School of Arts & Science

DEPARTMENT OF CHEMISTRY & GEOSCIENCE

Chemistry 214
NUTRITION FOR FITNESS
Winter Semester

COURSE OUTLINE

Fundamental aspects of nutrition associated with improved fitness and health through exercise are presented. Topics include: balanced roles of proteins, carbohydrates, fats, vitamins, minerals and water; supplements; dietary intake and energy usage; dietary programs and myths; nutrition for exercise targeting weight-loss, obesity, diabetes, osteoporosis, hypokinetic disorders, cardiovascular health, and aging.

The Approved Course Description is available at the Camosun College website @
http://camosun.ca/learn/calendar/current/web/chem.html

Please note: This outline will not be kept indefinitely. It is recommended students keep it for their records.

1. Instructor Information

(a) Instructor Jamie Doran, Ph.D.

(b) Office hours Interurban Campus, TC232
Monday, 3:00 pm to 4:30 pm (*if there is no lab period*)
Wednesday, 1:30 pm to 3:20 pm
Friday, 1:30 pm to 3:00 pm

Folks are welcome whenever my office door is open.
Appointments can be made at other times on Thursday and Friday afternoons.
Office hours will be extended immediately prior to tests.
Email and voice-mail messages are always encouraged.

(c) Location Room TC232, Technologies Centre Bldg., Interurban Campus
{Alternate: Rm. 342C, Fisher Bldg., Lansdowne Campus}

(d) Phone 370-3441 (voice-mail) 370-4447 (during office hours)

(e) E-mail jdoran@camosun.bc.ca

(f) Website http://camosun.ca/learn/programs/acbp/doran.html

2. Intended Learning Outcomes

- Students will be able to explain the fundamental roles and importance of dietary proteins, lipids, carbohydrates, vitamins and minerals, and the necessity for an appropriately balanced intake of these nutrients for optimal fitness.

- Students will be able to relate the RDA's and optimal daily intakes of proteins, lipids, carbohydrates, vitamins, and minerals to appropriate dietary and supplement sources in relation to exercise regime type and intensity, optimal recovery, and optimal health and fitness.

- Students will be able to describe the importance of appropriate hydration (or re-hydration) before, during and after exercise, and explain the importance of appropriate water consumption to optimal health and fitness.

- Students will be able to describe the basic function of the gastrointestinal tract in terms of nutrient absorption and elimination, and explain exercise, dietary and hydration effects on absorption, elimination and performance.

- Students will be able to explain energy usage during various types and durations of exercise, explain the nature of the biochemical fuel requirements associated with energy metabolism under various exercise regimes, and explain the relationship between biochemical fuel needs and performance and fatigue.

- Students will be able to make basic comparisons concerning the benefits of current popular and/or medically-, health association- or government-recommended diets for people of varying fitness and health.

- Students will be able to assess in basic terms the relative values of commercially available sports drinks, sports gels and sports bars with regard to supporting muscle activity, energy metabolism, and recovery when taken before, during and/or after exercise.

- Students will be able to access scientific and medical studies on-line or in print form for the purpose of undertaking a basic evaluation of the potential benefits and/or potential hazards of nutritional supplements.

- Students will be able to consider appropriate dietary regimes for people interested in healthy approaches to weight loss through diet and exercise.

- Students will be able to consider and describe in basic terms appropriate dietary regimes for people attempting to slow, moderate or reverse the effects of food intolerance including food allergies, diabetes, osteopenia or osteoporosis, cardiovascular disease, or hyperkinetic disorders, or the general effects of aging through a fitness program.

3. Required Materials

(a) **Text:** ***Nutrition: A Functional Approach.*** Canadian Edition. 2007. J. Thompson, M. Manore & J. Sheeshka. Pearson-Benjamin Cummings & Pearson Education Canada, Toronto.

Textbooks are available from the Interurban Campus Book Store.
A copy will be made available in the reserve library at the Interurban Campus.

Supplementary information from recently-published, relevant articles concerning nutrition for fitness will be provided as part of the course or upon request from interested students.

(b) ***Laboratory Experiments***

Wet-lab experimental procedures, and descriptive materials for dry-lab, self-analyses that will accompany and parallel the wet-lab experimental work, will be provided in advance of each laboratory period.

(c) ***General Materials and Supplies***

Scientific calculator A non-programmable, non-cell phone-based, calculator may be required at times in the lab, in lecture, and/or during exams. Students are required to provide their own calculator.

Lab coats Lab coats are required for any experiments involving hazardous chemicals, biochemicals or potentially biohazardous student samples. Each student is required to provide her or his own lab coat. Students lacking lab coats when required will not be permitted to work in the laboratory.

Safety glasses Safety glasses will be required when handling potentially hazardous chemicals and when working with glassware. Safety glasses must be purchased by each student, and are available through the campus bookstore.

Latex gloves Latex or 'non-allergen' gloves will be available in the lab for several purposes including:

i. handling any human sample, such as urine or blood, that may be considered potentially biohazardous;
ii. to prevent contamination of sample materials with proteins, fats, oils and/or enzymes from the skin that may interfere with an experimental result;
iii. if a person with an allergy, such as a skin contact-based food allergy, requires their use.

NB. Of course, people with food allergies* should not risk inappropriate contact with allergens and this may obviate participating in a wet-lab if it cannot be redesigned to remove all potentially antigenic materials. (*As the instructor of this course and a person who has several food allergies that require me to carry an epi-pen (for IM adrenaline delivery), I am acutely aware of the dangers allergies may present.)

4. Course Content and Schedule

Credits	3 credits
In-class workload	3 hours per week • Two 50-minute lectures per week. One 1 h and 50-minute lab period in approximately alternating weeks *(Please refer to the laboratory schedule below for details).* • As student numbers allow the offering of a single lab section, lab sections X01 & X02 will be combined.
Out-of-class workload	4.5 hours per week
Number of weeks	14 weeks
Pre-requisite courses	BIO 141 - Anatomy for Sport Education BIO 142 - Physiology for Sport Education HLTH 110 - Health in Today's World SPEX 210 - Exercise Physiology

Course times and locations

Lectures	Mondays, 12:30 - 1:20 PM Campus Centre, Room CC104 Wednesdays, 12:30 - 1:20 PM Campus Centre, Room CC104
Lab Periods	Lab Group X01 & X02: Mondays, 1:30 - 2:20 Technologies Centre, Room TC230

Labs to be held in alternating weeks provided combining the two lab sections of students does not detract from a pedagogically optimal offering or present laboratory safety concerns.
Students will work in pairs arranged in a voluntary and flexible basis as much as possible.

Please refer to the laboratory and term test schedule below.

Lecture Outline

An outline of the topics to be covered in the course is provided below.
Study guides for each chapter of the textbook will be provided in class. Each study guide includes an assigned reading list for the chapter, a listing of the relevant discipline-specific vocabulary, a list of practice questions, and identification of any relevant outside resources.
Supplementary materials, including scientific reports, review articles, and opinion papers will be provided to enhance the curriculum and promote critical thinking which must accompany the learning experience.

To enjoy the lectures to the fullest, and to gain the most from time spent in lecture, students should prepare for lectures ***by reading the relevant subject materials in the text book in advance*** *(please refer to the outline directly below).*

I. Introduction - Nutrition & Health *Chapter One*

- Nutrition and the roots of good health
- Classes of nutrients
- Nutrient intake in relation to energy intake
- Essential nutrients including vitamins and minerals
- DRI, RDA, AI, UL, EER & other measures of nutritional requirements
- Reliable sources of nutritional information

II. Diet & Nutrition *Chapter Two*

- Bases of a nutritious diet
- Food labelling & interpretation
- Canadian & US dietary guidelines including dietary 'pyramids'
- DASH, Zone, Atkins, Orkins, Mediterranean and other dietary plans
- The obesity epidemic

III. Digestion, Absorption and Elimination *Chapter Three*

- Appetite vs. hunger
- Gastrointestinal function - digestion and absorption
- Gastrointestinal regulation
- Gastrointestinal impairments & disease
- Probiotics: Are they useful?

IV. Carbohydrate Nutrition *Chapter Four*

- Types and sources of carbohydrates
- Carbohydrate metabolism & hormonal regulation
- Glycemic index and glycemic load
- Dietary carbohydrate intake & wellness
- Alternate sweeteners
- Diabetes & other diseases related to carbohydrate metabolism
- Nutritional strategies for exercising diabetic individuals
- Nutrition and exercise to relieve diabetics of insulin supplementation

V. Lipid Nutrition *Chapter Five*

- Biochemistry and dietary sources of lipids (fats & oils).
- 'Fats' as fuel for exercise.
- Essential omega-fats, and fat-soluble vitamins
- Dietary 'fat' intake for optimal wellness
- 'Fats' and risks for cardiovascular and other diseases
- Reversing poor conditions of cardiovascular health
- The good, the bad, and the trans

VI. Protein and Amino Acids *Chapter Six*

- Essential and non-essential amino acids
- Protein biochemistry & dietary requirements
- Protein supplements
- Protein metabolism and wellness
- Protein intake and optimal training effects
- Consideration of vegetarian diets
- Disorders and diseases related to protein intake
- High protein diets & potential weight loss

VII. Fluid & Electrolyte Balance *Chapter Seven*

- Functions of fluids and electrolytes
- Maintaining proper hydration
- Effects of hydration and dehydration on exercise and wellness
- Disorders related to fluid and electrolyte balance: dehydration, heat stroke, hypertension and others
- Sport beverages: Help or Hype?

VIII. Antioxidant Nutrients *Chapter Eight*

- Chemistry and biochemistry of antioxidants
- Antioxidant vitamins (A,C,E) and minerals (e.g. selenium)
- Disorders related to oxidation: cancer, cardiovascular disease & vision impairment
- Are vitamin and mineral supplements necessary?

IX. Relationship of Nutrition to Bone Health *Chapter Nine*

- Chemistry and biochemistry of bone health
- Calcium, phosphorous, magnesium & vitamin D intakes
- Osteoporosis
- Nutrition in support of exercise to slow the progression of osteopenia and osteoporosis

X. Energy Metabolism & Blood Health *Chapter Ten*

- Biochemistry & bioenergetics: Metabolism and exercise
- Energy demands of muscle activity and metabolism
- Blood glucose, and stored glycogen, and fats: regulation of bioenergetics
- Role of B vitamins and relevant essential elements in bioenergetics
- Dietary energy sources & supplements
- Assessing energy expenditure
- Nutrition and blood health
- Disorders of energy metabolism

XI. Weight Management *Chapter Eleven*

- Healthy body weight(s) and composition(s)
- Various methods for estimation of percent body fat
- Nutrition and exercise to reverse obesity

XII. Nutrition and Exercise *Chapter Twelve*

- Physical activity vs. exercise vs. fitness
- Nutrition, metabolism, bioenergetics & physical activity
- Optimal nutrition for exercise & athletics
- Nutritional & other supplements

XIII. Eating Disorders *Chapter Thirteen*

- Eating disorders vs. disordered eating
- Anorexia nervosa, bulimia nervosa, binge-eating disorder
- Food intolerance & food allergies.
- Dieting & chronic dieting and basal metabolic rate
- Female athletic triad
- Optimizing exercise with nutrition

XIV. Food Safety *Chapter Fourteen*

- Foodborne illnesses
- Natural and synthetic additives and contaminants
- Organic foods
- Genetically modified foods (GMO's)

XV. Nutrition and Life Cycle Fitness *Chapters Fifteen & Sixteen*

- Pre-natal and post-natal nutrition for wellness
- Infant nutrition
- Childhood to late adulthood nutrition for fitness
- Slowing the detrimental effects aging through nutrition and exercise.

Laboratory (& Term Test) Schedule

Week 1. Monday January 7th **Orientation, Organization & Planning**

*** The full class meets together *** Safety Video(s) a Must Watch Event ***

1. Lab organization
    - students determine whether they are in lab group A or lab group B
    - people pair-up such that each pair has an individual willing to collect urine and/or participate in finger pin-prick blood droplet provision during certain labs
    - lab outlines are provided, and planning for sample and data collection, and sample storage is conducted

2. Distribute 2 L sterile, wide-mouth bottles for urine collection over a 24 h period (one per pair*).
    - It would be unfortunate if students do not get a chance to get a glimpse into their own biochemistry but vicarious learning is sufficient if there is a limitation in volunteerism.
    - Students handling the urine samples of another student should sign a form to confirm that they recognize the potential biohazardous nature of the samples.
    - Students who have or suspect a bladder or urinary tract infection are NOT to participate.
    - The entire 2 L volume need not be saved. Four 100 to 250 mL samples from one member of each pair is sufficient, and will provide an extra sample should a bottle crack on storage in a -20°C freezer

3. Outline the personal food journal analysis work that is conducted out of class, and analyzed in class where data can be compared or assembled. Data collection sheets and information on conducting appropriate analyses including calculations will be distributed. These include:
    - A food journal for seven-day food intake.

    The evaluEAT software that accompanies the textbook, and possibly www.mypyramidtracker.gov/ *will prove extremely valuable in detailing the contents of foods.*
    - *Detailed examination of carbohydrate content in each person's diet (using seven-day food journal).
    - *Detailed examination of lipid content in each person's diet (using seven-day food journal).
        i. calculation of BMI and waist to hip ratio
        ii. calculation of BMI and daily energy requirements
        iii. calculation of percent body fat using Sears' 'Zone' approach
        iv. comparison to various recommended values including Health Canada, USFDA and Met Life Table data

v. comparison to anthropometric measurements made in the Exercise Physiology class the previous semester

- *Detailed examination of protein content in each person's diet (using each person's seven-day food journal)

* The results of dry lab data and calculations will form a part of those lab periods that focus on a particular relevant aspect of nutrition (please see below).

Week 3. Monday January 21st **Carbohydrates & Nutrition**

'Sugar Flares' - A Comparison of the Energy Content of Common Monosaccharide and Disaccharide Sugars Used as Sweeteners, and the Sugar Content of Sports Drinks
A qualitative comparison of the energy content of common natural dietary sugars, many also used as sweeteners, will be examined using a simple $NaClO_3$-sulfuric acid, 'sugar-chlorate flare' reaction to generate a small flame in proportion to the sugar content. Similar analysis will be applied to powders used to reconstitute sports drinks and sports gels. Students may select such supplements of interest for testing provided the composition is compatible with the assay. *These must be supplied a week in advance.*

A simple assay of the carbon content of sugars will also be performed as a second qualitative or semi-quantitative assay. It is another simple, visual assay that involved dehydration of carbohydrates through a reaction with sulfuric acid.
'NB. To conduct these assays students muse wear safety glasses and lab coats, and follow all safety instructions provided in the lab. When required, students must wear face shields and work properly in a chemical fume hood.

Follow-up: A comparison of the results will be discussed in light of the potential demands of the body for rapidly absorbed sugar as a calorie-replacement during or following aerobic vs. anaerobic of exercise.

Blood Glucose - The 'First Choice' in Energy
Students will drink a solution rich in glucose an appropriate time before the lab. During the lab, pin-prick dip stick tests will be conducted on droplets of blood at intervals. The data will be graphed to allow students to appreciate how rapidly insulin production rises to return blood glucose levels to normal. Students with diabetes, or pre-diabetic conditions, would not participate directly but would work with a partner.

Hunger vs. Appetite
If time allows, this lab period will also examine the taste perception of the sweetness of natural and artificial compounds. The semi-quantitative measurements that can be made would begin to create a glimpse of the difference between hunger and satiety.

Accompanying 'Dry-Lab'
In advance, students will calculate their average weekly carbohydrate intake from their seven-day journal. Each person will compare their results to their calculated daily calorie requirements (depending upon whether one desires to remain at the same weight or to be slowly looking to lose or gain weight). These requirements are determined using the evaluEAT software that came with the textbook. Alternatively,

an assessment of food composition can be conducted at the website
http://www.mypyramidtracker.gov/
A collection of class data will be assembled to give everyone a broader scope of carbohydrate intakes vs. calorie requirements. The data will to examined in light of diet type (e.g. vegetarian or one sort or another; vegan; 'high-protein', etc.)

Week 5. Monday, February 4th **Lipids & Nutrition**

In Search of the Cholesterol Gene In examining the genetic predisposition for high blood cholesterol levels using DNA-based assays, this experiment will provide an appreciation of the manner in which certain molecular genetic data that has implications to nutrition and disease is generated and analyzed. (This experiment will be conducted in stages over a few weeks.) Part 1. Consideration of DNA samples, and agarose gel preparation.

'Good Cholesterol' - 'Bad Cholesterol'

Simple, pin-prick, dipstick-based analyses of total blood cholesterol levels, and LDL & HDL levels, will be used. The data will compared with optimal levels, and ratios, of cholesterol, LDL ('bad' cholesterol) and HDL ('good' cholesterol) associated with wellness, and considered in light of recent dietary intake (dry-lab data).

Accompanying 'Dry-Lab'
Students will compare their daily average dietary lipid intake, calculated from their seven day journal, with each other and with recommended levels of both calorie intake and lipid intake. They will also estimate their own percent body fat measurements estimated by such readily available means as BMI, Metropolitan Life Tables, and 'The Zone' method of calculation. These values will be compared with the results of their more-involved, anthropometric analyses conducted during the fall semester course in Exercise Physiology course. Comparisons will also be made with percent body-fat percentages published for healthy persons by Health Canada and the Canadian Heart Association (and similar organizations), and that of individuals determined to exhibit type 1, 2 or 3 obesity, as well as the average values for athletes in various fields.

A collection of class data will be assembled to give everyone a broader scope of lipid intake vs. optimal intakes for as broad a spectrum of individuals as the class provides. The data will be considered in light of diet type (e.g. vegetarian or one sort or another; vegan; 'high-protein', etc.), and very recent food intake.

Week 6. Monday, February 11th **Term Exam #1**.

Week 7. Monday, February 18th 'Ongoing Experiments'

In Search of the Cholesterol Gene *(continued)*
Part 2. Agarose gel electrophoresis of DNA samples.

Staining and photography will follow, hopefully within the allotted lab time. Photographs of the data will be provided to all involved.

The Biochemistry of Bone Deterioration *(initiation of an experiment to be continued)*
Using bones from poultry or fish, students can examine the effects of the removal of calcium or collagen from bone tissue.
Part 1. Students will set up an experiment to examine the effects of decalcification of bone over the coming weeks.

Week 8. Monday, February 25th **Proteins & Nutrition**

Are All Amino Acid Supplements Made Equal?
Rapid paper chromatographic analysis will be used to compare the relative amino acid contents of competitive supplement products. ***Students may select supplements of interest for testing provided the composition is compatible with the assay.*** **These must be supplied a week in advance.** The results, and the nature of regulation of the manufacture of nutritional supplements, will be discussed.

Protein Intake and Nitrogen Balance
Using the urine samples collected and stored earlier in the course, urea nitrogen can be readily determined quantitatively. Estimations of protein intake will allow comparisons to calculate nitrogen balance. An added feature of interest would involve comparing nitrogen balance for students with distinctly varying diets (e.g. omnivore. vegetarian, vegan).

Creatine Excretion & Lean Body Mass
A simple spectrophotometric evaluation of creatine excretion in urine and a comparison with muscle/lean body mass will be conducted.

Accompanying Dry-Lab
Students will calculate their average daily protein intake from their seven-day journal and compare it to recommended daily intakes.

The Biochemistry of Bone Deterioration *(continued)*

Part 2. The effects of partial decalcification of bone will be examined.

Week 10. Monday, March 10th **Hydration: Fluid/ Electrolyte Balance**

'You Are Not Hungry. You Are Thirsty! - A Look at Water Balance

Students will undertake varying regimes of water consumption prior to class and hydration will be compared. The concentration of chemicals in the urine will be assayed visually, spectrophotometrically and by specific gravity measurements. Calculations can be made using known average values, as well as values provide by students, that will allow an estimation of a 24 hour water balance. An appreciation of the ease with which moderate dehydration can occur will be gained.

Accompanying Dry-Lab
Students will calculate their average water and sodium (and other mineral) intake from their seven-day journal and compare it to standard daily requirements.

The Biochemistry of Bone Deterioration *(continued)*

Part 3. The continued effects of decalcification will be examined, and the experiment will be extended by initiating collagenase activity.

Week 11. Monday, March 17th **Term Exam #2**

Week 13. Monday, March 31st **Ongoing Experiments & Food Journal Wrap-Up**.

In Search of the Cholesterol Gene *(continued)*
Part 3. Analysis of agarose gel electrophoresis analysis of DNA samples. Photographs provided to students weeks earlier will now be discussed in detail.

The Biochemistry of Bone Deterioration *(continued)*
Part 4. The effects of collagenase activity in conjunction with decalcification will be examined.

Accompanying Dry-Lab
Students will complete consideration of their seven-day journals. A discussion of nutrition/health claims for a variety of potentially relevant and potentially non-beneficial products on the market will ensue.

Week 14. Monday, April 7th **Final Exam review period**.

Final Exam: The time and location of the Chem 214 Final Exam will be published by the College during the Winter Semester as indicated in the Calendar.

5. Basis of Student Assessment (Weighting)

(a) 'Dry Lab' Nutritional Self Assignment
The total value this works contributes to the final grade is 12.5%.
(b) 'Wet Lab' Laboratory Experiments
Please come to each lab period prepared for the experiment. These will contribute a total 12.5% to the final grade.
Students are responsible for understanding the principles and results of each experiment. These aspects of the laboratory work are potentially subject to examination on the term exams and the final exam.
Attendance in the lab periods is mandatory. No laboratory experiment can be missed without an acceptable reason submitted in writing such as a proper letter from Medical Doctor.

(c) Term Tests

Term Test #1 This exam covers relevant material from approximately the first third of the course. The delineation of material that you are responsible for will be provided about one week before the date of the test. This is a 110 minute test that will be written on Monday, February 11th from 1:30 pm to 3:20 pm in the lab, TC230, or preferably in a classroom TBA. The results of this test contribute to 20% of the final grade. The preceding lecture period that day will be devoted to review.

Term Test #2
This exam covers relevant material from approximately the second third of the course. The delineation of material that you may be responsible for on this test will be provided in class about one week before the date of the exam. This is a 110 min. test that will be written on Monday, March 17th in a classroom TBA from 1:30 pm to 3:20 pm in the lab, TC230, or preferably in a classroom TBA. The results of this test contribute to 20% of the final grade. The preceding lecture period that day will be devoted to review.
If either or both of the midterm exams is missed due to illness or for any other justifiable reason (accompanied by appropriate documentation), a student may choose to either negate that exam from determination of the final grade, or write another version of that exam at a mutually agreeable time, or add the percentage value of that midterm exam (20%) to the percentage value of the final exam.

(d) Final Exam

The final exam is a comprehensive exam. The value this exam contributes to the final grade is **35%**.

Attendance at the final exam is mandatory. Appropriate documentation must accompany any explanation for absence.

The time and location of the final exam will be published by the College during the semester as indicated in the College Calendar.

6. Grading System

Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at **camosun.ca** or information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	*Incomplete*: A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	*In progress*: A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.

CW	*Compulsory Withdrawal:* A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy E-1.5 at **camosun.ca** for information on conversion to final grades, and for additional information on student record and transcript notations.

7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

The study guides provided in the course will prove highly valuable. In addition to the practice problems provided in the text, the corresponding website provides learning resources that will further enhance the understanding and appreciation of the curriculum of this course.

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Registrar's Office or the College web site at http://www.camosun.bc.ca

ACADEMIC CONDUCT POLICY

There is an Academic Conduct Policy. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html