the principles involved in: (i) emission spectroscopy (X-ray fluorescence, inductively coupled plasma, and mass spectroscopy); (ii) electroanalytical techniques (polarography, anodic stripping voltammetry); and (iii) radio- and isotope trace analysis.
To provide the student with the skills required to operate and perform reliable analyses with X-Ray fluorescence and electroanalytical equipment.

4. **Budgetary and Space Requirements** (for information only)
What additional resources will be required in the following areas?

Faculty	New faculty
Staff	Technician
Library	
Audio Visual	
Space	Lab space available in C9013/9014 in 1992.
Equipment	XRF upgrade; mass spectrometer, electroanalytical equipment purchased for Chem 316/317.

5. **Approval**
Date: Feb 12, '91 — March 12 91 — Oct 29/91

R Kretschmer — CATH. JONES — A R Bowman

Department Chair — Dean — Chair SCUS

15

FSC 8-91

SIMON FRASER UNIVERSITY
MEMORANDUM

To: AC Oehlschlager, Chair
Department of Chemistry
Subject: Chemistry Core Program
File: W:\UGSTD\PROGRAM\DUGS\NEWP\CORE-01.PRG

* From: R. Korteling, Chair
* Undergraduate Studies Com.
* Date: June 10, 1991

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At the May 23rd Meeting of the Undergraduate Studies Committee the addition of CHEM 316-3, CHEM 331-3 and CHEM 367-2 to the core requirement for a majors and honors chemistry degree was accepted and recommended to the Department without opposition.

These additions are required to meet the new accreditation standards of the Canadian Society for Chemistry. Two of the courses, CHEM 316-3 and CHEM 331-3 are new and still require University approval. However, since we will be seeking accreditation this year, it is vital that these courses be added to the core at this time subject to final University approval. A summary of the undergraduate course offerings is appended as is an analysis by E. Kiehlmann of the impact on the student's program relative to other disciplines.

R. Korteling

cc: Undergaduate Studies Committee

Undergraduate Course Summary

	General	Organic	Analytical	Inorganic	Physical
Remedial	C101-3 C106-2				
First Year	C102-3 C115-2	C150-3 C155-2			
Second Year	C103-3 C119-2	C250-3 C255-2	C218-3	C232-3	
Majors core:		C357-3	**C316-3***	C332-3 **C331-3*** C336-2	C261-3 C361-3 C366-2 **C367-2***
Electives:		C450-3 C455-3 C459-3	**C415-3** **C417-3**	C333-2 C432-2 C433-3 C439-3	C362-3 C363-3 C462-3 C465-3 C469-3 C472-3

Biochemistry	Nuclear	Evironmental	Research	Co-Op
B301-3	N341-3	**C317-3**	C481-5	C306-0
B302-3	N342-3	C371-3	C482-3	C307-0
B311-2	N344-3	**C372-3**	B490-3	C308-0
B312-2	N346-2		B491-5	C406-0
B403-3	(N442-3)		B492-10	C407-0
B413-2	(N485-3)		B493-15	
B420-3				
B440-3				

Note:

1. New courses are in bold.
2. Additions to the core are stared.
3. Bracketed courses are given by physics.

17.

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: DUCC members

FROM: Dr. E. Kiehlmann
Faculty Advisor
Dept. of Chemistry

SUBJECT: Upper-division requirements for a B.Sc. degree

DATE: 7 May 1991
WP:C17051

The following analysis of upper-division credits required to complete various B.Sc. programs may be helpful for our discussion i.e. the addition of 3 courses (8 credits) to the CHEM core program:

CHEM 316-3, 33~~6~~-3 and 367-2.

Minimum UD requirements for B.Sc: 44 credit hours, including at least 28 in the major subject are (SA).

	Subject Area (SA)		
Program	Core	Electives	Free Electives
CHEM (now)	18	10	16
CHEM (proposed)	26	2	16
Appl. MATH	18	12	14
BICH	35	0	9
BISC	34	6	4
CHPH	40	3	1
GEOG	28*	17	-1
MSSC	34*	0	10
MATH	0	30	14
STAT	24*	6	14
PHYS	15	21	8
Appl. PHYS	47	0	-3

* denotes the availability of limited choices

This comparison shows that most science programs contain a more rigid core than CHEM, and that the proposed change from 18 + 10 to 26 + 2 UD subject area credits would not be unreasonable. It would actually give the student more guidance as to course selection.

E. Kiehlmann

18.

FSC
9-91

SIMON FRASER UNIVERSITY

MEMORANDUM

TO:	Pablo Dobud Dean of Science Office	FROM:	E. Kiehlmann Faculty Advisor Dept. of Chemistry
SUBJECT:	**Chemistry Calendar Changes**	DATE:	18 September 1991 w:\adm\gen\cor\ek\c17302

The attached Calendar changes have been approved by the Chemistry Department.

A. Course Revisions

Most changes are editorial and designed to permit efficient automatic prerequisite checking when TeleReg starts. The substantive revisions fall into three general categories:

1. CHEM 306/307/406/407:
   The change of the minimum CGPA from 2.75 to 2.67 is prompted by the high demand for Co-op students. (General university requirement: CGPA > 2.50.)

2. CHEM 316/317/371/372/415/417:
   Environmental/Analytical Chemistry Program approved by the Faculty of Science on 25 February 1991.

3. CHEM 331/332/336/432/433/439:
   New Inorganic Chemistry Program approved by the FSUCC on 25 July 1991.

B. Program Revisions

All program revisions were prompted by the introduction of the new analytical, environmental and inorganic chemistry courses listed above, and of the new Environmental Chemistry Minor (approved by FSUCC on 14 February 1991).

Please place these Calendar changes on the agenda of the next FSUCC meeting. Thank you.

E. Kiehlmann

Dr. E. Kiehlmann

EK:vm

19.

CHEMISTRY CALENDAR REVISIONS (1991): COURSES

The following revisions of the 1991/92 SFU Calendar are necessitated by recent Chemistry curriculum changes.
(NCPF = New Course Proposal Form; ed = editorial)

8 October 1991

Page	Course	Current text	Change to, add or delete:
164	CHEM 306-0	Prerequisites: Normally 28 semester hours credit with a minimum cumulative GPA of 2.75, including CHEM 103 (or 105) and 119 (or 118), PHYS 121 and MATH 152. Permission of Co-op Co-ordinator.	Prerequisites: Completion of 28 credit hours in a science program, including first-year calculus, chemistry and physics.Minimum CGPA: 2.67 (or permission of Co-op Co-ordinator).
164	CHEM 307-0	Prerequisites: CHEM 306, CHEM 218 and completion of 42 semester hours credit with a cumulative GPA of 2.75.	Prerequisites: CHEM 306 and completion of 42 credit hours toward a B.Sc.degree. Minimum CGPA: 2.67 (or permission of Co-op Coordinator).
NCPF (ed)	CHEM 316-3	*Introductory Instrumental Analysis* Principles and applications of basic analytical instrumentation based upon spectroscopy, chromatography and electrochemistry, in analytical chemistry. Prerequisites: CHEM 218 (or permission of the Department). Students who have taken CHEM 416 cannot obtain credit for CHEM 316.	*Introductory Instrumental Analysis* Principles and applications of basic analytical instrumentation based upon spectroscopy, chromatography and electrochemistry.(2-0-4) Prerequisite: CHEM 218. Students with credit for CHEM 416 may not take this course for further credit.
NCPF (ed)	CHEM 317-2	*Analytical Environmental Chemistry* Principles and applications of the methodologies of analytical chemistry employed in the determination of substances in terrestial (air, water, soil) samples, with particular emphasis upon sampling and sample preparation. Prerequisites: CHEM 316 and CHEM 371, or permission of the Department. CHEM 372 would normally be taken concurrently.	*Analytical Environmental Chemistry* Principles and applications of the methodologies of analytical chemistry employed in the determination of substances in air, water and soil, with particular emphasis upon sampling and sample preparation.(0-0-4) Prerequisites: CHEM 316 and 371. CHEM 372 should be taken concurrently.
NCPF	CHEM 331-3	(New course:)	*Practical Aspects of Inorganic Chemistry* Introduction to bonding, spectroscopy and laboratory techniques in inorganic chemistry. The laboratory part will include experiments from solid state, main group and transition metal chemistry.(2-0-4) Prerequisites: CHEM 118 (or 119) and CHEM 232.
164 (Inorg.)	CHEM 332-3	*The Chemistry of Transition Elements* The chemistry of transition elements, lanthanides and actinides; the nature of ligands, and the stability and structure of complexes; ligand field theory, spectrochemistry, magnetochemistry.Prerequisite: CHEM 232.	*Chemistry of the Transition Metals* The chemistry of the transition elements, lanthanides and actinides; the stability and structure of complexes. Prerequisite: CHEM 331.
164 (Inorg.)	CHEM 336-2	*Inorganic Chemistry Laboratory I* Preparation of inorganic compounds selected to illustrate types of bonding and structural principles; determination of physical properties, spectra and magnetic susceptibility.Prerequisite: CHEM 332 or 333 must precede or be taken concurrently.	*Inorganic Chemistry Laboratory* Laboratory experiments in coordination, organometallic and bioinorganic chemistry. (0-0-4) Prerequisite: CHEM 332 must precede or be taken concurrently.
164	CHEM 371-3	*Chemistry of the Environment I* Chemical processes in the aqueous, terrestrial and atmospheric environment, with emphasis on the quantitative treatment of the variables determining the composition of natural systems. Prerequisites: CHEM 150 (or 251) and 261.	(see below)
NCPF (ed)	CHEM 371-3	*Chemistry of the Aqueous Environment* An introduction to chemical processes in the environment with particular emphasis on the aqueous environment. Quantitative treatment of the variables determining the composition of natural systems. Chemistry of aqueous toxic agents, wastewater treatment, and related matters. Prerequisites: CHEM 250 (typo) and CHEM 261.	*Chemistry of the Aqueous Environment* An introduction to chemical processes in the aqueous environment. Quantitative treatment of the variables determining the composition of natural systems. Chemistry of aqueous toxic agents, wastewater treatment, and related matters.(3-1-0) Prerequisites: CHEM 150 (or 251) and CHEM 261.

CPF ed)	CHEM 372-3	*Chemistry of the Atmospheric Environment* Quantitative treatment of chemical and physical processes in the atmospheric environment. Chemistry of air pollution. Environmental radioactivity, its detection and effects. Specific case studies. Prerequisites: CHEM 250 (typo) and CHEM 261.	*Chemistry of the Atmospheric Environment* Quantitative treatment of chemical and physical processes in the atmospheric environment. Chemistry of air pollution. Environmental radioactivity, its detection and effects. Specific case studies.(3-1-0) Prerequisites: CHEM 150 (or 251) and CHEM 261.
164	CHEM 406-0	Prerequisites: CHEM 307 and completion of 56 semester hours credit with a cumulative GPA of 2.75.	Prerequisites: CHEM 307 and completion of 56 credit hours toward a B.Sc.degree.Minimum CGPA: 2.67 (or permission of Co-op Co-ordinator).
164	CHEM 407-0	Prerequisites: CHEM 406 and a cumulative GPA of 2.75.	Prerequisites: CHEM 406. Minimum CGPA: 2.67 (or permission of Co-op Co-ordinator).
NCPF ed)	CHEM 415-3	*Selected Topics in Analytical Chemistry* Applications and principles of emerging chemistry techniques in analytical chemistry. Prerequisites: CHEM 316.	*Selected Topics in Analytical Chemistry* Principles and applications of emerging techniques in analytical chemistry.(3-1-0) Prerequisite: CHEM 316.
164	CHEM 416-3		(delete this course)
NCPF ed)	CHEM 417-3	*Advanced Instrumental Analysis* Applications and principles of advanced analytical techniques based upon electrochemistry, nuclear spectroscopy, plasma spectroscopy and mass spectroscopy. Prerequisites: CHEM 316 (or permission of the Department).	*Advanced Instrumental Analysis* Principles and applications of advanced analytical techniques based upon electrochemistry, nuclear spectroscopy, plasma spectroscopy and mass spectroscopy. (2-0-4) Prerequisite: CHEM 316
NCPF (Incrg.)	CHEM 433-3	(New course:)	*Mechanistic Inorganic Chemistry* Discussion of the mechanisms of reaction of inorganic and organometallic complexes highlighting the use of ligand field and molecular orbital theory, valence bond and electron transfer reactivity.(3-1-0) Prerequisite: CHEM 332.
NCPF .)	CHEM 439-3	(New course:)	*Special Topics in Inorganic Chemistry* An in-depth treatment of a current topic in inorganic chemistry. Contact the Department for information regarding the topic to be covered in a given semester. (3-1-0) Prerequisite: CHEM 332.
205 (ed)	NUSC 341-3	Prerequisite: Normally 60 semester hours credits in a science program, including first-year calculus, physics and chemistry. Students with credit for CHEM 341 may not take this course for further credit. (Note: CHEM 341 was last offered in 1979/80.)	Prerequisite:Completion of 60 credit hours in a science program, including first-year calculus, chemistry and physics.
205 (ed)	NUSC 344-3	Prerequisite: Normally 60 semester hours credit in a science program, including CHEM 103, MATH 152 and PHYS 121.	Prerequisite: Completion of 60 credit hours in a science program, including first-year calculus, chemistry and physics.
156 (ed)	BICH 491-5	Prerequisites: Permission of the Chair and Program Advisor of the Biochemistry Curriculum Committee.	Prerequisite: Permission of the Biochemistry Curriculum Committee.
156 (ed)	BICH 492-10	(Note: The restriction to honors students applies not only to BICH 491 but also to BICH 492 and 493.)	(Add at the beginning of the course description:) Laboratory research for preparation of a thesis for the honors degree in Biochemistry.
(ed)		Prerequisite: Permission of the Biochemistry Curriculum Committee.	Prerequisite: Permission of the Biochemistry Curriculum Committee. Criteria for approval: see BICH 493.
156 (ed)	BICH 493-15	(Note: The restriction to honors students applies not only to BICH 491 but also to BICH 492 and 493.)	(Add at the beginning of the course description:) Laboratory research for preparation of a thesis for the honors degree in Biochemistry.
(ed)		Criteria for approval.... : - Students wishing to pursue an individual study semester must obtain an agreement in writing from a faculty member who will serve as research supervisor.	Criteria for approval.... : - Students wishing to pursue an individual study semester must obtain an agreement in writing from an SFU faculty member who will serve as research supervisor. .....
		Upon approval of the student and the project, the Biochemistry Curriculum Committee (or the research coordinator) will assign a supervisory committee consisting of the research supervisor and two other faculty members.	Upon approval of the student and the project, the Biochemistry Curriculum Committee will assign a supervisory committee consisting of the research supervisor and two other faculty members. ....

1 August 91

(3)

CHEMISTRY CALENDAR REVISIONS (1991): PROGRAM

The following revisions of the 1991/92 SFU Calendar (pages 138-139) are necessitated by recent Chemistry curriculum changes.

Current text	Change to, add or delete:
Chemistry Major Program (120 semester hours) Required Courses (72 semester hours) CHEM ..... 255-2 ..... 332-3 The Chemistry of Transition Elements (or CHEM 333-3 Inorganic Chemistry of Biological Processes) 336-2 Inorganic Chemistry Laboratory I ..... 366-2 ..... (42 semester hours)	Chemistry Major Program Required Courses (80 semester hours) CHEM ..... 255-2 ..... 316-3 Introductory Instrumental Analysis 331-3 Practical Aspects of Inorganic Chemistry 332-3 Chemistry of the Transition Metals 336-2 Inorganic Chemistry Laboratory ..... 366-2 ..... 367-2 Physical Chemistry Laboratory II (50 semester hours)
Electives (48 semester hours) -An additional 12 hours of	Electives (40 semester hours) -An additional 4 hours of .....
Honors Program (132 semester hours) Required Courses (92 semester hours) CHEM ..... 261-3 ..... 332-3 The Chemistry of Transition Elements 336-2 Inorganic Chemistry Laboratory I ..... (55 semester hours) CMPT 102-3 ..... NUSC 341-3 ..... (3 semester hours)	Honors Program Required Courses (98 semester hours) CHEM ..... 261-3 ..... 316-3 Introductory Instrumental Analysis 331-3 Practical Aspects of Inorganic Chemistry 332-3 Chemistry of the Transition Metals 336-2 Inorganic Chemistry Laboratory ..... (58 semester hours) CMPT 102-3 ..... NUSC 341-3 ..... (6 semester hours)
Minor Program .....To qualify for a minor in Chemistry, students will be required to complete a minimum of 14 hours of upper division credit in Chemistry, Biochemistry or Nuclear Science, together with all the prerequisites.	Minor Program .....To qualify for a minor in Chemistry, students will be required to complete a minimum of 14 hours of upper division credit in Chemistry, Biochemistry or Nuclear Science (including a minimum of 8 credit hours in Chemistry, and excluding undergraduate research courses), together with all the prerequisites.
Chemistry Minor (Organic Chemistry) CHEM .....250-3, 255-2, 357-3 and three courses from CHEM 450-3, 455-3, 459-3, BICH 301-3, 302-3	Chemistry Minor (Organic Chemistry) CHEM .....250-3, 255-2, 357-3 and four courses from CHEM 316-3, 363-3, 450-3, 455-3, 459-3 BICH 301-3, 302-3, 311-2, 312-2
Chemistry Minor (Inorganic/Radiochemistry) CHEM 102-3, 103-3, 115-2, 119-2, 232-3, 332-3, 336-2 and 9 credit hours from CHEM 333-3, 416-3, 432-3, 437-2 or any Nuclear Science course	Chemistry Minor (Inorganic/Radiochemistry) CHEM 102-3, 103-3, 115-2, 119-2, 232-3, 331-3, 332-3, 336-2 and 6 credit hours from CHEM 316-3, 333-3, 415-3, 432-3, 433-3, 439-3 NUSC 341-3, 342-3, 344-3, 346-2
Chemistry Minor (Physical Chemistry) CHEM 102-3, 103-3, 115-2, 119-2, 261-3 and 14 credit hours from CHEM 361-3, 362-3, 363-3, 366-2, 367-2, 416-3, 62-3, 465-3, 469-3, 472-3	Chemistry Minor (Physical Chemistry) CHEM 102-3, 103-3, 115-2, 119-2, 261-3, 361-3, 366-2 and 9 credit hours from CHEM 316-3, 362-3, 363-3, 367-2, 462-3, 465-3, 469-3, 472-3

TURN

(12 Sept. 91) New (4)

(New entry:)	Environmental Chemistry Minor To qualify for a minor in Environmental Chemistry, students must complete the following courses: CHEM..102-3, 103-3, 115-2, 119-2, 150-3, 155-2, 218-3, 232-3, 261-3 CHEM 316-3 Introductory Instrumental Analysis 317-2 Analytical Environmental Chemistry 371-3 Chemistry of the Aqueous Environment 372-3 Chemistry of the Atmospheric Environment and at least one of CHEM 357-3 Chemical and Instrumental Methods of Identification of Organic Compounds 415-3 Selected Topics in Analytical Chemistry 417-3 Advanced Instrumental Analysis NUSC 341-3 Introduction to Radiochemistry
Biochemistry Program (page 132, left-hand column, second paragraph after listing of core courses): In addition to the core program, students majoring in Biochem. must complete 35 semester hours of electives, at least 9 of which must be upper division credits ..... (counting error)	.....at least 11 of which must be upper division credits .....

Addendum to: CHEMISTRY CALENDAR REVISIONS (1991): COURSES

9 October 1991

Page	Course	Current text	Change to, add or delete:
163	CHEM 106-2	....Corequisite: CHEM 101 should be taken concurrently.	....Corequisite: CHEM 101.
163	CHEM 251-3		(delete this course)
163	CHEM 252-3		(delete this course)
163	CHEM 256-2		(delete this course)
164	CHEM 308-0	CHEM 308-0 Practicum V Optional semester of work experience in the Chemistry Co-operative Education program. Prerequisite: CHEM 307.	CHEM 408-0 Practicum V Optional semester of work experience in the Chemistry Co-operative Education program. Prerequisite: CHEM 407.
164	CHEM 356-2		(delete this course)
164	CHEM 432-3	*Inorganic Chemistry III* Recent developments in inorganic chemistry. Carbonyls and related compounds. Hydrides, including boron hydrides and electron-deficient compounds. Inorganic polymers. The use of non-aqueous solvents in inorganic chemistry.	*Organotransition Metal Chemistry* Chemistry of the transition elements; the synthesis, characterization and catalytic behavior of organometallic compounds. The organometallic
164	CHEM 465-3	(Vector:) (3-0-0)	(Vector:) (3-1-0)
164	CHEM 469-3	Prerequisites: CHEM 261; CHEM 361 and/or CHEM 362 may be required or recommended. Permission of the Department.	Prerequisites: CHEM 261; CHEM 361 and/or CHEM 362 may be required or recommended.
290	CHEM 754-3	....mono saccharides....	....monosaccharides
290	CHEM 834-4	CHEM 834-4 (typo)	CHEM 834-3
290	CHEM 836-3	Special Topics in Inorganic Chemistry	Special Topics in Inorganic Chemistry I
290	CHEM 861-3	....Basic principles of photochemistry and its application to some simple processes involving a) atoms and b) molecules.	....Basic principles of photochemistry and their application.

FSC 7-91

SIMON FRASER UNIVERSITY

Department of Chemistry

MEMORANDUM

TO: C. H. W. Jones, Dean of Science

FROM: A. C. Oehlschlager, Chair

DATE: July 8, 1991

RE: Chemistry Core Program

The Department recently approved the addition of Chem 316-3, Chem 331-3 and Chem 367-2 to the core course requirement for a majors and honors degree in chemistry. These additions are necessary to meet the existing accreditation standards of the Canadian Society for Chemistry. Since we will be seeking accreditation standards of the Canadian Society for Chemistry. Since we will be seeking accreditation for our program later this year or early next year, it is vital that these courses be approved by the relevant University bodies as quickly as possible. You will note that Chem 316-3 and Chem 331-3 are new courses.

At the same meeting the Department approved modifications to the inorganic chemistry offerings. The attached documentation will show that these changes bring the new offerings in line with that at other Canadian universities. In essence three new courses were created and three others were significantly modified. The new course offerings will initially be at a frequency that allows current faculty to teach them but there is a proposal in the formulation stage to add another faculty member in inorganic chemistry within the next few years. My reading of the initial proposal is that this will be clearly justified not only in terms of these increased offerings but in terms of the increasing popularity of inorganic chemistry courses among those students interested in materials science.

A. C. Oehlschlager

ACO:ps/Encl:

[Chair\Dept\Corresp\1022.dea;LAN]

Proposed Changes
to the
Inorganic Chemistry Program

° Inorganic Group
Department of Chemistry
August 2, 1991
File: W:\UGSTD\PROGRAM\DUGS\NEWP\INORG-03.PRG

Introduction

Inorganic chemistry is one of the four core areas of chemistry. At SFU the teaching of inorganic chemistry has fallen into three major areas, main group chemistry, transition metal chemistry and organometallic chemistry, each of which must be supplemented with laboratory experience. Several shortcomings may be identified within our current program. The lanthanide and actinide elements are either not covered or given only a cursory examination. The laboratory hours are insufficient to include advanced experiments in each of these areas. Solid state and materials are given only a short treatment in lectures and not covered at all in the laboratories and solid state chemistry has not been covered at all beyond the second year. And lastly, mechanistic chemistry has only been treated as an aside in more advanced courses.

This document describes proposed revisions to the inorganic chemistry program to upgrade it to an acceptable level.

The Proposal

The current inorganic course requirements for a chemistry major are: CHEM 232-3, CHEM 332-3, and CHEM 336-2. This allows the student to be exposed to one semester of laboratory instruction and two lecture courses. Within these two lecture courses an attempt is made to introduce the student to descriptive chemistry of the elements and bonding theories. This is the only exposure to crystal field theory (CFT), solid state theory, group theory and molecular orbital theory, from the inorganic perspective which our students get.

Past experience has shown the following shortcomings with this program. The lanthanides and actinides, which are nominally included within CHEM 332-3, have not been covered at all due to the lack of time. Low valent and organometallic chemistry, along with the associated topic of catalysis, have only received a short introduction in our core program. And as mentioned above, solid state bonding has not been covered at an advanced level.

The proposal before you will address these shortcomings by revising the current program to move some of the material currently in CHEM 332-3 to a new lab/lecture course and either add or expand upon the above topics in CHEM 332-3. It is worth noting at this point that many chemistry graduates go on to work in environments in which catalysis is very important for the production of materials. This topic deserves more treatment in the core program.

The laboratory course has been insufficient to expose the students to a variety of topics such as solid state synthesis, inorganic polymers, air sensitive techniques and NMR spectroscopy of nuclei other than hydrogen. In addition, experiments on magnetic properties have been dropped due to lack of equipment.

In short, to expose the students to all the areas of inorganic chemistry which any graduating chemistry student should have seen, we must increase both the lecture and laboratory content of our undergraduate program. While it would be desirable to create both one new laboratory course and a new lecture course, the following compromise (ie, less demanding on the total credit load) was found. The addition of a single lab/lecture course would have the largest impact on the level of inorganic chemistry within the core with the least impact on the rest of the program.

Two additional courses, to be added at the 400 level, are available for students specializing in inorganic chemistry. One is a mechanistic inorganic chemistry course, CHEM 433-3, which will allow a more in-depth treatment of mechanistic aspects of inorganic chemistry. The other is a topics course, CHEM 439-3, which will allow offerings in fields such as solid state and materials chemistry.

Is this suggested program out of line with the programs in other Canadian universities?

By considering requirements listed in other calendars, it is clear that our current program is indeed not comparable with the requirements of other majors programs. The current offerings of the other BC universities are given in table 1. This comparison shows that our current program is below the accepted level of the other universities in both lecture and laboratory hours. Not only is it below average but it is the lowest of the universities sampled.

Table 1: Inorganic Chemistry Courses Offered at BC Universities
(corrected to SFU weekly contact hours)

	Lecture in core	Tutorial in core	Lab in core	% Inorganic in core	Additional Courses offered	Total hours
UVic	9	0	10[a]	27	(6-0-6)	31
UBC	6[c]	3	12[b]	30	(8-4-0)[b]	33
SFU current	6	2	4	19	(6-2-0)[d]	20
SFU proposed	8	2	8	26	(9-3-0)[e]	30

a. Does not include spectroscopy course UVic CHEM 213 (3-0-3) which is a mixture of inorganic and organic practical spectroscopy.
b. This does not include an additional lab of 4hrs/week which includes some inorganic chemistry.
c. Does not include the transition metal chemistry and crystal field chemistry which is taught in first year.
d. CHEM 333, 432.
e. Does not include CHEM 439 which will only be offered when neither CHEM 432 nor 433 is offered.

The proposed revisions would result in our program still having the fewest laboratory hours of the universities listed . (It is worth pointing out that UBC, which has the lowest number of lecture hours in inorganic chemistry, can accomplish this in part by introducing transition metal chemistry in the first year along with CFT and by virtue of a two-term lecture course in third year.)

It is clear from the above that we are not proposing to introduce an inordinate amount of inorganic chemistry into the program, but rather attempting to approach the level which is found in other BC universities.

One may consider that it is a basic philosophy of the chemistry department to have lower numbers of required courses and more electives. If this is truly a function of our system, then at least our % inorganic in the core should compare with other universities. This comparison is included in table 1 and demonstrates that as a percentage of core courses at SFU, the inorganic component is lower than of the other BC universities and will remain so even after the revision. The shortcoming in inorganic chemistry is not a function of our different system but rather a true deficiency in inorganic chemistry content.

It is worth noting that even following the proposed revisions we will still have a serious shortage of laboratory hours in inorganic chemistry available as options for the student who intends to continue in the speciality. The total number of hours available for inorganic instruction at SFU following all revisions is [14-4-8] compared with UBC [14-7-12] and UVic [15-0-16]. It is interesting to note that we will still offer fewer laboratory hours than the other BC universities and even in tutorial hours, we will have only slightly more than 50% of the hours available at UBC.

However with the added content, the inorganic chemistry component will now reach the Canadian Society of Chemistry recommended levels for a major in chemistry, provided all inorganic courses at the 200 and 300 level, with the exception of CHEM 333-3, are required for a majors degree.

The need for additional 400-level lecture courses is best demonstrated by considering the total number of 400 level lecture hours per week in inorganic chemistry available for the student who wishes to specialize in this area. A comparison of the total number of available lecture hours per week offered by several Canadian universities is shown in table 2.

Table 2: 400 level options in inorganic chemistry availabe at different Canadian universities

		Lecture hours/wk
UBC		8
UVic		6
UWO		6
Carlton		6
Queens		6
York		6
Waterloo		10
SFU	current	3
SFU	proposed	6[a]

a. Includes CHEM 432 and 433 but not 439 which will only be offered in years when neither CHEM 432 nor CHEM433 is offered.

Table 2 demonstrates that the total number of 400 level inorganic lecture hours per week offered at SFU is lower than at other Canadian universities. The addition of CHEM 433 (and 439) would make our program comparable to the situation at other Canadian universities.

Summary of Proposed Changes

CHEM 232-3 [3-1-0]	No change
CHEM 331-3 [2-0-4]	New lab/lecture course. This will introduce the students to aspects of bonding in transition metal chemistry and also to spectroscopy.
CHEM 332-3 [3-1-0]	This will now include the chemistry of the f-group elements and exclude the bonding theory which has been transferred to CHEM 331-3.
CHEM 333-3 [3-1-0]	No change
CHEM 336-2 [0-0-4]	This lab has been revised to cover primarily transition metal, organometallic and bioinorganic chemistry experiments.
CHEM 432-3 [3-1-0]	This course will now exclude the mechanistic aspects covered in CHEM 433-3.
CHEM 433-3 [3-1-0]	New lecture course. This course will cover, in detail, physical inorganic chemistry including mechanistic inorganic chemistry and some aspects of solid state chemistry.
CHEM 439-3 [3-1-0]	New lecture course. This will be a special topics course.

(New course)

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. **Calendar Information** **Department:** Chemistry

Abbreviated Code: CHEM Course Number: 331 Credit Hours: 3 Vector: 2-0-4

Title of Course: Practical Aspects of Inorganic Chemistry

Calendar Description of Course:

Introduction to bonding, spectroscopy and laboratory techniques in inorganic chemistry. The laboratory part will include experiments from solid state, main group and transition metal chemistry.

Nature of Course: Lab/Lecture

Prerequisites (or special instructions): CHEM 118 (or 119) and CHEM 232

What course (courses), if any, is being dropped from the calendar if this course is approved?
None

2. **Scheduling**
How frequently will the course be offered? twice a year
Semester in which the course will first be offered: 93-1
Which of the present faculty would be available to make the proposed offering possible?
RH Hill, L Hanlan, D Sutton, RK Pomeroy, LK Peterson, FWB Einstein

3. **Objectives of the Course**

To introduce the students to practical inorganic chemistry and the principles of bonding and spectroscopy required for inorganic laboratories.

4. **Budgetary and Space Requirements** (for information only)
What additional resources will be required in the following areas?

Faculty	a new faculty member
Staff	nil
Library	nil
Audio Visual	nil
Space	nil
Equipment	various items costing approximately $60,000

5. **Approval**

Date: Aug 2, 1991 — Aug 9, 1991 — Oct 29/91

Department Chair — Dean — Chair, SCUS

D.

(New course)

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. **Calendar Information** **Department:** Chemistry

Abbreviated Code: CHEM Course Number: 433 Credit Hours: 3 Vector: 3-1-0

Title of Course: Mechanistic Inorganic Chemistry

Calendar Description of Course:

Discussion of the mechanisms of reaction of inorganic and organometallic complexes highlighting the use of ligand field and molecular orbital theory, valence bond and electron transfer reactivity.

Nature of Course: Lecture

Prerequisites (or special instructions): CHEM 332

What course (courses), if any, is being dropped from the calendar if this course is approved?

2. **Scheduling**
How frequently will the course be offered? once a year
Semester in which the course will first be offered: 93-1
Which of the present faculty would be available to make the proposed offering possible?
RH Hill, LK Peterson, FWB Einstein

3. **Objectives of the Course**

Continues the development of inorganic chemistry at a senior level.

4. **Budgetary and Space Requirements** (for information only)
What additional resources will be required in the following areas?

Faculty	a new faculty member
Staff	nil
Library	nil
Audio Visual	nil
Space	nil
Equipment	nil

5. **Approval**

Date: Aug 2, 1991 Oct 9/91 Oct 29/91

Department Chair Dean Chair, SCUS

(New course)

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. **Calendar Information** **Department:** Chemistry

Abbreviated Code: CHEM Course Number: 439 Credit Hours: 3 Vector: 3-1-0

Title of Course: Special Topics in Inorganic Chemistry

Calendar Description of Course:

An in depth treatment of a current topic in inorganic chemistry. Contact the department for information regarding the topic to be covered in a given semester.

Nature of Course: Lecture

Prerequisites (or special instructions): CHEM 332

What course (courses), if any, is being dropped from the calendar if this course is approved?
None

2. **Scheduling**
How frequently will the course be offered? on demand
Semester in which the course will first be offered: 93-1
Which of the present faculty would be available to make the proposed offering possible?
RH Hill, FWB Einstein, RK Pomeroy, LK Peterson, D Sutton

3. **Objectives of the Course**

Continues the development of inorganic chemistry at a senior level.

4. **Budgetary and Space Requirements** (for information only)
What additional resources will be required in the following areas?

Faculty	nil
Staff	nil
Library	nil
Audio Visual	nil
Space	nil
Equipment	nil

5. **Approval**

Date: Aug 2, 1991 Oct 9/91 Oct 29/91

Department Chair Dean Chair, SCUS

Department of Mathematics and Statistics
Curriculum Changes

SCUS Reference: **SCUS 91-16; SCUS 91-53; SCUS 91-54; SCUS 91-55**
SCAP Reference: **SCAP 91-39b**

Revisions to calendar descriptions and schedules of studies for the Minor, Major and Honors programs in Mathematics and Statistics, and to the Mathematics and Computing Science Program, including:

New Courses:
STAT 350-3 Linear Models in Applied Statistics II
and **Course Deletions:**

MACM 360-3	Computation for Statistical Data Processing
STAT 480-3	Probability Theory
MATH 362-3	Fluid Mechanics I

For Information:
Acting under delegated authority of Senate, SCUS has approved changes to the following courses as detailed in **SCUS 91-16, 91-50, and 91-52:**
Editorial revisions to information and prerequisite statements for students in Actuarial Mathematics

STAT 330	Change of title
STAT 380	Change of prerequisite
STAT 402	Change of prerequisite
STAT 430	Change of prerequisite
STAT 460	Change of course description and prerequisite
MATH 161/162	Change in prerequisite statement
MATH 462	Change of course title and prerequisite

Changes to calendar description to the following courses in discrete mathematics:
MATH 243/308/343/408/443/445 and 447.

FSC 12-91

To: K. Heinrich, Chair
Undergraduate Studies Committee

From: Richard Lockhart

Date: 17 July 1991

Re: Proposal for changes to STAT Undergraduate Courses

Summary:

The Statistics group propose to delete two courses, add one new course, restructure our prerequisites, modify some course descriptions and outlines and make some changes to the requirements for the minor, major and honors statistics options. Our proposals also have a minor impact on the Mathematics and Computing Science Program entry in the calendar. Rationales are incorporated with each specific proposal.

Course deletions:

MACM 360: This course has developed too large an overlap with our other applied statistics and linear models courses. We are now developing a specific computing requirement for each of our courses to ensure that students graduating using the Statistics Option will have a satisfactory introduction to statistical computing.

Impact: MACM 360 is listed under "Other Courses" for the Statistics branch --labelled a) on page 144 of the 1991-92 Calendar-- and will have to be deleted here. A modified version of the page 144 entry is attached and described below. *This deletion and program change require approval of the Department of Computing Science. I have contacted Prof. J. Delgrande and he has confirmed that the Department of Computing Science has no objection.*

STAT 480: For these past several years there has been no significant undergraduate audience for this course. We can give it as a special topics course to strong students or allow particularly strong undergraduates to take MATH 872 when that course is offered.

Impact: STAT 480 is presently required for our honours program. Our proposed revision of our calendar entry and program are in this document.

New course:

STAT 350-3 Linear Models in Applied Statistics II

The Statistics group has realized after a couple of years of experience with our new set of courses that the required stream is not long enough and that some of the courses (STAT 402, 430, 450 and 460) have inadequate prerequisites. This course pulls together the necessary basic material for a number of 400 level courses and permits, together with the course STAT 330 which will be a prerequisite for STAT 350, a much more satisfactory coverage of the range of basic theory and applications of the linear model.

Program changes: (photocopy of old calendar pages attached along with draft of new pages)

Under the majors and honours programs:

Change 4) to drop MATH 310 requirement. This change reflects the Statistics group's conviction that this particular course is not sufficiently central to a Statistics program to be mandatory; differential equations appear only in STAT 380 for which MATH 310 is not a prerequisite. The differential equations solved there are too elementary to warrant an entire course as background. We will still be recommending this course to our major and honors students. The program is already rather full and we want to offer our students as much flexibility as possible consistent with our needs.

Change 5) to STAT 330, 350, and 450 and at least 3 of STAT 402, 410, 420, 430, 440, and 460. This change moves 430 from required to recommended and replaces it with more fundamental material.

Change 6) to replace 'fields' by 'field'. The occurrence of the plural in former calendars is a typographical error. The original proposal approved by Senate in 1987 had the singular.

Change 7) Replace list of courses with recommendation to consult an advisor. We feel that the present list is not very useful. Rather than lengthen it to a ridiculously long list we prefer to provide advice suited to each particular student. Change two additional to three additional to compensate for MATH 310 deletion.

Change 8) to delete STAT 480.

Under the minor option:

Delete STAT 480, add STAT 350 and 402. The omission of 402 was an oversight in the original list; it is a very suitable course for the minor. Change normal inclusions to 330, 350 and 430.

To the Mathematics and Computing Science Program:

Under a) Statistics top of page 144 of 1991/1992 calendar delete reference to MACM 360. Replace STAT 450 by STAT 350. Add STAT 402 to other courses. The course STAT 402 has a larger computational component than STAT 450 and seems a natural choice for this program.

Note: The present Upper Division Requirements section of this program on page 143 should be amended to say MATH or STAT and consideration should be given to including ACMA in the 25 units of upper division math courses required. This change does not seem a natural part of the present proposal.

Proposed new calendar entry

Statistics Major and Honors Options

Students majoring or taking honors in Mathematics and Statistics with the statistics option for a BA degree are subject to the general regulations of the Faculty of Arts. Students majoring or taking honors in Mathematics and Statistics with the statistics option for a BSc degree are subject to the general regulations of the Faculty of Science. In each case students following these options will be required by the Department of Mathematics and Statistics to obtain credit for the following courses.

(1) Lower Division Mathematics
MATH 151 (or 154 or 157), 152 (or 155 or 158), 232, 242, 251, and 252.

(2) Lower Division Statistics
STAT 270 and STAT 280

(3) Lower Division Computing
CMPT 101 or 102 or 103 or equivalent evidence of competence in computer programming.

(4) Upper Division Mathematics/Computing Science
MACM 316

(5) Upper Division Probability and Statistics
STAT 330, 350, and 450 and at least three of STAT 402, 410, 420, 430, 440 and 460.

(6) Upper Division Auxiliary Concentration
At least 15 upper division credit hours in some specific field other than Probability and Statistics, Mathematics, Actuarial Mathematics or Computing Science. These courses are to be approved by a departmental adviser.

(7) In addition, faculty requirements stipulate that at least three additional upper division courses be taken in Mathematics, Statistics, Actuarial Mathematics or Mathematics/Computing Science. Students are encouraged to consult a departmental advisor before selecting these courses.

(8) In addition to requirements (1) through (6) for a major, candidates for an honors degree in Mathematics and Statistics with the statistics option will be required to obtain credit for MATH 320, 322, 426, and 438, all of the courses listed under (5) above, and three additional upper division courses labelled MATH, STAT, ACMA or MACM.

Statistics Minor Option

Candidates for a minor in Mathematics and Statistics with the statistics option are subject to the general regulation of the faculty in which they are registered. In addition they must

(i) obtain credit for
MATH 151 (or 154 or 157), 152 (or 155 or 158), 232, 251, and STAT 270.

and

(ii) obtain credit for at least 5 of the following courses
STAT 330, 350, 380, 402, 410, 420, 430, 440, 450, 460 and ACMA 330.
(This will normally include: STAT 330, 350, and 450.)

Mathematics and Computing Science Program

On page 144 replace the heading a) **Statistics** with the following:

a) **Statistics**

Required Courses

STAT	330-3	Linear Models in Applied Statistics I
	350-3	Linear Models in Applied Statistics II
	380-3	Introduction to Stochastic Processes

Other courses

STAT	402-3	Generalized Linear and Non-Linear Modelling
STAT	420-3	Non-Parametric Statistics

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE PROPOSAL FORM

1. Calendar Information

Department: Mathematics and Statistics

Abbreviation Code: STAT Course Number: 350 Credit Hours: 3 Vector: 3-1-0

Title of Course: Linear Models in Applied Statistics II

Calendar Description of Course:

Theory and application of linear regression. Normal distribution theory. Hypothesis tests and confidence intervals. Model selection. Model diagnostics. Introduction to weighted least squares and generalized linear models.

Nature of Course

Lecture

Prerequisites (or special instructions) :

STAT 330 and MATH 251

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

MACM 360 and STAT 480

2. Scheduling

How frequently will the course be offered?

Three times each two years

Semester in which the course will first be offered?

92-3 or 93-1

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

Dean, Eaves, Lockhart, Routledge, Stephens, Swartz, Weldon

3. Objectives of the Course

To strengthen the prerequisite structure of our fourth year courses and permit a reduction in the overlap between various 400 level courses.

4. Budgetary and Space requirements (for information only)

What additional resources will be required in the following areas: NONE

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: August 12, 91	Oct 9/91	Oct 29/91
Department Chair	Dean	Chair, SCUS

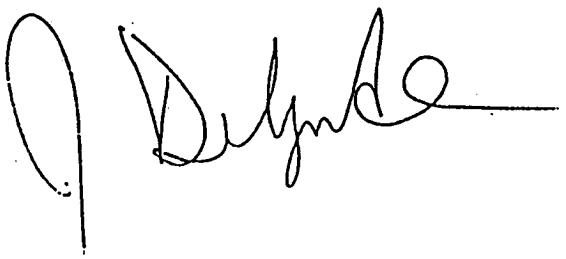
SCUS 73-34b:- (When completing this form, for instructions see Memorandum SCUS 73-34a. Attach course outline.)

5.

Simon Fraser University
MEMORANDUM

To: K. Heinrich, Chair Undergraduate Studies Committee Dept. of Mathematics and Statistics	From: Dr. J. Delgrande, Chair Undergraduate Curriculum Committee Department of Computing Science
Subject: Deletion of MACM 360	Date: July 15, 1990

The Department of Computing Science has no objection to the deletion of MACM 360 from the calendar of undergraduate courses and the deletion of MACM 360 from the list of other courses under Statistics in the Mathematics and Computing Science Program.



Department of Physics
Curriculum Changes

SCUS Reference: **SCUS 91-57; SCUS 91-58**
SCAP Reference: **SCAP 91-39c**

i) Revisions to the schedule of studies for Major and Honors programs in Physics and Applied Physics

ii) **New course:**
PHYS 190-3 Introduction to Astronomy

iii) Change in grading for PHYS 130 and 131 to Pass/Fail

For Information:
Acting under delegated authority of Senate, SCUS has approved the following course revisions as detailed in **SCUS 91-57 and 91-58:**

PHYS 120	Revision to calendar description and course title
PHYS 121	Revision to calendar description and course title
PHYS 233	Revision to calendar description
PHYS 325	Revision to calendar description
PHYS 390	Revision to calendar description and course title
PHYS 332	Revision to calendar description
PHYS 344	Renumbered to PHYS 244
PHYS 425	Revision to calendar description
PHYS 431	Change of prerequisite
PHYS 484	Revision to calendar description and course title
NUSC 442	Revision to calendar description and course title

FSC 15-91

PHYSICS UNDERGRADUATE CURRICULUM CHANGES

The following motions were approved by the Physics Department on 16 September, 1991.

1. *Changes to the prerequisite for PHYS431 (Advanced Physics Laboratory) to include PHYS332 (Intermediate Laboratory) as a recommended prerequisite, in addition to PHYS331 (Electronics Laboratory). It is felt that PHYS331 by itself is insufficient preparation for the Advanced Physics Laboratory.*

Approved by SCUS under delegated authority of Senate

That the calendar description of PHYS431 be changed from "Prerequisite: PHYS331" to "Prerequisite: PHYS331; PHYS332 is recommended".

2. *Include PHYS332 as a required course for Physics Honours. As with the previous recommendation, it is felt that the laboratory skills taught in PHYS332 should be required for the Honours Physics program. The total number of required hours for the Honours program remains the same.*

That the Physics Honours program be changed from

"All of

PHYS325-3	Relativity and Electromagnetism
PHYS326-3	Electronics and Instrumentation
PHYS331-3	Electronics Laboratory
PHYS345-3	Statistical Physics
PHYS355-3	Optics
PHYS384-3	Methods of Theoretical Physics I
PHYS385-3	Quantum Physics
PHYS413-3	Advanced Mechanics
PHYS415-3	Quantum Mechanics
PHYS425-3	Electromagnetic Theory
PHYS431-4	Advanced Physics Laboratory I

Either

PHYS332-3	Intermediate Laboratory

or

PHYS430-5	Digital Electronics and Interfacing

Three of

PHYS332-3	Intermediate Laboratory

PHYS430-5 Digital Electronics and Interfacing ...."

to

"All of
PHYS325-3 Relativity and Electromagnetism
PHYS326-3 Electronics and Instrumentation
PHYS331-3 Electronics Laboratory
PHYS332-3 Intermediate Laboratory
PHYS345-3 Statistical Physics
PHYS355-3 Optics
PHYS384-3 Methods of Theoretical Physics I
PHYS385-3 Quantum Physics
PHYS413-3 Advanced Mechanics
PHYS415-3 Quantum Mechanics
PHYS425-3 Electromagnetic Theory
PHYS431-4 Advanced Physics Laboratory I
Three of
PHYS430-5 Digital Electronics and Interfacing ...."

3. *Changes to PHYS233 and PHYS332 required for Engineering Physics. These changes are required for accreditation of the Engineering Physics program.*

That the sentence "Engineering Science students will do a selected set of experiments." be added to the calendar descriptions of PHYS233 and PHYS332.

Approved by SCUS under delegated authority

4. *Applied Physics Major program: CMPT391-3 is to be changed to CMPT391-4 and the course content is to be made less relevant to the core Applied Physics Major program. The suggestion is to remove CMPT390, CMPT391 and PHYS430 from the core program, and offer the student a choice between CMPT390+CMPT391 and PHYS430. This change would also reduce the number of specified upper division hours in the Applied Physics Major from 43-45 to 37-41, a range of hours more in keeping with a majors program.*

That part of the Applied Physics Major program be changed from
"Core

CMPT390-3 Digital Circuits and Systems
CMPT391-3 Microcomputer Hardware Workshop
MATH310-3 Introduction to Ordinary Differential Equations
MACM316-3 Numerical Analysis I
PHYS324-3 Electromagnetics
PHYS326-3 Electronics and Instrumentation
PHYS331-3 Electronics Laboratory
PHYS332-3 Intermediate Laboratory
PHYS355-3 Optics
PHYS385-3 Quantum Physics
PHYS430-5 Digital Electronics and Interfacing

and either

NUSC341-3 Introduction to Radiochemistry
NUSC342-3 Introduction to Nuclear Science
NUSC346-2 Radiochemistry Laboratory

or three of

PHYS365-3 Semiconductor Device Physics
PHYS431-4 Advanced Physics Laboratory I
PHYS455-3 Laser Physics
PHYS465-3 Solid State Physics"

to

"Core

MATH310-3 Introduction to Ordinary Differential Equations
MACM316-3 Numerical Analysis I
PHYS324-3 Electromagnetics
PHYS326-3 Electronics and Instrumentation
PHYS331-3 Electronics Laboratory
PHYS332-3 Intermediate Laboratory
PHYS355-3 Optics
PHYS385-3 Quantum Physics

Either

NUSC341-3 Introduction to Radiochemistry
NUSC342-3 Introduction to Nuclear Science
NUSC346-2 Radiochemistry Laboratory

or three of

PHYS365-3 Semiconductor Device Physics
PHYS431-4 Advanced Physics Laboratory I
PHYS455-3 Laser Physics
PHYS465-3 Solid State Physics"

Either

CMPT390-3 Digital Circuits and Systems

10. Changes to MATH content of Physics Honours and Majors

Recommendation

That the MATH requirements for physics majors and honours students be changed from

Majors: MATH151, 152, 232, 251, 252, 310; plus 1 more MATH course numbered 316 or greater

Honours: MATH151, 152, 232, 251, 252, 310, 322; plus 2 more MATH courses numbered 316 or greater

to

Majors: MATH151, 152, 232, 251, 252, 310

Honours: MATH151, 152, 232, 251, 252, 310, 322; plus 1 more MATH course numbered 316 or greater (including MACM316)

Motivation

The current situation at SFU for MATH and mathematical methods courses is as follows:

Physics Majors: (21 credits)

MATH151	Calculus I	3 credits
MATH152	Calculus II	3 credits
MATH232	Linear algebra	3 credits
MATH251	Calculus III	3 credits
MATH252	Vector calculus	3 credits
MATH310	O.D.E.'s	3 credits

1 MATH course numbered 316 or higher (3 credits)

Physics Honours: (30 credits)

MATH151	Calculus I	3 credits
MATH152	Calculus II	3 credits
MATH232	Linear algebra	3 credits
MATH251	Calculus III	3 credits
MATH252	Vector calculus	3 credits
MATH310	O.D.E.'s	3 credits
MATH322	Complex variables	3 credits
PHYS384	Math'l physics	3 credits

2 MATH courses numbered 316 or higher (6 credits)

Most of the math courses have specific material which is required for physics courses. However, there are 3 and 6 math credits in the majors and honours programs, respectively, which are unspecified, and are included only for the general preparation of the student.

Our honours program presently specifies a minimum of 64 upper division credits in math and physics (61 credits if PHYS344 is renamed PHYS244). It is a very rigid program and leaves virtually no room for the student to take more advanced courses in chemistry, biology or other subjects without taking more than the 132 credits required for honours. Further, our current requirements are higher than many, if not most, other departments in Canada. A sampling of other institutions (chosen from calendars available in our reading room):

Majors	*Honours*
SFU 21 (now)	SFU 30 (now)
UBC 18	UBC 27-33
	Carleton 27
McGill 18	McGill 24
York 18	York 24

Reducing our MATH requirements as proposed will not lower our mathematics standards below our peer institutions.

11. Changes to PHYS requirements for Honours and Majors. In order to help the student choose a program which he/she can finish in four years, the following outline will be inserted in the calendar.

Recommended Physics Honours Program for first four semesters:

Semester I (14 or 15 credits)
PHYS120, MATH151, CHEM102, Elective I (CHEM115 suggested), Elective II

Semester II (17 credits)
PHYS121, PHYS131, CHEM103, MATH152, Elective III (CMPT102 suggested), Elective IV

Semester III (17 credits)
PHYS211, PHYS233, MATH251, MATH232, Elective V, Elective VI

Semester IV (17 credits)
PHYS221, PHYS234, PHYS244, MATH252, MATH310, Elective VII

The changes will require the following modifications to our undergraduate degree programs:

Physics Honours and Majors
Applied Physics Majors
Chemical Physics Honours and Majors
PHYS244 will be added to lower division courses while PHYS344 will be removed from upper division.

Mathematical Physics Honours
PHYS244 will be added to lower division courses while PHYS344 will be removed from upper division. The choice of 1 course from PHYS465, PHYS484 and NUSC485 will be changed to 1 course from PHYS465, PHYS484, NUSC442 and NUSC485.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Physics

Abbreviation Code: PHYS Course Number: 190 Credit Hours: 3 Vector: 3-1-0

Title of Course: Introduction to Astronomy

Calendar Description of Course:

Historical astronomy, telescopes, the sun and the solar system, stellar evolution, galaxies, cosmology.

Nature of Course Lecture, tutorial

Prerequisites (or special instructions): B.C. High School Math 12 or MATH 100.

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

None

2. Scheduling

How frequently will the course be offered? Once per year initially

Semester in which the course will first be offered? 92-3

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

3. Objectives of the Course

This course is intermittently offered as PHYS 197 (Periphysical Topics II). It will become a regularly offered introductory astronomy course, open to all students with a minimum mathematical background. The course should become a popular elective.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 2 May, 1991 — 9/OCT/91 — Oct 29/91

David A. Bool — Department Chairman

Dean

A R Blackman — Chairman, SCUS

SCUS 73-34b:- (When completing this form, for instructions see Memorandum SCUS 73-34a.

S.91-58d

Management and Systems Science Program
Curriculum Changes

SCUS Reference: **SCUS 91-56**
SCAP Reference: **SCAP 91-39d**

Revision to the Lower Division requirements for the MSSC Program

FSC 13-91

SFU SIMON FRASER UNIVERSITY

MEMORANDUM

To: Faculty of Science Undergraduate Studies Committee	Date: September 13, 1991 From: Brian Alspach, Coordinator MSSC Program
Subject: MSSC Requirements	

At the 91-2 meeting of the Management and Systems Science Program Steering Committee, the following motion was passed unanimously:

Motion: The requirement that MSSC students take at least one of MATH 243-3 or CMPT 205-3 be changed to "students must take both MATH 243-3 and CMPT 205-3."

Rationale: The main mathematical components of the MSSC Program are discrete mathematics and statistics. Mathematics 243-3 is an elementary course in discrete mathematics and a gateway to MATH 308, MATH 343 and MATH 408. The latter three courses are all required for the MSSC Program. Heretofore, we had allowed students to use CMPT 205 as a prerequisite for these courses, but it has not worked and the Mathematics and Statistics Department is now going to require MATH 243. This necessitates that all MSSC students now take MATH 243. In addition, it is better that students take a course whose focus is preparation for the upper level discrete mathematics courses. For a long time, Computing Science has not recognized MATH 243 as a prerequisite for upper level courses in Computing Science. Thus, it is necessary that students also take CMPT 205.

BA:EdE