S.96-19

SIMON FRASER UNIVERSITY

OFFICE OF THE VICE-PRESIDENT, ACADEMIC

MEMORANDUM

To: Senate

From: D. Gagan, Chair
Senate Committee on Academic Planning

Subject: University College of the Fraser Valley/
Simon Fraser University
a) B.Sc. Majors Degree Program in General Biology
b) Physics 300 and 400 level courses
(SCUS Ref. SCUS 96-1, SCAP Ref. SCAP 96-2)

Date: February 12, 1996

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 to the Board of Governors, as set forth in S.96 -19, the following new programs to be offered at the University College of the Fraser Valley:

a) B.Sc. Majors Degree Program in General Biology
b) Physics 300 and 400 level courses."

SIMON FRASER UNIVERSITY
DEPARTMENT OF BIOLOGICAL SCIENCES

MEMORANDUM

To: Dr. Mike Plischke

From: Norbert Haunerland
Associate Chair

Subject: UCFV Biology Major

Date: 2/5/96

In response to the concerns expressed at the last SCUS meeting, I have initiated the evaluation of the transfer credit status of the UCFV courses.
Transfer credit is recommended for the following courses:

UCFV	SFU
BIOL 301-4	BISC 000-3
BIOL 303-4	BISC 337-3
BIOL 304-4	BISC 366-3
BIOL 305-4	BISC 305-3
BIOL 306-4	BISC 307-3
BIOL 312-3	BISC 333-3
BIOL 401-3	BISC 331-3
BIOL 416-3	BISC 400-3

BIOL 320, and BIOL 402 may be equivalent to SFU BICH courses. I have submitted the course outlines for evaluation to Bill Richards (Biochemistry coordinator) but not yet received his decision.

An editorial change was made on page 6 of the proposal: The last paragraph ("Included in the additional 28 hours.....BIOL 306-4 (3-0-3) Vertebrate Anatomy and Physiology II") was eliminated, since it the content is redundant.

Neurophysiology content of BIOL 305 and 306: I was assured by the instructors of UCFV and our Animal Physiology instructors that Neurophysiology is covered adequately at UCFV.

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A PROPOSAL FOR THE UNIVERSITY COLLEGE OF THE FRASER VALLEY
TO OFFER A BSc MAJOR IN GENERAL BIOLOGY

1. PROGRAM NAME

Bachelor of Science in Biology.

2. RATIONALE

Purpose:

After completing the biology major, the successful student will:

1. have a thorough knowledge of biology;
2. be able to think critically about current problems in biology and have the necessary skills to analyze solutions to these problems;
3. be able to use their acquired skills in a manner which makes them successful and valuable employees;
4. be able to attain admission to graduate schools by demonstrating the requisite knowledge and skills needed by these schools;
5. have communication and computational skills commensurate with standards expected of a college educated person.

Benefits:

On completion of the BSc Biology Major students will have a broad, high quality foundation in biology. This will allow them to pursue a variety of careers in business and industry or to pursue further educational opportunities. Students holding a BSc Biology degree are well placed to compete for entry level positions such as lab technicians or managerial trainees in firms requiring a background knowledge in biology. The BSc Biology Major is also excellent preparation for students who intend to pursue professional qualifications for elementary and secondary school teaching. Students wishing to continue their studies through to the graduate level will be eligible to apply directly to graduate programs.

The general Biology BSc is also very useful background for students seeking entry into professional schools that require a good grounding in biological science as a prerequisite. The degree is appropriate training for entry into professional occupations such as medicine, audiology, chiropractor, dentistry, dietitian, medical lab technician, optician, paramedic, physiotherapists, radiotherapy technologists, ultrasound therapists, and veterinarian.

Program Priority:

At present we have a BSc degree option that requires double minors. This option was established in our initial efforts to offer a degree in the natural sciences considering the prevailing budget, staffing, and enrolment restrictions; and to satisfy requirements dictated by our interaction with Simon Fraser University. However, the present double minors degree is cumbersome (it requires a minimum of 130 hours) and is not popular with students. In order to meet our mandate we need to augment the double minors option with a more conventional biology major.

Taking into consideration present space restrictions, budget restrictions, prospective initial enrolments, and the department's limited resources, a general Biology Major is the most suitable for us to initiate at this time. The Biology Major will provide a broad, general education in the biological sciences.

Of all the natural sciences , the biology department has a history of being the most popular in terms of student enrolments. Also, students with biology degrees have good employment prospects.

For these reasons, it is a consensus in the Natural Sciences that we need a more popular biology

degree as soon as possible.

The following data will give some credence to the above statements. These data were collected from the registrar's office on January 27th from Winter 1995 enrolment figures. If we do the calculation:

# of students enrolled ÷ number of available seats = % of capacity.

the following is generated:

Biology: 552 ÷ 702 = 79% with 5 faculty = 110 students/faculty

Biology is running at 79% of present capacity which is approx. 20% above the college norm. Also, biology has the most favourable student/faculty ratio in the sciences: 110 students per faculty.

Because of the foregoing points, we feel that the highest priority should be given to establishing a BSc Biology Major as soon as possible.

3. START UP DATE

The anticipated start date is September 1996.

4. DEGREE TO BE AWARDED

Bachelor of Science in Biology.

5. DEPARTMENT OBJECTIVES

UCFV is a relatively small educational institution dedicated to high quality teaching, therefore, the Biology Department is focused on excellence in teaching. Faculty members are also expected to engage in scholarly activity in their area of expertise.
All students in the Biology Department can expect:

1. to learn in a teaching environment with excellent faculty, staff, and support structures;
2. to have their knowledge and skills evaluated fairly;
3. to be treated equally and fairly regardless of gender, sexual orientation, race, religion, or political affiliation;
4. to have laboratory experiences and equipment that are up to date and commensurate with accepted standards for college/university graduates;
5. to have adequate study space, library and other support services available on their major campus;
6. to be able to proceed through their academic program in a reasonable time, typically eight study semesters for a Bachelor's degree.

A future objective is to have co-operative education as an option for our students.

6. CURRICULUM DESCRIPTION

The general requirements for the major include a prescribed set of core and prerequisite courses in the lower division and a number of required and elective courses in the upper division. The general requirements are:

- 120 semester hours minimum.
- A minimum CGPA of 2.0
- A minimum CGPA of 2.0 in upper division biology courses.

- Electives must include a minimum of 12 semester hours numbered 100 and above in subjects outside of Biology, Chemistry, Mathematics and Physics. Of these, 6 semester hours must be in Communications courses (eg, CMNS XXX-3 and CMNS YYY-3, Technical Writing for the Sciences, to be developed) or in English courses numbered 105 and greater, or a combination of both.

- A minimum of 45 semester hours of upper division must be included in the program.

- Computer courses are not specifically required in the BSc program. However, it is essential that degree holders at least be competent with desk top computers. Therefore, it is strongly recommended that at least COMP 100 be taken as an elective.

It is recommended that students take at least one of their upper level courses at SFU to augment course offerings at UCFV. Degree students wishing to take courses at SFU should consult the UCFV Biology department head prior to enrolling at SFU.

The basic semester hour requirements are as follows:

LOWER DIVISION:		
Biology	**24**	**semester hours**
Other courses	**37**	**semester hours**
Total:	**61**	**semester hours**
UPPER DIVISION:		
Biology core	**12**	**semester hours**
Biology electives	**28**	**semester hours**
Other electives	**5**	**semester hours**
Total:	**45**	**semester hours**
Other electives	**14**	**semester hours**
Total (minimum)	**120**	**semester hours**

SPECIFIC COURSE REQUIREMENTS:

LOWER DIVISION REQUIRED COURSES:

Note: Science courses are vectored to indicate the actual number of course contact hours: (n1,n2,n3) where n1 = the number of lecture contact hours, n2 = the number of tutorial, seminar, or faculty consultation hours, and n3 = the number of lab hours. For example, a course vectored (3,1,3) has a 3 hour lecture, a one hour tutorial, and a 3 hour lab. A vector of (0,0,3) would indicate a lab only course, and a vector of (3,0,0) indicates a lecture only course.

* in the following designates new courses that will be developed.

The Lower Division Core:

Biology

Biol 111-4 (3,1,3) Introductory Biology I
Biol 112-4 (3,1,3) Introductory Biology II
Biol 201-4 (3,0,3) Cell Biology I
Biol 202-4 (3,0,3) Cell Biology II
Biol 210-4 (3,1,3) Introductory Ecology
Biol 220-4 (3,0,3) Introductory Genetics

24 semester hours

Nonbiology Courses:

Chem 111-4 (3,1,3) Principles of Chemistry I
Chem 112-4 (3,1,3) Principles of Chemistry II
*Phys 105-4 (3,1,3) Non-Calculus Physics
or
Phys 111-4 (3,1,3) and 112-4 (3,1,3) Calculus based Physics
Math 111-4 (5,0,0) Calculus I
Math 112-4 (5,0,0,) Calculus II
Chem 211-4 (3,0,3) Introductory Organic Chemistry I
Chem 212-4 (3,0,3) Introductory Organic Chemistry II

at least 3 semester hours from the following courses:

Math 106-4 (5,0,0) Statistics I
Math 104-4 (5,0,0) Introduction to Probability and Statistics
Psych 201-3 (3,0,0) Statistical Analysis in Psychology

at least 6 semester hours from the following courses:

*CMNS XXX-3 (3,0,0) Technical and Scientific Communication I
*CMNS YYY-3 (3,0,0) Technical and Scientific Communication II
Engl 05-3 (3,0,0) The Reading and Writing of Prose
Engl XXX-3 (3,0,0) any English course greater than 105

37 - 42 semester hours

61 - 66 lower division total

UPPER DIVISION REQUIRED COURSES:

Upper Division Core:

Required Upper Division core courses:

*Biol 312-3 (3,1,0) Developmental Biology (First offered Jan '96)
Biol 320-3 (3,0,0) Biochemistry
Biol 401-3 (3,1,0) Molecular Biology I
*Biol 416-3 (3,2,0) Evolution (First offered Jan '97)

12 semester hours

Plus an additional **28** semester hours of upper division biology courses selected from the following courses,
or equivalent SFU courses, as approved by the Department Chair:

Biol 301-4 (3,0,3) Invertebrate Anatomy & Physiology
Biol 303-4 (3,0,3) Plant Anatomy & Physiology I
Biol 304-4 (3,0,3) Plant Anatomy & Physiology II
Biol 305-4 (3,0,3) Vertebrate Anatomy & Physiology I
Biol 306-4 (3,0,3) Vertebrate Anatomy & Physiology II
Biol 402-3 (3,1,0) Molecular Biology II
*Biol 406-3 (3,1,0) Advanced Genetics (First offered Jan '96)
Biol 408-3 (0,2,4) Directed Studies I (Senior thesis)
*Biol 409-6 (0,2,4) Directed Studies II (Senior thesis)

12 semester hours

Plus an additional 5 semester hours of upper division courses.

5 semester hours

Total Upper Division required hours **45 semester hours**

TERM BY TERM STUDENT SCHEDULE

YEAR 1

FALL SEMESTER 1		WINTER SEMESTER 2	
Biol 111-4	Intro Bio I	Biol 112-4	Intro Biol II
Chem 111-4	General Chem I	Chem 112-4	General Chem II
Phys 105-4	Non-Calc Phys		
or			
Phys 111-4	Mechanics and	Phys 112-4	Elect & Magnetism
Math 111-4	Calculus I	Math 112-4	Calculus II
CMNS XXX-3		CMNS YYY-3	
or		or	
Engl 105-3	Intro to Prose	Engl XXX-3 > 105	
or combinations of both			
(19hrs)		(15-19 hrs)	

YEAR 2

FALL SEMESTER 3		WINTER SEMESTER 4	
Biol 201-4	Cell Biology I	Biol 202-4	Cell Biology II
Biol 210-4	Ecology	Biol 220-4	Genetics
Chem 211-4	Organic Chem I	Chem 212-4	Organic Chem II
Math 106-4	Statistics I	Electives 4 hour	
or			
Math 104-4	Intro Prob & Stats,		
or			
Psych 201			
(15 hrs)		(16 hrs)	

YEAR 3

FALL SEMESTER 5 (Sept 95)		WINTER SEM 6 (Jan 96)	
Biol 305-4	Vertebrate A&P I	Biol 306-4	Vert A&P II
Biol 320-3	Biochemistry	*Bio 312-3	Develop Biol
Other electives 6 hrs		Other electives 7 hrs	
(13 hrs)		(14 hrs)	

YEAR 4

FALL SEMESTER 7 (Sept 96)		WINTER SEM 8 (Jan 97)	
Biol 303-4	Plant A&P I	Biol 304-4	Plant A&P II
Biol 401-3	Molecular Biology I	Biol 402-3	Molecular Biol II
*Biol 406-3	Advanced Genetics	*Biol 416-3	Evolution
Other electives 4 hrs		Other electives 4 hrs	
(14 hrs)		(14 hrs)	

TOTAL OF 120 HOURS

9. RELATIONSHIP TO OTHER PROVINCIAL PROGRAMS:

Since this is a General Biology Degree it will not be unique to UCFV; students can obtain suchä a degree at all three B.C. universities. The same degree may be available at other university colleges also, but they tend to offer programs in a specialized area, e.g. aquatic biology, forestry, etc. It should be made clear that the General Biology Degree is not the first choice of the UCFV Biology Department. We would much rather offer a more unique degree in cell-molecular biology, and that is our long term plan.

10. TRANSFER ARRANGEMENTS AND CONSULTATION WITH OTHER INSTITUTIONS:

All of the lower division courses offered as part of the BSc program are transferable to all B.C. universities. Upper division courses may in some cases be transferred to a university. Students should consult with the university of their choice concerning possible transfer credit of UCFV upper division courses.

11. ARRANGEMENTS FOR INSTITUTIONAL EVALUATION:

The program will be reviewed at the end of the first year of implementation. If the program is implemented under the sponsorship of SFU then they would be involved in the evaluation. It would seem advisable to request SFU's involvement in the evaluation even if they are not sponsoring the program. Subsequent evaluation would be during the regular UCFV five year institutional evaluation.

12. OTHER PROGRAMS CANCELLED TO INITIATE THIS PROGRAM:

None. The current BSc double minors program should be retained. However, a biology minor less cumbersome than the current double minors program could be put together from this proposed majors program to satisfy the needs of students in programs that require a minor in biology.

13. SPONSORING INSTITUTION:

Simon Fraser University will be the sponsoring institution.

14. CHANGES TO THE DIPLOMA LEVEL PROGRAM:

This program will augment the current BSc double minors program and offer students a more popular option.

15. EFFECTS ON OTHER PROGRAMS AND ANTICIPATED DEMANDS FOR SERVICE FROM OTHER AREAS:

Since the General Biology Major requires students to take lower division communications or english, chemistry, math, and physics courses, it should have a favourable impact on enrolments in those courses. The only upper division non-biology option would be some upper division chemistry courses.

The Science 400 course is an elective in this program and may also benefit from increased enrolments.

Prepared by The Department of Biological Sciences, University College of the Fraser Valley, March, 1995, edited Jnuary, 1996.

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: BIOLOGY

IMPLEMENTATION DATE: January 1995

Biology 301	Anatomy and Physiology of Animals - I	4
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION:

The course deals with physiological and anatomical adaptations of select invertebrate animals with an emphasis on principles of functional morphology. Life histories, feeding and nutrition, respiration, excretion, reproduction and development will be studied. This course includes two field trips.

COURSE PREREQUISITES: Biology 111/112

COURSE COREQUISITES: none

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed Learning	hrs
	Laboratory	33 hrs	Other - specify:	
	Seminar	hrs		hrs
	Field Experience	12 hrs	TOTAL	90 HRS

UCFV CREDIT TRANSFER	☒	UCFV CREDIT NON-TRANSFER	☐	NON-CREDIT	☐

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC

SFU

UVIC

Other

Barbara Moon
COURSE DESIGNER

CHW Jones

K Wayne Welsh
WAYNE WELSH Ph.D.
DEAN OF SCIENCE AND TECHNOLOGY

Biology 301
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES:
none	Biology 305 and 306, Anatomy & Physiology of Vertebrates

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: *The Invertebrates*, Barnes, Calow and Olive (1993

Lab manual: *Comparative Invertebrates Zoology* (UBC Press)

OBJECTIVES:

To provide a basic understanding of the anatomy and physiology of the invertebrates. Students should gain an appreciation for invertebrate diversity and evolution as well as structure and function relationships within specific body plans.

METHODS:

Lecture, demonstration, small group practice, discussion, AV materials, use of models and charts, and lab exercises with at least two field trips.

STUDENT EVALUATION PROCEDURE:

Midterm lecture	20%
Midterm lab	10%
Final lecture	30%
Final lab	15%
Student project	15%
Physiology Lab Assignment	10%

Biology 301
NAME & NUMBER OF COURSE

COURSE CONTENT:

The course will deal with the functional anatomy, physiology and evolution of the following groups: Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes, Mollusca, Annelida, Arthropoda and Echinodermata. Relevant topics including basic body plan, feeding and digestion, reproduction and development, locomotion, respiration, hormones, and excretion will be discussed.

INSTRUCTOR: Barbara Moon

LAB INSTRUCTOR: TBA

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Biology 301
NAME & NUMBER OF COURSE

LABORATORY EXPERIMENTS:

1. ***Porifera*** and ***Cnidaria***; comparative anatomy and physiology
2. ***Platyhelminthes*** and Annelida; ***comparative anatomy and physiology***
3. ***Mollusca***; Annelida; ***comparative anatomy and physiology***
4. Weekend field trip to Friday harbour
5. ***Echinodermata*** and Chordata; comparative anatomy and physiology
6. ***Arthropoda***; ***comparative anatomy and physiology***
7. Physiology experiments designed by students
8. Physiology experiments designed by students
9. Physiology experiments designed by students

SUPPORTING LAB EQUIPMENT AVAILABLE:

Basic lab equipment; microscopes, microscope slide collection, preserved specimens and models, incubators, centrifuges, waterbaths, glassware, pH meters, oxygen electrodes, and salt water tanks are available.

SUPPORTING LAB EQUIPMENT TO BE PURCHASED:

Special order equipment to be determined.

LIBRARY RESOURCES:

BOOKS: *Invertebrate Zoology*, Ruppert and Barnes
The Invertebrates vol. I-VI, Hyman
The Principles of Insect Physiology, Wigglesworth
Limited collection on specific groups;
Protozoan, Insects, Echinoderms, Molluscs, Nematodes, Arthropoda

JOURNALS: Archives of Insect Biochemistry and Physiology
Journal of Experimental Biology
Journal of the Marime Biological Assn of UK
general physiology journals listed for Biology 302

INTERNET: WWW and e-mail searches by students in support of research projects

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: Biology DATE: Nov 1993

Biology 303	Physiology and Anatomy of Plants - I	4
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION: A study of the relationship of plant structure and function. Emphasis is placed on modern interpretations of anatomical adaptations for nutrient and energy acquisition and transport of assimilated material. Laboratory exercises are an integral part of the course.

COURSE PREREQUISITES: Biol 201/202 Cell biology
Biol 220 Genetics

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed Learning	hrs
	Laboratory	45 hrs	Other - specify:	
	Seminar	hrs		hrs
	Field Experience	hrs	TOTAL	90 HRS

UCFV CREDIT TRANSFER ☐ UCFV CREDIT NON-TRANSFER ☐ NON-CREDIT ☐

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits

SFU credits

UVIC units

Other

Edith Camm

Edith Camm, Ph.D. — COURSE DESIGNER

C.H.W. Jones

I.D. TUNSTALL Ph.D. — DEAN OF ACADEMIC STUDIES

OUTLN93/10/DD

Biology 303
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
Biology 304	Biology 304, Physiology and Anatomy of Plants

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: Plant Physiology 4th edition. Salisbury, F. and Ross, C. Wadsworth Publishing.

OBJECTIVES:

Students will look at the relationship of plant structures and plant function. We will deal with transformation of energy in the plant, the acquisition of resources, and their transfer within the plant.

METHODS:

Lecture, demonstration, discussion, audiovisual presentation, laboratory exercises and field trips.

STUDENT EVALUATION PROCEDURE:

Midterm	20%
Lab assignments	40%
Final Exam	40%

Biology 303
NAME & NUMBER OF COURSE

COURSE CONTENT

Biol 303: Sept-Dec (laboratory exercises in boldface)

PART I. INTRODUCTION: TOOLS FOR USE IN THE REST OF THE COURSE

1. Course objectives and organization. Climate change and plant physiology and development.
2. Tool Set 1: Energy balances and material transfer by plants.
   Set up for the Nutrient Deficiencies Exercise.
3. Tool Set 2: Energetics of phosphorylation and oxidation/reduction.

PART III. PLANT WATER RELATIONS

4. Expressions for the state of water in plants. Free energy and the components of water potential. diffusion, osmosis and determinants of water flow.
   Workshop: Designing a plant physiology experiment.
5. Diffusion, osmosis and determinants of water flow, continued. Root structure and absorption of water by roots. Leakiness of roots. Pathway of water flow through plants and the ascent of sap.
6. Stomatal function and regulation. Introduction to the concept of light-mediated responses, and to regulation by abscisic acid.
   Structure of plants: roots and leaves.
7. Evapotranspiration from vegetation; the photosynthesis/transpiration compromise. Water use efficiency.

PART II. ACQUISITION OF ENERGY AND CARBON

8. Photosynthetically active radiation and lighting requirements for plant growth. Interception of radiant energy by leaves; chloroplasts, pigments and constituents involved in chloroplast energy transduction.
   Quantum yield of sun and shade leaves measured with a leaf disc electrode. Anatomy of sun and shade leaves.
9. Mechanisms of chloroplasts energy transduction.
10. CO_2 absorption by leaves and plant response to atmospheric CO_2 concentration.
11. Pathways of CO_2 fixation. Photorespiration.
    Measurement of transpiration using a Vaisala humidity sensor. Size and frequency of stomata.
12. Implications of photosynthetic diversity for the management of plants in natural and managed ecosystems.

PART IV. INORGANIC NUTRIENT ACQUISITION

13. Plant responses to nutrient supply. Elements essential for plant growth and their physiological roles. Physiological responses to nutrient deficiency and excess. Diagnosis of nutritional problems.
    Uptake of potassium by barley roots followed by potassium-proton exchange.
14. Absorption of inorganic elements from the soil. Xylem transport of inorganic ions and other solutes.
    Analysis of nutrient deficiency experiment.
15. Solute transfer across membranes: (1) Membrane components and transport kinetics.
16. Solute transfer across membranes: (2) Transfer mechanisms and kinetics. Stomatal function re-examined in light of membrane function.
    Nitrate reductase measurement.
17. Nitrate reduction and the formation of amino acids. Biochemical incorporation of sulfur.
    Respiration of plant tissues using an oxygen electrode. ATP-generating and alternative pathways.
18. Biological nitrogen fixation. Nodule development and structure. 15

Biology 303
NAME & NUMBER OF COURSE

PART V. UTILIZATION OF ENERGY AND MATERIAL RESOURCES

19. Mechanisms of mitochondrial energy transduction. Respiratory pathways and their links to secondary metabolism.
Use of Carbon Dioxide Analyzer to compare C3 and C4 plants. Anatomical comparison.

PART VI. TRANSPORT OF ORGANIC COMPOUNDS

20. Phloem structure. Materials transported in the phloem. Source-sink relationships and rates of transport.
21. Mechanisms and regulation of phloem loading and transport.
22. Mechanisms and regulation of phloem unloading. Carbon partitioning and plant productivity.

LABORATORY EXPERIMENTS

1. **Nutrient deficiencies:** (1) Experimental Set up (Requires 5 weeks for growth; requires biweekly observations). Introduces students to diagnosis of nutrient deficiencies in bushbean.
2. **Designing an Experiment in Plant Physiology.** Students will design an experiment, after guided group discussion, to determine the role of water potential in seed germination. This exercise is deliberately technically simple to permit the students to focus on factors that go into designing an experiment. Includes material on seed structure.
3. **Plant structure-stems, roots, leaves.** We will use prepared slides and hang sections of fresh material to demonstrate aspects of anatomy stressed in the lectures on water uptake and transport, and later in the term, photosynthesis and phloem transport. Some of this material is examined during the exercise on quantum yield in sun and shade leaves.
4. **Quantum yield of sun and shade leaves needles of Douglas-fir, measured with a leaf disc electrode.** Anatomy of sun and shade leaves, hand sections and prepared slides.
5. **Chlorophyll fluorescence as a probe of plant function** sun and shade needles of Douglas-fir. The use of the same material as last week permits the student to compare two modern techniques.
6. **Measurement of transpiration rate.** Students examine the effect of environmental conditions upon transpiration in bean leaves (measured with a Vaisala humidity sensor) and look potassium uptake by stomata in epidermal peels.
7. **Potassium uptake.** An introduction to the chemiosmotic theory of ion uptake. Students will follow potassium exchange for protons in roots of barley plants using a pH electrode.
8. **Nutrient Deficiencies:** (II) Analysis.
9. **Induction of an enzyme of nitrogen metabolism.** Induction of nitrate reductase by nitrate in bean plants, measured with a colorimetric assay.
10. **Respiration of different plant tissues.** An oxygen electrode is used to compare rate of respiration in various plant tissues, with and without inhibitors.
11. **Determination of rates oh photosynthesis and CO_2 compensation point; C3 and C4 Plants.** Use an infrared gas analyzer to compare C3 and C4 plants; includes examination of hand sections and prepared slides.

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: Biology IMPLEMENTATION DATE: January 1994

Biology 304	Anatomy and Physiology of Plants II	4
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION:

This course looks at changes in anatomy and function during the plant life cycle. In lecture and laboratory, students will look at how plants perceive the environment. Students will follow how they respond anatomically and physiologically to environmental signals and stresses.

COURSE PREREQUISITES: Biology 303

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed Learning	hrs
	Laboratory	45 hrs	Other - specify:	
	Seminar	hrs		hrs
	Field Experience	hrs	TOTAL	90 HRS

UCFV CREDIT TRANSFER	☐	UCFV CREDIT NON-TRANSFER	☐	NON-CREDIT	☐

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC

SFU

UVIC

UNBC

OLA

Edith Camm

Edith Camm, Ph.D.
COURSE DESIGNER

C.H.W. Jones

J.D. TUNSTALL Ph.D.
DEAN OF ACADEMIC STUDIES

OUTLN93/12/DD

Biology 304
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
	Biology 303

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: *Microbiology*, Prescott, Harley & Klein

Lab handouts: available in the bookstore

OBJECTIVES:

The overall emphasis is to give the student a foundation in microbiology. Students should gain an appreciation of the unique biochemical pathways and complex genetic mechanisms found in the microbial world. In addition, the lab component will focus on modern techniques used in identifying bacteria.

METHODS:

Lecture, demonstrations, small group practice, discussions, audio-visual presentations, use of models and charts:

STUDENT EVALUATION PROCEDURE:

Midterm	25%
Lecture final	50%
Labs	25%

Students must pass both the lab and lecture portions of the course in order to receive a passing grade.

COURSE CONTENT:

Lecture #1: Introduction: Ch. 2, Specimen Identification

Lecture #2: Cell Structure, Ch. 3

Lecture #3: Cell Wall, Ch. 3
Lab #1: Basic Techniques

Lecture #4: Nutrition, Ch. 5

Lecture #5: Growth, Ch. 6
Lab #2: Staining Techniques

Lecture #6: Metabolism, Energy & Enzymes, Ch. 7

Biology 304
NAME & NUMBER OF COURSE

COURSE CONTENT: (cont'd)

Lecture #7: Metabolism; 6C, 5C, & TCA Cycles
Lab #2(continued): Staining Techniques

Lecture #8: Metabolism; Fermentation, Mixed Acids, Ch. 8

Lecture #9: Metabolsim; Biosynthesis
Lab #3: API & Virus Titer

Lecture #10: Catch Up and Review

MIDTERM I: Ch. 2,3,5,6,7,8,9
Lab #3 (cont'd) API & Virus Titer

Lecture #11: Nucleic Acids, Ch. 10

Lecture #12: Proteins, Ch. 10
Lab #4: Environmental Factors

Lecture #13: Enzyme Activity, Ch. 11

Lecture #14: Gene Structure, Ch. 12

Lecture #15: Mutations, Ch. 12

Lecture #16: Plasmids, Transposable Elements, Ch. 13
Lab #5: Biochemical Activities

Lecture #17: Conjugation, Transformation, Ch. 13

Lecture #18: Molecular Genetics, Ch. 14
Lab #6: Student Project

MIDTERM II: Ch. 10, 11, 12, 13, 14
Lab #6: Student Project (cont'd)

Lecture #19: Molecular Genetics, Ch. 14 (cont'd)

Lecture #20: Bacterial Control, Ch. 15, 16
Lab #6: Student Project (cont'd)

Lecture #21: General Viruses, Ch. 17

Lecture #22: Bacteriophage, Ch. 18
Lab #6: Student Project (cont'd)

Lecture #23: Eukaryotic Viruses, Ch. 19

Lecture #24: Catch Up and Review

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: Biology **DATE:** Fall 1994

NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT
Biology 305	Anatomy and Physiology of Vertebrates I	4

CATALOGUE DESCRIPTION:

Vertebrate organisms will be studied with emphasis on comparative anatomy and physiology. Lectures and laboratories will focus on physiological mechanisms and the relationship between structure and function. Organ systems covered in this course include integumentary, musculoskeletal, cardiovascular, respiratory, and nervous.

COURSE PREREQUISITES: Biology 201/202

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT				
Lecture	45 hrs		Student Directed Learning	hrs
Laboratory	45 hrs		Other - specify:	
Seminar	hrs		______________	hrs
Field Experience	hrs		TOTAL	90 HRS

UCFV CREDIT TRANSFER ☐ UCFV CREDIT NON-TRANSFER ☐ NON-CREDIT ☐

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC

SFU

UVIC

UNBC

OLA

David Harper, PhD
COURSE DESIGNER

Chris. Jones

J.D. TUNSTALL PhD
DEAN OF ACADEMIC STUDIES

Biology 305
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
Biology 306	Biology 306

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: *Animal Physiology:* Adaptation & Environment, Knut Schmidt-Nielsen
Lab Manual: An in-house manual has been developed
Journals: Journal of Experimental Biology (Primary)

OBJECTIVES: (with Bio 306)

To provide a basic understanding of the vertebrate organ systems. Students will gain an appreciation for the mechanisms of organismic function and their regulation. A comparative approach emphasizes evolutionary trends.

METHODS:

Lecture, demonstrations, small group practice, discussions, audio-visual presentations. Use of models and charts.

STUDENT EVALUATION PROCEDURE:

Lecture Midterm	30%
Lecture Final	30%
Laboratory	25%
Research Project*	15%

*written essay on a selected topic plus an oral presentation on the same topic

Biology 305
NAME & NUMBER OF COURSE

COURSE CONTENT:

TOPICS WILL INCLUDE:

Introduction
- overview of metabolism
- overview of organ systems

Integumentary System

Information and Integration (Neurophysiology)
- control and integration
- information and senses

Movement
- vertebrate muscle
- skeletons
- biomechanics

Cardiorespiratory Systems
- circulation
- blood
- respiration

Environmental Physiology
- temperature
- temperature regulation

LIBRARY RESOURCES:

Books:
The Life of Vertebrates, Young
Functional Anatomy of Vertebrates, Walker
An Atlas of Histology, Freeman & Bracegirdle
Animal Physiology, Ekert & Randall
The Vertebrate Body, Romer & Parsons
Human Physiology, Guyton
Human Physiology, Vander, Sherman & Luciano

Journals:
Journal of Experimental Biology
Journal of comparative Physiology
Annual Review of Physiology
Physiological Zoology
Environmental Physiology
Canadian Journal of Zoology
Nature
Science

Biology 305
NAME & NUMBER OF COURSE

Laboratory Experiments:

Anatomy
- Histology (2 labs)
- Field trip to Animal Health Centre
- Dogfish Dissection
- Turtle Dissection
- Cat Dissection (2 labs)
- Brain Dissection

Physiology
- Nerve-action potentials
- Muscle function
- Heart function
- Human Physiology

Oral Presentation

Supporting Laboratory Equipment:

Basic: Microscopes, slide collection, preserved specimens, models, incubators, centrifuges, water baths, glassare, pH meters, balances, oxygen electrodes, salt water tanks, animal care room

Special: Oscilloscopes, amplifiers, pre-amps, stimulators, force transducers, EKG & EEG apparatus, spirometers, and miscellaneous kits for physiology experiments

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

Revised: February 1995

DEPARTMENT: Biology DATE: Fall 1994

Biology 306	Anatomy and Physiology of Vertebrates II	4
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION:

A continuation of the comparative anatomy and physiology of the vertebrates. Organ systems covered in this course include endocrine, digestive, excretory, reproductive, and lymphatic/immune.

COURSE PREREQUISITES: Biology 305

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed Learning	hrs
	Laboratory	45 hrs		
	Seminar	hrs	Other - specify:	
	Field Experience	hrs	_____	hrs
			TOTAL	90 HRS

UCFV CREDIT TRANSFER ☐	UCFV CREDIT NON-TRANSFER ☐	NON-CREDIT ☐

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC

SFU

UVIC

UNBC

OLA

David Harper, PhD
COURSE DESIGNER

J.D. TUNSTALL PhD
DEAN OF ACADEMIC STUDIES

OUTLN93/12/DD

Biology 306
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
None	Biology 305

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: *Animal Physiology:* Adaptation & Environment, Knut Schmidt-Nielsen
Lab Manual: An in-house manual has been developed
Journals: Journal of Experimental Biology (Primary)

OBJECTIVES:

To provide a basic understanding of the vertebrate organ systems. Students will gain an appreciation for the mechanisms of organismic function and their regulation. A comparative approach emphasizes evolutionary trends.

METHODS:

Lecture, demonstrations, small group practice, discussions, audio-visual presentations. Use of models and charts.

STUDENT EVALUATION PROCEDURE:

Lecture Midterm	30%
Lecture Final	30%
Laboratory	25%
Research Project*	15%

*written essay on a selected topic plus an oral presentation on the same topic

Biology 306
NAME & NUMBER OF COURSE

COURSE CONTENT:

TOPICS WILL INCLUDE:

Endocrine system
- chemical messengers
- regulation of metabolism

Digestion
- mechanical/chemical digestion
- absorption and assimilation
- feeding
- nutrition

Excretory system
- water and osmotic regulation
- tubular secretion

Lymphatic system
- water/fatty acid transport
- immunity

Reproduction
- male and female reproductive systems
- oviparous vs. viviparous reproduction
- prenatal development
- menstrual cycles

LIBRARY RESOURCES:

Books:
The Life of Vertebrates, Young
Functional Anatomy of Vertebrates, Walker
An Atlas of Histology, Freeman & Bracegirdle
Animal Physiology, Ekert & Randall
The Vertebrate Body, Romer & Parsons
Human Physiology, Guyton
Human Physiology, Vander, Sherman & Luciano

Journals:
Journal of Experimental Biology
Journal of comparative Physiology
Annual Review of Physiology
Physiological Zoology
Environmental Physiology
Canadian Journal of Zoology
Nature
Science

Biology 306
NAME & NUMBER OF COURSE

Laboratory Experiments:

Metabolic rate in exercise
Metabolic rate and action of thyroid hormone
Enzyme activity
Kidney function and urinalysis
Adrenalectomy and mineral balance
Uterine smooth muscle
Fertilization and pregnancy
Fetal pig dissection
Embryonic development in the chick

Supporting Laboratory Equipment:

Basic: Microscopes, slide collection, preserved specimens, models, incubators, centrifuges, water baths, glassare, pH meters, balances, oxygen electrodes, salt water tanks, animal care room

Special: Oscilloscopes, amplifiers, pre-amps, stimulators, force transducers, EKG & EEG apparatus, spirometers, and miscellaneous kits for physiology experiments

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: BIOLOGY IMPLEMENTATION DATE: January 1996

Revised:

Biology 312	Developmental Biology	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION: Embryonic development is studied at various levels; organismal, cellular, molecular and genetic. Both classical and modern experimental approaches using several model species will be described.

RATIONALE: This course is part of the core for a Biology Major because an understanding of the development of organisms is a central theme in modern biology and biotechnology.

COURSE PREREQUISITES: Biol 201, Biol 202 and Biol 220

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45	hrs	Student Directed Learning		hrs
	Laboratory		hrs			
	Seminar		hrs	Other - specify:		
	Field Experience		hrs	Tutorial	15	hrs
				TOTAL	60	HRS

MAXIMUM ENROLMENT: 35

Is transfer credit requested? ☐ Yes ☒ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Ernest Kroeker, Ph.D. Chairperson: Curriculum Committee

Department Head: Ernest Kroeker, Ph.D. Dean: Wayne Welsh

PAC: Approval in Principle _____ (Date) PAC: Final Approval: Oct. 96 (Date)

OUTLN95/01/dd

Biology 312- Developmental Biology
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces N/A
(course #)

(b) cannot take N/A for further credit
(course #)

SUPPLIES/MATERIALS: NONE

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

Developmental Biology, 4th Ed. Scott F. Gilbert, 1994. Sinauer Associates, Inc.

OBJECTIVES:

After successful completion of this course the students should be able to:

1. explain how gametes are produced
2. describe fertilization at the cellular level
3. describe the physical changes involved in the development of plant and animal embryos into whole organisms
4. explain the process of differentiation based on differential gene expression
5. discuss the significance of cytoplasmic determinants, gradients, and cell-cell interactions on axial and cell specification and pattern formation

METHODS:

Lectures and weekly tutorials.

Biology 312- Developmental Biology
NAME & NUMBER OF COURSE

STUDENT EVALUATION PROCEDURE:

2 Midterm exams	30%
Research paper	20%
Final exam	50%

COURSE CONTENT

The following topics will be discussed:

- basic embryology
- Differential gene expression
- gametogenesis
- fertilization
- cleavage
- gastrulation, neurulation and organ formation
- cytoplasmic determinants
- axial specification and pattern formation in insects
- cell-cell interactions; induction

Special topics including limb formation, and metamorphosis may be included if time permits.

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: BIOLOGY IMPLEMENTATION DATE: Sept. 1995

Revised: Sept. 27/95

Biology 320	BIOCHEMISTRY	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION: This course deals with the structures, function and metabolic interactions of lipids, steroids, vitamins, nucleotides, nucleic acids and amino acids. DNA replication, transcription and protein synthesis as well as regulatory aspects of these processes will also be discussed.

RATIONALE: This course is required for entry into UBC's professional schools; medicine, dentistry, etc. We anticipate high student demand.

COURSE PREREQUISITES: Biology 201/202.

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45	hrs	Student Directed Learning	hrs
	Laboratory		hrs		
	Seminar		hrs	Other - specify:	
	Field Experience		hrs		
				TOTAL	45 HRS

MAXIMUM ENROLMENT: 35

Is transfer credit requested? ☐ Yes ☒ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Ernest Kroeker, Ph.D. Chairperson: Curriculum Committee

Department Head: Ernest Kroeker, Ph.D. Dean: Wayne Welsh

PAC: Approval in Principle _____ (Date) PAC: Final Approval: May 24, 1995 (Date)

Biology 320 - Biochemistry
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces N/A
(course #)

(b) cannot take N/A for further credit
(course #)

SUPPLIES/MATERIALS: NONE

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

Principles of Biochemistry, Zubay, Parson and Vance, 1995

OBJECTIVES:

This course is designed to give students a good basic understanding of the metabolism of lipids, amino acids, and nucleotides. Students will also gain an understanding of the role of vitamins and hormones in metabolic processes. Students should also be able to discuss certain aspects of the regulation of metabolic processes. In addition students should come away with a deeper understanding of biochemical transfer of information regarding replication and transcription of nucleic acids and protein synthesis as well as the regulation of these processes.

METHODS:

This is a lecture course.

STUDENT EVALUATION PROCEDURE:

Midterm exam 30%
Final exam 70%

Biology 320 - Biochemistry
NAME & NUMBER OF COURSE

COURSE CONTENT

Topics will include:

Fatty acids:
- structure and nomenclature
- biosynthesis, catabolism and regulation
- role of fatty acids as fuel
- essential vs. non-essential
- ketone bodies
- functional aspects of biotin

Membrane lipids - basic structure

Phospholipids - basic structure

Cholesterol
- biosynthesis
- formation of bile
- steroids

Digestion and transport of lipids

Lipids and heart disease in humans

Amino acids
- structures
- fate of amino acids in catabolism
- urea cycle
- biosynthesis of amino acids
- SAM cycle and tetrahydrofolate
- synthesis of amino acid derivatives

Nucleotides
- structures and biosynthesis

Vitamins
- structures and biosynthesis
- role of vitamins in metabolic processes

Biology 320 - Biochemistry
NAME & NUMBER OF COURSE

COURSE CONTENT CON'T

Integration of metabolism and hormone action
- storage of biochemical energy
- biosynthesis of hormones
- human diseases associated with the endocrine system

DNA replication

Transcription

Translation

DNA repair

Special topics in molecular genetics

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: BIOLOGY DATE: Fall 1992

Biology 401	Molecular Biology I	3
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION:

A study of advanced problems and concepts on topics such as cell organization, cell function and the control of cell division and growth. Students will be required to participate in class seminars designed to analyze the recent scientific literature on topics related to the molecular biology of cells.

COURSE PREREQUISITES: Biology 201 / 202 / 220
Chemistry 211 / 212

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed Learning		hrs
	Laboratory	hrs			
	Seminar	45 hrs	Other - specify:		
	Field Experience	hrs			hrs
			TOTAL	90	HRS

UCFV CREDIT TRANSFER [X] UCFV CREDIT NON-TRANSFER [ ] NON-CREDIT [ ]

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC

SFU

UVIC

Other

Terry V.B. Starr, Ph.D. — COURSE DESIGNER

J.D. TUNSTALL Ph.D. — DEAN OF ACADEMIC STUDIES

Biology 401
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
Biology 402 Molecular Biology of the Cell II	Biology 402 Molecular Biology of the Cell II

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: *Molecular Biology of the Cell*, Alberts, Bray, Lewis, Raff, Roberts and Watson

Supplemented with current research papers

OBJECTIVES:

The overall emphasis is to give the student a foundation in molecular biology while emphasizing the molecular organization of cells. In addition, students will be required to participate in a weekly seminar series. The critical analysis of current scientific literature related to cell molecular biology is a major theme of this course.

METHODS:

Lecture, Demonstration, Small group practice, Discussion, Audiovisual presentation, Use of models and charts.

STUDENT EVALUATION PROCEDURE:

Midterms	2 × 15%	30%
Lecture final		40%
Seminar final		30%

Biology 401
NAME & NUMBER OF COURSE

COURSE CONTENT

MOLECULAR BIOLOGY I

The course consists of 30 two hour lecture periods per semester. A weekly three hour period will be used for student seminars. These seminars will analyze key scientific papers pertaining to the molecular biology of cells.

Lecture topics include:

Structure and function of nucleic acids

- Recombinant DNA methods;
  - construction and screening of genomic and cDNA libraries
  - subcloning
  - PCR
  - sequencing
  - computer analysis of sequence information

Replication, recombination and repair

Regulation of gene expression in bacteria

Genome organization and regulation of gene expression in eukaryotes

Student Seminars

- weekly student seminar presentations
- analysis of seminar material

Laboratory Experiments

Not required for this course

Biology 401
NAME & NUMBER OF COURSE

LIBRARY RESOURCES:

Molecular Biology of the Gene	Watson et al 4th Ed.
Principles of Gene Manipulation	Old and Primrose
Introduction to Molecular Neurobiology	Zack Hall
Molecular Cell Biology	Darnell, Lodish and Baltimore
Immunology	Roitt, Brotsoff and Male
Annual Reviews of Biochemistry	
Annual Reviews of Genetics	
Annual Reviews of Cell Biology	
Science	
Nature	
PNAS	
Journal of Biological Chemistry	
Journal of Cellular Biochemistry	
Molecular and General Genetics	
Trends in Biotechnology	
Trends in Genetics	
Trends in Endocrinology and Metabolism	

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: BIOLOGY IMPLEMENTATION DATE: January 1995

Biology 402	Molecular Biology of the Cell II	3
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION:

A study of advanced problems and concepts on topics such as abnormal cell growth, the molecular basis of immunity, and the molecular biology of the nervous system. Students will be required to participate in class seminars designed to analyze the recent scientific literature on topics related to the molecular biology of cells.

COURSE PREREQUISITES: Biology 401: Molecular Biology of the Cell I

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed Learning		hrs
	Laboratory	hrs			
	Seminar	45 hrs	Other - specify:		
	Field Experience	hrs			hrs
			TOTAL	90	HRS

UCFV CREDIT TRANSFER [x] UCFV CREDIT NON-TRANSFER [ ] NON-CREDIT [ ]

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC

SFU

UVIC

Other

T. Starr

Terry V.B. Starr, Ph.D.
COURSE DESIGNER

C.A.W. Sones

J.D. TUNSTALL Ph.D.
DEAN OF ACADEMIC STUDIES

Biology 402
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
None	Biology 401: Molecular Biology of the Cell I

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: *Molecular Biology of the Cell*, Alberts, Bray, Lewis, Raff, Roberts and Watson

Supplemented with current research papers

OBJECTIVES:

This course is a continuation of Molecular Biology of the Cell I. The overall objective is to give the student a foundation in molecular biology while emphasizing the specialized topics of cancer, immunology and neurobiology. In addition, students will be required to participate in a weekly seminar series. The critical analysis of current scientific literature related to cell molecular biology is a major theme of this course.

METHODS:

Lecture, Demonstration, Small group practice, Discussion, Audiovisual presentation, Use of models and charts.

STUDENT EVALUATION PROCEDURE:

Midterms	2 × 15%	30%
Lecture final		40%
Seminar final		30%

Biology 402
NAME & NUMBER OF COURSE

COURSE CONTENT

MOLECULAR BIOLOGY I

The course consists of 30 two hour lecture periods per semester. A weekly three hour period will be used for student seminars. These seminars will analyze key scientific papers pertaining to the molecular biology of cells.

Part I Molecular Basis of Cancer

- control of cell proliferation
- genetic basis of cancer
- tumor viruses
- chromosome abnormalities and human cancer
- use of tissue culture cells

Part II Molecular Basis of Immunity

- cells of the immune system
- antibody structure and function
- generation of antibody diversity
- antibody - antigen reactions
- genetic control and regulation of immunity

Part III Molecular Biology of the Nervous System

- cells of the nervous system
- ion channels: structure and function
- synaptic transmission
- neuromuscular connections

Part IV Student Seminars

- weekly student seminar presentations
- analysis of seminar material

Laboratory Experiments

Not required for this course

Biology 402
NAME & NUMBER OF COURSE

LIBRARY RESOURCES:

Molecular Biology of the Gene	Watson et al 4th Ed.
Principles of Gene Manipulation	Old and Primrose
Introduction to Molecular Neurobiology	Zack Hall
Molecular Cell Biology	Darnell, Lodish and Baltimore
Immunology	Roitt, Brotsoff and Male
Annual Reviews of Biochemistry	
Annual Reviews of Genetics	
Annual Reviews of Neuroscience	
Annual Reviews of Immunology	
Annual Reviews of Cell Biology	
Journals	
Science	
Nature	
Neuron	
PNAS	
Journal of Biological Chemistry	
Journal of Neuroscience	
Journal of Cellular Biochemistry	
Journal of Immunology	
Immunology	
Cancer	
Cancer Research	
Trends in Biotechnology	
Trends in Genetics	
Trends in Neuroscience	
Trends in Endocrinology and Metabolism	

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: BIOLOGY IMPLEMENTATION DATE: Sept. 1995

Revised: Sept. 27/95

Biology 406	Advanced Genetics	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION: This course provides for a detailed discussion of the molecular basis and practical aspects of genetic recombination and mutation. The influence of genetic change through mutation and recombination on populations and quantitative traits will also be discussed.

RATIONALE: Understanding genetic recombination and mutation provides biologists with powerful analytical tools to address important questions. Advanced genetics is also an excellent course for students wishing to enhance analytical and problem-solving skills.

COURSE PREREQUISITES:Biol 220 and an Introductory Statistics course (Math 104, 106, 270 or Psych 201)

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45	hrs	Student Directed Learning		hrs
	Laboratory		hrs			
	Seminar		hrs	Other - specify:		
	Field Experience		hrs	tutorial		15hrs
				TOTAL	60	HRS

MAXIMUM ENROLMENT: 35

Is transfer credit requested? ☐ Yes ☒ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Ernest Kroeker. Ph.D. Chairperson: Arthur M. Kent
Curriculum Committee

Department Head: Ernest Kroeker. Ph.D. Dean: Wayne Welsh K Wayne Welsh

PAC: Approval in Principle _____ (Date) PAC: Final Approval: Oct. 96 (Date)

OUTLN95/01/dd

Biology 406 - Advanced Genetics
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces N/A
(course #)

(b) cannot take N/A for further credit
(course #)

SUPPLIES/MATERIALS: NONE

TEXTBOOKS. REFERENCES. MATERIALS (List reading resources elsewhere)

An Introduction to Genetic Analysis, 5th ed.
Griffiths, Miller, Suzuki, Lewontin, Gelbart

OBJECTIVES:

Upon successful completion of this course the students should be able to:

a. map genes on eukaryotic chromosomes given appropriate data.

b. describe mechanisms of chromosome mutation resulting in changes in structure and number of chromosomes.

c. describe mechanisms of genetic change based on mutation, recombination, and transposable elements.

d. explain concepts of heritability and genetic variability and identify the significance of these concepts.

e. estimate the number of genes affecting a trait

f. explain how populations change over time due to genetic variability and selection.

g. show a marked improvement in analytical and problem-solving skills.

METHODS:

A combination of lectures and small group tutorials emphasizing problem-solving.

Biology 406 - Advanced Genetics
NAME & NUMBER OF COURSE

STUDENT EVALUATION PROCEDURE:

Midterm exam	35%
Assigned problems	15%
Final exam	50%

COURSE CONTENT

Topics will include:

I. Special Eukaryotic Chromosome Mapping Techniques
   a. Application of mapping functions
   b. analysis of single meioses
   c. mitotic recombination
   d. mapping human chromosomes

II. Chromosome Mutations
   a. changes in chromosome structure
   b. changes in chromosome number

III. Mechanism of genetic change
   a. gene mutation
   b. recombination
   c. transposable elements

IV. Quantitative genetics
   a. heritability
   b. estimating number of genes affecting a trait
   c. analyzing sources of variance

V. Population genetics
   a. sources of variation
   b. sexual reproduction and variation
   c. selection
   d. balanced polymorphisms

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: BIOLOGY DATE: NOV. 17, 1994

Biology 408	Directed Studies in Biology	3
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION: Biology 408 is designed for third and fourth year students taking a Biology minor or major. Students will have an opportunity to apply scientific principles in a creative hands on research experience outside the usual course format. Students will develop their own individual projects in biology under the supervision of a faculty member with expertise in the field.

COURSE PREREQUISITES: Bio 202, Bio 210, Bio 220

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT				
	Lecture	hrs	Student Directed Learning	105 hrs
	Laboratory	hrs	Other - specify:	
	Seminar	hrs		hrs
	Field Experience	hrs	TOTAL	105 HRS

UCFV CREDIT TRANSFER ☐ UCFV CREDIT NON-TRANSFER ☒ NON-CREDIT ☐

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits

SFU credits

UVIC units

UNBC

OLA

Edith Camm
Edith Camm, Ph.D
COURSE DESIGNER

Chris Sowa

J.D. TUNSTALL Ph.D.
DEAN OF ACADEMIC STUDIES

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OUTLN93/10/DD

Biology 408
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
Nil	Biology 409

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS:
The student will have the opportunity to access original literature. Literature surveys will be conducted using database searches at UCFV, UBC and SFU libraries.

OBJECTIVES:
Students will have an opportunity to:
1. exercise creativity in science;
2. explore a specific area in depth;
3. practice the clear formulation of answerable questions;
4. express themselves clearly and professionally, both orally and written;
5. in some cases, make industrial contacts which might lead to employment.

METHODS:
Students will work closely with college supervisors and where appropriate, with industrial sponsors.

Lecture, Demonstration, Small group practice, Discussion, Audiovisual presentation, Use of models and charts.

STUDENT EVALUATION PROCEDURE:

All students will be required to deliver an interim report or presentation to the supervising instructor. The final report will be delivered to a committee consisting of the supervisor and a minimum of one other instructor, and the industrial partner if one exists. This committee will be responsible for assigning the final grade.

Biology 408
NAME & NUMBER OF COURSE

COURSE CONTENT

A student will be expected to spend no fewer hours on this project than on any other upper level 4 credit Biology course with a laboratory component (100 hrs.)

The student experience may be considered to consist of several stages;

Selection of a Suitable Area
The student may already have a specific area of research in mind or a specific instructor with whom he or she would like to interact. In this case, the student and instructor will strike an agreement depending on (i) available equipment and space, (ii) budget for consumables and (iii) availability of appropriate faculty and staff. Otherwise, an instructor may suggest a project to a suitable student. In all cases, it will be the instructor's responsibility to ensure that the proposed project is appropriate for an upper level student to accomplish in the proposed time. It is also the responsibility of the instructor to ensure that equipment, funding, and space are available for the project.

In some cases, students may benefit from expert advice and input in addition to that of the supervising instructor (for example, see Industrial Partners, below). However, it is always the responsibility of the instructor to ensure that the project conforms to UCFV academic standards.

Design of Research Project
The student will survey the literature in a particular field under the guidance of the appropriate instructor. The student will be assisted to build on the literature to formulate a testable hypothesis and design an appropriate experimental approach. The student will address questions such as: novelty of the approach, statistical analysis to be carried out, use of controls, use of replicates.

Because of the nature of biological science, not all projects will fit neatly into one semester. Student and instructor will have the option of extending the course into a second semester, although the credit value of the course will remain 3 credits.

Carry out Research
The instructor will aid the student in mastery of the techniques necessary to carry out the research. The student will be responsible for scheduling time for the various stages of the project, making sure equipment is available, reporting to the instructor and industrial sponsor where appropriate. Regular meetings of student and instructor are required for all projects.

Production of Research Paper
The student will be expected to produce a research paper that is clear and scholarly and written in the style of a major journal. The instructor will aid the student in producing a quality piece of science communication.

Biology 408
NAME & NUMBER OF COURSE

Course Content cont'd

Industrial Partners
An industrial partner may, if desired, be built into this project in one of several ways. In these cases, expenses and/or a salary may be underwritten by an industrial sponsor. The instructor remains the judge of the academic quality of the work.

1. The Biology 408 project may be accomplished through a part-time job. A student who expects to gain relevant science experience through a part-time job may wish to use the project as the basis for a Biology 408 report. A guidance/evaluation committee will be struck, consisting of the principal instructor and the industrial sponsor, plus at least one additional instructor. The student must have prior approval before registering in Bio 408.

2. The Biology 408 project may arise out of summer work or work undertaken in a semester that the student is away from the college. Such an arrangement must be set up in advance of the time away from UCFV. The student must obtain approval from a supervising instructor before a project undertaken in a semester away from campus can be considered for Bio 408. In this case, the student, instructor and employer must remain in contact for the duration of the project.

3. The expenses incurred in a Biology 408 project may be supported by an industrial sponsor. Such an arrangement may be fostered by the proposed Science Council of British Columbia Skills Partnership program.

In all cases, the report produced by the student remains the property of the University College of the Fraser. Valley.

LABORATORY EXPERIMENTS

Appropriate experiments will be determined by the supervising instructor and student. Cost and space considerations will be considered on an ad hoc basis.

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: BIOLOGY DATE: NOV. 17, 1994

Biology 409	Directed Studies in Biology	6
NAME & NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDIT

CATALOGUE DESCRIPTION: Biology 409 is designed for third and fourth year students taking a Biology minor or major. Students will have an opportunity to apply scientific principles in a creative hands on research experience outside the usual course format. Students will develop their own individual projects in biology under the supervision of a faculty member with expertise in the field.

COURSE PREREQUISITES: Bio 202, Bio 210, Bio 220

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT	Lecture	hrs	Student Directed Learning	105 hrs
	Laboratory	hrs		
	Seminar	hrs	Other - specify:	
	Field Experience	hrs		hrs
This course is a 2 semester course			TOTAL	105 HRS

UCFV CREDIT TRANSFER ☐ UCFV CREDIT NON-TRANSFER ☒ NON-CREDIT ☐

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits

SFU credits

UVIC units

UNBC

OLA

Edith Camm

Edith Camm, Ph.D
COURSE DESIGNER

J.D. TUNSTALL Ph.D.
DEAN OF ACADEMIC STUDIES

OUTLN93/10/DD

Biology 409
NAME & NUMBER OF COURSE

COURSES FOR WHICH THIS IS A PREREQUISITE:	RELATED COURSES
Nil	Biology 408

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS:
The student will have the opportunity to access original literature. Literature surveys will be conducted using database searches at UCFV, UBC and SFU libraries.

OBJECTIVES:
Students will have an opportunity to:
1. exercise creativity in science;
2. explore a specific area in depth;
3. practice the clear formulation of answerable questions;
4. express themselves clearly and professionally, both orally and written;
5. in some cases, make industrial contacts which might lead to employment.

METHODS:
Students will work closely with college supervisors and where appropriate, with industrial sponsors.

Lecture, Demonstration, Small group practice, Discussion, Audiovisual presentation, Use of models and charts.

STUDENT EVALUATION PROCEDURE:

All students will be required to deliver an interim report or presentation to the supervising instructor. The final report will be delivered to a committee consisting of the supervisor and a minimum of one other instructor, and the industrial partner if one exists. This committee will be responsible for assigning the final grade.

Biology 409
NAME & NUMBER OF COURSE

COURSE CONTENT

A student will be expected to spend no fewer hours on this project than on any other upper level 6 credit Biology course with a laboratory component (100 hrs/term.)

The student experience may be considered to consist of several stages;

Selection of a Suitable Area
The student may already have a specific area of research in mind or a specific instructor with whom he or she would like to interact. In this case, the student and instructor will strike an agreement depending on (i) available equipment and space, (ii) budget for consumables and (iii) availability of appropriate faculty and staff. Otherwise, an instructor may suggest a project to a suitable student. In all cases, it will be the instructor's responsibility to ensure that the proposed project is appropriate for an upper level student to accomplish in the proposed time. It is also the responsibility of the instructor to ensure that equipment, funding, and space are available for the project.

In some cases, students may benefit from expert advice and input in addition to that of the supervising instructor (for example, see Industrial Partners, below). However, it is always the responsibility of the instructor to ensure that the project conforms to UCFV academic standards.

Design of Research Project
The student will survey the literature in a particular field under the guidance of the appropriate instructor. The student will be assisted to build on the literature to formulate a testable hypothesis and design an appropriate experimental approach. The student will address questions such as: novelty of the approach, statistical analysis to be carried out, use of controls, use of replicates.

Because of the nature of biological science, not all projects will fit neatly into two semesters. Student and instructor will have the option of extending the course into a thirdd semester, although the credit value of the course will remain 6 credits.

Carry out Research
The instructor will aid the student in mastery of the techniques necessary to carry out the research. The student will be responsible for scheduling time for the various stages of the project, making sure equipment is available, reporting to the instructor and industrial sponsor where appropriate. Regular meetings of student and instructor are required for all projects.

Production of Research Paper
The student will be expected to produce a research paper that is clear and scholarly and written in the style of a major journal. The instructor will aid the student in producing a quality piece of science communication.

Biology 409
NAME & NUMBER OF COURSE

Course Content cont'd

Industrial Partners
An industrial partner may, if desired, be built into this project in one of several ways. In these cases, expenses and/or a salary may be underwritten by an industrial sponsor. The instructor remains the judge of the academic quality of the work.

1. The Biology 409 project may be accomplished through a part-time job. A student who expects to gain relevant science experience through a part-time job may wish to use the project as the basis for a Biology 409 report. A guidance/evaluation committee will be struck, consisting of the principal instructor and the industrial sponsor, plus at least one additional instructor. The student must have prior approval before registering in Bio 409.

2. The Biology 409 project may arise out of summer work or work undertaken in a semester that the student is away from the college. Such an arrangement must be set up in advance of the time away from UCFV. The student must obtain approval from a supervising instructor before a project undertaken in a semester away from campus can be considered for Bio 408. In this case, the student, instructor and employer must remain in contact for the duration of the project.

3. The expenses incurred in a Biology 409 project may be supported by an industrial sponsor. Such an arrangement may be fostered by the proposed Science Council of British Columbia Skills Partnership program.

In all cases, the report produced by the student remains the property of the University College of the Fraser. Valley.

LABORATORY EXPERIMENTS

Appropriate experiments will be determined by the supervising instructor and student. Cost and space considerations will be considered on an ad hoc basis.

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: BIOLOGY IMPLEMENTATION DATE: Jan. 1997

Revised:

Biology 416	Evolution	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION:
An investigation of the mechanisms and processes of the evolution of biological organisms. The history and development of evolutionary thought and contemporary issues are discussed.

RATIONALE:
Core in all biology degree programmes.
Part of UCFV biology core programme.

COURSE PREREQUISITES: Bio 210 and Bio 220 or permission of the instructor.

COURSE COREQUISITES: None

HOURS PER TERM FOR EACH STUDENT	Lecture	45	hrs	Student Directed Learning	15	hrs
	Laboratory		hrs	Other - specify:		
	Seminar	25	hrs			
	Field Experience		hrs			
				TOTAL	85	HRS

MAXIMUM ENROLMENT: 35

Is transfer credit requested? ☐ Yes ☒ No

AUTHORIZATION SIGNATURES:

Course Designer(s): David G. Harper

Department Head: Ernest Kroeker

Chairperson: Curriculum Committee

Dean: Wayne Welsh

PAC: Approval in Principle _____ (Date)

PAC: Final Approval: Oct. 96 (Date)

OUTLN95/01/dd

Evolution - Biology 416
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces N/A
(course #)

(b) cannot take N/A for further credit
(course #)

SUPPLIES/MATERIALS: NONE

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

Evolution, by Mark Ridley, Blackwell Scientific.
Assigned readings from library resources.

Additional Reading Resources:

Briggs	Palaeobiology: A Synthesis
Calow	Evolutionary Synthesis
Carroll	Vertebrate Palaeontology and Evolution
Cockburn	Introduction to Evolutionary Ecology
Dawkins	The Selfish Gene
	The Extended Phenotype
Futuyma	Evolutionary Biology
Gould	Wonderful Life
Nisbet	Living Earth
Stewart	Palaeobotany and Evolution of Plants
Stickberger	Evolution
Weiner	The Beak of The Finch
Wilson & Bossert	A Primer of Population Biology

OBJECTIVES:

To give the student an understanding of:

1. The history and development of evolutionary concepts and principles.
2. Gene expression in changing environments and population genetics.
3. Species concepts and speciation.
4. Contemporary issues in evolutionary biology.

Evolution - Biology 416
NAME & NUMBER OF COURSE

METHODS:

A combination of lectures, small groups/seminars, student presentations and written assignments.

STUDENT EVALUATION PROCEDURE:

Term Paper	25%
Oral Presentation	15%
Midterm Exam	25%
Final Exam	35%

COURSE CONTENT

Pre-Darwin: The Fossil Record
Darwin's Theories
Natural Selection
Mechanisms of Inheritance
Neo-Darwinism
Population Genetics
Species Concepts and Speciation
Phylogenetic Systematics
Contemporary Issues:
- Molecular Evolution
- Heterochrony and Development
- Senescence
- Coevolution
- Sexual Selection
- Game Theory
- Punctuated Equilibrium
- Sociobiology
- Human Evolution

SIMON FRASER UNIVERSITY
Memorandum

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

FROM: M. Plischke, Chair
Faculty of Science
Undergraduate
Curriculum Committee

SUBJECT: UCFV Upper Level Physics Courses

DATE: December 5, 1995

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The Faculty of Science Curriculum Committee at its meeting of December 5, 1995 approved the enclosed new courses proposed by the Physics Department at UCFV. I request that you bring these to the next Faculty of Science Meeting.

M. Plischke

MP:rh:Encl.

SIMON FRASER UNIVERSITY
Memorandum

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

FROM: M. Plischke, Chair
Faculty of Science
Undergraduate
Curriculum
Committee

SUBJECT: UCFV Upper Level Physics Courses **DATE:** January 12, 1996

The Physics Department Curriculum Committee and the Faculty of Science Curriculum Committee approved the proposed new UCFV upper level physics courses described in document SCAP 96-2. The reason for introducing these courses is to provide a richer selection of material for students in the Minor program in physics at that institution. It is not anticipated that each of these courses will be offered every year. Rather the Department plans to consult the students enrolled in the program and to select from this group those courses that are most in demand in a given semester. These additional courses should make the Minor program both more attractive and academically stronger.

While some of the new courses are not equivalent to any offered by our Physics Department, they are clearly appropriate for third and fourth year physics students and the Physics Curriculum Committee has tentatively assigned transfer credit to each should the unlikely circumstance of an advanced UCFV student wishing to enroll at SFU arise. These proposed transfer credits are listed below.

UCFV Course	SFU Credit
Physics 325	PHYS (3)
Physics 451	PHYS 415-3
Physics 462 + Physics 472	PHYS 430-5
Physics 484 + Physics 485	PHYS 484 + PHYS (3)

Michael Plischke
M. Plischke

MP:rh

APPROVED: Department of Physics Curriculum Committee November 28, 1995
Faculty of Science Undergraduate Curriculum Com. December 5, 1995
Faculty of Science Meeting December 11, 1995

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: PHYSICS IMPLEMENTATION DATE: September 1995

Revised: _____

PHYSICS 325	Fluid Mechanics	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION: Fluid mechanics is undergoing renaissance with the advent of personal computers. In this course we will examine the fundamental laws of fluid motion and use accompanying software to solve realistic problems.

RATIONALE: Student Demand

COURSE PREREQUISITES: Physics 231; Math 211, 212

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT	Lecture	60	hrs	Student Directed Learning		hrs
	Laboratory		hrs	Other - specify:		
	Seminar		hrs			hrs
	Field Experience		hrs	TOTAL	60	HRS

MAXIMUM ENROLMENT: 35

Is transfer credit requested? ☐ Yes ☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): R.W.M. Woodside, Ph.D

Chairperson: Art Last
Curriculum Committee

Department Head: Tim Cooper

Dean: Wayne Welsh, Ph.D

PAC: Approval in Principle _____ (Date)

PAC: Final Approval: 29 11 95 (Date)

OUTLN95/01/dd

Fluid Mechanics - Physics 325
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces _____
(course #)

(b) cannot take _____ for further credit
(course #)

SUPPLIES/MATERIALS:

N/A

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

Introduction to Fluid Mechanics, 4th ed; R.W. Fox, A.T. McDonald, Wiley (1994)
Fluid Mechanics, Vol.6 of course of Theoretical Physics, L. D. Landau, Pergamon (1959)
Mechanics of Deformable Bodies, Vol 2 of Lectures on Theoretical Physics, A. Sommerfeld, Academic (1929)

OBJECTIVES:

To introduce the student to Fluid Mechanics

METHODS:

This course will be taught using lectures, demonstrations and accompanying software. Problems will be assigned and marked on regular basis.

STUDENT EVALUATION PROCEDURE:

Assignments	25%
Midterm Examinations	30%
Final Examinations	45%

Fluid Mechanics - Physics 325
NAME & NUMBER OF COURSE

COURSE CONTENT

Week	Topic	Fox Chapter
1	Introduction	1
2	Fundamental Concepts	2
3-4	Statics	3
5-6	Integral Equations In Control Volumes	4
6-7	Differential Analysis of Fluid Flow	5
7-8	Incompressible, Inviscid Flow	6
9	Dimensional Analysis or Similitude	7
10	Internal Incompressible Viscous flow	8
11	Extremal incompressible Viscous Flow	9
12	Flow in Open Channels	10
13	Introduction to Compressible flow	12

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: PHYSICS IMPLEMENTATION DATE: JUNE 20/94

Revised:

PHYSICS 451	Advanced Quantum Mechanics	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION: This course is a continuation from Physic 381, the intermediate quantum mechanics. Course is mostly application of quantum mechanics. Topics include one electron atoms, perturbation theory, variational method, Time dependent perturbation theory, spin, multi-electron atoms.

RATIONALE:

COURSE PREREQUISITES: Physics 351

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT	Lecture	60	hrs	Student Directed Learning		hrs
	Laboratory		hrs	Other - specify:		
	Seminar		hrs			hrs
	Field Experience		hrs	TOTAL	60	HRS

MAXIMUM ENROLMENT:

Is transfer credit requested? ☐ Yes ☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Tim Cooper Chairperson: Art Last
Curriculum Committee

Department Head: Tim Cooper Dean: Wayne Welsh, Ph.D.

PAC: Approval in Principle (Date) PAC: Final Approval: Nov. 29/95 (Date)

OUTLN95/01/dd

Advanced Quantum Mechanics - Physics 451
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces _____
(course #)

(b) cannot take _____ for further credit
(course #)

SUPPLIES/MATERIALS:

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS:

Michael A. Morrison, Thomas L. Estle and Neal F. Lane.
Understanding More Quantum Physics. Prentice Hall.

REFERENCES:

Quantum Mechanics, A. Goswami. Wm. C. Brown.

OBJECTIVES:

To give the student a strong background in quantum mechanics as it applies to the real world. To show the use of approximate methods in physics.

METHODS:

Lecture, Demonstration, small group practice, Discussion, Audiovisual presentation, Use of models and charts.

STUDENT EVALUATION PROCEDURE:

Assignments	30%
Midterm	25%
Final	45%

Advanced Quantum Mechanics - Physics 451
NAME & NUMBER OF COURSE

COURSE CONTENT

1. Central Force Problem
2. One Electron Atoms
3. Approximate methods, perturbation theory, variational methods
4. Time dependent Perturbation theory
5. Spin, Pauli Spin Matrices
6. Spin and H-atom
7. Multi-electron atoms, introduction
8. Multi-electron atoms, continued
9. Two electron atoms, Hartree and Hartree Fock theories

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: PHYSICS IMPLEMENTATION DATE: MAY 1994

Revised: _____

PHYSICS 462	Digital Electronics and Comp. Interfacing	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION: Physics 462 is an introductory digital electronic course with emphasis on understanding how digital electronics is used in personal computers. Topics include:

- gates and Boolean algebra, Karnaugh maps, flip flops, registers, counters and memories
- digital components, microprocessor functions and architecture, instruction sets,
- addressing modes and programming the popular microprocessors.

Physics 472, the laboratory portion of this course must be taken concurrently. This course is designed to provide practical experience with the basic digital logic chips and how digital circuits can be interfaced with microprocessors.

RATIONALE:

COURSE PREREQUISITES:

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT					
	Lecture	60	hrs	Student Directed Learning	
	Laboratory		hrs		
			hrs		
	Seminar		hrs	Other - specify:	
	Field Experience		hrs	_____	hrs
				TOTAL 60	HRS

MAXIMUM ENROLMENT: _____

Is transfer credit requested? ☐ Yes ☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): George McGuire Chairperson: Art Last
Curriculum Committee

Department Head: Tim Cooper Dean: Wayne Welsh, Ph.D

PAC: Approval in Principle _____ (Date) PAC: Final Approval: Nov. 29/95 (Date)

OUTLN95/01/dd

Physics 462
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces _____
(course #)

(b) cannot take _____ for further credit
(course #)

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: Malvino/Brown, *Digital Computer Electronics*, 3rd Ed., McGraw Hill (1993)

REFERENCES:

1. Horowitz and Hill, *The Art of Electronics*, Cambridge, 1989
2. Simpson, R., *Introductory Electronics for Scientists and Engineers*, 2nd Ed., Simon & Schuster, 1987
3. Driscoll, F., *Analysis of Electric Circuits*, Prentice Hall, 1973
4. Fortney, L., *Principles of Electronics*, HBJ, 1987

OBJECTIVES:

This course is designed to provide students with:

1. the theory needed to understand the purpose and how digital devices function;
2. an understanding and an appreciation of how a digital computer functions;
3. the ability to design, construct and test simple digital logic circuits;
4. an ability to program the common microprocessors;
5. how information can be transferred to and from computers.

METHODS:

This course will be presented using lectures, demonstrations, experiments, and computer simulations. Computer simulations will be used to design and to check the digital logic circuits. The laboratory portion of the course will provide the actual experience and the practice needed to confirm the digital logic theory studied in the lecture portion of the course. This unique combination of classroom theory, computer simulation, and practical experience should provide the students with the necessary knowledge and experience to design circuits to perform specific tasks. Students after successfully completing this course will have a good understanding of basic digital electronics, microprocessors, computer architecture, computer interfacing, and computers can be used to model and test circuits.

STUDENT EVALUATION PROCEDURE:

Assignments	20%
Mid-term	20%
Computer Simulations	20%
Final	40%

66

Physics 462
NAME & NUMBER OF COURSE

COURSE CONTENT

PART 1: DIGITAL PRINCIPLES

Week 1: Number Systems and Codes

a. binary, octal, decimal, and hexadecimal numbers and operations
b. Microprocessors and ASCII code

Week 2/3: Gates

a. Inverters
b. OR AND Gates
c. Boolean Algebra
d NOR, NAND, Exclusive OR Gates
e. DeMorgan's First and Second Theorem
f. TTL circuits
g. 7400 devices

Week 4: Boolean Algebra and Karnaugh Maps

a. sum and Products
b. Karnaugh Maps
c. Pairs, Quads, Octets
d. CE amplifier
e. binary Mathematics
f. Adders

Week 5/6: Flips Flops, Registers, and Counters

a. RS and D Latches
b. Flip Flops
c. Registers (Buffers, Shift, Controlled)
d. Counters (Ripple, Synchronous, Ring, etc.)
e. Bus-organized computers
f. Memories
a. ROMs, PROMs, EPROMs, RAMs

PART 2

Week 7: Computers

a. architecture
b. instruction sets
c. fetch and execution cycle
d. instructions (memory reference, registers, jump, call, logic)

Week 8: Programming

a. models
b. arithmetic instructions
c. increments, decrements, and rotates
d. logic instructions
e. jump and indirect instructions
f. extended register instructions

Physics 462
NAME & NUMBER OF COURSE

PART 3

Week 9: Introduction to the Microprocessor
- a. computer hardware
- b. common uses of a microprocessor
- c. access to microprocessors

Week 10: Languages
- a. digital electronics and programming
- b. flowcharts
- c. assembly language

Week 11/12: System Overview
- a. computer architecture
- b. microprocessor families
- c. data transfer and CPU instructions
- d. data transfer and specific microprocessors
- e. addressing modes
- f. flags and their instructions
- g. logical instructions
- h. shift and rotate instructions
- i. addressing modes

Week 13/14: Branching and Looping
- a. conditional and unconditional branching
- b. compare and test
- c. increment and decrement
- d. loops
- e. stacks and pointers
- f. pushing and popping registers

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: PHYSICS IMPLEMENTATION DATE: MAY 1994

Revised: _____

PHYSICS 472	Laboratory: Digital Electronics	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION: Physics 472 is the laboratory portion of the digital electronics course, Physics 462. The experiments done in this course are designed to provide the students with the practical experience using, testing, and designing digital logic circuits. The experiments are closely related to the material covered in the classroom. The unifying philosophy of this course is to show how digital logic circuits can be interfaced with many of the common microprocessors.

RATIONALE:

COURSE PREREQUISITES:

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT	Lecture		hrs	Student Directed Learning	
	Laboratory	60	hrs		
			hrs		
	Seminar		hrs	Other - specify:	
	Field Experience		hrs	_____	hrs
				TOTAL 60	HRS

MAXIMUM ENROLMENT: _____

Is transfer credit requested? ☐ Yes ☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): George McGuire

Chairperson: Art Last
Curriculum Committee

Department Head: Tim Cooper

Dean: Wayne Welsh, Ph. D

PAC: Approval in Principle _____ (Date)

PAC: Final Approval: Nov. 24/95 (Date)

Physics 472
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces _____
(course #)

(b) cannot take _____ for further credit
(course #)

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

TEXTS: Miller, *Experiments for Digital Computer Electronics*, 3rd Ed., McGraw Hill (1993)

REFERENCES:

1. Horowitz and Hill, *The Art of Electronics*, Cambridge, 1989
2. Simpson, R., *Introductory Electronics for Scientists and Engineers*, 2nd Ed., Simon & Shuster, 1987
3. Driscoll, F., *Analysis of Electric Circuits*, Prentice Hall, 1973
4. Fortney, L., *Principles of Electronics*, HBJ, 1987

OBJECTIVES:

The experiments in this course are designed to provide students with:
1. the practical experience in using the basic digital gates;
2. digital design experience and how these circuits perform binary mathematics;
3. practical experience in using IC chips
4. the ability interface digital circuits with common microprocessors.

METHODS:

The experiments used in this course will be closely tied to the material covered in the lectures and to the assigned computer simulations. The laboratory is meant to be an integral part of the classroom portion of the course--it should not to be thought of as a separate part of the course. The experiments are needed to provide the practical experience with the logic circuits studied in the classroom. The unique combination of classroom theory, computer simulation, and practical experience should provide the students with the necessary knowledge and the experience to design and test digital electronic circuits. Experiments on computer interfacing will be assigned. Students after successfully completing this course will have a good understanding of digital electronics, microprocessors, computer architecture, and computer interfacing.

Physics 472
NAME & NUMBER OF COURSE

STUDENT EVALUATION PROCEDURE:

Experiments	25%
Project	25%
Computer Simulations	15%
Final Exam (Physics 362)	35%

COURSE CONTENT

EXPERIMENTS

Period 1. Experiment 2 and Experiment 3: Inverter, logic gates, and basic gates

Period 2. Experiment 4: Decoders and Multiplexers

Period 3. Experiment 5, Experiment 6: Adders and Complex Adders

Period 4. Experiment 7: Flip Flops

Period 5. Experiment 8 and Experiment 9: Four Bit register and Counters

Period 6. Experiment 11: A/D and D/A Converters

Period 7. Experiment 12 and Experiment 13: A/D and D/A computer interfaces

Period 8. Experiment 14 and Experiment 15: Random Access Memory

Period 9. Experiment 16 and Experiment 17: Program counters and Output Register

Period 10. Experiment 18 and Experiment 19: Ring Counter

Period 12. Experiment 22, and Experiment 23: ALU, Accumulator

Period 13. Experiment 24 and Experiment 25: Memory

Period 14. Experiment 25: System Interconnections

Period 15. Experiment 26; Assembler programming the 8080 microprocessor

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: PHYSICS IMPLEMENTATION DATE: Oct. 1994

Revised: _____

PHYSICS 484	Nonlinear Physics	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION:
The study of nonlinear physics is important and useful because its models are used in so many disciplines, disciplines as diverse as business and ecology. This course is designed to integrate the computer's ability to perform; symbolic computations, simulations, equation solving and plotting, and model testing with the classroom theory along with the related laboratory experiments of Physics 485. The text will include a large number of computer Files which can be used to model test, and simulate the text's examples. Topics include: nonlinear mechanics, interesting nonlinear systems, methods of solving nonlinear equations, topological analysis, limit cycles, analytical methods, forced oscillations of nonlinear systems, partial nonlinear differential equations, numerical techniques, etc. Access to a home, IBM compatible computer, will assist the student in doing the problems and in understanding the text's examples.
RATIONALE:

COURSE PREREQUISITES: Physics 221, Physics 381
COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT				Student Directed Learning		
	Lecture	45	hrs		15	hrs
	Laboratory		hrs	Other - specify:		
	Seminar		hrs	_____		hrs
	Field Experience		hrs	TOTAL	60	HRS

MAXIMUM ENROLMENT: _____

Is transfer credit requested? ☐ Yes ☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): _____ Chairperson: Art Last
Curriculum Committee

Department Head: Tim Cooper Dean: Wayne Welsh, Ph.D

PAC: Approval in Principle _____ PAC: Final Approval: _____
(Date) (Date)

Physics 484
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces _____
(course #)

(b) cannot take _____ for further credit
(course #)

SUPPLIES/MATERIALS:

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)
Enns, McGuire, Tangnekar, *Nonlinear Physics with Maple*, 1st Ed., TBA (1995)

References:

1. Jackson, E.A., *Perspectives of Nonlinear Dynamics*, Vol. 1 and Vol. 2, Cambridge University Press, 198[illegible] 1991
2. Moon, FC, *Chaotic and Fractal Dynamics, An Introduction for Applied Scientists and Engineers*, Wiley, 1992
3. Hilborn, R.C., *Chaos and Nonlinear Dynamics*, Oxford University Press. 1994

OBJECTIVES:
This course is designed to provide students with:

1. an appreciation of the importance of nonlinear phenomena in the everyday world;
2. symbolic computational skills that are needed for employment in a highly technical society;
3. useful problem solving and critical thinking skills;
4. the skills needed to tackle problems in a variety of non-scientific disciplines;
5. an understanding of the capabilities and limitations of symbolic computational software;
6. a skill which makes them employable.

METHODS:
This course will be presented using lectures, demonstrations, experiments, and computer simulations. Heavy reliance will be made of the computer to simulate, mode, animate, and test the text's and the experiment's nonlinear models. The students will be introduced to models not only from the physical sciences (biology, chemistry and physics) but from the humanities, medical, and business.

PHYSICS 484
NAME & NUMBER OF COURSE

STUDENT EVALUATION PROCEDURE:

Assignments	20%
Mid-term	20%
Computer Simulations	20%
Final	40%

COURSE CONTENT:

Week 1/2: Interesting Nonlinear Systems
- a. nonlinear mechanics (simple pendulum, eardrum, nonlinear damping, lattice dynamics)
- b. competition phenomena (Volterra equations, fox rabies in Europe, laser beam competition)
- c. nonlinear electrical phenomena
- d. chemical oscillators
- e. solitons
- f. chaos

Week 3/4: Methods of Solutions
- a. exactly solvable equations (i.e. Bernoulli, Riccati, elliptical integrals)
- b. variation of parameters

Week 5/6: Topological Analysis and Graphical Solutions
- a. types of singular points
- b. graphical methods of solution

Week 7: Limit Cycles
- a. oregonator model
- b. first theorem of Bendixon
- c. Poincare-Bendixon Theorem
- d. Prigogine-Lefever Model

Week 8: Analysis Methods
- a. Perturbation method (Poisson's & Linstedt's)
- b. Krylov-Bogoliubov Method
- c. Ritz method
- d. Galerkin method

Week 9: Forced Nonlinear Oscillators
- a. iterative solution of Duffing's equation
- b. nonlinear response curve
- c. nonlinear damping
- d. jump phenomena and hysteresis
- e. subharmonic response

Physics 484
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Course Content (cont)

Week 10: Partial Nonlinear Differential Equations
- a. Burger's Equation-Hopf-Cole transformation
- b. elementary soliton calculations

Week 11: Inverse Scattering Transformation Method
- a. Lax's formulation
- b. one and two soliton formulas
- c. general input shapes
- d. Zakharov-Shabat/AKNS Approach

Week 12: Numerical Techniques
- a. finite difference approximations
- b. Special Methods
  Euler, Modified Euler, Runge-Kutta, explicit method of solving PDE's

Week 13: Summary
- a. review
- b. summary of uses and importance of nonlinear physics
- c. conclusion

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DISCIPLINE/DEPARTMENT: PHYSICS IMPLEMENTATION DATE: October 1994

Revised: _____

PHYSICS 485	Nonlinear Physics Laboratory	3
SUBJECT/NUMBER OF COURSE	DESCRIPTIVE TITLE	UCFV CREDITS

CALENDAR DESCRIPTION:
The study of nonlinear physics is important and useful because its models are used in so many disciplines, disciplines as diverse as business and ecology. This course is designed to integrate the computer's ability to perform: symbolic computations, simulations, equation solving and plotting, and model testing with the classroom theory along with the related theory covered in Physics 484. The text will include a large number of computer files which can be used to model, test, and simulate the text's examples. Topics include: nonlinear mechanics, interesting nonlinear systems, methods of solving nonlinear equations, topological analysis, limit cycles, analytical methods, forced oscillations of nonlinear systems, partial nonlinear differential equations, numerical techniques, etc. Access to a home, IBM compatible computer, will assist the student in doing the problems and in understanding the text's examples.

RATIONALE:
COURSE PREREQUISITES: Physics 221, Physics 381
COURSE COREQUISITES: Physics 484

HOURS PER TERM FOR EACH STUDENT				Student Directed		
	Lecture		hrs			
	Laboratory	45	hrs	Learning	15	hrs
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	Field Experience		hrs	_____		hrs
				TOTAL	60	HRS

MAXIMUM ENROLMENT: _____

Is transfer credit requested? ☐ Yes ☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): _____ Chairperson: Art Last
Curriculum Committee

Department Head: Tim Cooper C.H.W. Jones. Dean: Wayne Welsh, Ph.D Kewayne Welsh

PAC: Approval in Principle _____ (Date) PAC: Final Approval: Nov. 29/95 (Date)

Physics 485
NAME & NUMBER OF COURSE

SYNONYMOUS COURSES:

(a) replaces _____
(course #)

(b) cannot take _____ for further credit
(course #)

SUPPLIES/MATERIALS:

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)

Enns, McGuire, Rangnekar, *Nonlinear Physics with Maple*, 1st Ed., TBA (1995)

References:

1. Jackson, E.A. *Perspectives of Nonlinear Dynamics*, Vol 1 and Vol. 2, Cambridge University Press, 1989, 1991
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Physics 485
NAME & NUMBER OF COURSE

STUDENT EVALUATION PROCEDURE:

Experiments	20%
Mid-term	20%
Computer Simulations	20%
Final	40%

COURSE CONTENT

Experiments

1. Nonlinear air drag
2. Nonlinear Inductance
3. Diodes tunnel
4. Diode varactors
5. Chemical waves
6. Liquid solitons
7. Duffing
8. Forced Duffing
9. Sine-Gordon model
10. Nonlinear simple pendulum
11. Relaxation oscillations
12. Forced oscillations in time varying magnetic field
13. Nonlinear oscillations in quadrapole field