S.87-61

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: Senate

FROM: J.W.G. Ivany
Chair, SCAP

SUBJECT: Faculty of Science
Department of Biological Sciences
Reference: SCUS 87-31, SCAP 87-25

DATE: Nov. 19, 1987

Action undertaken by the Senate Committee on Academic Planning/Senate Committee on Undergraduate Studies gives rise to the following motion:

MOTION: "that Senate approve and recommend approval to the Board of Governors, as set forth in S.87-61

New courses:

BISC 272-3	Special Topics in Biology
BISC 372-3	Special Topics in Biology
BISC 307-3	Biosystematics of Flowering Plants
BISC 406-3	Marine Invertebrate Ecology
BISC 411-3	Introduction to Plant Tissue Culture and Micropropagation
BISC 412-3	Introduction to Virology
BISC 426-3	Biology of Seaweeds
BISC 453-3	Advanced Developmental Biology
BISC 457-3	Plant Biochemistry and Molecular Biology

Deletion of:

BISC 346-3	Biosystematics
BISC 418-3	Advanced Invertebrate Biology
BISC 439-3	Experimental Techniques II: Ecological Methods."

DETAILED PROPOSALS & RATIONALE

FOR TWO NEW SPECIAL TOPIC COURSES

BISC 272-3 Special Topics in Biology
BISC 372-3 Special Topics in Biology

These courses are proposed to provide Biological Sciences with greater flexibility in offering subject matter of contemporary interest, in exploiting visiting faculty, and in testing new courses. Presently, we can present such material at the OOX and 472 levels only. These levels are often inappropriate for the material to be presented.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

002

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 272 Credit Hours: 3 Vector: _____

Title of Course: SPECIAL TOPICS IN BIOLOGY

Calendar Description of Course:

Selected topics in areas not currentlyoffered within the undergraduate course offerings in the Department of Biological Sciences.

Nature of Course

Prerequisites (or special instructions):

Permission of Department

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

2. Scheduling

How frequently will the course be offered? As required

Semester in which the course will first be offered?

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

3. Objectives of the Course

To allow for the presentation of subject matter of contemporary interest or from visiting specialist at a level less stringent than required For BISC 372 or 472.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty NONE

Staff NONE

Library NONE

Audio Visual NONE

Space NONE

Equipment NONE

5. Approval

Date: 87/05/05 OCT 16 1987

Department Chairman | Dean | Chairman, SCUS

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

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

003

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 372 Credit Hours: 3 Vector: _____

Title of Course: SPECIAL TOPICS IN BIOLOGY

Calendar Description of Course:

Selected topics in areas not currently offered within the undergraduate course offering in the Department of Biological Sciences.

Nature of Course

Prerequisites (or special instructions):

Permission of Department

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

NONE

2. Scheduling

How frequently will the course be offered? As required

Semester in which the course will first be offered?

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

3. Objectives of the Course

To allow for the presentation of subject matter of contemporary interest or from visiting specialist at a level less stringest than required for BISC 472.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty NONE

Staff NONE

Library NONE

Audio Visual NONE

Space NONE

Equipment NONE

5. Approval

Date: 87/05/05 OCT 06 1987

Department Chairman — Dean — Chairman, SCUS

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

DETAILED PROPOSALS & RATIONALE

FOR THREE NEW COURSES INTENDED TO REPLACE THREE EXISTING COURSES

BISC 307-3 (3-0-3) Biosystematics of Flowering Plants. (Replaces BISC 346-3 Biosystematics).

BISC 406-3 (2-0-4) Marine Invertebrate Ecology (Replaces BISC 418-3 (2-0-4) Advanced Invertebrate Biology).

BISC 457-3 (3-0-0) Plant Biochemistry and Molecular Biology. (Replaces, in part BISC 447-3 (2-0-4) Control and Regulation in Plants).

These three requested curriculum additions, along with the three coincident curriculum deletions, reflect an upgrading of the subject matter to correspond to present day faculty and student interests. Details of these three courses are attached.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

005

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 307 Credit Hours: 3 Vector: 3-0-3

Title of Course: BIOSYSTEMATICS OF FLOWERING PLANTS

Calendar Description of Course:

Introduction to: - the kinds of variance, theoretical principles, and concepts fundamental to flowering plant taxonomic studies; taxonomic research pertinent in the plant sciences (e.g. in ecology, physiology, genetics); practical techniques relevant to taxonomic work including preparation, documentation, and interpretation of taxonomic data; higher levels of classification and systematics.

Nature of Course Lectures, lab and short field trips

Prerequisites (or special instructions):

Third year level except by arrangement with department.

What course (courses), if any, is being dropped from the calendar if this course is approved: BISC 346. This course has been taught once as a special topics course, BISC 471.

2. Scheduling

How frequently will the course be offered? Once a year.

Semester in which the course will first be offered? 1988-1 (currently as Special Topics)

Which of your present faculty would be available to make the proposed offering possible? Fisher, Brooke, Mathewes.

3. Objectives of the Course

To delineate, define and explain taxonomic principles and concepts; to provide the knowledge necessary to identify and communicate about plant taxa including skills needed for preparing inventories of flora using appropriate references; to evaluate classifications and explain their evolutionary implications and utilization; to teach contemporary methods for collecting morphological, physiological, cytogenetic and ecological data used in taxonomy and their documentation.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty None

Staff Laboratory Technician

Library None

Audio Visual None

Space Three hour lab

Equipment Computer time for taximetric and cladistic analysis class.

5. Approval

Date: 87/05/05 OCT 06 1987

Department Chairman Dean Chairman, SCUS

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

BIOSYSTEMATICS OF FLOWERING PLANTS

INTRODUCTION

A fundamental shift in outlook has occurred in taxonomy during the past half century. Most practitioners of applied plant sciences repeatedly need to identify species of plants, but pitfalls and embarassments often arise from a taxonomic foundation that is simplistic and pre-Darwinian in perspective. As a result, differences in variation patterns and breeding systems are frequently overlooked; consistency is unfortunately expected in the characteristics of a species. The effects of such misinterpretations are not only scientific but have had serious economic consequences especially in relation to such issues as productivity and disease resistance.

The ideas of Natural Selection imply that adaptive changes emerging from variation must be expected everywhere. The naive observer might assume, for example, that the adaptive requirements for cultivation of two samples of the same species must be identical because they look so similar. Knowledge of natural selection should ensure that the possibility of hidden physiological differences be kept in mind. Natural selection implies too that reservations be automatically made about the causes of phenotypic differences between samples. When no information is available about growing conditions, about potential developmental plasticity or about the genetic background of the material under study, such assumptions are carefully avoided.

Taxonomy today is, accordingly, based not only on the direct comparative morphology and anatomy of individuals, but upon whole populations of plants, upon their embryology and development, their physiology and biochemical differences, and their cyto-genetics and ecology in the widest sense. Populations making up species are not seen as fixed entities but as dynamically changing complexes endlessly adjusting themselves physiologically to the conditions of their surroundings. Who, then would expect consistency?

Because taxonomy is based upon systematic principles of relationship, the central key to learning identification lies in an understanding of such organizational foundations. The all too popular view of taxonomy as a dry descriptive subject is therefore as completely unscientific and dated as would be a view of contemporary ecology as consisting merely of field studies without experimental or theoretical foundation. Taxonomy today, is likewise fully vindicated as an experimental discipline with a rich theoretical underpinning that must provide, moreover, the solid scientific understanding of living material on which all other biological disciplines depend whenever a name is utilised.

BIOSYSTEMATICS OF FLOWERING PLANTS

COURSE OUTLINE

General learning objectives:

a. To delineate, define and understand taxonomic principles and concepts.
b. To identify and communicate about plant taxa with the knowledge necessary to prepare an inventory of local indigenous, adventive, and cultivated flora using appropriate references.
c. To understand and utilise classification systems and their evolutionary implications (based on familiarity with 40 major families).
d. To use appropriate contemporary methods for collecting the relevant morphological, physiological, cyto-genetic, and ecological data (or other information) for a given taxonomic question.

Schedule of Topics:

1. Introduction to kinds of evidence, theoretical principles and concepts fundamental to higher plant taxonomic studies, and to taxonomic research directly pertinent to plant science investigations of other kinds (e.g. ecology, physiology, genetics, etc.) (3 weeks).

   - historical development of contemporary systematics and taxonomy.
   - basic processes of evolution, variation, and speciation.
   - principles of plant geography and ecology basic to taxonomy.
   - understanding concepts of taxonomic character and evidence.
   - the roles of embryology, developmental morphology, anatomy, cytology and biochemistry.
   - significance of environmentally induced phenotypic variation.

2. Practical techniques relevant to taxonomic work (3 weeks).

   - field (specimen collection, annotation, preservation and storage).
   - recognizing anomalous variation in the field (e.g. hybridisation, clines and polyploidy).
   - experimental garden (uniform growth conditions, ecophysiological parameters, breeding systems, growth chambers).
   - laboratory (microscopy, biochemical methods, measurement).
   - statistical procedures of taxonomy, taximetrics and cladistics.

3. Interpretation and documentation of botanical material (4 weeks)

   - International rules of Botanical Nomenclature
   - taxonomic identification and citation in documents
   - methods of data presentation & documentation
   - naming plants and how names are changed

- using bibliographies and indexes.
- identifying natural or cultivated plants.
- indigenous and cultivated members of 40 major families.
- finding maximum regional diversity.
- preparing simple floras.

4. Higher levels of classification and systematics (2 weeks)

- the rules of sound phylogeny.
- critical assessment of classification systems.
- using literature of plant systematics.
- keys, field guides, floras and catalogues.
- locations and regulations of systematic facilities.

STRUCTURE

Three lectures weekly, and three-hour lab.
Weekly assignment problems (two questions each week).
Day trips and field-weekend.
Midterm, practical, and final exams.
Term paper on biosystematic topic or project with problem solving basis.

TEXT

PLANT SYSTEMATICS. Jones & Luchsinger McGraw-Hill 1979

Preliminary additional text references:

Taxonomy and Systematics:
Vascular Plant Systematics. Radford et al., Harper & Row.
Families of Flowering plants. Hutchinson, Clarendon.
Plant Taxonomy, Methods & Principles. Benson, Ronald.
Principles of Angiosperm Taxonomy Davis & Heywood, Van Nostrand.
Botanical Nomenclature. Jeffrey, Arnold.
Taxonomy of Vascular Plants. Lawrence, Macmillan.

Taximetrics and Cladistics:
Phylogenetic Systematics. Hennig, U. Illinois.
Numerical Taxonomy. Sneath & Sokal, Freeman.

Chemotaxonomy:
Chemistry in Evolution & Systematics. Swain, Butterworth.
Chemistry in Botanical Classification. Bendz & Santesson, Academic Press.

Experimental Taxonomy and Evolution:
Variation & Evolution in Plants. Stebbins. Columbia.
Evolution. Dobzhansky, Ayala, Stebbins & Valentine, Freeman.
Stages in the Development of Plant Species. Clausen, Cornell.
New Concepts in Flowering Plant Taxonomy. Heslop-Harrison, Metnuen.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

010

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 406 Credit Hours: 3 Vector: 2-0-4

Title of Course: MARINE INVERTEBRATE ECOLOGY

Calendar Description of Course:

Theoretical and applied aspects of the ecology of marine organisms especially benthic invertebrates.

Nature of Course - Lecture and Laboratory

Prerequisites (or special instructions):

BISC 306

What course (courses), if any, is being dropped from the calendar if this course is approved:
This course has been offered once as a Special Topics course, BISC 471

2. Scheduling

How frequently will the course be offered? Biennially

Semester in which the course will first be offered? 89-1

Which of your present faculty would be available to make the proposed offering possible? B. Hartwick

3. Objectives of the Course

To increase awareness and understanding of patterns and processes in marine intertidal and shallow subtidal environments. To investigate the methods of measurement and analysis of marine invertebrate populations. Special problems related to selected organisms and marine habitats will be considered. To increase awareness of marine benthic resources and their exploitation.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty NONE

Staff NONE

Library NONE

Audio Visual NONE

Space NONE

Equipment Some sampling and measurement equipment may be required including calipers, shovels, corers, quadrats, rope, etc., but much of this may be available throu

5. Approval BISC 439 or 424. Petersen disc tags. Access to sieves, drying oven, muffl

furnace, bomb calorimeter, balances at some point during the course.

Date: OCT 06 1987

Department Chairman Dean Chairman, SCUS

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

MARINE INVERTEBRATE ECOLOGY

This course will emphasize experimental and quantitative methods in the study of marine invertebrate populations. Although emphasis will be on benthic organisms the approaches and techniques will be useful for students with more general interests in marine biology. The course will provide students with an understanding of current topics in marine ecology and the procedures used in analysizing natural populations during investigations in theoretical and applied marine ecology. Awareness of problems in dealing with marine resources will be increased through examination of specific cases.

The course should complement BISC 424 Marine Biology and Oceanography which provides marine oriented students with a general introduction to the diversity of marine environments and the adaptations of organisms living in them. This course along with P. Fankboner's course are natural extensions of BISC 306 and complete our undergraduate invertebrate offerings within the proposed Marine Biology stream.

LECTURES

012

Lectures will cover the following topics:

Marine benthic organisms and their habitats

Trophic structure and energy flow

Life history characteristics of selected groups

Population parameters and their estimation

Population studies on hard substrates

Population studies on soft substrates

Population studies of selected groups

Exploitation of benthic marine invertebrates

Habitat considerations

Community ecology

Benthic - pelagic links

Marine benthic systems

One or more laboratories to cover each of the following topics:

Intertidal and subtidal benthic sampling
Design, methods and basic analysis for macrofauna and meiofauna on hard and soft substrates

Analysis of sediments and dispersion patterns

Estimation of abundance and mortality

Growth and aging in selected groups
Growth rates, size frequencies, relationships between parameters, aging

Reproduction in marine invertebrates
Spawning cycles, indices, fecundity, size at maturity, reproductive effort and value

Estimation of single-species production

Trophic relations
Food habits analysis, feeding rates, prey selection

Habitat - production relationships

Benthic community characteristics

Project in applied marine ecology

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

013

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 457 Credit Hours: 3 Vector: 3-0-0

Title of Course: PLANT BIOCHEMISTRY & MOLECULAR BIOLOGY

Calendar Description of Course:

A description of biochemical processes that are unique to plants; secondary metabolism; introduction to plant molecular biology.

Nature of Course Lecture

Prerequisites (or special instructions):

BISC 301 or BICH 302, and BISC 337 or 347, or consent of the instructor.

What course (courses), if any, is being dropped from the calendar if this course is approved: BISC 447

2. Scheduling

How frequently will the course be offered? Every second year

Semester in which the course will first be offered? 87-88 Academic year

Which of your present faculty would be available to make the proposed offering possible? Dr. K. Eastwell

3. Objectives of the Course

To present students with the molecular basis for many processes associated with plant growth and development, including the biosynthesis of economically important compounds; to present a survey of plant nuclear and plastid genomes and their interaction. Although this course may be the terminal course in a sequence, it will also equip students for further studies in plant biochemistry or physiology.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty None

Staff None

Library See attached list of recommended library additions

Audio Visual Small lecture room withoverhead projector (for approx. 10 students).

Space None

Equipment None

5. Approval

Date: 87/05/05 087 06 1987

Department Chairman Dean Chairman, SCUS

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

BISC 457 - PLANT BIOCHEMISTRY & MOLECULAR BIOLOGY

REQUIRED TEXT:
T.W. Goodwin & E.I. Mercer. Introduction to Plant Biochemistry: Second Edition. Pergamon Press, 1983, 677 pp.

COURSE OUTLINE:

Lecture	Description
1-6	Plant growth regulators - biochemical mode of action. - auxins, gibberellins, cytokinins, abscisic acid, ethylene.
7,8,9	Polysaccharide biosynthesis. - complex carbohydrates; cell wall biosynthesis.
10,11,12	Fatty acid metabolism.
13,14	Polyphenol oxidase - regulation and function.
15,16	Phenylalanine ammonia lyase - regulation and function.
17	Mid-term examination.
18-23	Secondary metabolism - - terpenes. - alkaloids and phenolics.
24-26	Introduction to plant molecular biology - - organization of nuclear, mitochondrial and plastid genomes.
27,28	- chloroplast biogenesis.
29-32	- chloroplast protein biosynthesis - coordination. - review of photochemistry - light reactions of photosynthesis. - ultrastructure and assembly of the photosynthetic units. - other plastid proteins.
33,34	- heat shock proteins; pathogenesis-related proteins.
35,36	- male sterility factors - origins; activity.
37,38,39	- introduction to genetic engineering. - TI plasmid. - direct DNA transfer. - cryptic viruses. - virus vectors.

BISC 457 - Plant Biochemistry & Molecular Biology

LIBRARY RESOURCES:

Grierson, D., Covey S. Plant Molecular Biology. Blackie/Chapman and Hall, 1985.

Mantell, S.H., Matthews, J.A., McKee, R.A. Principles of Plant Biotechnology: An Introduction to Genetic Engineering in Plants. Blackwell Scientific, Palo Alto, 1985, 269pp.

Parthier, B., Boutler, D. Nucleic Acids and Proteins in Plants 11: Structure, Biochemistry and Physiology of Nucleic Acids. Springer - Verlag, New York, 1982, 774pp.

DETAILED PROPOSALS AND RATIONALE FOR THREE NEW COURSES WHICH HAVE BEEN TAUGHT PREVIOUSLY AS SPECIAL TOPICS

BISC 411-3 (2-0-4) Introduction to Plant Tissue Culture and Micropropagation.
BISC 426-3 (2-0-4) Biology of Seaweed.
BISC 453-3 (3-0-0) Advanced Developmental Biology.

These three new courses reflect the research interests of the faculty to offer them. Further, it is the view of the department that these courses compliment our fourth year offerings. Each course has been given as a Special Topics course (one to four times) in the past, thus resources necessary for their execution are on hand. Details of the courses are attached.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

017

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 411 Credit Hours: 3 Vector: 2-0-4

Title of Course: INTRODUCTION TO PLANT TISSUE CULTURE AND MICROPROPAGATION

Calendar Description of Course:

An introduction to the culture of plant cells and tissues; methods of plant micropropagation and their improvement.

Nature of Course A lecture plus laboratory course and associated field trips.

Prerequisites (or special instructions):

BISC 301 and BISC 347 or permission of instructors.

What course (courses), if any, is being dropped from the calendar if this course is approved: None. This course has been offered as a special topic course once, BISC 471.

2. Scheduling

How frequently will the course be offered? Annually or as faculty available.

Semester in which the course will first be offered? 88 academic year.

Which of your present faculty would be available to make the proposed offering possible? W. Vidaver

3. Objectives of the Course

To acquaint the student with current practices and future potential of plant cell and tissue culture related to commercial plant propogation genetic improvement of plant species, production of plant secondary products and development of new plant varieties.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty None

Staff A laboratory technician with tissue culture skills

Library Subscription to Horticultural Science, Journal of Horticulture and Plants cell and tissue cultures.

Audio Visual None

Space

Equipment Laminar flowhood

5. Approval

Date: 8-Nov-87 OCT 06 1987

Department Chairman Dean Chairman, SCUS

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

INTRODUCTION TO PLANT TISSUE CULTURE AND MICROPROPAGATION

BISC 411

Lecture Outline:

1. Introduction. Scope and objectives, course mechanics.
2. Tissue culture micropropagation. Practices, methods, applications, explant selection.
3. Culture media. Inorganic nutrients, organic energy sources, hormones.
4. Virus free cultures. Techniques for eradication. Uses of virus-free plants.
5. Proliferation vs. rooting. Axillary and adventitious shoot induction, root induction.
6. Epigenetic variation. Definition, implications for plant tissue culture, causes, control.
7. Micropropagation of conifers. Explant sources, the juvenility-maturity problem, hormone pulses.
8. Acclimatization. Definition, necessity for, methods, resource requirements.
9. Commercial practices and applications of plant tissue culture micropropagation.
10. Physiological and biochemical activities of plants growing in vitro. Heterotrophic vs. autotrophic metabolism, stomatal function, root function.
11-12. Biochemical and developmental aspects of hormonal effects on in vitro grown plants.
13-14. Physiological assessment methods of tissue-cultured plants. Photosynthetic capacity, chlorophyll content, leaf area, dry and fresh weights, water relations, stomatal and vascular function.
15. Industrial aspects of plant tissue culture: present status, potential for the future.
16. Callus cultures. Techniques, uses, advantages, drawbacks.
17. Cell cultures, cell suspensions and embryoids. Preparation, maintenance, uses.
18. Anther and pollen cultures. Haploid and dihaploid plants, regeneration of functional plants.
19. Protoplasts. In initiating cell cultures, cell fusion, organelle transfer, induction of polyploidy.
20. Culture-induced variation. Causes, selection for desirable traits or properties, genetic stability of traits.
21-22. Genetic modification at the cellular level. Survey of current techniques and potential for economic application.
23. The future of plant tissue culture and biotechnology. Research needs, pathogen resistance, new plant varieties, greater crop yields, new pharmaceuticals, better, faster growing trees.
24. Summary.

BISC 411

Laboratory Outline

Week

1. Free
2. Introduction to techniques, subculture existing Daphne plantlets.
3. Isolation of carnation and orchid explants.
4. Field trip to commercial nursery.
5. Prepare protoplasts from leaf mesophyll cells.
6. Prepare cell suspension from isolated protoplasts.
7. Subculture Daphne, cell suspensio and shoot apex explants.
8. Field trip.
9-11. Introduction to physiological assessments: CO2exchange, variable chlorophyll fluorescence, stomatal-leaf conductance, fresh-dry weight measurements, chlorophyll content.
12. Assess and terminate ongoing cultures.
13. Oral reports on projects.

References

Dodds, J.H and L.W. Roberts. 198 Experiments in Plant Tissue Culture. Cambridge University Press.

Donnelly, D. and W. Vidaver. 1987. A Glossary of Plant Tissue Culture. Dioscorides Press, Portland, Oregon.

Hartmann, H.T. and D.E. Kester. 1983. Plant Propagation. 4th ed., Prentice-Hall, Englewood Cliffs, New Jersey.

Kyte, L. 1983. Plants from Test Tubes. Timber Press. Portland, Oregon. 132pp.

Reinert, J. and M.M. Yeoman. 1982. Plant Cell and Tissue Culture. Springer-Verlag, Berlin. 83 pp.

Robinson, C.W. and J.A. Howell (eds.) 1985. Comprehensive Biotechnology. Vol 4, Pergamon Press, Oxford.

Vasil, I.K. (ed.) 1985. Cell Culture and Somatic Cell Genetics of Plants. Vol. 11 Growth, Nutrition, Cytodifferentiation and Cryopreservation. Academic Press. Orlando, Fla. 330 pp.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 426 Credit Hours: 3 Vector: 2-0-4

Title of Course: BIOLOGY OF SEAWEEDS

Calendar Description of Course:

The contemporary biology of seaweeds is reviewed. Emphasis is on the comparative adaptability of seaweeds inhabiting different environments. Students may be required to complete a research project.

Nature of Course Advanced, with laboratory, field, lecture and student participant components.

Prerequisites (or special instructions):
BISC 326. Weekend field trips will be required.

What course (courses), if any, is being dropped from the calendar if this course is approved:
This course has been offered four times as Special Topics BISC 471.

2. Scheduling

How frequently will the course be offered? Alternate years

Semester in which the course will first be offered? 1989-1

Which of your present faculty would be available to make the proposed offering possible? Louis Druehl

3. Objectives of the Course

1. To expose students to advanced concepts in the biology of an important group of non-vascular plants (strengthens our botany programme).
2. To balance our marine biology programme. This course would parallel BISC 406 (advanced invertebrates).
3. To prepare students for careers in areas related to marine plant resources (aquaculture and resource management) or graduate training.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty None

Staff None

Library None

Audio Visual None

Space None

Equipment None

5. Approval

Date: 87/05/05 OCT 06 1987

Department Chairman Dean Chairman, SCUS

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

BISC 426 - BIOLOGY OF SEAWEEDS

COURSE OUTLINE

Lecture Topics:

What is a seaweed?
Taxonomic diversity
Morphological diversity
Reproductive diversity
Behavioral diversity
Contemporary ecophysiology
Productivity and Mariculture
Student presentations

Laboratory/Field Exercises:

Seaweed diversity
Laboratory culture
Pigment extractions and identification
Photosynthesis and respiration
Nutrient uptake
Standing crop
Student Projects

Texts:

Lobban, C.S., Harrison, P.J. and Duncan, M.J. 1985. The Physiological Ecology of Seaweeds. Cambridge Univ. Press. N.Y. 242pp.

Lobban, C.S. and Wynne, M.J. 1981. The Biology of Seaweeds. Blackwell Sci. Publ. Oxford. 675pp.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

022

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 453 Credit Hours: 3 Vector: 3-0-0

Title of Course: ADVANCED DEVELOPMENTAL BIOLOGY

Calendar Description of Course:

Intensive examination of the recent research literature in modern molecular studies of the development and differentiation of animal systems. Emphasis will be on molecular mechanism which underlie basic developmental phenomena.

Nature of Course

Prerequisites (or special instructions):

BISC 301 and BISC 321

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

This course has been offered three times as a Special Topics course, BISC 471.

2. Scheduling

How frequently will the course be offered? 1/2 years.

Semester in which the course will first be offered? 1989-1

Which of your present faculty would be available to make the proposed offering possible? Michael J. Smith

3. Objectives of the Course

This course will provide senior undergraduates with an opportunity to examine modern approaches to the study of development in biological systems.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty Ø

Staff Ø

Library Ø

Audio Visual Ø

Space Ø

Equipment Ø

5. Approval

Date: 87/05/05 OCT 06 1987

Department Chairman Dean Chairman, SCUS

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

CALENDAR DESCRIPTION:

An intensive examination of the recent research literature in modern molecular studies of development and differentiation of animal systems. Emphasis will be on study of the molecular mechanisms which underlie basic developmental phenomena.

NATURE OF THE COURSE:

Course Outline:

Description of the classical problems in development and differentiation: maternal influences on development, cytoplasmic localization at the molecular level, embryonic versus maternal gene effects in development, induction.

Molecular studies of oogenesis: special mechanisms, ribosomal gene amplification, lampbrush chromosomes, transcriptional and translational activity in the developing oocyte, follicle and nurse cells activities, nature of maternal transcripts and their fates.

Molecular studies of the early embryo: onset of embryonic gene activity, quantitative analyses of transcription and translation of specific genes, localized gene expression, cell lineage analyses at a molecular level.

Molecular studies of differentiation: development switches in hemoglobin synthesis, coordinate expression of muscle genes in myogenesis, development of the immune system and self-recognition.

RATIONALE:

Presently there is one course in developmental biology at SFU. This is a second year survey course which addresses, at a very superficial level, both embryology and developmental biology. Much of modern biology is concerned with the molecular mechanisms which result in the development of the complex organism from a single cell, the egg. There have been significant advances in these types of studies with the application of modern biochemical and molecular biological analyses to developing systems. Unfortunately students at Simon Fraser get at best a fleeting glimpse of such studies. In the last eight years I have twice offered such an advanced course under the Special Topics rubric. In both cases, the course was well received and attended.

In the past four years I have been teaching BISC 203 and each year a significant number of undergraduates inquire whether further courses in this area are available. The proposed course is seen as an integral necessity for the Cell Biology and Genetics stream in this Department. I forecast an enrollment of approximately 20 students for this class.

TEXT:

Although there are several modern texts and a continuing publication of monographs in this area, I prefer to use reading from the original research and review articles in this course. Standard texts will be placed on reserve in the library for reference purposes.

DETAILED PROPOSAL & RATIONALE

FOR A NEW COURSE IN VIROLOGY

BISC 412-3 (3-0-0) Introduction to Virology.

This course reflects the concerted research interests of one of our faculty. In the view of the Department this is an important area and this course compliments offerings in Biochemistry and Molecular Biology. Details of the Virology course are attached.

This course was offered as a Special Topics graduate course, open to upper undergraduate students.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

026

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 412 Credit Hours: 3 Vector: 3-0-0

Title of Course: INTRODUCTION TO VIROLOGY

Calendar Description of Course:

A general introduction to viruses of prokaryotes, plants and animals; methods of analysis; virus replication; immunity and resistance; viruses as tools for genetic manipulation.

Nature of Course Lecture

Prerequisites (or special instructions):

BISC 301 or BISCH 302; BISC 321 corequisite

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

2. Scheduling

How frequently will the course be offered? Once every other year

Semester in which the course will first be offered? 88-3

Which of your present faculty would be available to make the proposed offering possible? Dr. K. Eastwell

3. Objectives of the Course

To explore strategies adapted by viruses to ensure their survival. Select viruses or groups will be used to illustrate replication mechanisms.

To provide information on the biology/biochemistry of viruses that serve as progenitors of many vectors currently used for modifying the genetic and phenotypic composition of other organisms.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty None

Staff None

Library Some modest additions, e.g., the book Bacteriophage T4; use of reserve reading room facilities.

Audio Visual None

Space Some lecture room to accommodate small class (approx. 25 students)

Equipment None

5. Approval

Date: 87/05/05 OCT 06 1987

Department Chairman Dean Chairman, SCUS

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

BISC 412 - Course Outline

INTRODUCTION TO VIROLOGY

LECTURE

1. Concepts of virology

1,2 A. Definitions, classification

3,4,5 B. Architecture and assembly

6,7 C. Tools of virus research - purification and assay

8,9 11. Virus invasion of the host cells - the "eclipse period"

A. T-even bacteriophages

B. Enveloped viruses

C. Naked viruses

111. Virus replication strategies - the "synthetic period"

A. Single-stranded (+) RNA viruses

10,11 i. Tobamoviruses
- dsRNAs, subgenomics, mRNA amplification

ii. Togaviruses
- split mRNAs

12,13 iii. Picornaviruses/comoviruses
- pactamycin mapping, polyprotein processing

14,15 iv. RNA Bacteriophage - QB, R17, MS2
- translation repression

16,17 v. Retroviruses
- oncogenes

B. Single-stranded (-) RNA viruses

18,19 i. Rhabdoviruses
- encapsidated enzymes, transcriptional regulation

20 ii. Para- and Ortho-myxoviruses
- dependence on host DNA synthesis

C. Double-stranded RNA viruses

21 i. Reoviruses
- subvirus particles

D. Double-stranded RNA viruses

22 i. Papovavirus (SV40)
- splicer RNA activity, early vs. late transcription

ii. Adenoviruses

23 iii. Poxvirus (vaccinia)
- "uncoating protein", translational control

24,25 iv. Caulimovirus
- gene structure

E. Single-stranded DNA viruses

26 i. Parvoviruses
- defective particles, "helper virus"

ii. Arenoviruses

BISC 412 - Course Outline

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LECTURE

IV. Immunity and resistance

27 A. Interferon
28 B. Plant immunity
29 C. Mixed virus infections

V. Subvirus particles

30 A. Defective interfering particles
31,32 B. Viroids, virusoids, satellite viruses and satellite RNAs

VI. Viruses as tools for genetic manipulation

33,34 A. Cloning vectors for bacteria
35,36 B. Caulimoviruses
C. RNA viruses
D. Satellites

BISC 412 - Introduction to Virology

REFERENCE LIST

BOOKS:

Backer, Y., Editor. Molecular Virology. 1983. Martinus Nijhoff Publishers, The Haque.

*Mathews, C.K., Kutter, E.M., Mosig, G., Berget, P.B. Bacteriophage T4, 1983, American Society for Microbiology, Washington, D.C.

Matthews, R.E.F. Plant Virology, Second Edition, 1981, Academic Press, New York.

PAPERS:

Butler, P.T.J., Klug, A., 1978. The assembly of a virus. Scientific American, 239:69.

Caspar, D.L.D., Klug, A., 1962. Physical principles in the construction of regular viruses. CSH Symposium on Quantitative Biology, 27:1.

Harrison, S.C., 1984. Multiple modes of sunbunit association in the structure of simple spherical viruses. Trends in Biochemical Sciences, 9:345.

Simons, K., Garoff, H., Helenius, A. 1982. How an animal virus gets into and out of its host cell. Scientific American, 246:58.

Taliansky, M.E., Malyshenko, S.I., Pshennikova, E.S., Kaplan, I.B., Ulanova, E.F., Atabekov, J.G., 1982. Plant virus-specific transport function. Virology, 122:318.

REQUIRED TEXT:

Fraenkel-Courat, H. and Kimball, P.C., 1982. Virology. Prentice-Hall, New Jersey.

DETAILED PROPOSAL AND RATIONALE FOR A COURSE DELETION

BISC 439-3 (1-1-6) Experimental Techniques: Ecological Methods.

Subsequent to an exhaustive review by Dr. A. Harestad (an ecologist in our Department) the Department decided this course was redundant. It is recommended students aquatically oriented take BISC 414 and BISC 424 and those terrestrially oriented take BISC 404 and BISC 419 to achieve experience similar to that offered in BISC 439.