

## Course Outline

### FOOD 4203/FOOD 5105. Functional Foods and Natural Health Products

#### Instructor:

Farah Hossenian

613-520-2600 Ext 2048

[Farah.Hosseinian@carleton.ca](mailto:Farah.Hosseinian@carleton.ca)

#### Course description

Study of the bioactive components of functional foods and natural health products, for the improvement of health and nutrition. The sources of bioactives, their chemistry, and mechanisms of actions, process technology, efficacy, safety and potential role of R&D in industry in commercialization of new products will be discussed.

**Learning Outcomes:** By the end of the course, the student should:

1. Learn and distinguish between phytochemicals in foods and natural health products.
2. Know the scientific basis and technologies for functional foods and natural health products.
3. Identify and describe examples of functional foods and natural health products that discuss health benefits.
4. Become knowledgeable on the specific issues concerning functional foods and natural health products.
5. Become familiar role of R&D in functional foods and natural health in industry.
6. Be aware of current topics, terms and products in this emerging field.
7. Learn to independently examine scientific proof of efficacy, safety, and effectiveness and communicate this information in oral and written forms.

#### Topics to be covered (by instructor and student presentations)

Lec 1: (LOs 1,2,3,4)

Overview of functional food and natural health products

1. Definition of functional food and natural health products
2. Value added products from food and natural health products
  - a. Identify sustainable bio-based resources
  - b. product development
  - c. functional ingredient characteristics
  - d. manufacturing and industry growth
  - e. commercializing high-quality functional foods and natural health products
3. Functional foods and natural health products: hype or reality
4. Regulatory-related testing requirements

## Course Outline

- a. need science-based evidence to support claims
- b. clinical trails
- c. product safety/toxicity
- d. validating efficacy
- e. role of GMP, HACCP and ISO as a process assessment
- f. role of CIFA, AAFC, Natural Health Products (NHP) Program
- g. Health Canada Approved Health Claims

### Lec 2: (LOs: 1,2,3,5)

#### Bioactives with antioxidant and anti-inflammatory properties

1. Selected bioactives with antioxidant and anti-inflammatory properties in foods
  - a. cereals
  - b. oilseeds
  - c. fruits and vegetables
2. Selected bioactives with antioxidant and anti-inflammatory properties of natural health products (pills, capsules, powder...)
  - i. herbs
  - ii. vitamins & minerals
  - iii. homeopathics & traditional herbal medicine
  - iv. plant & animal
  - v. micro-organism
3. Potential role of GMP, HACCP and ISO in product development and as a process for the assessment of scientific support for health claims
4. Health Canada Approved Health Claims

### Lec 3: (LOs: 1,2,3,5)

#### Bioactive polysaccharides:

1. Classifications and identification
2. Chemical properties, analytical approaches, characterization
3. Dietary Fibre and prebiotics activity of polysaccharides in:
  - a. regular plant foods (e.g. cereal, oilseeds, fruit and vegetable)
  - b. process foods
    - i. fermented food products, particularly in baked and dairy products
  - c. natural health products (pills, capsules, powder...)
    - i. traditional herbal medicine (e.g. psyllium products)
4. Potential role of GMP, HACCP and ISO in product development and assessment of scientific support for health claims
5. Health Canada Approved Health Claims

### Lec 4: (LOs: 1,2,3,5)

#### Bioactive lipids:

1. Classifications and identification
2. Chemical properties, analytical approaches, characterization
  - a. Phenolic lipids, sterols and waxes in plant foods
  - b. Omega-3 fats in animal and vegetable sources

## Course Outline

- c. natural health products (pills, capsules, powder...)
  - i. traditional herbal medicine (e.g. omega-3 products)
  - ii. essential oils (flowers)
  - iii. cosmetic products (herbs, tubers, stem and leaves)
3. potential role of GMP, HACCP and ISO in product development
4. Health Canada Approved Health Claims

### Lec 5: (LOs: 5,6,7)

Efficacy and safety of functional foods and natural health products:

1. Relationship between bioactive compounds and inhibition or induction of diseases
2. Mechanism of action
3. Identification of appropriate biomarkers
4. Interactions/adverse effect and toxicity of bioactive compounds with nutrients and medications
  - a. (e.g. cyanogenic compounds in flaxseed, anti-trypsin in soybean, naringin in grapefruit)
5. Adulteration in the market place
  - a. adding hazardous natural products (e.g. steroids, ephedrine alkaloids)
  - b. contaminants (e.g. pesticides in ginseng)
  - c. fillers and stabilizers with allergy concerns (e.g. adding lactose to pills and capsules)

### Lec 6: (LOs: 5,6,7)

Safety and health claim of functional foods and natural health products

1. Regulatory assessment support
  - a. examine scientific proof of efficacy and safety
    - i. understand the mechanisms in order to construct hypotheses for testing on volunteers
    - ii. intervention trials in human subjects
    - iii. randomized, placebo-controlled scientific evidence
    - iv. application of proper biological markers as a process for the assessment of scientific support for health claims
2. Reduce risk of further regulation
  - a. improve quality
    - i. controlling the entire value chain
    - ii. consumer respond
    - iii. authenticity and validation
    - iv. reduce potential legal liabilities

### Lec 7:

Product development: (LOs: 4,5,6,7)

1. Market value and future trend for product developments.
2. role of industry and government

## Course Outline

- a. R&D in development of functional foods and natural health products in industry
- b. role of GMP, HACCP and ISO as a process for the assessment of scientific support for health claims
3. Role of government agencies
  - a. roles of Health Canada, Office of Natural Health Products, CFIA, Agriculture and Agri-Food Canada
    - i. products driving regulators to act
    - ii. increase Canada's global reputation for quality and safety
    - iii. help to develop right industries with right products
    - iv. help to distinguish sustainable functional foods and natural health products
    - v. provide required regulatory guidelines for acceptability or non-acceptability of functional foods and natural health products

### Evaluation:

#### **Paper critique (30%): Presentation (20%) followed by two pages written report (10%)**

- Students will read and discuss in class a scientific articles assigned to them by the instructors. Each week, one student will lead the discussion and other students will have an opportunity to talk about the paper. Based on receiving feedbacks, a 2 pages report will be written and given (hard copy and electronically) to instructor.

#### Break down marks:

- Part 1. Paper critique (20%) (Presentation)
- Title (1 mark)
- Abstract (2 marks)
- Background/Introduction (4 marks)
- Materials and Methods (4 marks)
- Results & Discussion (6 marks)
- Summary/Conclusion (2 marks)
- References (1 mark)
- Part 2. Report (10%)

#### **Presentation (30%): Evaluation of safety and efficacy of food functional foods and Natural Health Products**

4. Highlight 1 major ingredient and discuss about the functionality, efficacy, and metabolism of selected ingredients. Market value and future trend should be discussed as well. Role of government agencies need to be discussed. Each student will prepare its finding in the form of PowerPoint presentation after the winter break.

#### Break down marks:

- Title (1 mark)

## Course Outline

- Abstract (4 marks)
- Background/Introduction (6 marks)
- Materials and Methods (6 marks)
- Results & Discussion (8 marks)
- Summary/Conclusion (4 marks)
- References (1 mark)

### Take home exam: 40%

\*Two extra questions for graduate students (FOOD 5105)!.

### Suggested reading

#### Texts/References:

- Handbook of Fermented Functional Foods, (2003) E.F. Farnworth ISBN 0-8493-1372-4
- Functional Foods - Biochemical and Processing Aspects (Vol 2) (2002) J. Shi, G. Mazza and M. Le Maguer ISBN 1-56676-902-7
- Herbs, Botanicals & Teas,(2000) G. Mazza, and B.D. Oomah. ISBN: 1-56676-851-9
- Professional's Handbook of Complimentary & Alternative Medicine, 3rd Edition. Febrow, C.W. & Avila, J.R. 2004.
- Handbook of Nutraceuticals and Functional Foods (2001). Robert E.C.Wilman ISBN 0-8493- 8734-5 Herbs, Botanicals & Teas, (2000) G. Mazza, B.D. Oomah ISBN: 1-56676-851-9.

#### Journals and websites:

- Natural Health
- Functional Foods and Nutraceuticals
- Journal of Agricultural Food Chemistry
- Food Technology
- American Journal of Clinical Nutrition
- European Journal of Clinical Nutrition
- Journal of Nutritional Biochemistry
- <http://www.hc-sc.gc.ca/fn-an/label-etiquet/claims-reclam/assess-evalu/index-eng.php>
- <http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/hpfb-dgpsa/index-eng.php>
- <http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/hpfb-dgpsa/nhpd-dpsn/index-eng.php>

PLEASE REFER TO CARLETON UNIVERSITY ACADEMIC REGULATIONS REGARDING ACADEMIC INTEGRITY, EXAMINATION POLICIES, ETC.

<http://www.carleton.ca/cuuc/regulations/acadregsuniv14.html>