

Course Description of Food Science and Technology Program

Foundation Courses

ICMA 100 Foundation Mathematics 0

Prerequisites: Placement test

Expressions and equations; linear functions; polynomials and nonlinear functions; radical and rational functions; data analysis

ICME 100 English Resource Skills 0

Prerequisites: Placement test

A remedial course preparing students to read and write academic English at a level suitable for entering the Intermediate English Communication I

General Education Courses

English Communication

ICGC 101 Academic Writing and Research I 4

Prerequisites: Placement Writing Test

An introduction to the academic writing process through the development of the writer's voice through sentencing, structure, and rhetorical devices; focus on strategies for using and integrating researched sources; methods to compose well-structured essays based on themes relevant to the world today

ICGC 102 Academic Writing and Research II 4

Prerequisites: ICGC 101 Academic Writing and Research I

The integration of skills in academic research and writing to analyze and create persuasive compositions; techniques to identify strengths and weaknesses in argument; development of students' knowledge and preconceptions of global issues through a progressive series of essays and journal assignments

ICGC 103 Public Speaking 4

Prerequisites: ICGC 102 Academic Writing and Research II

Fundamentals of key skills for confident and effective public speaking through a series of prepared and unprepared speeches; introduction and application of techniques to inform/persuade audiences; utilization of Academic Writing and Research I and II to create and deliver speeches to a professional standard

ICGC 111 Academic Writing and Research I (Advanced) 4

Prerequisites: Placement Writing Test

Theories and practical methods to enhance students' creative and descriptive abilities; emphasis on the development of a writer's voice through sentencing, structure, and rhetorical devices; strategies for using and integrating researched sources are introduced by way of explaining theories; concepts and writing conventions

- ICGC 112 Academic Writing and Research II (Advanced) 4**
Prerequisites: ICGC 111 Academic Writing and Research I (Advanced)
A focus on high levels of academic literacy and presentation skills in reading, writing, and public speaking for experts or near-expert users of English; utilization of advanced strategies to exploit secondary research and argumentation; application of advanced skills in critical thinking and rhetorical knowledge through class discussions and written and oral assignments
- ICGC 201 Global Realities 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
An exploration and a critical analysis of key texts on poetry, literature, and legislative documents in order to understand the complexity and challenges of the world we live in; themes encouraging students to consider values, human rights and government; class discussions, journal writing, and presentation activities to demonstrate how students can contribute to the betterment of society
- ICGC 202 Literary Analysis 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
A review of literary works from selected literary genres; an exploration of how literature informs our perceptions of the world by way of analytical and critical thinking; an analysis of short stories, poetry and drama; scaffolding of strategies for students to understand the function of a variety of literary forms
- ICGC 203 Creative Writing 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
An examination of fictions, poetry, drama, and the media production through readings, speeches and films; comparisons of writing in different genres; a creation of the work of publishable quality by means of the consideration of audience and genre
- ICGC 204 Advanced Oral Communication 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
Theories of persuasion, non-verbal techniques, and voice control for advanced presenters; strategies to develop high levels of voice control and expressions; activities including debates, presentations, and occasional speeches; the development of students' abilities to express themselves confidently in a variety of academic and professional environments through impromptu and prepared speeches
- ICGC 206 Literature Into Film 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
An introduction to the technical aspects of translating literature into films; an exploration of the interplay between literature and films through an analysis of short stories, novels, and plays and their film versions; an exploration of the challenges merging both mediums

- ICGC 208 Language and Culture 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
An examination of the interplay between language and culture; having texts and class discussions to focus on the importance of understanding the link between culture and languages; a completion of a research paper on the topic
- ICGC 210 First and Second Language Acquisition 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
An introduction to how children develop their first language; comparing and contrasting of the second language development; theories of language development from behaviorism to more recent cognitive and functional approaches; the implications of theories
- ICGC 211 Topics in Comparative Literature A: Poetry 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
An in-depth study of poetry, including: metrics, forms, themes, ethnic voices, throughout history; an evaluation of poetry from different genres through a series of discussions, workshops and a term research paper
- ICGC 212 Topics in Comparative Literature B: The Short Story and the Novel 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
A study of elements of fictions in short stories and novels through class workshops on characters, dialogue, plot and atmosphere; class discussions to analyze the effect of historical and social developments on selected themes
- ICGC 213 Topics in Comparative Literature C: Drama 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
An exploration of ways to understand and appreciate drama by reading, watching, and analyzing theatrical performances; staging and enactment of a theatrical production; readings, essays, and theater workshop activities to prepare students for a final stage performance
- ICGC 214 Literary Non-fiction 4**
Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)
Exploration of creative nonfiction, a flourishing genre of writing a step away from academic work; reading of compelling, informative, and insightful but also entertaining, imaginative, and risky nonfiction work; overview of various techniques utilized within this field of writing and media; analysis and response to a variety of texts

ICGC 215 Writing for Research 4

Prerequisites: ICGC 103 Public Speaking or ICGC 112 Academic Writing and Research II (Advanced)

A student-centric approach to developing research writing skills; an overview of the conventions of the world of research with an emphasis on academic honesty and academic style; use of sample papers to provide students with models to prepare effective abstracts, literature reviews, research paper outlines and short academic articles

Life Appreciation

ICGH 113 Moving Pictures: A History of Film 4

Prerequisites: -

An investigation of European, American and Asian film as art, philosophy, social commentary, propaganda, self-expression, well-being and social harmony; a focus not only on techniques, style and technological advances but on interpretation, comparison and criticism

ICGH 117 Drawing as Creative Expression 4

Prerequisites: -

Develop creativity and cognitive learning; utilize visual communication, design and art principles; experience multiple tools, techniques, medium, experimental mark making; research, analysis, observation, gesture, principles and elements of design and composition; examine, analyze, observe and reinterpret the human figure, plant and still life forms; research, interpret, evaluate, analyses contemporary artists; personal evaluation; personal expression

ICGH 118 Photography Visualizing in the Digital Age 4

Prerequisites: -

Basic skills and aesthetic principles of photography, how the camera works, types of cameras and digital image capture, techniques in taking pictures, in camera editing, specialized forms of photography, simple editing adjustments, the aesthetics of picture taking

ICGH 119 Listen! Soundscapes, Well-Being and Musical Soul Searching 4

Prerequisites: -

An examination of sound and music as sources of pleasure, aesthetic experience, well-being as well as stress; discussion of music's expressivity and the emotions it induces; cases studies linking music experience to aspects of perceptual training, personal development, public health and the appreciation of nature

ICGN 105 Ecology, Ecosystems and Socio-Economics in Southeast Asia 4

Prerequisites: -

Human impacts on Southeast Asian ecology; human impacts on Southeast Asian's biodiversity and natural resources; fundamental ecological and resource management principles; current sustainable development issues; sustainable development practices for Southeast Asia

ICGN 108	Essentials of Culinary Science for Food Business	4
Prerequisites: -		
Changes during preparation, heating, and storage of raw materials and of finished products, foodservice and commercial packaged food industries; chemical, sensory, and nutritional natures of food, food safety concepts, changing trends and interests, legal requirements of food establishment		
ICGN 109	Food for Health	4
Prerequisites: -		
Knowledge of general human nutritional requirements; the health benefits of various foods; quality and safety of the various types of food including processing; health and nutritional value		
ICGN 110	Maker Workshop	
Prerequisites: -		
Mechanical design consideration, 3D drawing, safety in design; motion in 1 and 2 Dimension; sound and oscillation motion, mechanical properties of materials; basic electronics, circuit analysis, soldering; microcontroller, basic programming		
ICGN 112	Stargazer	4
Prerequisites: -		
Basic ideas of astronomy, astrophysics and cosmology; the progress of human understanding of the universe; the impact of scientific method on astronomical observation; the Earth & Moon; the Solar System; the lifecycle of stars; Black Holes; galaxies; and the current understandings about the origins and future of the universe		
ICGN 113	Plants, People and Poisons	4
Prerequisites: -		
The plant world; the way plants grow and reproduce; modern technologies used for improving agricultural methods; the basics of plant biology; the distinctions among major groups of plants; the social implications of plant use and abuse		
ICGN 115	Human Evolution, Diversity and Health	4
Prerequisites: -		
Changing modern society; human ability; human body; human distinctiveness; human diversity; human evolution; human health; human origins; primate diversity; scientific advancements		
ICGN 120	Chemistry of Cosmetics and Dietary Supplements	4
Prerequisites: -		
Chemistry of cosmetic products; basic sciences behind common aesthetic medical procedures; basic biochemistry of human skins; basic functioning of vitamins, minerals, and specialty supplements		

ICGN 124	Climate Change and Human Society	4
Prerequisites: - Human activities and the global climate; consequences for human society; consequences for the essential life support systems; perspectives on human health and diseases; adapting to global climate change; mitigating global climate change; an optional field visit included		
ICGN 125	Games and Learning	2
Prerequisites: - History of games, combinatorial games, games of chance, game theory		
ICGP 101	American Flag Football	1
Prerequisites: - A ball based sport course emphasizing techniques, non-contact game play, including dodging, throwing, and catching and development of teamwork management, communication, and terminology		
ICGP 102	Badminton	1
Prerequisites: - A racket based sport course stressing technique, strategies, grip, serving, positioning and movement, game play in both singles and doubles		
ICGP 103	Basketball	1
Prerequisites: - A ball based sport course emphasizing attentiveness, dribbling, passing, shooting, rebounding, ball control, game play, and development of game strategies		
ICGP 104	Body Fitness	1
Prerequisites: - A comprehensive course in one or more exercise techniques: strength/resistance, cardio, plyometric, stretching, high-intensity interval training, and calisthenics; to maintain health and wellness		
ICGP 105	Cycling	
Prerequisites: - A course designed on cycling instruction for safety, fitness, riding techniques, posture, communication, knowledge of equipment and hazards, for recreational and commuter cycling		
ICGP 106	Discover Dance	1
Prerequisites: - A dance based course of current forms and techniques in one or more categories: African/Jazz, Worldwide Dances/Latin Dances, Professional Performance Dance, Modern Dance, Hip-hop/Funk		
ICGP 107	Golf	1
Prerequisites: - A club based game course designed on developing correct grip, stance, posture, swing, and knowledge of equipment, rules, regulations, and etiquette		

ICGP 108	Mind and Body	1
Prerequisites: -		
A course stressing meditation postures, techniques, movement, and breathing to achieve positive mental state		
ICGP 109	Selected Topics in Sports	1
Prerequisites: -		
Learning concepts, rules and strategies through planned and structured movements by way of sport or activity to enhance a healthy lifestyle		
ICGP 110	Self Defense (Striking)	1
Prerequisites: -		
External martial arts (striking) course emphasizing hard physical impact and exertion, muscular strength and tension, maximizing speed and power, through body coordination		
ICGP 111	Self Defense (Grappling)	1
Prerequisites: -		
Internal martial arts (grappling) course stressing timing, awareness, precision, and techniques, using body leverage for throws, take downs, pins, and submissions		
ICGP 112	Soccer	1
Prerequisites: -		
A ball based sport course stressing alertness, ball control, including dribbling, passing, trapping, shooting, ball movement, game play, and development of strategies through drills and competitive play		
ICGP 113	Social Dance	1
Prerequisites: -		
A dance based social sport or activity course of choreographed movements, styles and regulations from International Ballroom (Standard) and International Latin dances		
ICGP 114	Swimming	1
Prerequisites: -		
A water based sport course stressing swimming techniques, breathing, and knowledge of buoyancy, propulsion, and water safety		
ICGP 115	Tennis	1
Prerequisites: -		
A racket based sport course of techniques, strategy, grip, serve, game play, ball tracking, timing, shot control, through drills, live ball hitting sessions, and competition		
ICGP 116	Volleyball	1
Prerequisites: -		
A ball sport course emphasizing passing, setting, serving, developing strategies, positions, game play, teamwork management, and communication		

ICGS 102 Business Sustainability and the Global Climate Change 4

Prerequisites: -

Study on the role of business in the society; the basic concept of sustainability; global governance; sustainable development; social inequalities and social inclusion; environment sustainability; climate change; climate change mitigation; climate change adaptation; green marketing; business sustainability

ICGS 115 Sociology in the Modern World 4

Prerequisites: -

Sociology as a principle for understanding the modern world, life appreciation; a field of study explaining social, political, and economic phenomena; social interactions and social organizations; sociological perspectives; methodologies and sociological insights; topics relevant to the modern world including culture, socialization process, family, social inequality, gender relations, racism, ageism, modern media, and social change; global social problems; evaluation of societies; influencing and improving life's quality

ICGS 125 American History, Popular Media and Modern Life 4

Prerequisites: -

Exploring modern American history through the lense of popular media and the state's power projection through hard and soft power; introducing the concept of life in the roaring twenties and the Great Depression, investigating available media sources during the war time from World War I, World War II, and the Cold war; understanding historical events impacting the American life including feminist and LGBT movement, the Vietnam War, African-American civil rights movement; discussing the importance modern digital media platforms and social media

ICGS 126 Introduction to Psychology 4

Prerequisites: -

Human behaviour and mental functioning; the nervous system; consciousness; sensation and perception; psychogenetics, life-span development; thinking, memory, language, conditioning and learning, motivation, personality, and stress

ICGS 127 Positive Psychology 4

Prerequisites: -

Concepts of success; societies emphasis on financial wealth and the accumulation of material things versus the importance of having a loving family, developing rewarding relationships with friends and colleagues; career achievement and the respect of others; regularly feeling positive emotions, developing morally and spiritually, engaging in worthwhile activities; staying physically fit; success as a multi-faceted and intensely personal concept; the exploration of well-being from the field of positive psychology; developing understanding of what comprises a successful life with an emphasis on greater self-expression and overall well-being

ICGS 128 Global Gastronomy and Cuisines 4

Prerequisites: -

Understanding the interconnection between gastronomy, culture, society, and local and global food systems; highlighting the global food production and consumption trends; examining diverse cultures through the food and food preparation; emphasis on multicultural context in cooking practices; understanding the current trend in various healthy diets and cuisines

ICGS 129 Tea Studies 2

Prerequisites: -

What is tea, main tea varieties, main tea types, climatic conditions for sustainable growth of tea, important tea growing countries and regions, tea processing, tea and health, tea tasting and evaluation, tea utensils and preparation, tea and food pairing

ICLL 100 Self Development 2

Prerequisites: -

Life skills for 21st century workplace through learning or training activities in various topics including creativity, growth mindset, leadership, and emotional intelligence or other selected personal development activities approved by the academic advisor and Curriculum Administrative Committee

Global Citizenship

ICGH 116 World Cinemas 4

Prerequisites: -

An introduction, practice and an application of languages to critical thinking and analysis of key world cinema texts; principal critical methods and theoretical debates of film theory; theoretical perspectives including structuralism, semiology, Marxism, feminism, psychoanalysis, post-structuralism, and cultural studies; questions of narrative and narration, realism, formalism, modernism, postmodernism, postcolonialism, gender, sexuality, and ideology

ICGH 120 Thai and ASEAN Cinema 4

Prerequisites: -

An introduction, practice and an application of languages to critical thinking and analysis of Thai and ASEAN film texts; examine key film languages and textual examples, including narrative theories; genre, film theories; an analysis of key film texts; the development of skills in research, writing and analytical thinking

ICGH 121 The End of the World? Development and Environment 4

Prerequisites: -

An integrated and system oriented view on applied ethics with an eye on development, the environment and technology; emphasis on the intersection between the central notions of justice, nature and technology, particularly under consideration of sustainability; critical analysis of current states of affairs in terms of diverse political traditions, the history of colonialism and the dialectic between globalization and segregation; examples and cases studies include issues of public health, education, food technology, global institutionalization, energy management, the international monetary system, trade, labor migration, and violations of human rights

ICGH 122 Introduction to Asian Philosophy 4

Prerequisites: -

A differentiation between the main schools of Asian philosophy, including Buddhism, Hinduism, Confucianism, Taoism, Jainism, among others; summaries of foundational concepts and themes; the influences of these philosophies on the beliefs and cultures as well as the politics, economics and legal frameworks around the world

ICGH 123 Faiths, Ecological Justice, and the Tropical Rainforests 2

Prerequisites: -

Biological diversity; ecological justice; environmentally ethical actions; environmental justice; faiths; indigenous peoples; impacts; interconnection; interdependence; religions; religious diversity; social equity; social justice; threats; tropical rainforests

ICGL 101 Elementary German I 4

Prerequisites: Placement test

Greetings, introducing oneself or others, German alphabet and phonemes, personal information, numbers from 1 – 100 and price quotations, expressing wishes, telling the time and making appointments, quality of items, measurements; verb forms, pronouns, sentence structure, gender of nouns, accusative case and plural forms, negation

ICGL 102 Elementary German II 4

Prerequisites: Placement test or ICGL 101 Elementary German I

Ordering and paying for meals in a restaurant, preferences of food and drinks, giving and asking for directions, reading a map, preferences of work conditions, job advertisements; essay writing, yes/no questions, imperative forms, compound verbs, preposition with dative case, modal verbs I, German sentence bracket

ICGL 103 Elementary German III 4

Prerequisites: Placement test or ICGL 102 Elementary German II

Health advice and problems, healthy and unhealthy lifestyles, events and accidents, travel reports, curriculum vitae (CV); possessive articles in nominative, accusative and dative case, perfect tense, connectors, modal verbs II

ICGL 111 Elementary Japanese I 4

Prerequisites: Placement test

Hiragana and Katakana characters; fundamentals of basic Japanese grammar (noun-ending sentences, particles, demonstratives, verb-ending sentences, non-past and past tenses); scaffolding of basic vocabulary; basic communication about personal topics (self and others); description of Japan; designing written products in the target language; expressing existence, preferences, and agreement; comparing cultures

ICGL 112 Elementary Japanese II 4

Prerequisites: Placement test or ICGL 111 Elementary Japanese I

Kanji characters (approximately 50); fundamentals of basic Japanese grammar concepts (particles, verbs of giving and receiving, na-adjective-ending sentences, i-adjectives-ending sentences, non-past and past tenses, and classifiers); scaffolding of basic vocabulary; basic communication about daily life topics; designing written products in the target language; expressing simply points of view, describing people and daily life activities; comparing cultures

ICGL 113 Elementary Japanese III 4

Prerequisites: Placement test or ICGL 112 Elementary Japanese II

Kanji characters (approximately 50); fundamentals of basic Japanese grammar concepts (verb conjugation (masu-form, te-form, nai-form, and dictionary form), and related sentence patterns; polite style of speech, and plain style of speech, particles); scaffolding of basic vocabulary; basic communication about various topics; designing written products in the target language; expressing points of view, describing people and various activities; comparing cultures

ICGL 121 Elementary French I 4

Prerequisites: Placement test

Fundamentals of basic French grammar (pronouns, present tense conjugation, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); identifying and describing French speaking countries; designing written products in the target language; expressing existence, preferences and agreement; comparing cultures

ICGL 122 Elementary French II 4

Prerequisites: Placement test or ICGL 121 Elementary French I

Fundamentals of basic French grammar (present and future tense, adjective gender, place & agreement, more complex prepositions, more complex questions); scaffolding of simple vocabulary; simple communication about daily life topics (in France and in their country); designing written products in the target language; expressing simply point of view, describing people and daily life activities; comparing cultures

ICGL 123 Elementary French III 4

Prerequisites: Placement test or ICGL 122 Elementary French II

Fundamentals of more complex French grammar (present and future tense, adjective gender, place & agreement, more complex prepositions, questions and past tense notions); scaffolding of more complex vocabulary; longer communication about daily life topics (in France and in their country); designing written products in the target language; expressing point of view, describing people and daily life activities; comparing cultures

ICGL 131 Elementary Chinese I 4

Prerequisites: Placement test

The Chinese phonetic system (Pinyin); the Chinese basic writing system (Stroke order); Chinese characters (approximately 100); fundamentals of basic Chinese grammar (interrogative pronouns, the 的 particle, yes/no questions with 吗, demonstrative pronouns, classifiers, adverbs 也, 都); scaffolding of basic vocabulary; basic communication about personal topics (self and others); describing China; designing written products in the target language; expressing existence, preferences and agreement; comparing cultures

ICGL 132 Elementary Chinese II 4

Prerequisites: Placement test or ICGL 131 Elementary Chinese I

The Chinese phonetic system (Pinyin); the Chinese writing system; Chinese characters (approximately 100); fundamental Chinese grammar concepts (interrogative pronouns, classifiers, the “的” particle, “的” phrases, adverbials, continuous action sentence structures and reduplication of verbs); scaffolding of basic vocabulary; basic communication about daily life topics; designing written products in the target language; expressing simply points of view, describing people and daily life activities; comparing cultures

ICGL 133 Elementary Chinese III 4

Prerequisites: Placement test or ICGL 132 Elementary Chinese II

The Chinese phonetics (Pinyin); Chinese characters (approximately 150) ; Fundamentals of basic Chinese grammar concepts (interrogative pronouns, modal verbs, complex sentences, the modal particle “了” (了), complements of state, complements of result, complements of duration); scaffolding of basic vocabulary; basic communication about various topics; designing written products in the target language; expressing points of view; telling directions; describing oneself and other people’s abilities; comparing cultures

ICGL 141 Elementary Spanish I 4

Prerequisites: Placement test

Fundamentals of basic Spanish grammar (pronouns, present tense conjugation, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); identifying and describing Spanish speaking countries; designing written products in the target language; expressing existence, preferences and agreement; comparing cultures

ICGL 142	Elementary Spanish II	4
Prerequisites: Placement test or ICGL 141 Elementary Spanish I		
Fundamentals of basic Spanish grammar (pronouns, present tense conjugation, reflexive verbs, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); identifying and describing Spanish speaking countries; designing written products in the target language; expressing existence, preferences and agreement; talking about daily habits		
ICGL 143	Elementary Spanish III	4
Prerequisites: Placement test or ICGL 142 Elementary Spanish II		
Towns, quarters and cities; directions; past experiences; present perfect tense, past tense indefinido; verbs ser, estar and hay; vocabulary of places; time markers for past tense; verbs empezar a+ infinitive; verbs ir / irse		
ICGL 160	Introduction to Thai Language and Culture	4
Prerequisites: -		
Fundamental vocabularies and structures for various communicative situations in everyday use and introduce basic aspects of Thai culture		
ICGL 161	Elementary Thai I	4
Prerequisites: Placement test		
Listening and speaking skills on the following topics: introducing oneself one's friend and family, basic food and drink ordering, places, directions, transportation, buying tickets, clothing items, colours, and sizes, bargaining, counting and using classifiers, reading and writing Thai consonants, vowels placed after, before, above, and below the consonants, Thai numbers, live and dead syllables		
ICGL 162	Elementary Thai II	4
Prerequisites: Placement test or ICGL 161 Elementary Thai I		
Listening and speaking skills on the following topics: one's schedule, making appointments, favorite leisure activities, ordering food, drinks and desserts with special requests, presentation of one's plan for activities during school break, continuation of Elementary Thai I in reading and writing skills, consonant clusters, tone marks, words with special spelling rules, reading short paragraphs		
ICGL 163	Elementary Thai III	4
Prerequisites: Placement test or ICGL 162 Elementary Thai II		
Listening and speaking skills on the following topics: going to see the doctor, looking for a house for rent, seasons, travel and festivals		
ICGL 170	Diversities in Multilingual Societies	2
Prerequisites: -		
Multilingual societies; cultural diversities; cross-cultural communication; Chinese-, German-, French-, Japanese, and Spanish-speaking cultures; Chinese-, German-, French-, Japanese, and Spanish languages; cultural conflicts; cultural gaps; cultural shocks; cultural discoveries; cultural awareness; cultural harmonies; foreign visitors to Thailand; working with Thai people		

ICGL 201	Pre-intermediate German I	4
Prerequisites: ICGL 103 Elementary German III or Placement Test		
Clothing and accessory, appearance, shopping for clothes and accessory family members, present and past families, statistics, festivities and culture, dates, presents; comparative forms of adjectives, modal verbs past tense, dependent clauses (cause and condition), personal pronouns, accusative and dative cases		
ICGL 202	Pre-intermediate German II	4
Prerequisites: ICGL 201 Pre-Intermediate German I or Placement Test		
Media usage and Internet-shopping, advertisement, expressing surprise, meeting someone for the first time, country and city life, cultural capitals in Europe; direct and indirect questions, adjective without article, relative clause and pronoun, modal verb in simple past, sub-clause with als		
ICGL 203	Pre-intermediate German III	4
Prerequisites: ICGL 202 Pre-Intermediate German II or Placement Test		
Professional biographies, job announcements, festivities and customs, emotions, movie synopsis, products and inventions; reasons with weil and denn, nominalization, preposition with dative, sub-clause with wenn and um zu, passive voice		
ICGL 211	Pre-intermediate Japanese I	4
Prerequisites: ICGL 113 Elementary Japanese III or Placement Test		
Kanji characters (approximately 50); fundamentals of basic Japanese grammar concepts (verb conjugation (masu-form, te-form, nai-form, and dictionary form), and related sentence patterns; polite style of speech, and plain style of speech, particles); scaffolding of basic vocabulary; basic communication about various topics; design of written products in the target language; expressing points of view, describing people and various activities; comparing cultures		
ICGL 212	Pre-intermediate Japanese II	4
Prerequisites: ICGL 211 Pre-Intermediate Japanese I or Placement Test		
50 Kanji characters; explaining the state of things; describing necessary things to do in advance as preparations for the future; expressing own intentions, plans, and schedule; expressing own guess and inference; asking someone to take a message or conveying a message; stating standards or norms, when one explains the manner of doing a certain action or work; explaining a condition in which a certain action is performed; stating everyday habitual actions		

ICGL 213 Pre-intermediate Japanese III 4

Prerequisites: ICGL 212 Pre-Intermediate Japanese II or Placement Test

50 Kanji characters; expressing judgments under certain conditions; stating a purpose or an aim; describing changes in human ability and conditions; describing an action performed by a third person, or an action when one feels annoyed or troubled, using passive verbs; expressing something with the most important information emphasized; describing natural phenomena, happenings, and events, together with their causes; clearly telling what speakers consider as questions, by using a question with an interrogative as a component of a sentence; using appropriate expressions for giving and receiving of things and actions, depending on the relationship between the giver and the receiver, in terms of social status; telling usage, evaluation, necessary time, expense, etc.

ICGL 221 Pre-intermediate French I 4

Prerequisites: ICGL 123 Elementary French III or Placement Test

Developing further knowledge of French grammar at the pre-intermediate level (present, past and future, more complex interrogative sentence, negative sentence, comparative and pronouns); scaffolding of more complex vocabulary; more complex and longer communication about personal needs, solving simple problems; interacting in predictable context topics in French; designing written products in the target language; expressing points of view, giving simple advices and interacting in daily life activities; comparing cultures

ICGL 222 Pre-intermediate French II 4

Prerequisites: ICGL 221 Pre-Intermediate French I or Placement Test

Extending further knowledge of French grammar at the pre-intermediate level (hypotheses and conditions, future, conditional, pronouns, direct and indirect speech, imperative and gerundive); scaffolding of more complex vocabulary; longer communication about solving problems and expressing feelings; commenting on attitudes and justifying actions in predictable context topics in French; comparing cultures

ICGL 223 Pre-intermediate French III 4

Prerequisites: ICGL 222 Pre-Intermediate French II or Placement Test

Developing further knowledge of French grammar at the pre-intermediate level (comparative, complex interrogative sentence, gerundive, subjunctive present in regular and irregular forms, passive voice); scaffolding of more complex vocabulary; longer communication about personal feelings, wishes and hopes; complaining and talking about difficulties, suggesting solutions; comparing cultures

ICGL 231 Pre-intermediate Chinese I 4

Prerequisites: ICGL 133 Elementary Chinese III or Placement Test

Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (complements of duration, expressing approximate numbers, comparative sentences, complements of quantity, exclamatory sentences); developing listening, speaking, reading and writing skills through an integrated approach; communication about various topics; comparing two cities in various aspects; comparing the seasons in China and Thailand; activities and festivals in each season; organizing a trip

ICGL 232	Pre-intermediate Chinese II	4
Prerequisites: ICGL 231 Pre-intermediate Chinese I or Placement Test		
Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (past experiences, complements of frequency, the structure of 是.....的, reduplication of adjectives, S-P phrases, complements of result II, simple passive sentences); developing listening, speaking, reading and writing skills through an integrated approach communication about various topics; sports or entertainment; expressing unlucky stories; describing appearance and clothes; Chinese style weddings (1)		
ICGL 233	Pre-intermediate Chinese III	4
Prerequisites: ICGL 232 Pre-intermediate Chinese II or Placement Test		
Chinese characters (approximately 300); identifying pre-intermediate level Chinese grammar concepts (continuous actions or states, Chinese style weddings, Chinese construction quadrangles, existence emergence sentences, “把” sentence I, “把” sentence II, “被” sentence, adverb “又”); developing listening, speaking, reading and writing skills through an integrated approach; communication about various topics; travelling by airplane; Beijing Opera performances; outdoor activities; reunions with old friends		
ICGL 241	Pre-intermediate Spanish I	4
Prerequisites: ICGL 143 Elementary Spanish III or Placement Test		
Habits; pronominal verbs; porque/para; furniture and parts of the house; appearance; family, irregular verbs in present tense; present progressive		
ICGL 242	Pre-intermediate Spanish II	4
Prerequisites: ICGL 241 Pre-Intermediate Spanish I or Placement Test		
Leisure activities; intentions and projects; pain, discomfort and symptoms; parts of the body; vocabulary of food; ir a+ infinitive; present perfect; differences between ser and estar; personal pronouns for objects; verb gustar		
ICGL 243	Pre-intermediate Spanish III	4
Prerequisites: ICGL 242 Pre-Intermediate Spanish II or Placement Test		
Past habits, customs and circumstances; past and present actions; advice, instructions (imperative); future situations and actions, conditions, hypotheses; past experience; imperfect verb tense; indefinido verb tense; present perfect verb tense; contrast of past tenses		
ICGN 126	Plant Society	2
Prerequisites: -		
People interacting with the plant and fungal worlds; differences among cultures and the indigenous uses of medicinal, textile and food plants; the benefits, problems and social implications of their use; hands-on experiences with techniques and methods used by field scientists		

ICGS 106 Fashion and Society 4

Prerequisites: -

Design elements of fashion, fashion terminology, fashion reflecting its temporal and spatial context, fashion and the development of art, fashion is a cultural expression, fashion is creativity, fashion needs customers' approval and endorsements, fashion and consumer behaviour, fashion and consumerism, and ethical issues of fashion

ICGS 111 Exploring Religions 4

Prerequisites: -

Major religions in the world: Hinduism, Buddhism, Sikhism, Chinese religions, Shinto, Judaism, Christianity, and Islam; origins of the three religious groups, religions arising in India, religions of China and Japan, and the religions of the family of Abraham; similarities and differences; contemporary new religious developments and related issues; religious diversities present in the world

ICGS 112 Geography of Human Activities 4

Prerequisites: -

Global Learning Initiative class; a systematic study of patterns and processes of geography; understanding human perceptions of surroundings and alterations of the earth's surface; diversity of cultures, beliefs, and ways of life; establishing global unity and harmony; recognition of equality and respect between persons in diverse regional geographical settings; raising awareness of one's own humanity and human responsibilities; the interrelationship between humans and the spaces they create; human activity as interdisciplinary by nature; the physical and socially created environment people live in; human interactions shaping the human understanding of the environment; the utility of resources; phenomena on the earth's surface relating to human actions; concepts and geographical methodologies; examination of social organizations and environmental consequences; a broad dynamic domain reflecting such developments and issues as social bias, discrimination, and stereotyping in the contemporary world; associating a critical geographical perspective on the past, present and future achievement of the social world

ICGS 123 Tourism Concepts and Practices 4

Prerequisites: -

Exploring tourism as a geographical system approach and looking at the characteristics of tourism and the demand side first by examining driving forces shaping the strong growth of global tourism and Thailand tourism; the reasons for travelling and selecting a travel destination; examining the roles of tourism organisations both in the public and private sectors especially national tourism organisations, travel suppliers, and travel intermediaries; introducing the concept of community art event and creative tourism for promoting cultural diversity and social inclusion; and special interest tourism in Thailand

ICGS 130 Political Science 4

Prerequisites: -

The understanding of politics and political systems of the current world; interactions and connections of different ideas; systems of thought and conflict in contemporary society; analysis of political phenomenon; collecting information, organizing information, organizing in groups, analyzing information, presenting clearly and concisely on political phenomenon, state typology, political taxonomy, ideological persuasion, voting systems and outcomes

ICGS 131 Introduction to International Studies 4

Prerequisites: -

The field of international studies; interdisciplinary approaches; economic globalization; the Bretton Woods system and neoliberalism; political globalization; the United Nations system, the International Court of Justice, and Human Rights; cultural globalization; migration diaspora and transnationalism; the internet and global media; development; modernization and dependency; Global North and Global South; traditional and human security; food; health; energy; environment

ICGS 132 Career Preparation in a Globalized World 4

Prerequisites: -

Trends in national, regional and international job markets; self-assessment on career options; career plan creation; principles in business communication; job search process and tools; resume, cover letters; interview preparation and simulation; dimensions of culture

ICGS 133 Foundation of Mediterranean Cultures 4

Prerequisites: -

The Mediterranean as a source of Western culture; Egypt and the Fertile Crescent; Mohammed and the Muslim World; the Promised Land: Moses' Israel; Jesus and the birth of Christianity; Greek history and civilisation; Ancient Italy; arts in Florence and Venice; Modern Italy history; Italian food; the World of Fashion in modern Italy; Italian film; Italian music

Critical Thinking

ICGH 101 Biotechnology: from Science to Business 4

Prerequisites: -

Biotechnology, bioethics, and the law, biotechnology and the regulatory framework, genetic testing, patenting life, biobanks and modern genomics research, genetically modified organisms, human and animal testing; bioterrorism, biological weapons laws, bio-prospecting, pharmaceutical pricing, the future of the human beings and post-humanism

ICGH 102 Famous Arguments and Thought Experiments in Philosophy 4

Prerequisites: -

An examination of the most striking argumentative moves in Philosophy from Plato's Allegory of the Cave to Searle's Chinese Room and beyond; a transfer and an application of paradigmatic philosophical thinking to current open questions in politics and science

ICGH 103 Logic, Analysis and Critical Thinking: Good and Bad Arguments 4

Prerequisites: -

Basic formal tools from sentential and predicate logic; logical structures of arguments used in the everyday contexts of life; an analysis of their strengths and weaknesses; common fallacies in reasoning, including reasoning involving determining probabilities; a construction of good arguments using the principles of informal reasoning

ICGH 105 Technology, Philosophy and Human Kind: Where Are We Now?! 4

Prerequisites: -

An examination of major technological and scientific innovations across the globe and their effects on human life and thought; a focus on agriculture, steel, the printing press, the mechanical clock, magnifying lenses, antibiotics, electricity, steam and combustion engines, and transistor

ICGH 106 The Greeks: Crucible of Civilization 4

Prerequisites: -

An introduction to an overview of the philosophy and thought of Ancient Greece and its influence on contemporary civilization; theories about knowledge, propaganda, truth, art, psychology, happiness, justice and democracy

ICGH 107 Contemporary Art and Visual Culture 4

Prerequisites: -

Focusing on current issues in society as reflected in the new media utilized in art today; an analysis of images and group discussions regarding social and historical contexts of contemporary art; creative thinking skills; effects of globalization on the visual world; connections between global and local issues; an investigation of broader social and cultural matters such as ideology, gender, race, and ethnicity

ICGH 109 Creative Thinking Through Art and Design 4

Prerequisites: -

Combining hands-on studio experiences with demonstrations, lectures and discussions; developing creativity and gaining confidence in communicating one's own unique vision; exploring a variety of art and design mediums; understanding the elements of the visual language; implementing the creative process and creative thinking to develop individual solutions to open-ended problems

ICGH 110 Drawing as Visual Analysis 4

Prerequisites: -

Developing creativity and cognitive learning skills; utilizing visual communication, design and art principles; mark making; observation, analysis, record, representational plant and still life forms; practice, application, techniques for conventional pencil drawing tools: shape, form, perspective, lines, shading, value, negative space, texture, composition; observation; scientific illustration, realistic representational observation

ICGH 115	Cinematic Languages and Its Application	4
Prerequisites: -		
An introduction, practice and an application of languages to critical thinking and analysis; examining key film languages and textual examples, including narrative theories; genre, film theories; an analysis of key film texts; the development of skills in research, writing and analytical thinking; applied knowledge to creative works; the presentation of original ideas and reflection on the craft approach		
ICGH 124	Life Drawing and Anatomy	4
Prerequisites: -		
An introduction, practice and application of observation drawing to record the human form; including key principles of composition, gesture and observation drawing techniques and design skills for static, gesture and motion poses; understanding record and identifying the anatomical make-up of the human form in muscles and skeletons; technical proficiency with suitable media for observation drawing; studio practice; hand-drawing from observations		
ICGH 125	How Can We Know What Is Good? Moral Reasoning and Behavior	4
Prerequisites: -		
A survey of philosophical, psychological and scientific contributions to the understanding of moral values and agency; hands-on construction, scrutiny and analysis of ethical argument regarding burning issues in applied ethics		
ICGH 126	Behavioral Ethics: Why Good People Do Bad Things	2
Prerequisites: -		
Foundations of behavioral ethics, assumptions of ethical decision making, process of ethical decision making, cognitive errors in ethical decision making: incrementalism, self-serving bias, tangible and abstract, loss aversion, framing, and overconfidence, social and organizational pressures in ethical decision making, situational factors in ethical decision making		
ICGN 107	The Chemistry of Everyday Life	4
Prerequisites: -		
Portable electronics; the air we breathe; radiation from the sun; climate change; energy from combustion; energy from alternative sources; water; polymers and plastics; nutrition; health and medicine; genes and life		
ICGN 111	Physics for CEO	4
Prerequisites: -		
Basic concepts of physics impacting individuals and society on a daily basis: physical quantities, Newtonian mechanics and dynamics, energy and heat, electricity and magnetism, light and sound, and the electromagnetic spectrum		
ICGN 123	The Earth's Dynamic Structure	4
Prerequisites: -		
Introducing fundamental concepts and applying general geology at the beginning level; basic concepts of physical geology, emphasizing on surficial and deep earth processes, including minerals; rocks and their formations, crustal deformation, plate tectonics; weathering and erosion, formation of landscapes, geological resources and environmental geology		

ICGN 127	Practical Mathematics	2
Prerequisites: -		
Fibonacci numbers and the golden ratio, voting and election, data interpretation, probability, cryptography, financial mathematics		
ICGS 103	Economics in Modern Business	4
Prerequisites: -		
Forces of demand and supply, elasticity, opportunity cost; market structures, pricing strategy, business enterprise, consumers behavior; Thai economy, world economy, globalization and technology, profit maximizing, firm and organization, government policies; business analysis and managerial decision-making, competitive advantage, dynamic business environment		
ICGS 113	Perspectives on the Thai Past	4
Prerequisites: -		
The origins of the Thai people in pre-historic times to the late twentieth century; an alternative view incorporating the different regions and various ethnic groups making up present-day Thailand; key issues in Thai history; an analysis of the classics of Thai historiography; an evaluation and interpretation of a range of primary sources dealing with the Thai past; an understanding of how history is written		
ICGS 134	Is Democracy Good?	4
Prerequisites: -		
Democracy as a political system and a 'normal' form of governance throughout the world, especially since the transitional Third Wave of democratization ending in the 1990's; democracy as a highly contested term; forms of governance; contestations in Thailand; arguments of Thai Style Democracy; defining democracy; different forms of democracy; local perception of democracy; critical debate on the merits of democracy; functionality; theoretical and in pragmatic situations; qualitative and quantitative analysis; democratic performance		
ICGS 135	Entrepreneurial Accounting	4
Prerequisites: -		
Fundamental accounting concepts; financial statements for small enterprises; financial statement analysis; cost-volume-profit analysis; management decision making; business taxation		

Leadership

ICGN 114	The Scientific Approach and Society	4
Prerequisites: -		
Scientific literacy; the process of science discovery; verification, its limitation, and the influence in various disciplines; human and animal research ethics; the critical analysis of current scientific articles; the life cycle of scientific knowledge; modeling in science		

ICGN 128 Climate Emergency, Biodiversity Crisis, and Humanity at Risk 2

Prerequisites: -

Anthropogenic activities; biodiversity crisis; biodiversity loss; biological diversity; climate change; climate crisis; climate emergency; ecosystem functions; harmful and unsustainable practices; humanity at risk; mitigation and adaptation; threats, impacts and consequences

ICGS 104 Essentials of Entrepreneurship 4

Prerequisites: -

Creating new businesses, capturing new markets, enhancing organizational effectiveness; entrepreneurship theories and frameworks, practices of promoting and managing start-ups; the life-cycle of an entrepreneurial venture, concept implementation; entrepreneurial pathway, customer analysis, integrated marketing, funding, securing and managing capital, human capital management under the disruptive environment

ICGS 118 Skills in Dealing with People Across Cultures 4

Prerequisites: -

The development of skills in dealing with people across cultures, covering topics such as: identity formation and conflict; ethics and moral behavior; values and communication across cultures; culture and tourism; culture and work motivation; culture in educational institutions

ICGS 121 Abnormal Colleagues: How Do I Make This Work? 4

Prerequisites: -

The stigma of psychological issues; the fear of the workplace gossips and job security; an avoidance of getting treatment and counseling; a recognition of various disorders and devising strategies to effectively communicate and work with people; improving the workplace productivity and relationships

ICGS 136 Social and Health Issues in Thailand 4

Prerequisites: -

Social and health issues in Thailand; experiential learning approach; site visits to various government and non-governmental organizations; small groups work; identification of issues and characterize the factors affecting the issues; prioritization of the urgency of the issues and determination of the possible solutions; proposing action plans addressing the issues

ICGS 137 Witchcraft and Gender Representation 4

Prerequisites: -

The term "witch" used to suppress women: accusations of witchcraft to eliminate strong, assertive women; accusations of demonic or magic sources demeaning to women; European, American and African use of witch accusations to stifle women; other forms of oppression of women: the Chinese foot binding, the Indian Sutee, the African genital mutilation; the meaning of gender; gender vs sex; marginalization of women in patriarchal societies; women's rights in the contemporary world; differing concepts of women's rights; global and national enforcement of women's rights; organizations concerned with gender and women's issues: UN, ILO, etc; an application of gender rights to other genders like LGBTQ

ICGS 138 Business Event Essentials 4

Prerequisites: -

An introduction to business event industry, meetings, incentive travels, conventions, exhibitions; decision making criteria, special events, business event organization management, venue management, logistics for business event industry, stakeholders in business event industry and local community engagement, standards in business event industry, ethics for business event professionals

ICGS 139 Leadership and Change for a Global Society 4

Prerequisites: -

Concepts and practices for leadership development; developing leadership skills and challenges of change in a global society; the need, vision, initiation for change, teamwork and collaboration for the efficient management

ICLL 101 Professional Development 2

Prerequisites: -

Professional skills for 21st century workplace through learning or training activities in various topics including innovation management, start-up business, agile workplace or other selected professional development activities approved by the academic advisor and Curriculum Administrative Committee

Digital Literacy

ICGH 111 Media Literacy: Skills for 21st Century Learning 4

Prerequisites: -

An integration of the media literacy, the media production, and the media ethics; accessing, analyzing, evaluating, questioning, and producing media texts; social, cultural, and political implications of the media; representations in the media; the media as political economy; the media aesthetics; the media and influence; audiences negotiating meaning

ICGN 116 Understanding and Visualizing Data 4

Prerequisites: -

An introduction to data analytics; roles and examples of the data-driven decision making; technology landscape; data kinds and types; data sources and collection techniques; data storage and standard formats; data processing workflow; summary from data; different types of visualization; data visualization tools

ICGN 118 Everyday Connectivity 4

Prerequisites: -

The Internet, computer networks, and the World Wide Web (W3) in the daily life and organizations; troubleshooting small network problems; identifying threats and avoiding dangers online; finding credible information on the Web; online communication tools, such as the social media and email, for professional branding; the basic e-business concepts and tools

ICGN 119	Computer Essentials	4
Prerequisites: -		
Developing the digital literacy relating to the computer literacy and the information literacy; the computer hardware and its general functions; the operating systems; software packages and their daily use; computer security; the ethical use of the intellectual property		
ICGN 129	Programming for Problem Solving	4
Prerequisites: -		
Influence and impact of computer science on everyday life and society; the problem solving process in programming: abstraction, problem decomposition, algorithms; programming basic; privacy, ethical, and legal issues related to the software development		
ICGN 130	Cryptography: The Science of Making and Breaking Codes	2
Prerequisites: -		
Classical cryptography; cryptosystems; the shift cipher, the substitution cipher, the Hill cipher, the permutation cipher, the stream ciphers; the RSA encryption; cryptanalysis		
ICGN 131	Digital Search Literacy	2
Prerequisites: -		
The Information literacy relating to search term, the evaluation of the internet site and the quality of data; use of information; the ethical use of the intellectual property; the use of computer platforms; software, online services		
ICGN 132	Digital Security and Privacy	2
Prerequisites: -		
Privacy rights of data and safeguarding personal information by the protection organizations, anonymizing of data, computer security relating to computer platforms, network, internet and smart devices; password managements and shortcomings, authentication factors and technology		
ICGN 133	E-Business: Technology and Digital Strategies	4
Prerequisites: -		
The Landscape of technologies in the digital enterprise and e-business; internet-based staples such as web hosting, domain-name acquisition, the social media, the payment systems; electronic business models and digital strategies; emerging trends in technology; legal and ethical issues		
ICGN 134	Introduction to Artificial Intelligence	2
Prerequisites: -		
The artificial intelligence terminology; machine learning types and techniques; guidelines for building the machine learning model; neural networks; an evaluation in the AI system; the real-world artificial intelligence; the future trends of the artificial intelligence; dangers and threats of the artificial intelligence		

ICGS 140 Fake News, Censorship and the Politics of Truth 4

Prerequisites: -

Internet and hyper news flows; patterns of information consumption; knowledge of information authenticity; socio-political effects of 'fake news'; impacts and methods of data collection; censorship and contested 'digital space', fact-checking, source evaluation and trust-building online; social power of algorithms, quantification and profiling; citizens journalism and the traditional media

ICLL 102 Skills for a Digital World 2

Prerequisites: -

Twenty-first century skills for digital economy through learning or training activities in various topics including e-Commerce, Blockchain technology, and data science, or other selected activities approved by the academic advisor and Curriculum Administrative Committee

Major Courses

Core Courses

ICBI 121 Biology 4

Prerequisites: -

Properties of life, classification, and scientific process; chemistry of life; cells and metabolism; genetics; mechanisms of evolution

ICCH 101 General Chemistry I 4

Prerequisites: -

Concepts of general chemistry; matters, atoms, compounds, reactions, gases, thermodynamics, electrons in atoms, periodic table, chemical bonding; intermolecular forces, and spontaneous changes

ICCH 102 General Chemistry II 4

Prerequisites: ICCH 101 General Chemistry I

Comprehensive general concepts and principles of chemistry; solutions, equilibria, acids and bases, solubility, electrochemistry, chemical kinetics, chemistry of main-group and transition elements, coordination compound, nuclear chemistry and selected topics in chemistry

ICCH 103 Integrated Laboratory Techniques in Chemistry I 2

Prerequisites: MU LabPass or lecturer permission

Laboratory practicals for general chemistry: measurements; stoichiometry; solids, liquids and solutions; gases; thermochemistry; equilibrium; acids and bases; electrochemistry; kinetics; chemical safety practice and regulations

ICCH 200 Analytical Chemistry A 4

Prerequisites: ICCH 102 General Chemistry II

Separation techniques and concepts of modern analytical methods essential for quantitative and qualitative characterization; treatment of the analytical data; principles and applications of chemical equilibria; electrochemical methods; separation methods; practical exercises involving infrared spectrometry, UV-vis spectrometry, gas chromatography-mass spectrometry

ICCH 221	Organic Chemistry I	4
Prerequisites: ICCH 102 General Chemistry II		
Concepts and mechanistic considerations of organic chemistry; molecular structures and properties; methane and alkane chemistries; stereochemistry; acyclic compounds; alkyl halides; alkenes; conjugation and resonance; alcohols; ethers and epoxides; alkynes		
ICFS 215	Human Nutrition	4
Prerequisites: ICFS 216 General Biochemistry for Food Science and Technology		
Elements of human nutrition including vitamins, minerals, micronutrients, and antioxidants including sources, metabolism, and functions in the human body; nutritive values of foods; requirements for human health, nutraceuticals, and functional foods and their effects on human health beyond basic nutrition		
ICFS 216	General Biochemistry for Food Science and Technology	2
Prerequisites: ICCH 101 General Chemistry I		
The principles of biochemical aspects of foods, topics including structure and function of biomolecules with emphasis on water, carbohydrates, proteins, nucleic acids, lipids and enzymes, metabolism and bioenergetics		
ICFS 217	Physical Chemistry for Food Science and Technology	2
Prerequisites: ICCH 101 General Chemistry I		
The principles of physicochemical aspects of foods, topics including thermodynamics, thermal and mass transfer and physicochemical properties		
ICFS 231	General Microbiology	4
Prerequisites: ICBI 101 Biology		
Basic knowledge related to structure, physiology and ecology of microorganisms such as viruses, bacteria, and fungi, aspects of microbiology importance in food science and technology; practical exercises		
ICMA 106	Calculus I	4
Prerequisites: -		
Brief review of trigonometry; limits and continuity; differentiation and its techniques; derivatives of algebraic and trigonometric functions; graph sketching; applications of the derivatives; antiderivative and integration; area under a curve and between curves		
ICMA 151	Statistics for Science I	4
Prerequisites: Placement test or ICMA 100 Foundation Mathematics		
Statistical ideas and concepts; probability, conditional probability; distribution functions; expected value; estimators, good estimators; hypothesis testing		
ICMA 213	Calculus II	4
Prerequisites: ICMA 106 Calculus I		
Derivatives of logarithmic and exponential functions; techniques of integration; improper integrals and indeterminate forms; applications of the derivative and integration; infinite series; functions of several variables; limits and continuity; partial derivatives		

ICPY 101 Physics I **4**

Prerequisites: -

Measurement, units and dimensions; vectors, linear motion, Newton's law of motion, rotational motion, energy, momentum, static equilibrium, fluid mechanics

Required Courses

ICFS 112 Principle of Food Science and Technology **2**

Prerequisites: -

The concept of food science and technology, the relationship between the science of food and the well-being of humans; chemistry underlying properties and reactions of various food components; applying of basic principles of microbiology to food processing and safety; basic principles of large scale food production and its quality control

ICFS 314 Food Analysis **4**

Prerequisites: ICCH 103 Integrated Laboratory Techniques in Chemistry I, ICCH 200

Analytical Chemistry A

Principles of chemical and instrumental methods for the qualitative and quantitative analysis of food components and additives, chemical and instrumentals methods, practical exercises in laboratory

ICF S317 Food Chemistry **4**

Prerequisites: ICFS 112 Principle of Food Science and Technology, ICCH 102 General Chemistry II, ICCH 221 Organic Chemistry I

Chemical and physical properties of water, proteins, lipids, carbohydrates, vitamins and minerals; their interactions and functional roles in foods; practical exercises included

ICFS 318 Food Ingredients Functionality **2**

Prerequisites: ICFS 317 Food Chemistry

Chemistry and functionality of food ingredients in the food product; utilization and challenges of food ingredients in food industries; case studies from scientific literature and food industry

ICFS 333 Food Microbiology **4**

Prerequisites: ICFS 231 General Microbiology

Sources of microorganisms; factors affecting the growth of microorganisms in food; important pathogenic microorganisms in food; spoilage microorganisms; control and inactivation of pathogenic and spoilage microorganisms in foods; effect of food processing on microorganisms and control; beneficial microorganisms in food; food fermentation and preservation

ICFS 334 Food Microbiology Laboratory **2**

Co-requisites: ICFS 333 Food Microbiology

Basic microbiological techniques and standard plate counts; microscopic examination of yeast, mold, and bacteria; the enumeration of microorganisms in foods; most probable number method; the detection and identification of important foodborne pathogens and spoilage microorganisms in foods; inactivation of pathogens in foods; food fermentation and beneficial microorganisms; sanitary practices; microbial standards and regulations

- ICFS 341 Food Processing 4**
Prerequisites: ICFS 112 Principle of Food Science and Technology and ICFS 217 Physical Chemistry for Food Science and Technology
Fundamentals of the food processing industry; thermal processing, and the preservation of food materials by blanching, pasteurization, sterilization, evaporation, dehydration; processing factors influencing quality
- ICFS 342 Food Storage and Shelflife Extension 4**
Prerequisites: ICFS 112 Principle of Food Science and Technology and ICFS 217 Physical Chemistry for Food Science and Technology
Fundamentals of food preservations; raw material preparations; non-thermal methods, refrigeration, freezing, chemical preservations, including various packaging materials
- ICFS 344 Smart and Green Agro-Industry 2**
Prerequisites: ICFS 341 Food Processing
Concepts of smart agriculture for high quality raw materials, environmental-friendly manufacturing technologies; fundamentals of the plant design, clean technology, sources and uses of water, agro-industry waste management; biological treatment methods
- ICFS 351 Food Engineering Principles 3**
Prerequisites: ICMA 213 Calculus II
Principles of the various unit operations used in the food processing and the manufacturing industry; topics covered including units, dimensions, fluid properties, fluid flow, rheology, energy loss in flow, velocity and the pressure measurement and unit operations such as pump, mixing, and the mechanical separation as applied to food processing and manufacturing operations
- ICFS 352 Unit Operations in Food Engineering 3**
Prerequisites: ICFS 351 Food Engineering Principles
Unit operations in food engineering, major unit operations used in the food processing and manufacturing industry such as dryer, heat exchanger, evaporation, gas absorption; the effects of the input and operational parameters on the performance and food quality; thermal processing, mass transfer and heat transfer, psychometrics
- ICFS 361 Principles of Quality Assurance in Food Processing 4**
Prerequisites: ICFS 341 Food Processing, ICMA 252 Biological Statistics Laboratory
Methods of the quality control and management in food processing; the total quality control management, HACCP, ISO 9000 and 14,000 series, Halal; the control of raw materials, process, and finished products; sampling, an evaluation of sensory properties, and other factors; a statistical analysis for the quality control
- ICFS 362 Food Safety and Sanitation 4**
Prerequisites: ICFS 231 General Microbiology
Principles of food safety and food plant sanitation; hazards and sources, Good Manufacturing Practices (GMPs), Sanitation Standard Operating Procedures (SSOPs), Hazard Analysis Critical Control Point (HACCP); the hygienic design of equipment and facilities, cleaning and sanitization, the pest control, personal hygiene, hygienic food handling

ICFS 364	Food Law and Standards	3
Prerequisites: ICFS 317 Food Chemistry		
Food law and standards and standard of foods and food products in the Thailand; international food regulations; labeling of the food products; the regulation of irradiated Foods, biotechnology and genetic modified foods, dietary supplements, functional foods and nutraceuticals		
ICFS 391	Scientific Research and Presentation	2
Prerequisites: -		
Scientific interpretation of the results; proper format for presenting papers in public and in a scientific forum; practical sessions and participation in scientific seminars included		
ICFS 491	Seminar in Food Science and Technology	2
Prerequisites: Seniors		
Senior student presentations, discussions of research, and reviews of the topics of current interest; staff and invited speakers from Mahidol University and from other universities or the food processing industry		
<u>Research Option</u>		
ICFS 451	Internship in Food Science and Technology	4
Prerequisites: ICFS 341 Food Processing		
Industrial work-internship programs in the food manufacturing industry, the industrial internship programs focusing on the actual work and on-the-job training at production line, process control, quality control of process and product, laboratory work; chemical, physical, microbiological analysis		
ICFS 497	Senior Project in Food Science and Technology	4
Prerequisites: Senior Student		
Small research projects in food science and technology or related fields under the supervision of a research advisor		
<u>Work Integrated Education Option</u>		
ICFS 464	Work Integrated Education	8
Prerequisites: ICFS 318 Food Ingredients Functionality, ICFS 341 Food Processing		
Work-based experience for 16 weeks with specific goals needed to achieve, with the academic supervision and assessment from both faculty and industry supervisors		

Major Elective Courses

- ICFS 320 Food Chemistry and Quality 4**
Prerequisites: ICFS 317 Food Chemistry
Chemical and physical properties of other food components and additives; chemical reactions and changes taking place during the processing and storage; their impact on food quality
- ICFS 323 Foods for Sports and Exercises 4**
Prerequisites: Being 2nd year student or higher
Energy sources and energy expenditures of human locomotions; food sources and roles of carbohydrates, protein, dietary fats, micronutrients, fluid, electrolytes, and dietary supplement in sports and exercises, basic nutrition guidelines for high-intensity sports, endurance sports, weight and body-focused sports
- ICFS 345 Food Product and Process Design 4**
Prerequisites: -
Food processing; design new food product processing; evaluation of the new product characteristics to target consumers
- ICFS 365 Food Safety and Sanitation Management 4**
Prerequisites: -
Basic knowledge of food safety and sanitation including food borne illness, element of safe food, personal hygiene, hygienic food handling; food safety and sanitation approaches
- ICFS 366 Consultancy and Auditing in Food Quality and Safety Management 4**
Prerequisites: -
Basic knowledge in consultation; food quality and safety system standards; principles and guides for food quality and safety system auditor in line with ISO 19011; case study from the past experience of professional consultants and auditors; ethics in conducting consultancy and auditing as per the food safety management system
- ICFS 374 Experimental Design in Food Product Development 2**
Prerequisites: ICMA 151 Statistics for Science I
An integration of chefs and food scientists' tasks through the design of the experiments foundation, regression, and correlation, basic understanding of multivariate data-analysis techniques, screening designs, the response surface model, optimization experimental designs
- ICFS 375 Integrated Sensory and Consumer Sciences for Product Development 4**
Prerequisites: ICFS 374 Experimental Design in Food Product Development, ICFS 432
Sensory Evaluation of Food Products
Physical stimulants and human sensory perception, understanding consumer behaviors and preferences, identifying consumer insights for concepts and product improvement; the relationships between instrumental data of food properties - sensory perception – and the data on consumer preference, formulation optimization

- ICFS 376 Science of Thai Culinary Arts 4**
Prerequisites: Being 2nd year student or higher
Chemical, physical, and microbiological aspects of Thai foods, design and analysis for the sensory evaluation, flavors and flavors pairing, nutraceutical potentials of Thai cuisines; laboratory sessions on techniques of Thai cuisine processing for dishes such as stir-fried, steamed, spicy salads, chili paste, curry, fermented food, and deserts; scientific explanation behind local wisdoms of these techniques
- ICFS 411 Food Product Development 4**
Prerequisites: ICFS 318 Food Ingredients Functionality
Principles and steps used in a new product-developing process: formulation, lab-scale production, quality control, and commercial feasibility study; sensory evaluation of food products; the data and statistical analysis of sensory test results; practical exercises
- ICFS 413 Marketing of Food Product and Services 2**
Prerequisites: Being FS students, or being 3rd year student or higher
Principles of marketing with an emphasis on food product; market research and analysis, consumer behavior and marketing strategies; basic economic principles, marketing analytical tools, trends in processed food and food service industries
- ICFS 414 Operations Management in Food Business 2**
Prerequisites: Being FS students, or being 3rd year student or higher
The main factors affecting the performance in food industry, matching of supply and demand, eliminating inefficiencies, increasing productivity and utility, cost control including the return of the investment (ROI) and the cost of goods sold (COGS) calculation
- ICFS 418 Fruits and Vegetables Technology 4**
Prerequisites: ICFS 317 Food Chemistry, ICFS 341 Food Processing
Characteristics, composition, and the nutritional importance of fruit and vegetables; characteristics, composition and nutritional importance of fruit and vegetables; post-harvest handling and changes and in the product quality; preservations and processing technologies applied to fruits and vegetables; the production of fresh and manufactured food products and ingredients from fruits and vegetables; the by-products utilization and waste management of fruit and vegetables processing
- ICFS 419 Meat, Poultry and Marine Product Technology 4**
Prerequisites: ICFS 317 Food Chemistry, ICFS 341 Food Processing
Ready-to-eat meat products, meat fermentation, the control of the meat quality, meat structure manipulation, meat processing technologies (high pressure, pulsed electric field, irradiation, ultrasound), meat by-products, meat packaging, meat sensory attributes
- ICFS 422 Dairy Product Technology 4**
Prerequisites: ICFS 317 Food Chemistry, ICFS 341 Food Processing
The composition and properties of milk, physical and chemical changes occurring in milk during processing and storage, milk processing i.e. fluid milk; fermented products, concentrated and dried dairy products, butter, cream frozen dairy desserts; milk microbiology and microbial transformations of milk, food safety aspects, functional health benefits

ICFS 423	Beverage Technology	4
Prerequisites: ICFS 317 Food Chemistry, ICFS 341 Food Processing		
Ingredients, processing, and packaging technologies for beverages, high-pressure processing, carbonation, alcoholic beverages, fruit juices and soft drinks, extended shelf-life beverages dilutable beverages, ready-to-drink products, novel concepts of functional drinks and bioactive compounds, market trends		
ICFS 424	Fat and Oil Technology	4
Prerequisites: ICFS 318 Food Ingredients Functionality, ICFS 341 Food Processing		
Processing and technologies of edible fats and oils; physical and chemical properties of both raw materials and finished products such as salad dressing, margarines, butters; quality, safety, and nutritional aspects of fat and oil products		
ICFS 426	Bakery Product Technology	4
Prerequisites: ICFS 318 Food Ingredients Functionality, ICFS 341 Food Processing		
Properties and chemistry of flour, ingredients technology and selection, the science of mixing and baking; functional bakery products, sensory attributes of bakery products, packaging and shelf-life extension of finished products; the skill development in bread, cake and pastry making		
ICFS 427	Confectionary and Chocolate Technology	4
Prerequisites: ICFS 318 Food Ingredients Functionality, ICFS 341 Food Processing		
The candy processing technology, crystalline and non-crystalline candy, sugar and corn syrup chemistry; aerated confection, chocolate properties, chocolate processing, tempering, panning and shell molding; regulations such as sugar taxes, food safety and quality aspects		
ICFS 432	Sensory Evaluation of Food Products	4
Prerequisites: ICFS 318 Food Ingredients Functionality		
Sensory evaluation theories and practices through descriptive analysis; analytical instrumental methods of sensory evaluation and correlation with the consumer sensory evaluation; anatomy and physiology of the sensory systems (sight, taste, smell, touch, and hearing); physiological and psychological factors affecting performance on sensory tests		
ICFS 436	Food Fermentation Technology	4
Prerequisites: ICFS 333 Food Microbiology		
The principle of biological fermentation process; submerged fermentation; solid state fermentation; disinfection of the equipment; factors affecting the process; raw materials for fermentation; the media design, the optimization of fermentation conditions; the process control, downstream processing; the quality control of products		
ICFS 437	Application of Modern Biotechnology to Food Products	4
Prerequisites: ICFS 231 General Microbiology		
Potential benefits and the risk of biotechnology in foods; GMOs, GM foods and the food security; the current use, research and development of foods produced through modern biotechnology		

ICFS 438	Cereal and Starch Technology	4
Prerequisites: ICFS 317 Food Chemistry		
Fundamental structure, chemistry, functional properties of cereal and starches; cereal and starch based human food products; their utilization in applications of healthy and functional foods		
ICFS 439	Food Product Innovation	4
Prerequisites:		
The agrifood system innovation; an innovation in the food product development including novel products, product improvements, functional ingredients and functional foods; an innovation in the food industry processing such as technologies and packaging; an innovation in the cooking sector in regards to the molecular gastronomy and science based cooking		
ICFS 452	Food Packaging	4
Prerequisites: ICFS 342 Food Storage and Shelflife Extension		
Materials, systems, and applications of food packaging materials and methods; properties, fabrication, and functions of metal, glass, paper and plastic packaging, sanitation of packaging materials, forming, filling, joining and enclosure operations and related equipment for packaging systems and equipment; selected topics for food packaging applications including aseptic packaging, food-package interactions, sealing integrity, handling of packages, and modified atmospheric packaging		
ICFS 463	Field Trip	2
Prerequisites:		
Visits and industrial plant studies of food manufacturing industry or related organizations		
ICFS 471	Trends and Novel Techniques of World Foods and Cuisines	4
Prerequisites: ICFS 318 Food Ingredients Functionality		
Current issues, emerging tools and technology in food science, food processing and the food service industry; the prediction of trends of world foods; guest lecturers from academic, industry, and culinary arts with some hands-on sessions		

Food Innovation and Design Module

- ICFS 320 Food Chemistry and Quality 4**
Prerequisites: ICFS 317 Food Chemistry
Chemical and physical properties of other food components and additives; chemical reactions and changes taking place during the processing and storage; their impact on food quality
- ICFS 345 Food Product and Process Design 4**
Prerequisites: -
Food processing; design new food product processing; evaluation of the new product characteristics to target consumers
- ICFS 439 Food Product Innovation 4**
Prerequisites:
The agrifood system innovation; an innovation in the food product development including novel products, product improvements, functional ingredients and functional foods; an innovation in the food industry processing such as technologies and packaging; an innovation in the cooking sector in regards to the molecular gastronomy and science based cooking
- ICMB 222 Principles of Marketing 4**
Prerequisites:
Marketing concepts, the role of marketing in organization, creating-communicating-delivering-exchanging product and services that having value to customers and the society; customer needs and wants, consumer decision making process, marketing information and research, market segmentation-targeting-positioning, product development and life cycle management; pricing, channel management, marketing communication, customer relationship management

Culinary Science Module

- ICFS 171 Discovering Culinary Arts Techniques 4**
Prerequisites: Being FS students, or being 3rd year student or higher
Principles of mise en place (preparation before cooking), proper culinary terminology; developing standardized recipes, basic cooking method both with dry heat and moist heat; developing knife skills, the proper use of ingredients
- ICFS 172 World Cuisines 4**
Prerequisites: ICFS 171 Discovering Culinary Arts Techniques
Global history of food, gastronomy and culture, menus and meals preparations of classical, Western, Eastern, Mediterranean, and Oriental cuisines; identifying culinary trends, principles of the menu layout, food presentation techniques; the proper cost control and appropriate technology

ICFS 373 Food Safety for Food Service Industry 2

Prerequisites: Being FS students, or being 3rd year student or higher

Foodborne illnesses and causes of illness; microorganisms causing foodborne illness; contamination and food allergens; safe food handling and personal hygiene; cross-contamination and the temperature control; purchasing considerations and the storage of foods; preparations and cooking; safe holding temperature and service; cleaning and sanitizing; food safety management systems and the safe operation; an integrated pest management; food safety regulations and standards; staff food safety training

ICFS 374 Experimental Design in Food Product Development 2

Prerequisites: ICMA 151 Statistics for Science I

An integration of chefs and food scientists' tasks through the design of the experiments foundation, regression, and correlation, basic understanding of multivariate data-analysis techniques, screening designs, the response surface model, optimization experimental designs

ICFS 375 Integrated Sensory and Consumer Sciences for Product Development 4

Prerequisites: ICFS 374 Experimental Design in Food Product Development, ICFS 432

Sensory Evaluation of Food Products

Physical stimulants and human sensory perception, understanding consumer behaviors and preferences, identifying consumer insights for concepts and product improvement; the relationships between instrumental data of food properties - sensory perception – and the data on consumer preference, formulation optimization

ICFS 413 Marketing of Food Product and Services 2

Prerequisites: Being FS students, or being 3rd year student or higher

Principles of marketing with an emphasis on food product; market research and analysis, consumer behavior and marketing strategies; basic economic principles, marketing analytical tools, trends in processed food and food service industries

ICFS 414 Operations Management in Food Business 2

Prerequisites: Being FS students, or being 3rd year student or higher

The main factors affecting the performance in food industry, matching of supply and demand, eliminating inefficiencies, increasing productivity and utility, cost control including the return of the investment (ROI) and the cost of goods sold (COGS) calculation