

• Department of Food and Nutrition

1. Educational Goal

The science of "Food and Nutrition" composed of two major fields, food science and nutritional science, is a field of life science. That covers dietary life associated with mental and physical health, and growth and development. The aim of this program is focused on training professional leaders who are able to conduct research and development in the fields of nutritional health-science and food technology.

2. Educational Objective

1) Master Degree Program

① To educate a professional workforce with the ability to conduct the research and development in food industry, food-related institutes, and government agencies.

② To cultivate students' research skills to work in nutrition-related institutions, and educate them to develop professional knowledge on clinical nutrition and community nutrition.

2) Ph.D. Program

① Through advanced lectures and experiments, doctorate candidates can be cultivated as professional global leaders who are able to do research creatively and independently.

② In order to cultivate professional researchers for working in academia, hospitals, and public health institutions, this course provides students with on research skill and analytic ability for solving nutrition problems.

③ This program is also designed to train the students to become professional researchers with creative problem solving ability in the field of food industry through coaching in basic and applied laboratory experiment practice.

3) A combined master's and doctorate program : same as above all

3. List of Full-time Faculty

Name	Position	Degree(University)	Field of Instruction	Area of Research
Hye-Sun Min	Professor	Univ. of California, Berkeley, USA	Nutrition	Nutritional Biochemistry
Hae-Dong Jang	Professor	North Carolina State Univ., USA	Food Science	Protein Chemistry
Young-In Kwon	Associate Professor	Univ. of Massachusetts. Amherst, USA	Food Science	Food Biotechnology
Eunmi Park	Assistant Professor	Univ. of Texas at Austin, USA	Nutrition	Nutrigenetics
SuJin Song	Assistant Professor	Seoul National Univ., Korea	Nutrition	Nutritional Epidemiology
Jin-Hee Kim	Associate Professor	Yonsei Univ. Korea	Nutrition	Food Service Management

4. Course Description

- **FN601 Biostatistics 3 credits**

The Biostatistics Unit consults and assists in study design, implementation, and analysis and develops new statistical techniques and software to support research activities. The Biostatistics Unit provides investigators with their own site-licensed copies of the current releases of standard statistical software packages including SAS, SPSS, and Systat. This course also provides an introduction to the basic principles and applications of statistics as they are applied to the problems in clinical and public health settings. Topics include the description and presentation of data, random variables and distributions, descriptive statistics, elements of hypothesis testing, and one-and-two sample tests. Lecturers, problem sets and computer output are used to develop these and additional concepts.

- **FN602 Seminar in Food and Nutrition I 1 credits**

- **FN603 Seminar in Food and Nutrition II 1 credits**

- **FN604 Seminar in Food and Nutrition III 1 credits**

Students are expected to summarize, discuss, and present on the latest academic journals and publications in order for them to be able to read the trend of recent field of food and nutrition. Students read and learn how to critically analyze and interpret original articles published in a wide variety of journals. Students also learn how to make professional presentations and how to critique the presentations given by others.

- **FN605 Lipid &Carbohydrate Nutrition 3 credits**

Through this course students understand the function and metabolism of lipid and carbohydrate from a nutritional point of view, as well come to grasp the recent issues with lipid and carbohydrate nutrition. Because the nutrition of lipid and carbohydrate is closely related with diabetes, heart disease, stroke, and cancer, a multidirectional approach on ideal intake of lipid and carbohydrate in basic as well as preventive measures, is required. Therefore, this course covers basic theory of lipid - type, structure, absorption, transportation - as well as metabolism of lipoprotein and cholesterol. It also covers the basic theory of carbohydrates - structure, function, and metabolism. Also, in relation to etiology of diabetes, changes of carbohydrates and physiological metabolism, and changes of diabetes and lipid metabolism are studied. The importance of selecting fuel when exercising and nutritional therapy are investigated. This course will be run in question & answer and discussion format, and will emphasize literature research.

- **FN606 Protein &Amino Acid Nutrition 3 credits**

This course focuses on recent research directions of nutrition and metabolism

of protein and amino acid. Basic theories of synthesis and degradation of amino acid, synthesis and regulation of protein are discussed. For the establishment of demand and requirement of protein, methodology surrounding the research data of protein digestion, absorption, elimination, turnover is studied. Various methods for evaluating the quality of protein are also discussed. In addition to bodily changes during protein deficiency are studied, as well as genetic diseases.

- **FN607 Nutrition in Disease 3 credits**

Recent forms of diseases are more chronic than acute, and etiology of various chronic diseases are closely related to dietary habits. The relationship between nutritional status and chronic disease what physiological or pathological changes occur in the body when these diseases develop, and how the distribution of nutrients changes will be lectured and discussions will be centered around recent literature.

- **FN608 Nutrition, Development & Aging 3 credits**

The biology of the life cycle including development, growth, maturation, and aging and its impact on nutritional requirements of humans from the zygote to the elderly is considered. How to meet these nutritional requirements is discussed relative to the feeding issues and context of each major life stage. The course emphasizes the critical analyses of beneficial and adverse outcomes of various nutrient intakes and dietary patterns on nutritional status and well-being through integration of nutrition and other health sciences in understanding nutritional needs during the life cycle.

- **FN609 Cell physiology & Nutrition 3 credits**

Changes and functions of nutrient metabolism at the cellular level are discussed. In order to explore the cell from a nutritional point of view, distribution and function of bodily cells as well as functions and metabolism of each cell's organelles will be studied. The importance and passage of the cell wall, organization and metabolism of nucleus, structure and nutrient metabolism of ER, mitochondria, golgi, and cytoplasm will also be covered. Through this course one will explore the importance and attributes of gene expression, characteristics of cancer cells, and nutrients that are involved in cellular growth and differentiation. A biochemical, morphological, and nutritional approach towards each system and cellular organelles is required.

- **FN610 Nutrition, Cancer & immunity 3 credits**

Theory on process of tumor development is discussed, as well as regulation of gene expression of oncogenes. Comprehensive theory on various genes involved in cancer development is studied, together with tumor development process, carcinogens, and anti-carcinogen that can be changed by food or nutrition. In

nutrition & immunity, recent knowledge of structure and function of immunity is investigated and cellular immune response and humoral immune response are contrasted and studied.

- **FN611 Nutritional Epidemiology 3 credits**

The purpose of this course is to examine epidemiological methodology in relation to nutritional measures, and to review the current state of knowledge regarding diet and other nutritional indicators as etiology of disease. This course is designed to enable students to better conduct nutritional epidemiological research and/or to better interpret the scientific literature in which diet or other nutritional indicators are factors under study.

- **FN612 Advanced Molecular Biology 3 credits**

The structure of genes and chromosomes, the process of replication and the transcription of DNA, translation of RNA, and regulation of genetic expression are discussed, and essential latest recombinant DNA technology that is required for molecular biology research is examined.

- **FN613 Nutrition in Public Health 3 credits**

This course deals with efforts to improve the diets and nutritional status of whole populations by working at the community and national levels. The course helps prepare students to work in public health nutrition by describing methods used in the assessment of nutrition problems, the development of nutrition-related policies, and the delivery of health, nutrition, and food assistance programs.

- **FN614 Advanced Nutrition Assessment 3 credits**

This course will provide an overview of the common nutritional assessment tools. Laboratory and field methods for population wide nutritional deficiency assessment, nutritional screening and surveillance, dietary assessment, hunger and food security as well as diet diversity and food group indices will be examined. Clinical methods including body composition, biochemical and clinical factors related to macro and micronutrient deficiency will be discussed. Issues of validity and reliability of these methods will be addressed mainly in the context of strengths and limitations of each method. At the end of the course, students should have some familiarity with the common nutritional assessment techniques as well as their practical applications at the individual and population wide levels.

- **FN615 Mineral & Nutrition 3 credits**

Evaluate the evidence from primary literature that dietary calcium, sodium, and iron play an important role in the development of osteoporosis, hypertension, and anemia, respectively. An additional goal of the course is to review the

molecular processes that are involved in the homeostasis of each mineral and the recommendations for daily nutrient intakes. Critical analysis of concepts and research methods relating to nutritional metabolism and its regulation in intact organisms is studied.

- **FN616 Vitamin & Nutrition 3 credits**

Students learn the basis of nutrient requirements and nutritional assessment, integration of metabolic pathways, research techniques, nutritional diseases, and specific topics relating to vitamins. Also, students will evaluate the evidence from primary literature that vitamins play an important role in the prevention of various diseases.

- **FN617 Current Topics in Nutrition 3 credits**

Current issues in nutritional sciences will be discussed. Students will be asked to prepare an oral and written report on a topic selected from the current research literature in nutritional sciences.

- **FN618 Nutrition & Immunity 3 credits**

This course explores relationships between human nutrition and immunity in the context of global infections that account for considerable morbidity and mortality worldwide. Nutrition and principles of innate, adaptive and cell-mediated immunity, the role of nutrition and the inflammatory processes and nutritional status and vaccine outcomes will be discussed.

- **FN619 Topic in Nutritional Education 3 credits**

Students learn the theoretical basis of effective nutritional education and develop effective nutrition communication skills through application in a variety of settings. This course provides hands-on experiences in counseling, educational program development, and oral and written communications.

- **FN620 Nutrition Counseling 3 credits**

This course covers the application of counseling and learning theories with individuals and groups in community and clinical settings and includes discussion and experience in building rapport, data assessment and interpretation, developing goals/outcomes, selecting learning activities, evaluation, and documentation.

- **FN621 Obesity and Diet Treatment 3 credits**

This lecture covers the overview of being overweight and obesity from a public health perspective, including epidemiology, measurement issues, and intervention approaches at individual, community, and policy levels.

- **FN622 Experimental Designs for Food & Nutrition Research 3 credits**
Students learn basic principles and techniques used in human and animal nutrition research. Students design, execute, and analyze experiments.
- **FN623 Community & Nutrition 3 credits**
This course addresses the application of the nutritional care process in the community, including assessment of community nutritional needs, agencies providing nutritional services and the role of the environment, food, food systems and nutrition on community nutritional health.
- **FN624 Community Nutrition Policy 3 credits**
This course examines nutritional policies and interventions to and improve nutritional well-being of individuals, families, and communities. Public and health care policies affecting nutritional care are discussed.
- **FN625 Sports & Nutrition Treatment 3 credits**
This course examines interactions between nutrition, exercise, and athletic performance. Application is made to various sports through critiques of research studies and evaluation of popular sports nutrition claims. As well, educational strategies for communicating with athletes, coaches, and trainers are addressed.
- **FN626 Nutrition and Physical Activity 3 credits**
This course explores the biological and physiological factors in interactions between nutrition, exercise, and athletic performance.
- **FN627 Advanced Foodservice Management 3 credits**
This course is an overview of basic management concepts, leadership, quality control, and service marketing as they relate to the successful operation of a food service in health care and other institutional settings.
- **FN628 Food Service Industry Management 3 credits**
Principles and techniques related to basic management, leadership, quality control, food costing, work methods, menu planning, food production systems, service, and human resource management of foodservices are studied.
- **FN629 Consumer Behavior 3 credits**
This course covers nature and determinants of consumer behavior. Attention is focused on the influence of socio-psychological factors such as personality, small groups, demographic variables, social class and culture on the formation of consumers' attributes, consumption and purchasing behavior.

- **FN630 Nutrition and Chronic Disease 3 credits**

This course provides the foundation for understanding nutrient related chronic diseases such as diabetes, birth defects, osteoporosis, obesity, and cardiovascular disease. The influence of diet on atherosclerotic heart disease will be covered with an emphasis on the role of dietary constituents proposed to have either toxic or preventive effects on the artery wall.

- **FN631 Nutrigenomics 3 credits**

Students learn basic human genetics and population genetics principles. Nutrigenomics is the science of how genes interact with nutrients. This course addresses the study of the response of humans to food and food components using genomics, proteomics and metabolomics approaches.

- **FN632 Foodservice Marketing 3 credits**

Students learn marketing-related overall activities including processes for creating, communicating, delivering, and exchanging offerings that have value for customers.

- **FN701 Seminar in Food and Nutrition 3 credits**

Students are expected to summarize, discuss, and present on the latest academic journals and publications in order for them to be able to read the recent trends of food and nutrition. Students read and learn how to critically analyze and interpret original articles published in a wide variety of journals. Students also learn how to make professional presentations and how to critique the presentations given by others.

- **FN702 Topics in Clinical Nutrition 3 credits**

This course covers the physiological aspects of clinical disorders, including symptoms, risk factors, biological pathology, and clinical management, as well as the role of nutrition in their prevention and treatment.

- **FN703 Metabolic Disorders and Diseases 3 credits**

This course will focus on the current approach on etiology, pathology, treatment, and prevention of congenital and acquired metabolic disorders and disease. Involvement of nutrients, co-enzymes, and vitamins and principle of diet that utilizes these is studied. A nutritional, genetic, biochemical, and molecular and cellular biological analysis on metabolic disorders and their characteristics as well as latest technology will be used to seek solutions through this course.

- **FN704 Nutrition and Gastrointestinal Diseases 3 credits**

It is the goal of this course to understand the clinical characteristics of various gastrointestinal diseases, and to research the nutritional prevention and

treatment after understanding the physiological and metabolic changes that result from gastrointestinal diseases. This course will aim to specifically focus on the unique aspect of the etiology and treatment methodology of gastrointestinal diseases in Korea, as well as discuss problems with nutrition and diet.

- **FN705 Current Topics in Nutrition 3 credits**

This course focuses on examining the current literature with an emphasis on topics not covered in other courses. The purpose is to develop in the student a critical approach to scientific information using student presentations and discussion.

- **FN706 Nutrition Counseling 3 credits**

Students learn the theoretical basis of effective health promotion communications and develop effective nutrition communication skills through application in a variety of settings. This course provides hands-on experiences in counseling, educational program development, and oral and written communications.

- **FN707 Current Nutrition Education 3 credits**

The importance of nutrition and diet in order to maintain a good nutritional status is emphasized. This course will go over the nutritional education theories, and discuss the issues surrounding them.

- **FN708 Public Health Nutrition 3 credits**

Public health nutrition is the major professional career track for nutritionists outside of dietetics. It deals with efforts to improve the diets and nutritional status of whole populations by working at the community and national levels. The course helps prepare students to work in public health nutrition by describing methods used in the assessment of nutrition problems, the development of nutrition-related policies, and the delivery of health, nutrition, and food assistance programs.

- **FN709 Recent Nutritional Issues of Korean 3 credits**

Recent nutritional issues of Korea will be researched and discussed through this class. Students will be expected to investigate and present plans to improve these issues.

- **FN710 Field Study in Nutrition 3 credits**

After learning about the various types and characteristics of nutritional investigation/research, The student will obtain practical and concrete experience through being exposed to the field by conducting nutritional investigation/research as well as doing analysis and evaluations on it.

- **FN711 Nutrition Policy 3 credits**

Student-led seminars will be based on recent food and nutrition policy controversies. Nutrition monitoring program, nutrition labeling, nutrition intervention projects, and nutrition program evaluation conducted toward the population will be studied. One or two relevant papers in food policy per course session will be discussed. Some papers/topics may be set before the start of the course and some can be proposed and chosen by the students during the course in order to encourage students to explore and share their interests. Guest speakers will also be invited

- **FN712 Computer Programs in Nutrition 3 credits**

Theory, application method, and direction for the future in developing computer programs for resolving nutritional issues such as nutrient-intake status, assessment of nutritional status, creating a diet menu, and nutritional counseling, are studied throughout this course.

- **FN713 Nutrition and Culture 3 credits**

By historically examining humanity's endeavor to maintain good health and understanding, the history of diseases, and the history of nutrient discovery, students will expand and enrich their knowledge/discernment in the field of nutrition.

- **FN714 Topics in Nutritional Assessment 3 credits**

Through methodological approach of nutritional assessment, latest topics on dietary intake research, clinical and biochemical research methods are studied. latest topics in nutritional selection and assessment of patients with chronic degenerative diseases will be researched, discussed, and required to give presentations in the form of projects.

- **FN715 Antioxidant nutrients 3 credits**

The generation of oxygen free radicals during cellular metabolism and by certain environmental factors, including lifestyle, appear to play a critical role in the aging process. High dietary intakes of antioxidant vitamins and phytochemicals are associated with better maintenance of physiologic function and a lower prevalence of many degenerative conditions in older adults. Understanding how antioxidants, especially the phytochemical carotenoids and flavonoids, reduce oxidative stress and impact the pathogenesis of chronic disease presents opportunities for health promotion and alternative therapeutic modalities for an aging population.

- **FN716 Molecular Epidemiology in Nutrition 3 credits**

This course is an introduction to basic techniques of molecular biology (DNA,

RNA, protein techniques) and their use in epidemiological research (e.g., diagnosis of disease, biomarker discovery and validation). This course addresses the monitoring method of various biomarkers at the levels of molecular biology and the relationship between chronic disease and nutritional biomarkers. Students will present and discuss a topic selected from the current research literature in nutritional epidemiology.

- **FN717 Nutritional Statistics 3 credits**

This course addresses the application of statistical techniques to data in nutritional sciences, including descriptive statistics; probability; normal, binomial, and Poisson distributions; sampling distributions; tests of significance; confidence intervals; analysis of frequency data; simple linear regression. Also, the biostatistical aspect of nutritional sciences is emphasized.

- **FN718 Hormone and Nutrition 3 credits**

This lectures provide a detailed study of the structure and function of hormones and the complex endocrine control of the metabolism in various nutritional statuses.

- **FN719 Advanced Cell Nutrition 3 credits**

This course provides principles of metabolic regulation in higher animals, integration of metabolic paths and fluxes. Also, advances in methods for studying metabolism. Iso, ranging from isotopic to molecular genetics techniques, will be discussed.

- **FN720 Cancer and Nutrition 3 credits**

This course is a basic introduction to cancer biology. Students will discuss normal cell growth and what can go awry, leading to tumors and cancer. What environment and genetic factors contribute to cancer? How is cancer treated and can it be prevented? The influence of diet on DNA damage, cancer, and aging will be discussed with an emphasis on micronutrient deficiencies as a major contributor to DNA damage, cancer, and aging.

- **FN721 Immune Response and Nutrition 3 credits**

This course explores relationships between human nutrition and immunity. Nutrition and principles of innate, adaptive and cell-mediated immunity, the role of nutrition and the inflammatory processes and nutritional status and vaccine outcomes will be discussed.

- **FN722 Advanced Nutrigenomics 3 credits**

This course addresses the overall concept related to human genetic and population genetics principles and the methods of integrating genetic principles

into nutritional studies. Students will learn the influence of genetic variation on nutrition by correlating gene expression or single-nucleotide polymorphisms with a nutrient's absorption, metabolism, elimination or biological effects.

- **FN723 Obesity and Nutrition 3 credits**

The goal of obesity treatment is to reach and maintain a healthy weight. This lecture covers overall treatment methods for obesity including dietary changes, exercise and activity behavior change, prescription weight-loss medications, weight-loss surgery, and changes lifestyle.

- **FN724 Nutrition and Brain Functions 3 credits**

This course examines the interrelationship between the nervous system and behavior development and explores the outcome from nutritional deficiency in brain function and behavior .

- **FN725 Nutrition during Pregnancy and Infancy**

Critical analyses of the impact of nutritional status on the mother, fetus, and young child in domestic and global contexts are performed including advanced aspects of the biological bases of nutritional requirements for reproduction, growth, and development.

- **FN726 Nutrition in Childhood and Adolescence 3 credits**

Students will examine dietary factors related to nutritional status in infancy, preschool, and school age children. Students also learn the contribution of nutrition education and school lunch program in a school curriculum.

- **FN727 Aging & Geriatric Nutrition 3 credits**

This course will examine nutritional needs and unique concerns to foster achievement and maintenance of optimal health during the adult and older years. This lecture covers principles of sound nutrition, as elucidated through current research, used to plan and implement recommendations for dietary change during these two stages of the life cycle.

- **FN728 Advanced Sports Nutrition 3 credits**

Students will examine interactions between nutrition, exercise, and athletic performance and consider biological, psychological, and sociological perspectives. Application is made to various sports through critiques of research studies and evaluation of popular sports nutrition claims.

- **FN729 Advanced Sports Nutritional Physiology 3 credits**

Students will examine the physiological changes in exercise and the effects of nutritional factors in improving exercise performance and health.

- **FN730 Advanced Sports Science 3 credits**

This course provides an introduction to the procedure of maintaining and improving health by improving exercise capacity.

- **FN731 Food & Nutrition Policy 3 credits**

This course examines major national food and nutrition policies in Korea and other countries. Nutritional monitoring projects, nutritional intervention projects, and other nutritional programs for specific population groups will be discussed.

- **FN732 Production & Operations Management for Food-service 3 credits**

This lecture provides an introduction to cost control in foodservice departments, procedures for controlling food, labor, and other variable costs. The application of principles related to food product selection, specification, purchase, and storage will be addressed.

- **FN733 Advanced Food-service Industry 3 credits**

Students will explore the historical and cultural development of the world food table. Principles and techniques related to basic management, leadership, quality control, food costing, work methods, menu planning, food production systems, service, and human resource management of foodservices in health care and other institutional settings are studied.

- **FN734 Advanced Food-service Development 3 credits**

The application of quantity food production and service management principles and procedures in foodservice operation is studied. Principles and techniques related to basic management, leadership, and human resource management of foodservices in health care and other institutional settings are also covered.

- **FN735 Strategic Management 3 credits**

This lecture covers an introduction to strategic management principles and practices with an application to human resources, operations, marketing, and financial management concepts. Case studies will be focused on as well.

- **FN736 Special issues in Food-service Marketing 3 credits**

This course addresses the application of services marketing principles for developing effective marketing strategies for food-service management and the development of a marketing plan.

- **FN737 Food Sanitation Management 3 credits**

This lecture covers food safety and sanitation for institutions, including food spoilage, foodborne pathogens, sanitation standards and regulations, and employee training in food sanitation. Hazard Analysis Critical Control Points (HACCP) is also covered.

- **FN738 Service Management 3 credits**

This course addresses the Introduction to the strategic service management to help create value for customers in food-service industry.

- **FN739 Kitchen Design and Space Development 3 credits**

Principles of organization and management applied to institutional food service systems: production and delivery systems, management of resources, quality assurance, equipment, layout, marketing, personnel management, fiscal management are studied.

- **FN740 Foundation of Fast Food Restaurant 3 credits**

This lecture addresses the strategic approach for a successful foundation of a restaurant including concept development, business planning, the procedure of restaurant foundation, menu development and management, promotion, and service management.

- **FN741 Nutrition and Molecular Techniques 3 credits**

This course provides the principles and experimental techniques of molecular biology(DNA, RNA, protein techniques) and their use in nutritional sciences research(e.g., diagnosis of disease, biomarker discovery and validation).

- **FN742 Cancer and Nutritional Molecular Biology 3 credits**

This course addresses the detailed mechanism of food-derived phytochemicals in the prevention of cancer through the signal transduction pathway.

2) Food Science

- **FN633 Carbohydrate and Lipid Chemistry in Foods 3 credits**

This lecture covers chemical features and properties of food carbohydrates including simple carbohydrates (sugars) and complex carbohydrates (starches and fiber), and lipids including fats, oils, waxes, and cholesterol. The analysis and purification methods of carbohydrate and lipid of foods covered.

- **FN634 Protein Foods 3 credits**

In this course, students will learn to use analytical techniques to determine the structure of protein, food composition and amino acids. Physical and chemical features of protein are also covered.

- **FN635 Analytical Methods in Food & Nutrition 3 credits**

This course provides principles of sample preparation and chemical and physical analysis of food components and nutrition ingredients using current methodology. Application of different chemical and physical methods for identifying food components and nutrition ingredients is covered as well.

- **FN636 Food Toxicology 3 credits**

Students will examine chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards is also covered.

- **FN637 Food Rheology 3 credits**

Food rheology is the study of the rheological properties of food, that is, the consistency and flow of food under tightly specified conditions. The consistency, degree of fluidity, and other mechanical properties are important in understanding how long food can be stored, how stable it will remain, and how food texture is determined.

- **FN638 Advanced Food Processing 3 credits**

This lecture covers principles of food preservation by chilling, freezing, dehydration, fermentation, and thermal processing. Processing methods to control microbial and enzymatic activity and to minimize chemical and physical deterioration of foods are also covered.

- **FN639 Quality Assessment of Food Products 3 credits**

This course examines quality assurance measurement techniques applied to selected food processed products. The rationale for establishing valid quality assurance programs including selection of samples at critical points will be studied, as well as statistical problems in quality assurance programs used by the food industry.

- **FN640 Advanced Food Enzymology 3 credits**

This lecture addresses principles of physical, chemical and catalytic properties of enzymes and their quantitative evaluation of reaction conditions on activity. Specificity and mechanism of action will be illustrated by use of selected enzymes.

- **FN641 Advanced Fermented Foods 3 credits**

This course deals with application of the principles of microbiology to the understanding of fermentation of various categories of foods.

- **FN642 Development of Functional Foods 3 credits**

This course offers principles and technology for the production of health functional food material and development of functional food.

- **FN643 Quality Control of Functional Foods 3 credits**

Students learn basic information about the processing and quality control of functional foods in this lecture.

- **FN644 Analytical Methods of Functional Foods 3 credits**

This course provides the overall analysis of functional foods to analyze the components of foods or tissues for the study of health functional foods.

- **FN645 Advanced Functional Foods 3 credits**

This course is an introduction to functional foods with additional value beyond basic nutrition including development of functional foods, novel sources, and traditional foods with value-added health benefit, regulatory issues, and media messages.

- **FN646 New Food Material 3 credits**

This course is a study on the development and strategy of new foods materials for solution of food depletion according to population growth.

- **FN647 Food Flavor and Color 3 credits**

This course provides an introduction to the measurement method for food flavor and color.

- **FN648 Food Quality Control 3 credits**

The Food Quality Management master study programme offers an integrated approach to the study and assessment of quality processes in the agrifood chain through an exclusively developed techno-managerial approach.

- **FN649 Food Products Marketing 3 credits**

Food products often involve the general marketing approaches and techniques applied in the marketing of other kinds of products and services. In food marketing, topics such as test marketing, segmentation, positioning, branding, targeting, consumer research, and market entry strategy, for example, are highly relevant.

- **FN650 Method in Food Evaluation 3 credits**

This course provides overall food evaluation methods, such as nutrition, ingredient and functionality of foods.

- **FN651 Natural Product Chemistry 3 credits**

This course provides resources and information for natural product chemistry.

- **FN652 Advanced Condiment Foods 3 credits**

This course offers Knowledge of condiment foods, such as fermented food and emulsified food.

- **FN653 Food History 3 credits**

Food history is an interdisciplinary field that examines the history of food, and the cultural, economic, environmental, and sociological impacts of food. Food history is considered distinct from the more traditional field of culinary history, which focuses on the origin and recreation of specific recipes.

- **FN654 Ecology of Foods 3 credits**

Healthy populations require healthy environments and sufficient nutrients to meet basic dietary needs. This course studies the interplay between food, ecology and nutrition.

- **FN655 Topics in Food Science 3 credits**

Food preparation and cookery involves many processes which are well described by food sciences. Understanding the chemistry and physics of cooking should lead to improvements in performance in the kitchen.

- **FN656 Advanced Traditional Foods 3 credits**

This lecture provides information related to Korean palace dishes for royal family and Korean traditional food.

- **FN657 Comparative Research on Culture and Diet 3 credits**

This course examines comparative research on culture and cuisine of each nation in the world.

- **FN658 Dietary Life History 3 credits**

This course covers the distinct and unique characteristics of dietary life history according to historical changes.

- **FN659 Research in Experimental Cookery 3 credits**

Students learn basic principles of chemical and physical reactions during various cooking procedures and treatments.

- **FN660 Sensory Evaluation of Food 3 credits**

This course provides an understanding of basic mechanisms of human sensory organs and principles of sensory test methods and procedures used to evaluate the flavor, color and texture of foods. Relationships between sensory and instrumental measurements of color and texture are also studied. The application of methods to various foods and bio-renewable materials is covered as well.

- **FN661 Food Design and Styling 3 credits**

This course provides an introduction to food design and food styling. Students practice food design and styling.

- **FN662 Advanced Functional Food 3 credits**

This course conducts education and research for the purpose of clarifying food components that contribute to the prevention or alleviation of diseases or that are related to the onset of diseases, and for the purpose of developing foods with nutraceutical functions and eliminating hazardous components from food products.

- **FN743 Advanced Food Microbiology 3 credits**

This course provides an introduction to microorganisms in food safety, spoilage, and production, food-borne disease agents and their control, growth parameter of food spoilage agents, destruction of microbes in food, food fermentations, and the development of microbes as a resource for the food industry.

- **FN744 Advanced Food Preservation 3 credits**

This lecture emphasizes the fundamental principles that underlie much of food preservation and manufacturing. Students will use a systems analysis approach to make connections between the chemical, physical and biological changes that occur in food processing and their impact on food quality. Topics include materials properties of foods, heat processing, freezing, concentration, and drying. Selected products serve as case studies for more complex manufactured foods.

- **FN745 Food Additives 3 credits**

Food additives are substances added to food to preserve flavor or enhance its taste and appearance. Some additives have been used for centuries. With the advent of processed foods in the second half of the 20th century, many more additives have been introduced, of both natural and artificial origin. This lecture covers the variety and standard and development of food additives.

- **FN746 Advanced Food Chemistry 3 credits**

This course addresses chemical aspects of food composition with an emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins and water.

- **FN747 Food Product Development 3 credits**

This course covers the necessity, quality evaluation and processing of new food development.

- **FN748 Food Flavors 3 credits**

Food flavor is widely used in the food field to enhance the natural fragrances of food such as confectioneries, ice cream, chocolate, biscuits, puddings, etc. Students will study the diversity, structure and purification of food flavors.

- **FN749 Food Biotechnology 3 credits**

Students will explore microorganisms in food safety, spoilage, and production, food-borne disease agents and their control, growth parameter of food spoilage agents, destruction of microbes in food, food fermentation and the development of microbes as a resource for the food industry.

- **FN750 Food and Culture 3 credits**

This course explore the origin of food from ecological, geographical, social and cultural views.

- **FN751 Recent Advances in Food Science 3 credits**

Students will discuss the current topics in food science. Topics vary and are chosen from scientific literature and popular press.

- **FN752 Food Marketing 3 credits**

This lecture provides an overall introduction to food marketing related to advertisement, sales, display, and the distribution system of food.

- **FN753 Food Materials 3 credits**

This course aims for students to be world class scientists who use the concepts of food material science to control the quality attributes such as texture, flavor, structures, and shelf stability of new or existing food products.

- **FN754 Advanced Food Analysis 3 credits**

This course introduces basic analytical techniques for food analysis and other biological analyses. it emphasizes fundamental principles of analytical chemistry, basic laboratory techniques, and modern instrumental methods. Also, it discusses gravimetric, volumetric, and spectrophotometric methods, gas chromatography, high-performance liquid chromatography, infrared spectra, and atomic absorption spectrometry.

- **FN755 Food Packaging and Design 3 credits**

This course provides overall principles of food packaging and design, including functions of packaging, properties of metal, glass, paper and plastic materials and packages. Packaging of fresh and processed foods including fruits and vegetables, dairy foods, beer and wine is also covered.

- **FN756 Advanced Lipid Chemistry 3 credits**

This lecture provides the chemical features and properties of lipids in food.

- **FN757 Food Research and Development 3 credits**

Students will examine new food product development, food constituents and functionality, ingredient functions and selection, sensory evaluation/application,

dietary guidelines and food regulations affecting product development, new product development project management, protecting innovations, and market testing.

- **FN758 Advanced Carbohydrate Chemistry 3 credits**

This lecture discusses the chemistry and properties of carbohydrates, the most abundant class of organic compounds found in cereals. The property of new material of carbohydrate food will be covered.

- **FN759 Advanced Protein Chemistry 3 credits**

This lecture focuses on new material development of protein food, chemical features of protein and the chemical reactions generated by food processing.

- **FN760 Special Topics in Food Immunology 3 credits**

This course provides basic information related to food allergies and immunologically-mediated adverse reactions to foods.

- **FN761 Advanced Food Sanitation 3 credits**

Food sanitation and safety is the practice of keeping foods from cross-contamination, storing perishable food at the appropriate temperature, and heating food to a temperature that will inhibit bacterial growth. Remember bacteria is always present and trying to keep it from growing is our goal.

- **FN762 Advanced Evaluation of Functional Food 3 credits**

Various functional foods, potentially possessing primary preventive effects on lifestyle related diseases, were designed and developed. Students will evaluate quality of functional foods using objective and sensory methods.

- **FN763 Advanced Food Quality Control 3 credits**

This course aims at providing basic and practical information on food characteristics and safety controls. To ensure that food supplies are safe, of good quality and can contribute to an acceptable nutritional and health status for all population groups. Food Quality Control is linked to improvement in the health of the population, potential for a country's economic development and reduction of spoilage and food losses.

- **FN764 Culinary Art and Culture 3 credits**

This lecture provides overall information about culinary art and culture and how cultures develop a unique cuisine that builds upon the geographical region's food supply. Imported foodstuffs and the society's technology are also covered.

- **FN768 Topics in Advanced Experimental Cookery 3 credits**

This course deals with the composition, physical and chemical changes, the effect of cooking mediums, temperatures, techniques and ingredients to the final products. Experimental preparation of foods to conform with current concepts of health will be investigated.

- **FN769 Applied Food Science 3 credits**

Applied food sciences specializes in the development and marketing of proprietary technologies used in foods, beverages, and nutritional supplements.

- **FN770 Research in Traditional Foods 3 credits**

This course explores Korean traditional food which WHO introduced as an exemplary food with an excellent nutritional balance, recipe, and variety.

- **FN771 Oriental Cuisine 3 credits**

This course examines foods and food materials of Asian nations such as China, Japan, Vietnam, etc.

- **FN772 History & Cultures of European Cuisine 3 credits**

This course is an introduction to European cuisine through a study of the theory and practices used in Europe. Terminology, ingredients, equipment and techniques will be covered.

- **FN773 Baking & Pastry Arts 3 credits**

This course provides students the skills to pursue careers as pastry chefs. This program will focus on the general skills required of all food service professionals from critical thinking and professionalism to an understanding of food safety, nutrition, and service, while emphasizing baking and pastry-specific skills.

- **FN774 Study of Food-service and Catering 3 credits**

Food service and catering as a management position in hotels, resorts, independent and multi-unit restaurant operations, and other areas within the global hospitality industry will be studied.

- **00000 Cell Technology 3 credits**

Cell biology provides research solutions for the academic, biotechnology and pharmaceutical industries using cell technology such as cell culture, cell fusion, and genetic works. This lecture introduces unique analyses that allow researchers to study cellular functions and bioactive compounds of cell or tissue specific events while maintaining morphology and architecture.

- **00000 Advanced Food Biochemistry 3 credits**

This course studies on the effects of handling, storage, and processing on the biochemical aspects of food tissues, systems, and bioactive compounds in the diet. Students in food science, food technology, biochemistry, and nutrition, will find much of great use and interest in biochemistry of postharvest, enzyme chemistry and technology, membrane biology and chemistry, cell biology, genetic expression, and pharmacological properties of food ingredients with an emphasis on the content of bioactive ingredients in foods.

- **00000 Topics in Fermented Foods 3 credits**

Genetics and cellular metabolism of industrial microorganisms, vitamin production, microbial production of amino acids, lactic acid, vinegar, beer and wine via plant /animal biotechnology and biotechnology of functional foods as well as the control for mass-production will be covered.