



## Course Descriptor AHND 483 Nutraceuticals

<b>ACADEMIC YEAR</b>	2020-2021	<b>SEMESTER</b>	Fall
<b>Course Code &amp; Title</b>	AHND 483 Nutraceuticals		
<b>Credit hours</b>	2 (2+0)	<b>Level of study</b>	Undergraduate
<b>College / Centre</b>	CAHS/FSHNN		
<b>Co-requisites</b>	NIL	<b>Pre-requisites</b>	FDST 101, AHND 262, AHND 362, AHND 363,

### 1. COURSE OUTLINE

These functional foods are considered as those foods which are intended to be consumed as part of the normal diet but contain bioactive substances that offer the potential of enhanced health or reduced risk of disease. Nutraceuticals are concentrated forms of the food bioactive intended to be consumed as supplements in the form of tablets, capsules or liquid concentrates. Examples of functional foods include foods that contain specific fatty acids (e.g. omega 3) or dietary fiber (e.g. beta glucan), or biologically active substances such as phytochemicals or other antioxidants or probiotics with live beneficial cultures. Consumer awareness and interest in the relationship between diet and health has increased substantially and health is now a major driver for market positioning of foods. The course covers the issues and challenges in the development, evidence testing, marketing and changing regulations controlling functional foods and nutraceuticals.

### 2. AIMS

This course aims to provide students with an in-depth understanding of the topic and the ability to assist industry in the conception, formulation, assessment, marketing and regulatory compliance activities required for successful development of functional foods and nutraceuticals; Role of functional foods and nutraceuticals in assisting health; key types of active ingredients used in functional foods and nutraceuticals; Local and international legislation governing functional foods and nutraceuticals; Principle processing technologies used to manufacture and incorporate active ingredients into functional foods; Describe the key factors and delivery technologies that affect the bioavailability of active components and Evaluate the levels of evidence for health benefits of functional foods and nutraceuticals.

### 3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS (Indicative)

Learning Outcomes (Definitive)	Teaching and Learning methods (Indicative)	Assessment (Indicative)
1. Articulate the role of functional foods and nutraceuticals as options to aid health	Lectures	<i>In class test and quizzes</i>
2. Describe the key types of active ingredients used in functional foods and nutraceuticals	Group work, presentations,	Class presentation , written examination
3. Access the local and international legislation governing functional foods and nutraceuticals	Lectures	<i>Quizzes , Visits , Projects</i>

4. Describe the principle processing technologies used to manufacture and incorporate active ingredients into functional foods	Lectures	Quizzes ,
5. Describe the key factors and delivery technologies that affect the bioavailability of active components	Lectures	Quizzes
6. Evaluate the levels of evidence for health benefits of functional foods and nutraceuticals	Lectures	Quizzes

#### 4. ASSESSMENT WEIGHTING

#### 5.

Assessment	Percentage of final mark (%)
Quizzes	10%
Presentation	10%
Mid-Term Exam 1	20%
Mid-Term Exam 2	20%
Final Exam	40%
<b>TOTAL</b>	<b>100%</b>

#### 6. ACHIEVING A PASS

Students will achieve 03 credit hours for this course by passing **ALL** of the course assessments and achieving a **minimum overall score of 50%**

COURSE CONTENT (Indicative)	
LECTURE TOPIC	TIME (HOURS)
<b><u>Introduction to Nutraceutical</u></b> <ul style="list-style-type: none"> <li>Organizational elements,</li> <li>Classification of nutraceuticals,</li> <li>Dietary supplements,</li> <li></li> </ul>	<u>2</u>
<ul style="list-style-type: none"> <li>Fortified foods,</li> <li>Functional foods and phytonutracuticals.</li> <li>Scope involved in the industry and global scenario.</li> </ul>	<u>2</u>
<b><u>Concept, Biochemistry of nutrition and dietetics</u></b> <ul style="list-style-type: none"> <li>Classification of food components based on nutritional value,</li> <li>Nutritional assessment of carbohydrates, proteins and fats,</li> </ul>	<u>2</u>
<ul style="list-style-type: none"> <li>Recommended dietary intake,</li> <li>Acceptable dietary intake</li> <li>Basics of energy balance - (BMR, BMI) and Standard Dynamic Action (SDA) with special reference to nutraceutical industry.</li> </ul>	<u>2</u>
<b><u>Nutrition related diseases and disorders</u></b> <ul style="list-style-type: none"> <li>Carbohydrates, Protein, amino acids, Fat, vitamins and minerals - Excess and deficiency, symptoms, prevention and management.</li> <li>Role of nutraceuticals with special reference to diabetes mellitus,</li> </ul>	<u>2</u>

hypertension, hypercholesterolemia, cancer, glands in the prevention and treatment.	
<ul style="list-style-type: none"> <li>• Concept of antioxidants - use of antioxidants as dietary supplements in prevention and treatment of cancer, obesity and stress.</li> <li>• Role of nutraceuticals and functional foods in pediatrics, geriatrics, sports, pregnancy and lactation.</li> </ul>	<u>2</u>
<b>Midterm Exam</b>	
<b><u>Nutraceuticals of plant and animal origin</u></b> <ul style="list-style-type: none"> <li>• Plant secondary metabolites, <ul style="list-style-type: none"> <li>○ Classification and sub-classification - Alkaloids, phenols, Terpenoids.</li> <li>○ Extraction and purification,</li> <li>○ Applications with specific examples with reference to skin, hair, eye, bone, muscle, heart, brain, liver, kidney, general health and stimulants.</li> </ul> </li> </ul>	<u>2</u>
<ul style="list-style-type: none"> <li>• Concept of cosmoceuticals and aquaceuticals.</li> <li>• Animal metabolites - Sources and extraction of nutraceuticals of animal origin (chitin, chitosan, glucosamine, chondroitin sulphate and other polysaccharides of animal origin)</li> <li>• Uses and applications in preventive medicine and treatment.</li> </ul>	<u>2</u>
<b><u>Microbial and algal nutraceuticals</u></b> <ul style="list-style-type: none"> <li>• Concept of prebiotics (principle, mechanism, production and technology involved) <ul style="list-style-type: none"> <li>○ Applications - examples of bacteria used as probiotics,</li> </ul> </li> <li>• Use of prebiotics in maintaining the useful microflora</li> </ul>	<u>2</u>
<ul style="list-style-type: none"> <li>• Extraction from plant sources.</li> <li>• Algae as source of omega 3 fatty acids, antioxidants and minerals <ul style="list-style-type: none"> <li>○ extraction and enrichment.</li> </ul> </li> </ul>	<u>2</u>
<b><u>Biotechnology in Phytonutraceuticals</u></b> <ul style="list-style-type: none"> <li>• Role of medicinal and aromatic plants in nutraceutical industry</li> <li>• Propagation - conventional and tissue culture, cultivation,</li> <li>• Post-harvest technology and strategies for crop improvement,</li> <li>• Development of high yielding lines and yield enhancement,</li> <li>• Plant genomics and metabolomics.</li> </ul>	<u>2</u>
<ul style="list-style-type: none"> <li>• Introduction to nanobiotechnology with special reference to nutraceuticals.</li> <li>• Biofortification and nutritional enhancement.</li> <li>• Gm foods with enhanced nutraceutical properties.</li> <li>• Golden rice, gm tomatoes.</li> </ul>	<u>2</u>
<b><u>Product development and clinical trials</u></b> <ul style="list-style-type: none"> <li>• Activity screening, formulations of energy drinks, bars, sports drinks, fortified products, geriatric products, veterinary products, immune boosters, <ul style="list-style-type: none"> <li>○ Bioavailability, bioequivalence;</li> </ul> </li> <li>• Use of animal models and pre-clinical and clinical trials.</li> <li>• Basic Principles of toxicology <ul style="list-style-type: none"> <li>○ Oral toxicity,</li> <li>○ Sub-acute,</li> <li>○ Acute toxicity and chronic toxicity.</li> <li>○ Toxic dose,</li> <li>○ Toxic-kinetics,</li> <li>○ LD50,</li> <li>○ Dose-response relationships,</li> <li>○ Local v/s systemic toxicity, antagonism and synergism.</li> </ul> </li> </ul>	<u>2</u>
<b>FINAL EXAM</b>	
<b>RECOMMENDED STUDY HOURS 1-15</b>	<b><u>30</u></b>
<b>TOTAL HOURS</b>	<b><u>56</u></b>

## **7. RECOMMENDED READING**

Ramesh Gupta. Nutraceuticals: Efficacy, Safety and Toxicity (2016). Academic Press

