UNIVERSITY COLLEGE of the FRASER VALLEY

PAC FORM #2

COURSE IMPLEMENTATION DATE:[May 1994
COURSE TO BE REVIEWED DATE:[ ]
(Four years after implementation date)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.

Shaded headings are subject to change at the discretion of the department and material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT : **CHEMISTRY**

CHEM 312		**4**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

INTERMEDIATE ORGANIC CHEMISTRY II

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:
The topics covered in CHEM 312 include an introduction to the chemical literature, the investigation of reaction mechanisms, industrial organic chemistry, photochemistry, and the chemistry of selected compounds of biological interest, e.g., steroids. Laboratory work will illustrate a selection of the topics covered during lectures and may involve a short research project.

PREREQUISITES: CHEM 211 and CHEM 212

COREQUISITES: None

SYNONYMOUS COURSE(S)
(a) Replaces: N/A
(Course #)
(b) Cannot take CHEM 411 for further credit
(Course #)

SERVICE COURSE TO:
(Department / Program)
(Department / Program)

TOTAL HOURS PER TERM: **104**

STRUCTURE OF HOURS:

Lectures:	52	hrs
Seminar:	12	hrs
Laboratory:	40	hrs
Field Experience:		hrs
Student Directed Learning:		hrs
Other (Specify):		hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE:
HOURS PER DAY:

MAXIMUM ENROLMENT: 24

EXPECTED FREQUENCY OF COURSE OFFERING:

WILL TRANSFER CREDIT BE REQUESTED? **YES** ____ **NO** X

TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE: **YES** ____ **NO** X

AUTHORIZATION SIGNATURES:

Course designer(s): Arthur M. Last & Peter W. Slade
Chairperson: T. Cooper *(Curriculum Committee)*
Department Head: E. Kroeker
Dean: K. Wayne Welsh
PAC Approval in Principle Date:
PAC Final Approval Date: February 23, 2000

LEARNING OBJECTIVES / GOALS / OUTCOMES/ LEARNING OUTCOMES:

Students enrolling in this course will be pursuing careers in chemistry or biology or a minor in either or both subjects.

It is intended that students will be able to:

a) Acquire a deeper understanding of the basic principles of organic chemistry and apply them to new situations using a systematic and logical approach (e.g. in reaction syntheses).
b) Perform laboratory synthesis and analyses with care, precision, and confidence.
c) Extrapolate the information obtained in class sessions into the laboratory.
d) Demonstrate the connection between organic syntheses and biological systems, where applicable.
e) Acquire an expertise in searching the chemical literature.

METHODS:

Presentation of the course will be by interrelated class (theory), seminar, and laboratory sessions. Class sessions will promote active student participation to ensure continual mutual feedback in order to reinforce the learning process. Films and other audio-visual aids will be used where appropriate.

Problem assignments will be coninually given. Some selected problems will be collected and marked.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR YES _____ NO ___X___

METHODS OF OBTAINING PLAR:

TEXTBOOKS, REFERENCES, MATERIALS:

Advanced Organic Chemistry, 4th edition, Jerry March, (John Wiley), 1992.

or

Introduction to Organic Chemistry, 4th edition, Andrew Streitweiser, Clayton Heathcock & Edward Kosower, (MacMillan), 1992.

Supplementary material from various sources given in course content section.
UCFV Laboratory Manual for Chemistry 311 & 312 (in preparation).

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

This will be flexible, yet will be based on the following:

Laboratory (reports and techniques)	25%
Midterm examination	25%
Instructor assessment, problem assignments, class participation, other tests	20%
Final examination	30%

COURSE CONTENT:

Introduction to the primary journals and review journals of Organic Chemistry (8 hours)

Hands-on experience in the use of Chemical Abstracts (field-trip to SFU), computer searching (SFU assistance desirable), introduction to primary journals, to review journals and to other reference materials such as Beilstein, the Dictionary of Organic Compounds and Science Citation Index.

Reference materials:

Using Chemical Abstracts - Peter Groves (Royal Society of Chemistry Audiotape), 1984.
How To Find Chemical Information - Robert E. Maizeli (2nd edition) (John Wiley), 1987.

The Investigation of Organic Reactions (20 hours)

Discussion of the various techniques used to investigate reaction mechanisms. Topics included: kinetics and equilibrium studies (6 hours), isotope effects (2 hours), structure-reactivity relationships (e.g. the Hammett equation) (6 hours), and stereochemistry (6 hours).

Reference materials:

Mechanism: An Introduction to the Study of Organic Reactions - Richard A. Jackson (Oxford University Press), 1972
The Investigation of Organic Reactions - Ross Stewart (Prentice-Hall), 1966
Physical Organic Chemistry Through Solved Problems - Joseph B. Lambert (Holden-Day), 1978
Mechanism in Organic Chemistry: Case Studies - R.O.C. Norman, M.J. Tomlinson & D.J. Waddington (Mills & Boon), 1978
Various original papers and reviews from J. Organic Chem., Chem. Reviews etc.

Industrial Organic Chemistry (8 hours)

Petrochemicals, dyes & dyeing, pharmaceuticals: emphasis on Canadian content.

Reference materials:

Survey of Industrial Chemistry - P.J. Chenier (Wiley-Interscience), 1986
The Second 50 Industrial Chemicals, Parts 1 & 2 - P.J. Chenier & D.S. Artibee (J. Chem. Ed. 65, 244-250, 433-436, 1988)
The Teaching of Industrial Organic Chemistry - M.B. Hocking (Can. Chem. News 19-23, March 1991)
Organic Chemistry - Norman L. Allinger et al (chapter 35) (Worth), 1971
Various articles and news items from C. & E. News, Chemistry & Industry etc.

COURSE CONTENT: (contd.)

Molecular Orbital Systems and Spectroscopy (12 hours)

Molecular orbitals: basic theory, conjugated pi systems and pericyclic reactions; electrocyclic reactions; cycloadditions; Woodward-Hofmann rules, further u.v. visible spectroscopy.

Reference material:

Organic Chemistry - 3rd edition - John McMurray (Brooks/Cole) ch 30, 1992
Organic Chemistry - Alan Wingrove & Robert L. Caret (Harper & Row) ch 27, 1981

"Special Topics" (6 hours)

Proteins (synthesis from amino acids, Merrified Automated method, protein analysis), enzymes, nucleic acids and nucleotides.

Reference material:

Organic Chemistry - 3rd edition - John McMurray (Brooks/Cole) ch 29, 1992
Organic Chemistry - Alan Wingrove & Robert L. Caret (Harper & Row) ch 28, 1981

LABORATORY EXPERIMENTS:

Ten laboratory periods of four hours each. All experiments are one week in duration unless otherwise stated.

These will be comprised of some standard experiments and some project work. The standard experiments will be selected by the instructor from a given list that will include but will not be restricted to:

1. The Perkin reaction: preparation of cis and trans-2-phenylcinnamic acid.

2. Photochemical and Thermal Interconversion of cis and trans-1,4-diphenyl-2-butene-1,4-dione.

3. Qualitative Analysis (binary unknowns): Sodium fusion tests, functional group tests, separation and full identity by derivative and/or by i.r. and n.m.r. spectroscopy. (2 weeks)

4. The Small Scale Preparation of a variety of Polymers.

5. The Synthesis of Tyrian Purple. (2 weeks)

6. The Photochemical Dimerization of 4-methylbenzophenone.

7. The Preparation of tropylium iodide.

8. U.V. Visible Spectroscopy: The Determination of the pK_a of a Weak Acid.

9. As an alternative to some of the above, a suitable project will be selected by the more capable students, in consultation with the instructor. These projects will involve either the specific aspects of a given mechanism (e.g. several students might work together to prepare a number of substituted aromatic compounds, do a kinetic study and produce a Hammet plot) or a multi-step synthesis of a compound of commercial significance (e.g. a dye, a pharmaceutical product etc.). A project list will be developed.