

SIMON FRASER UNIVERSITY

S. 86-88

MEMORANDUM

Senate

From..Office of the Dean of Graduate Studies

Subject: Graduate Curriculum Changes - Department
of Chemistry

Date..... November 12, 1986

Action undertaken by the Senate Graduate Studies Committee, at its Meeting on November 10, 1986, gives rise to the following motion:

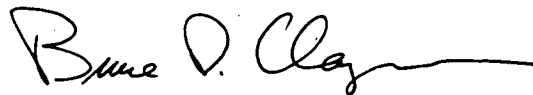
MOTION:

"That Senate approve and recommend approval to the Board of Governors, as set forth in S.86-88 , the proposed changes in the Department of Chemistry:

Delete: Chem 851-3 Stereochemistry
Chem 852-3 Physical Organic Chemistry
Chem 853-3 Modern Synthetic Techniques in Organic Chemistry
Chem 854-3 Chemistry of Natural Products
Chem 855-3 Biosynthesis of Natural Products

Add: Chem 750-3 Advanced Organic Chemistry I
Chem 751-3 Advanced Organic Chemistry II
Chem 752-3 Bio-Organic Chemistry
Chem 753-3 Photo-Organic Chemistry
Chem 754-3 Carbohydrate Chemistry"

Rationale for these changes is attached.



B.P. Clayman
Dean of Graduate Studies.

mm/
attach.

**SIMON FRASER UNIVERSITY
MEMORANDUM**

To: Dr. B. Clayman,
Dean of Graduate Studies,
Chairman of the Senate Committee
on Graduate Studies

From: G. Geen, Dean
Dean of Science

Subject: Curriculum Changes

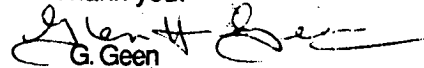
Date: October 6, 1986

Please find attached the documentation related to the Curriculum Changes to the Graduate Program of the departments of: Chemistry, Mathematics and Statistics, and Physics. These Curriculum Changes were approved by the Faculty of Science Graduate Studies Committee and by the Faculty of Science.

I would appreciate it very much if you would place these items on the Agenda of the next Senate Graduate Studies Committee for consideration and approval.

- a) *"To approve the new Course proposal for STAT 650-5 : Quantitative Analysis In Resource Management and Field Biology as contained in paper FSC 86-7".*
- ✓b) *"To approve the Changes In the Graduate Course Offering of the Chemistry Department as contained in the paper FSC 86-8."*
- c) *"To approve the new graduate course PHYS 875-3: Advanced Nuclear Physics (PAPER :FSC 86-9)."*

Thank you.


G. Geen

cc: Dr. A. R. Freedman, Chairman Faculty of Science Graduate Studies Committee,
Chairman Department of Mathematics and Statistics.
Dr. C. H. W. Jones, Chairman Department of Chemistry.
Dr. J. C. Irwin, Chairman Department of Physics.

SIMON FRASER UNIVERSITY

FSC 86-8

MEMORANDUM

To..... Faculty Graduate Studies Committee
..... Faculty of Science
..... Proposed Changes in Chemistry
Subject..... Organic Graduate Courses

From..... F. W. B. Einstein, Chairman
..... Dept.: Graduate Program Cmte.
..... Department of Chemistry
Date..... September 16, 1986
..... WP File: c5968, dc04

RECEIVED
SEP 17 1986DEAN OF SCIENCE
OFFICE

We suggest changes to the Chemistry graduate courses, in the area of organic chemistry, as detailed below.

<u>Delete</u>	CHEM 851-3	(Stereochemistry)
	CHEM 852-3	(Physical Organic Chemistry)
	CHEM 853-3	(Modern Synthetic Techniques in Organic Chemistry)
	CHEM 854-3	(Chemistry of Natural Products)
	CHEM 855-3	(Biosynthesis of Natural Products)
<u>Add</u>	CHEM 750-3	(Advanced Organic Chemistry I)
	CHEM 751-3	(Advanced Organic Chemistry II)
	CHEM 752-3	(Bio-Organic Chemistry)
	CHEM 753-3	(Photo-Organic Chemistry)
	CHEM 754-3	(Carbohydrate Chemistry)

It is proposed that the organic graduate courses consist of 750-3 - 754-3 inclusive and CHEM 856-3 (Selected Topics in Organic Chemistry).

Scheduling

CHEM 750-3 and 751-3 will be offered regularly in the Fall or Spring. They will be the courses of choice for entering graduate students in organic chemistry and could also serve as core courses for chemists enrolled in a graduate chemistry program.

CHEM 752, 753 and 856 will be offered regularly, in organized fashion to suit demand.

Rationale for the Change

1. The new course, 750, fulfills the need for an organic course accessible to all chemists enrolled in a graduate chemistry program.
2. The new course, 751, fulfills the need for a second organic course accessible to students specializing in organic chemistry. This will ensure that an organic graduate student receives a solid training in all fundamental aspects of organic chemistry. The combination of 750 and 751 in one course is not feasible owing to the extensive nature of the material to be presented.
3. The deletion of old courses, 851, 852 and 853 would avoid duplication of material presented in 750 and 751. In addition, some of the topics presented in 852 (Physical Organic Chemistry) will now be covered in the

core course, 860 (Advanced Physical Chemistry).

4. The old courses 854 and 855 no longer reflect current faculty interests and the new courses 752-754 accomodate current faculty interests and expertise.
5. The selected topics course 856 allows flexibility in the organic teaching and will be retained.
6. The revision allows a student requiring a full 15 hours of organic graduate work to be easily accomodated.

A handwritten signature in cursive script, appearing to read "Fred Einstein", is written over a horizontal line.

F. W. B. Einstein

att.

CURRENT AND PROPOSED CALENDAR ENTRIES

Current	Proposed
CHEM 851-3 Stereochemistry A study of the structure of organic molecules and reaction mechanisms with specific references to configuration and conformation.	CHEM 750-3 Advanced Organic Chemistry I An advanced treatment of mechanism and structure in organic chemistry and the use of physical methods as probes of structure, stereochemistry and conformation.
CHEM 852-3 Physical Organic Chemistry Consideration of physio-chemical aspects related to reaction mechanisms such as transition state theory, activation energies, acidity scales, kinetics and isotope effects.	CHEM 751-3 Advanced Organic Chemistry II An advanced treatment of strategy in organic synthesis. The principles and use of modern synthetic methodology.
CHEM 853-3 Modern Synthetic Techniques in Organic Chemistry Discussion of some recent and important methods of synthesis of organic compounds of applied or academic interests.	CHEM 752-3 Bio-organic chemistry An advanced treatment of the use of enzymes in organic synthesis, the use of stable- and radio-isotopes in the study of enzymatic processes, and the design of enzyme inhibitors.
CHEM 854-3 Chemistry of Natural Products Consideration of occurrence and chemistry of organic compounds of natural origin with particular emphasis devoted to alkaloids, steroids, terpenes and phenolics.	CHEM 753-3 Photo-Organic Chemistry Discussion of energy transfer, electron transfer, excited states, photo-physics, and mechanistic and synthetic aspects of photochemistry in solution.
CHEM 855-3 Biosynthesis of Natural Products A detailed treatment of the mode of biological elaboration of representative compounds belonging to alkaloid, terpenoid and phenolic groups.	CHEM 754-3 Carbohydrate Chemistry A detailed treatment of the structure and reactions of monosaccharides, the use of carbohydrates as chiral templates in organic synthesis, advances in glycoside synthesis, the occurrence, chemistry, and conformational analysis of complex carbohydrates and their role in biological systems.
CHEM 856-3 Selected Topics in Organic Chemistry An advanced treatment of specific topics related to the study of organic compounds. Topics which will be discussed will vary from one semester to the next.	CHEM 856-3 Selected Topics in Organic Chemistry An advanced treatment of specific topics related to the study of organic compounds. Topics which will be discussed will vary from one semester to the next.

SIMON FRASER UNIVERSITY

New Graduate Course Proposal Form

Form GS.8

1. CALENDAR INFORMATION:Department: Chemistry Course Number: 750Title: Advanced Organic Chemistry IDescription: An advanced treatment of mechanism and structure in organic chemistry and the use of physical methods as probes of structure, stereochemistry and conformation.Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: _____2. ENROLLMENT AND SCHEDULING:Estimated Enrollment: 8 When will the course first be offered: 87-3How often will the course be offered: Each Fall or Spring semester.3. JUSTIFICATION:CHEM 750 fulfills the need for an organic course accessible to all chemists enrolled in a graduate chemistry program.4. RESOURCES:Which Faculty member will normally teach the course: Drs. Pinto or ChowWhat are the budgetary implications of mounting the course: NoneAre there sufficient Library sources (append details): Yes, no additional holdings are required

- Appended: a) Outline of the course.
 b) An indication of the competence of the Faculty member to give the course.
 c) Library resources.

Approved: Departmental Graduate Studies Committee: Fred Kunkler Date: 16 Sept 86Faculty Graduate Studies Committee: W. R. Egan Date: _____Faculty: Alan H. Egan Date: 10 Oct 86Senate Graduate Studies Committee: B. R. Clay Date: 13 Nov 86

Senate: _____ Date: _____

CHEM 750-3 Advanced Organic Chemistry I

Instructor's Name: Drs. Pinto or Chow

Prerequisites:

Course Content: An advanced treatment of mechanism and structure in organic chemistry and the use of physical methods as probes of structure, stereochemistry and conformation.

Topics Included:

1. Molecular Structure and Chemical Reactivity
2. Isotope Effects Upon Chemical Reactions
3. Catalysis
4. Solvent Effects on Rates and Equilibria
5. Principles of Stereochemistry and Conformational Analysis.
6. Conformational and Steric Effects on Reactivity
7. Physical Methods as Probes of Structure, Stereochemistry and Conformation.
8. Aromaticity

Textbook(s):

"The Physical Basis of Organic Chemistry", H. Maskill, Oxford Science Pub., 1985
"Advanced Organic Chemistry" Pt. A, Carey and Sundberg, Plenum Press, 1984.

Faculty Competence: Drs. Pinto and Chow are specialists in the above areas.

New Graduate Course Proposal Form

Form GS.8

1. CALENDAR INFORMATION:Department: Chemistry Course Number: 751Title: Advanced Organic Chemistry IIDescription: An advanced treatment of strategy in organic synthesis. The principles and use of modern synthetic methodology.Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: \2. ENROLLMENT AND SCHEDULING:Estimated Enrollment: 8 When will the course first be offered: 88-1How often will the course be offered: Each Spring or Fall Semester3. JUSTIFICATION:

CHEM 751 fulfills the need for a second course accessible to students specializing in organic chemistry. This will ensure that an organic graduate student receives a solid training in all fundamental aspects of organic chemistry.

4. RESOURCES:

Drs. Oehlschlager

Which Faculty member will normally teach the course: or Pinto.What are the budgetary implications of mounting the course: NoneAre there sufficient Library sources (append details): Yes. No additional holdings required

- Appended: a) Outline of the course.
b) An indication of the competence of the Faculty member to give the course.
c) Library resources.

Approved: Departmental Graduate Studies Committee: [Signature] Date: Sept 16 1986
Faculty Graduate Studies Committee: [Signature] Date: _____
Faculty: [Signature] Date: 10 Oct 1986
Senate Graduate Studies Committee: [Signature] Date: 13 Nov/86
Senate: _____ Date: _____

GS.18/1/71

CHEM 751-3 Advanced Organic Chemistry II

Instructor's Name: Drs. Oehlschlager or Pinto

Prerequisites:

Course Content: An advanced treatment of strategy in organic synthesis.
The principles and use of modern synthetic methodology.

Topics included:

1. Planning a synthetic Route
2. Carbon-Carbon Bond Forming Reactions
3. Methods of Ring Formation
4. Electrocyclic Reactions, Sigmatropic Rearrangements, Cycloaddition and Cycloreversion Reactions
5. Normal vs. Reverse Reactivity
6. Carbon-Carbon Double-Bond and Triple-Bond formation, and Allene Formation
7. Oxidation and Reduction Reactions
8. Protecting Groups
9. Multi-Step Syntheses
10. Use of Organometallic reagents in organic synthesis

Textbook(s): "Advanced Organic Chemistry" Pt. B, Carey and Sundberg, Plenum Press, 1984.
Primary literature sources.

Faculty Competence: Drs. Oehlschlager and Pinto are specialists in the above areas.

SIMON FRASER UNIVERSITY

New Graduate Course Proposal Form

Form GS.8

1. CALENDAR INFORMATION:Department: Chemistry Course Number: 752Title: Advanced Bio-organic ChemistryDescription: An advanced treatment of the use of enzymes in organic synthesis, the use of stable- and radio-isotopes in the study of enzymatic processes, and the design of enzyme inhibitors.Credit Hours: 3\ Vector: 3-0-0 Prerequisite(s) if any: \2. ENROLLMENT AND SCHEDULING:Estimated Enrollment: 8 When will the course first be offered: 88-3How often will the course be offered: Once a year3. JUSTIFICATION:CHEM 752 allows a greater flexibility in organic teaching and accomodates current faculty interest and expertis.4. RESOURCES:Which Faculty member will normally teach the course: Dr. OehlschlagerWhat are the budgetary implications of mounting the course: NoneAre there sufficient Library sources (append details): Yes

- Appended: a) Outline of the course.
 b) An indication of the competence of the Faculty member to give the course.
 c) Library resources.

Approved: Departmental Graduate Studies Committee: Fred Knudsen Date: Sept 16, 1986
 Faculty Graduate Studies Committee: [Signature] Date:
 Faculty: [Signature] Date: 10 Oct 86
 Senate Graduate Studies Committee: BPC [Signature] Date: 13 Nov 86
 Senate: Date:
 GS.18/1/71

CHEM 752-3 Advanced Bio-organic Chemistry

Instructor's Name: A. C. Oehlschlager

Instructor's Office: C9044

Prerequisites:

Course Description: An advanced treatment of the use of enzymes in organic synthesis, the use of stable- and radio-isotopes in the study of enzymatic processes, and the design of enzyme inhibitors.

Topics included:

- A. Use of enzymes in organic synthesis
 - 1) Oxido reductases - specificity/active site topology/methods of cofactor regeneration.
 - 2) Hydrolases - specificity, effects of solvent, active site topology.
 - 3) Ligases.
- B. Use of stable- and radio-isotopes in the study of enzymatic processes.
 - 1) Synthesis and analysis of chiral methyl groups.
 - 2) Steric course and mechanism of enzymatic Claisen and Aldol condensation.
 - 3) Biotin-dependent Carboxylations and enzymatic carboxylation, of phosphoenol-pyruvate.
 - 4) Pyridoxyl phosphate-dependent enzymatic reactions.
 - 5) Addition and elimination reactions.
 - 6) Stereochemistry of terpenoid biosynthesis.
 - 7) Stereochemistry of phosphoryl group transfer reactions.
- C. Design of enzyme inhibitors.

Topics in this section to be drawn from current literature relating to design of theraputic and pesticide agents.

Faculty Competence: Dr. Oehlschlager is a specialist in the above areas.

Textbook(s): Primary Literature sources

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SIMON FRASER UNIVERSITY

New Graduate Course Proposal Form

Form GS.8

1. CALENDAR INFORMATION:Department: Chemistry Course Number: 753Title: Photo-organic ChemistryDescription: Discussion of energy transfer, electron transfer, excited states, photophysics, and mechanistic and synthetic aspects of photochemistry in solution.Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: \2. ENROLLMENT AND SCHEDULING:Estimated Enrollment: 8 When will the course first be offered: 88-3How often will the course be offered: Once a year3. JUSTIFICATION:CHEM 753 allows a greater flexibility in organic teaching and accomodates current faculty interests and expertise.4. RESOURCES:Which Faculty member will normally teach the course: Drs. Chow or HillWhat are the budgetary implications of mounting the course: NoneAre there sufficient Library sources (append details): Yes

- Appended: a) Outline of the course.
 b) An indication of the competence of the Faculty member to give the course.
 c) Library resources.

Approved: Departmental Graduate Studies Committee: [Signature] Date: Sept 16, 1987
 Faculty Graduate Studies Committee: [Signature] Date: 10 Oct 86
 Faculty: [Signature] Date: 13 Nov/86
 Senate Graduate Studies Committee: [Signature] Date: GS.18/1/71
 Senate: _____ Date: _____

CHEM 753-3 Photo-organic Chemistry

Instructor's Name: Y. L. Chow or R. Hill

Instructor's Office: C----

Prerequisites:

Course Description: Discussion of energy transfer, electron transfer, excited states, photophysics, and mechanistic and synthetic aspects of photochemistry in solution.

Topics included:

- 1) The interaction of light and matter - basic concept.
- 2) Transition between two state-energy surfaces - the Franck-Condon Principle
- 3) Absorption and emission spectroscopy - photophysics.
- 4) Excited states - physical and chemical properties.
- 5) The concept of radiationless transition.
- 6) Organic photochemistry - MO theory.
- 7) Mechanistic photochemistry in solution.
- 8) Energy transfer - electron transfer.
- 9) Synthetic applications.

Faculty Competence: Drs. Chow and Hill are specialists in the above areas.

Textbook(s): Primary Literature sources

Mark Distribution:

New Graduate Course Proposal Form

Form GS.8

1. CALENDAR INFORMATION:Department: ChemistryCourse Number: 754Title: Carbohydrate Chemistry

Description: A detailed treatment of the structure and reactions of mono saccharides, the use of carbohydrates as chiral templates in organic synthesis, advances in glycoside synthesis, the occurrence, chemistry, and conformational analysis of complex carbohydrates and their role in biological systems.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any: \2. ENROLLMENT AND SCHEDULING:Estimated Enrollment: 8 When will the course first be offered: 89-1How often will the course be offered: Once a year3. JUSTIFICATION:

CHEM 754 allows a greater flexibility in organic teaching and accomodates current faculty interests and expertise.

4. RESOURCES:Which Faculty member will normally teach the course: Drs. Pinto or SlessorWhat are the budgetary implications of mounting the course: NoneAre there sufficient Library sources (append details): yes

- Appended: a) Outline of the course.
b) An indication of the competence of the Faculty member to give the course.
c) Library resources.

Approved: Departmental Graduate Studies Committee: [Signature] Date: Sept 16, 1986Faculty Graduate Studies Committee: [Signature] Date: _____Faculty: [Signature] Date: Oct 10/86Senate Graduate Studies Committee: [Signature] Date: 13 Nov/86

Senate: _____ Date: _____

GS.18/1/71

CHEM 754-3 Carbohydrate Chemistry

Instructor's Name: B. M. Pinto or K. N. Slessor Instructor's Office: C----

Prerequisites:

Course Description: A detailed treatment of the structure and reactions of monosaccharides, the use of carbohydrates as chiral templates in organic synthesis, advances in glycoside synthesis, the occurrence, chemistry, and conformational analysis of complex carbohydrates and their role in biological systems.

Topics included:

- 1) Structure and configuration of monosaccharides.
- 2) Stereochemistry and conformational analysis of monosaccharides.
- 3) Reactions of monosaccharides.
- 4) Glycosylation Reactions.
- 5) Use of carbohydrates as chiral templates in organic synthesis.
- 6) Biosynthesis of Saccharides.
- 7) Carbohydrate Antibiotics.
- 8) Nucleosides and Nucleotides.
- 9) Complex Carbohydrates: occurrence, chemistry and their role in biological systems.
- 10) Conformational analysis of oligosaccharides.
- 11) Molecular Recognition.

Faculty Competence: Drs. Pinto and Slessor are specialists in the above areas.

Textbook(s): Primary Literature sources.
Guthrie and Honeyman, "Carbohydrate Chemistry"
Sharon, "Complex Carbohydrates"

Mark Distribution: