douglas college **Course Information**

A: Division: ACADEMIC DATE: September 12, 1994

B: Department: SCIENCE & MATHEMATICS New Course: ____

Revision of Course Information form: X

DATED: May 1984

C:	D:	E:
CHEM 320	ORGANIC CHEMISTRY - PART I	5
Subject & Course No.	Descriptive Title	Semester Credit

F: Calendar Description

This is part one of a general organic chemistry course. It begins with a review of the theories of bonding and molecular geometry and proceeds to illustrate the structure properties, synthesis, nomenclature and reactions of alkanes, cycloalkanes, alkenes, alkynes, organic halides, benzene and alcohols. Also covered is an introduction to carbonyl compounds as they relate to alcohol syntheses. Stereochemistry reaction mechanisms, U.V. and I.R. spectroscopy are also covered.

Summary of Revisions:
(Enter date & section)
Ex: Section C,E,F, &R

D, F, H, K, M, R

G: Type of Instruction:

	Hours Per Week/ Per Semester	
Lecture	4	Hrs.
Laboratory	3	Hrs.
Seminar	____	Hrs.
Clinical Experience	____	Hrs.
Field Experience	____	Hrs.
Practicum	____	Hrs.
Shop	____	Hrs.
Studio	____	Hrs.
Student Directed Learning	____	Hrs.
Other	____	Hrs.
TOTAL	7	HOURS

H: Course Prerequisites:

CHEM 210, C Grade or better or CHEM 110, B- or better

I: Course Corequisites:

J: Course for which this course is a pre-requisite

CHEM 420

K: Maximum Class Size:

36

L: College Credit Transfer X

College Credit Non-Transfer ____

M: Transfer Credit:

Requested ____
Granted X

Specify Course Equivalents or Unassigned Credit as Appropriate

U.B.C.	CHEM 230(6)(with CHEM 420)
S.F.U.	CHEM 150(3) + 155(2)
U. Vic.	CHEM 231(1.5)
OTHER:	Open University-CHEM 240(3)+ CHEM 245(1) + CHEM(1)

Hendrick H Conrad
COURSE DESIGNER(S)

DIVISIONAL DEAN

DIRECTOR/CHAIRPERSON

REGISTRAR

N: Textbooks and materials to be purchased by students (Use Bibliographic Form):

1. Solomons T.W.G. Organic Chemistry 4th Edition (Also used in CHEM 420) John Wiley and Sons Inc.
2. CHEM 320 - Laboratory Outline (Douglas College/Current Year)

Reference Texts:
Vollhardt and Schore, Organic Chemistry 2nd Edition W.H. Freeman and Co.
Fessenden and Fessenden, Organic Chemistry 5th Edition Brooks-Cole

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Complete Form with Entries Under the Following Headings:

O. Course Objectives; P. Course Content; Q. Method of Instruction;

R. Course Evaluation

O. Course Objectives:

General Objective:

The student will be able to relate the importance of Organic Chemistry, not only as a science in itself, but also its relevance to other sciences and the world as a whole.

SPECIFIC OBJECTIVES:

1. The student will be able to recognize the uniqueness of carbon and be able to classify the numerous compounds of carbon and do conversion problems.

2. The student will be able to study the various functional groups listed in the Course Outline and demonstrate how properties and reactions are affected by these.

3. The student will study the stereochemistry of carbon compounds and be able to show how different spatial arrangements of the same atoms and groups affect properties and reactivity.

4. In general, the student will be able to answer questions on nomenclature, structure, properties, reactions, mechanisms of reactions and stereochemistry as they relate to the chemistry of carbon involving the functional groups as detailed in the Course Outline.

5. The student, using modern Organic Techniques will perform experiments shown in the laboratory outline which will

   a) emphasize the importance of the practical aspects of Organic Chemistry
   b) illustrate many of the fundamental techniques of Organic Chemistry
   c) illustrate reactions discussed in class
   d) illustrate the use of instrumentation to identify new products synthesized in the laboratory

P. COURSE OUTLINE

1. CARBON COMPOUNDS AND CHEMICAL BONDS
Review: Ionic and Covalent bonding, Isomerism Resonance, sp, sp^2, sp^3 Hybridization, VSEPR Model, Representation of Structural Formulas.

2. REPRESENTATIVE CARBON COMPOUNDS
Review: Structure and Hybridization of Alkanes, Alkenes Alkynes, Benzene, Alkyl groups, Functional Groups, Lewis Acids and Bases, Introduction to Mechanisms, Cis-Trans Isomerism.

3. ACIDS AND BASES IN ORGANIC CHEMISTRY
Introduction, Reaction Mechanisms and the Curved Arrows, Synthesis of Deuterium and Tritium-labelled compounds.

4. ALKANES AND CYCLOALKANES
IUPAC Nomenclature of Alkanes, and Cycloalkanes, Isomerism, Conformations, Halogenation of Alkanes, Aromatic Nomenclature review.

5. STEREOCHEMISTRY
Chirality, Optical Activity, Enantiomers, Diastereomers, Meso compounds, R and S configurations, Specific Rotation, Optical Purity, Racemic Resolution, Stereoselective reactions.

6. IONIC REACTIONS
Nucleophilic Substitution and Elimination Reactions of Alkyl Halides, S_N1, S_N2, E1, and E2 Reactions and their Mechanisms, Free Radical Reactions, Nucleophiles, Leaving groups, Kinetics, Energy of Activation.

7. RADICAL REACTIONS
Bond Dissociation, Halogenations of Alkanes, Mechanism, Selectivity in Halogenation, Structure Geometry and Stability of Alkyl Radicals.

8. ALKENES AND ALKYNES I
Nomenclature of Alkenes and Cycloalkenes, (E)-(Z) system, Alkynes, Hydrogenation of Alkenes, Relative Stability of Alkenes, Synthesis of Alkenes via Dehydrohalogenation of Alkyl Halides, Zaitsev's rule, Carbocations, Dehydration of Alcohols, Synthesis and Reactions of Alkynes.

9. ALKENES AND ALKYNES II
Addition of Hydrogen, Halogens, Hydrogen Bromide (Markovnikov and Anti-Markovnikov), Water, Halohydrin formation, Epoxides and their Hydrolysis, Oxidation of Alkenes, Oxidative cleavage with $KMnO_4$ and O_3 tests for Alkenes and Alkynes.

10. ALCOHOLS AND ETHERS
Structure and Nomenclature of Alcohols and Ethers, Synthesis of Alcohols from Alkenes, Oxymercuration, Hydroboration, Dehydration of Alcohols, Alkyl Halides from Alcohols, Williamson Synthesis of Ethers.

11. ALCOHOLS FROM CARBONYL COMPOUNDS
Introduction to Carbonyl Compounds, Aldehydes Ketones, Acids and Derivatives. Preparation of Alcohols from Carbonyls, Oxidation of Alcohols Grignards and other Organometallics.

12. SPECTROSCOPY I
Visible and Ultra Violet and Infrared Spectroscopy emphasizing Hands-On and Structure Identification.

Q. METHOD OF INSTRUCTION

The course will be presented using lectures, assigned readings, problem sessions and class discussions. Films and other audio-visual aids, handouts and programmed material will be used where appropriate. The laboratory course will be used to illustrate the practical aspects of the course material. Close co-ordination will be maintained between laboratory and classroom work whenever possible.

R. EVALUATION

Students performance in the course will be evaluated in the following way:

1. Laboratory work 30%
   Pre-lab write ups, prelab quizzes
   Lab notebook 18%
   Product Analysis, Final lab quizz 12%

2. Examinations 70%
   a) A final comprehensive examination: 30%
   b) A minimum of three in class tests given throughout the semester: 40%

LABORATORY OUTLINE

1. Introduction and Orientation
2. Extraction. Separation of a 3-component Mixture
3. Recrystallization and Sublimation
4. Melting Point Determination and Practical Tests
5. Reaction Kinetics of the Oxidation of Alcohols
6. Thin Layer Chromatography. Separation of Alkaloids from Tobacco
7. Isolation of Eugenol from Cloves. Demonstration of IR and UV
8. Analysis of Eugenol by IR and UV Spectroscopy
9. Multistep Synthesis. From Acetophenone to 3-Nitro-methyl-benzoate
10. Introduction to Polymers.