THEOPHANE VENARD SCHOOL OF BIOTECHNOLOGY

1. Basic Science Foundations

BS 1115 Basic Chemistry3 (2-3-5)

Atomic theory and electronic structure of atom, periodic table and periodic properties, bonding theory, stoichiometry, gases, solutions, acids and bases, oxidation-reduction reactions, chemical analysis including qualitative and quantitative analysis, steps involved in sample preparation, analysis techniques using volumetric methods, organic compounds, synthetic and natural organic polymers, and corresponding laboratory sessions.

BS 1116 Basic Biology 3 (2-3-5)

Life, prokaryotic and eukaryotic cell structure, and functions of organelle in the cells, cell division, and gamete production, pattern of inheritance, gene expression, energy and photosynthesis, animal cells and plant cells, ecology, behavioral science and evolution and corresponding laboratory sessions.

BS 1117 Basic Physics 3 (2-3-5)

Basic knowledge of physics, force and motion, Newton's laws and projectile motion, conservation of energy and momentum, fluids mechanics, internal energy and fundamental of thermodynamics, waves and sound, electromagnetism, electricity, light and color and introduction to advance physics for bioscience.

2. General Education

GE 1303 Science for Sustainable Future 2 (2-0-4)

The interrelationship of human beings, science, technology, and nature, natural resources utilization on future environmental challenges, the importance of natural capital and ecosystem services on sustainability, the importance of sustainable natural resources for future.

3. Core Biotechnology and Food Science

BT 2012 Introduction to Food Biotechnology 3 (3-0-6)

Role and importance of food biotechnology and processing of produce for added value product. Food innovation based on modern biotechnology industries, including medicine and agriculture, genetic Engineering, nanotechnology, waste management, biodegradation, patents, and laws related to biosecurity. Case study of the utilization of biotechnology and investment in food business.

FT 1005 Sustainability and Circular Living 3 (3-0-6)

Goal of sustainability, guidelines, and concept of Bio-Circular Green (BCG) economy including the importance and benefits of BCG to business, society, and the environment.

FT 2001 Genetic inheritance and Molecular Genetic in Food application 3 (2-3-5)

Principles of classical genetics, Mendel's principles, exception of Mendel, chromosome mapping, molecular genetics which includes the structure and functions of DNA, extra chromosomal

inheritance, central dogma, control of gene expression, evolutionary genetics, and quantitative and qualitative genetics. Introduction to genetically modified (GM) foods and its safety, detection of genetic contaminants using PCR and other food applications along with corresponding laboratory sessions.

FT 2003 Foods Changing the World 3 (3-0-6)

The appreciation and connection of food as a cultural force. Revolution History through food and drink. Social structure in dimension of consumption, food culture, food and conflict in world history. A challenge of food on health and sustainability. Industrial farming, agricultural subsidies, and diminishing water supplies.

FT 2003A Foods Changing the World (Part A) 2 (2-0-4)

The appreciation and connection of food as a cultural force. Revolution History through food and drink. Social structure in dimension of consumption, food culture, food and conflict in world history

FT 2003B Foods Changing the World (Part B) 1 (1-0-2)

A challenge of food on health and sustainability. How the food system is broken. Industrial farming, agricultural subsidies, and diminishing water supplies.

4. Food Chemistry and Composition

FT 2007 Food Composition and Analysis 3 (2-3-5)

Food system and structure. Basic food components, water, carbohydrate, protein and lipid, their chemistry governing properties and functions in different foods, changes of food components during processing and storing, food additives, phytochemicals, trend and innovation in food system and composition and corresponding laboratory sessions.

FT 3119 Advanced Food Physical and Chemistry 3 (2-3-5)

Theory and application of physical and chemical methods for determining the constituents of foods, innovative separation, and various instrumental analysis techniques.

5. Food Processing and Innovation

FT3117 Food Processing Innovation and Technologies

FT 4157 Advanced Food Processing Innovations and Technologies 3 (2-3-5) Innovative system and its integration in the preparation, production, optimization, and scale-up to create the high production rate, flexibility, and efficiency food production process.

6. Industrial Applications

FT 4147I ndustrial Fermentation Innovation and Products 3 (2-3-5)

Use of microorganism for producing important industrial fermentation products, metabolic regulation of the pathways that generate products from yeast and other microbial fermentations for industrial applications, with corresponding laboratory sessions.

FT 4145 Packaging Design Innovation 3 (3-0-6)

Innovation of packaging, function, importance, identity, advertising, safety, and communication. Developing and executing materials, concepts, and graphics appropriate for effective packaging, including creative design process, technical and production areas of packaging and label design.

7. Food Product Development and Consumer Insights

FT 4146 Food Product Design and Development 3 (2-3-5)

Prerequisite: FT 3117 Food Processing Innovation and Technologies

New products idea and new product development process for food industry and its concept generation using design thinking techniques and tools, how to convert its concept into actual product ready for commercialization which include idea screening, product concept development, product formulation and process development, product quality testing, shelf-life evaluation, product launching and evaluation, food entrepreneur cases, and corresponding laboratory sessions.

FT 4149 Sensory Marketing and Consumer Behavior 3 (3-0-6)

Concept of marketing uses five senses (sight, smell, taste, sound, and touch) to influence buying behavior. Principles of how psychological, sociological, personal, and cultural factors influence buying behavior.

8. Food Quality and Regulation

FT 4143 Food Quality and Regulation 3 (2-3-5)

A general overview of the laws, regulations, practical applications and standard of the food quality and safety system, food laws and regulations including Thai and/or international regulatory compliance, codex, risk analysis, nutritional labeling and food quality and safety system (GMP, HACCP, ISO 22000 etc.) and corresponding laboratory sessions.

9. Specialized Skills and Techniques

FT 4144 Food Ingredients Functionality 3 (3-0-6)

Overview of ingredients and their applications, relationships between the structure of food ingredients and their techno-functional and bio-functional properties, influence of process on the food structure and food properties, food ingredients design, and ingredient modification to improve food functionality.

BT 3020 Design Thinking and Research Design

10. Biopharmaceuticals

FBT 4004 Biopharmaceuticals 3 (2-3-5)

Primary difference between biopharmaceuticals and traditional pharmaceuticals, biopharmaceutical classification system, drug discovery and drug development, recombinant technology, types of biopharmaceuticals, delivery of biopharmaceuticals, biopharmaceutical technology and manufacturing, characterization techniques of biopharmaceuticals, bioactivity determination of bioactive compounds, proteomics and molecular modeling, and corresponding laboratory sessions.

11. Major Elective Courses (choose one)

FT 4163 Dairy and Plant-Based Dairy Alternatives Innovation 3 (2-3-5)

Milk biosynthesis and factors affecting milk biosynthesis. Chemical, physical, and microbiological properties of milk and milk products, spoilage, storage, and processing methods of milk products. Determination of milk quality and standards of milk and milk products as well as dairy plant sanitation and plant-based dairy alternatives innovation.

FT 4166 Bitter n Sweet Sonata 3 (2-3-5)

Chocolate, confectioneries and Thai desserts, sweets fusion, chocolate drink, coffee, and tea; categories, process, brewing, taste, coffee/tea culture, and the pairing of bitter drink with sweets.

FT 4162 Bakery Technology and Entrepreneur Management 3 (2-3-5)

Type and properties of baking ingredients; formula balance, bakery products, processing and their keeping qualities, packaging and storage, quality control and management of industries, including bakery business plan and bakery business preparation.