

Physics

ICBI 101 Biology	4
Prerequisites: -	
Properties of life, classification, and scientific process; chemistry of life; cells and metabolism; genetics; mechanisms of evolution	
 ICBI 102 Integrated laboratory in Biological Sciences I	2
Prerequisites: -	
Cell structure and function; tissue; cell division; ecology; movement of molecules; respiration and photosynthesis	
 ICBI 103 Biology II	4
Prerequisite: -	
Diversity of life; plant forms and functions; animal forms and functions; ecology and behaviour	
 ICCH 210 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 211 General Chemistry II	4
Prerequisites: ICCH 210	
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 224 Integrated Laboratory Techniques in Chemistry I	2
Prerequisites: ICCH 210	
or	
Corequisites: ICCH 210	
Laboratory practicals for general chemistry: measurements; stoichiometry; solids, liquids and solutions; gases; thermochemistry; equilibrium; acids and bases; electrochemistry; kinetics	
 ICCS 204 Data Structures and Object-Oriented Programming	4
Prerequisites: ICCS 101 or ICPY 221	
Corequisites: ICCS 206	
Principles of object-oriented design and problem solving; objects and classes; encapsulation, abstraction, and information hiding; inheritance and polymorphism; unit testing; abstract data types and data structures, including stacks, queues, linked lists, hash tables, ordered dictionaries, binary search trees, priority queues, and heaps; upper bound efficiency analysis using big-O; elements of Java programming; the use of an integrated development environment	
 ICCS 206 Discrete Mathematics	4
Prerequisites: ICMA 106	
Mathematical statements and logical deduction; proves and proof techniques including direct, contradiction, contrapositive, induction, and invariants; summation, asymptotics, and recurrences; counting: combinations, permutations, and basic counting techniques; discrete probability: finite probability space, events, conditional probability, independence, random variables, expectation, variance, covariance, discrete distributions; graphs: tree, tree traversal, undirected graphs, directed graphs, weighted graphs, Euler's tours, isomorphisms, spanning trees	
 ICMA 106 Calculus I	4
Prerequisites: Placement test or ICMA 100	

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 213 Calculus II

4

Prerequisites: ICMA 106

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.

ICMA 424 Abstract Algebra

4

Prerequisites: -

Partitions and equivalence relations, binary operations, groups, subgroups, permutations, cyclic groups, isomorphism, direct products, cosets, normal subgroups, factor groups, homomorphism, rings, fields, integral domains

ICPY 101 Physics I

4

Prerequisites: -

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

ICPY 102 Physics II

4

Prerequisites: ICPY 101

Oscillations and wave; light and sound; Thermodynamics; electricity and magnetism; Modern Physics

ICPY 105 Integrated Laboratory in Physics I

2

Prerequisites: ICPY 101

Lab practice on measurement and uncertainty, propagation of errors, and data analysis for Newton's laws of motion; refraction and diffraction; heat transfer

ICPY 200 Modern Physics

4

Prerequisites: ICPY 101

Modern physics; special theory of relativity, quantum theory, the uncertainty principle, wave and particle duality; Schrodinger's equation, atomic and nuclear theories, nuclear instability and decay, Bohr's picture of atom

ICPY 221 Computer Programming for Physics

4

Prerequisites: ICMA 106

Fundamental principles of computer programs; basic three programming constructs, namely sequence, conditions, and iterations; logic of programs in the problem-solving process; object-oriented programming fundamentals

ICPY 231 Mathematical Methods for Physics IA

2

Prerequisites: - ICMA 213

Vector, dot product, cross product, parametric equations, plane, surface in 3D, arc length, partial derivative, tangent plane

ICPY 232 Mathematical Methods for Physics IB

2

Prerequisites: -

Linear equations, system of linear equations, matrices, Euclidean spaces, traces, determinants

ICPY 233 Mathematical Methods for Physics IIA

2

Prerequisites: ICMA 213

Lagrange multipliers, double integrals, triple integrals, line integrals, Green's Theorem, surface integrals

ICPY 234 Mathematical Methods for Physics IIB	2
Prerequisites: -	
General vector spaces, linear transformations, eigenvalues and eigenvectors, Inner product spaces	
 ICPY 309 Scientific Research and Presentation	4
Prerequisites: -	
Scientific discovery methods in chemistry, computer science, mathematics and physics; hypothesis and proofs; literature search; written presentations, papers and journals; public presentations and format	
 ICPY 321 Intermediate Mechanics	4
Prerequisites: ICPY 101	
Newton's laws, linear and rotational dynamics, Euler angles and rigid body dynamics, small oscillation	
 ICPY 322 Electricity and Magnetism	4
Prerequisites: ICPY 102	
The Coulomb force, electric fields and potential, Gauss' law, dielectrics, the Biot-Savary law, Ampere's law, magnetic field and magnetic induction, vector and scalar potential, Faraday's law	
 ICPY 323 Electrodynamics	4
Prerequisites: ICPY 322	
Maxwell's equation, Wave equations, Field, Guided wave, Resonance cavity, , radiation from dipoles and moving charges	
 ICPY 324 Wave and Optics	4
Prerequisites: ICPY 102	
Wave and vibration, mechanical wave, reflection and refraction, geometric optics, Maxwell's equations, EM waves, guided	
 ICPY 333 Mathematical Methods in Physics III	4
Prerequisites: -	
Heat equation, method of separation of variables, Fourier series, wave equation, Laplace's equation	
 ICPY 334 Numerical Methods in Physics	4
Prerequisites: ICPY 221, ICMA 213	
Taylor's Theorem, Numerical Derivative and Integral, Least Square Fitting, Solving System of Linear and Non-linear Equation Numerically, Optimization, Monte Carlo Simulations	
 ICPY 342 Integrated Laboratory in Physics II	2
Prerequisites: -	
Measurements and propagation of errors, how to prove phenomena predicted by mathematical models, experiments in electricity and Magnetism	
 ICPY 343 Integrated Laboratory in Physics III	2
Prerequisites: -	
Measurements and propagation of errors, how to prove phenomena predicted by mathematical models, data acquisition and data analysis, frequency discriminator	
 ICPY 355 Special Topics in Physics I	4
Prerequisites: -	
Topics of current interest	
 ICPY 356 Special Topics in Physics II	4
Prerequisites: -	
Topics of current interest	

ICPY 357 Special Topics in Laboratory Physics I	4
Prerequisites: -	
Topics of current interest	
ICPY 361 Quantum Mechanics I	4
Prerequisites: ICPY 102	
The development of quantum mechanics theory, Schrodinger's equation, uncertainty principle, statistical interpretation, wave function, momentum operator, Hermitian operators, infinite square well, harmonic oscillator, free particle, delta function potential, finite square well, observables, commutator, Hilbert space, eigenfunctions and Dirac notation	
ICPY 371 Thermal Physics	4
Prerequisites: -	
The laws of thermodynamics, heat engines, entropy, axiomatic formulation of thermodynamics	
ICPY 441 Senior Project in Physics	6
Prerequisites: -	
A student (individual or in group) perform a set of experiments with emphasis on building theoretical understanding and becoming competent in data analysis and report writing	
ICPY 451 Analytical Mechanics	4
Prerequisites: ICPY 321	
Lagrangian mechanics, minimum action principle, constraints, constraint forces and constraint dynamics; D'Alembert's principle, generalized potentials, Harmiltonian mechanics; theory of small oscillations; rotating coordinate system and rigid body, Euler angles, Coriolis effect	
ICPY 452 Statistical Mechanics	4
Co-requisite: ICPY 361	
Statistical physics, distributions and probability, Boltzmann's factor, partition and grand partition functions, Ising's model, quantum statistics	
ICPY 455 Special Topics in Physics III	4
Prerequisites: -	
Topics of current interest	
ICPY 456 Special Topics in Physics IV	4
Prerequisites: -	
Topics of current interest	
ICPY 457 Special Topics in Laboratory Physics II	4
Prerequisites: -	
Topics of current interest	
ICPY 461 Quantum Mechanics II	4
Prerequisites: ICPY 361	
Schrodinger equation in spherical coordinates, the hydrogen atom, angular momentum, spin, identical particles, two-particle systems, quantum statistical mechanics, time-independent perturbation theory, fine structure of hydrogen, the Zeeman effect, hyperfine splitting, the variational principle	
ICPY 463 Quantum Mechanics III	4
Prerequisites: ICPY 461	
Time-independent perturbation theory, variational principle, WKB approximation, time-dependent perturbation theory, EPR Paradox, Bell's theorem, No-clone theory	

ICPY 471 Atomic and Molecular Physics**4****Prerequisites:** -

One-electron atoms, Helium atom, multi-electron atoms, structure and spectra of molecules, atomic spectroscopy methods, excitations of atoms and molecules by photons and electrons

ICPY 472 Solid State Physics**4****Prerequisites:** -

Periodic structure and symmetries of crystals, diffraction, reciprocal lattice, chemical bonding, lattice dynamics, phonons, thermal properties, free electron gas, band theory, applications in metals and semi conduction materials

ICPY 473 Nuclear and Particle Physics**4****Prerequisites:** -

Nuclear structure, nuclear forces, radioactive decay, nuclear reaction, fission, fusion, nuclear detection and measurement, applications of radioactivity, fundamental particles and interactions, classification by quantum numbers, isospin concept, symmetries, conservation laws, quark model

ICPY 474 Astrophysics**4****Prerequisites:** -

Celestial mechanics, Kepler's laws of motion, Virial Theorem; Blackbody Radiation, quantization of energy, dual property of light; Telescopes, IR, UV X-Ray, gamma ray astronomy; spectra and classification of stars, Jeans density, interiors of stars, hydrostatic equilibrium, nucleosynthesis, Hertzsprung-Russell Diagram, the main sequence, stellar evolution, white dwarf, neutron stars, supernovae, and stellar black hole

ICPY 484 Cosmology**4****Prerequisites:** -

Newtonian Cosmology, homogeneous isotropic universe, Friedmann equations, The Einstein-de Sitter model; modification due to general relativity, gravitational instability, density perturbation and evolution, nonlinear structure evolution, dark matter halos; the cosmic microwave background and measurement, the beginning of the universe, cosmological parameters and dark energy

ICPY 486 Observational Astronomy**4****Prerequisites:** -

An overview of observational techniques used in Astronomy; basic techniques for obtaining and analyzing data from modern optical instruments, geometrical optics, optical design and instrumentation

ICPY 487 Data Analysis in Astronomy**4****Prerequisites:** -

Types of Astronomical data, basic statistics and sources of error, basic computer programming (C++, Python, IDL, SQL, etc.), data acquisition, methods used in astronomical data sets; parameter estimation and model fitting, Monte Carlo method, big data handling techniques, principal component analysis, density estimation, classification techniques and neural networks, interpretation of astronomical measurement

ICPY 488 Special Topics in Astronomy**4****Prerequisites:** -

Current research in astronomy; topics may include: instrumental science for astronomical observation; limit and sensitivity in electromagnetic wave and gravitational wave observation

ICPY 490 Computational Physics**4****Prerequisites:** -

Ordinary differential equations: stability, order and chaos in two-dimensional motion; boundary value and eigenvalue problems, stationary solutions of the one-dimensional Schrodinger equation; partial differential equations with different types of boundary conditions: the time-dependent Schrodinger equation, heat transfer, diffusion, wave, and Laplace equation; Monte Carlo methods: the Ising model in two dimensions; Discrete Fourier Transform and Fast Fourier Transform; diffraction, image processing

ICPY 492 Electronics

4

Prerequisites: ICPY 102

Microcontroller and programming, a circuit design and analysis, electrical Components, networking, and analog Circuit

ICPY 496 Biophysics

4

Prerequisites: ICBI 101

An introduction to biophysics, physical methods in the study of biological systems, including molecular and cellular biology, mathematical modeling of biological phenomena; applications of physics to biology; instruments in biophysics



**Mahidol University
International College**

Foundation Courses

(For all 618xxxx students, except ICCI, ICCU and ICMC students)

ICID 100 Freshman Seminar 0
Prerequisites: -
Compulsory for all freshmen; time management skills, study plan, adjustment to college's life, and teachers' expectation

ICMA 100 Foundation Mathematics 0
Prerequisites: Placement test
Expressions and equations; linear functions; polynomials and nonlinear functions; radical and rational functions; the data analysis

ICME 100 English Resource Skills 0
Prerequisites: Placement test
A remedial course preparing students for reading and writing academic English at a level suitable for entering the Intermediate English Communication I

General Education Courses

(For all 618xxxx students, except ICCI, ICCU and ICMC students)

English Communication

ICGC 101 Academic Writing and Research I 4
Prerequisites: Placement Writing Test or ICME 100
An introduction to the academic writing process through the development of the writer's voice through sentencing, structure, and rhetorical devices; a 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
The integration of skills in academic research and writing to analyze and create persuasive compositions; techniques to identify strengths and weaknesses in argument; the 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; an introduction and application of techniques to inform/persuade audiences; the 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; an emphasis on the development of a writer's voice through sentencing, structure, and rhetorical devices; strategies for using and integrating researched sources introduced by means of explaining theories, concepts, and writing conventions

ICGC 112 Academic Writing and Research II (Advanced)

4

Prerequisites: ICGC 111

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; the utilization of advanced strategies to exploit secondary research and argumentation; an 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 or ICGC 112

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 or ICGC 112

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 or ICGC 112

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 or ICGC 112

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, stage, and sales strategies; the development of students' abilities to express themselves confidently in a variety of academic and professional environments through impromptu and prepared speeches

ICGC 205 Linguistics

4

Prerequisites: ICGC 103 or ICGC 112

An introduction to major features and components of the human languages; a focus on power and complexity of languages, its influence on interactions and its contributions to understanding; an exploration of definitions and applications of syntax, semantics, pragmatics, and other related topics

ICGC 206 Literature Into Film

4

Prerequisites: ICGC 103 or ICGC 112

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 207 Diverse English Speaking Cultures

4

Prerequisites: ICGC 103 or ICGC 112

An introduction to the study and appreciation of post-colonial literature; utilizing literature, music, and film to help students develop the ability to understand influences in new ways; an evaluation through a combination of mock trials, debates, plays, presentations, reading notes, and essays

ICGC 208 Language and Culture	4
Prerequisites: ICGC 103 or ICGC 112	
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 research paper on the topic	
 ICGC 209 The Story of English	4
Prerequisites: ICGC 103 or ICGC 112	
The development of English traced from its origins; the/a demonstration through texts, films, and media of the growth and spread of English; an introduction to methods of understanding a variety of linguistic progressions in the language	
 ICGC 210 First and Second Language Acquisition	4
Prerequisites: ICGC 103 or ICGC 112	
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 or ICGC 112	
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 or ICGC 112	
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 or ICGC 112	
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	
Natural Science	
• Scientific and Environmental Literacy	
 ICGN 101 Decision Mathematics	4
Prerequisites: -	
Graphs and networks; linear programming; transportation problems; game theory	
 ICGN 102 Essential Mathematics	4
Prerequisites: Placement test	
Real numbers, algebraic expressions, percentages, ratio, proportion; linear functions; the systems of linear equations	
 ICGN 103 Essential Statistics	4
Prerequisites: ICGN 102	
Statistical ideas and concepts; probability and conditional probability; distribution functions; expected value; estimators; hypothesis testing; a linear regression analysis	

ICGN 104 Mathematics and Its Contemporary Applications	4
Prerequisites: Placement test or ICMA 100	
A review of algebra, logarithmic and exponential functions, matrix algebra, differential calculus, integral calculus	
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 106 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 107 The Chemistry of Everyday Life	4
Prerequisites: -	
The air we breathe; ozone hole; water quality; acid-base and everyday chemicals; energy and fuels; battery; portable electronics; pharmaceuticals from nature; polymer and plastics; nutrition and modern life; genetic engineering; forensics and the DNA technology	
ICGN 108 Essentials of Culinary Science for Food Business	4
Prerequisites: -	
Changes during the preparation, heating, and storage of raw materials and finished products, food service and commercial packaged food industries; chemical, sensory, and nutritional natures of food, food safety concepts, changing trends and interests, legal requirements of the food establishment	
ICGN 109 Food for Health	4
Prerequisites: -	
Human nutritional requirements; health benefits of various foods; quality and safety of foods; food additives; food production and preservation; health and nutritional value	
ICGN 110 Maker Workshop	4
Prerequisites: -	
A mechanical design consideration, 3D drawing, safety in design; motion in 1 and 2 dimension; the sound and the oscillation motion, mechanical properties of materials; basic electronics, a circuit analysis, soldering; microcontroller, basic programming	
ICGN 111 Physics for CEO	4
Prerequisites: -	
Basic concepts of physics impacting individuals and society on a daily basis: physical quantities, the Newtonian mechanics and dynamics, energy and heat, electricity and magnetism, light and sound, and the electromagnetic spectrum	
ICGN 112 Stargazer	4
Prerequisites: -	
Basic ideas of astronomy, astrophysics, and cosmology; the progress of human understanding of the universe; the impact of the scientific methods on the astronomical observation; the earth and the moon; the solar system; the lifecycle of stars; Black Holes; galaxies; and the current understandings about the origins and the 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 114 The Scientific Approach and Society	4
Prerequisites: -	
Scientific literacy; the process of science discovery; verification, its limitation, and the influence on various disciplines; human research and animal research ethics; the critical analysis of current scientific articles; life cycle of scientific knowledge; modeling in science	
ICGN 115 Human Evolution, Diversity and Health	4
Prerequisites: -	
The Hominid evolution; primate societies; the origins of human species; the Order Primates; human distinctiveness and diversity; the scientific advancements and the human body; the scientific advancements and the modern society	
<ul style="list-style-type: none"> • ICT and Digital Literacy 	
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 117 Technology behind E-Business and Digital Strategies	4
Prerequisites: -	
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 118 Everyday Connectivity	4
Prerequisites: -	
The Internet, computer networks, and the World Wide Web (W3) in daily life; 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; the e-payment systems	
ICGN 119 Computer Essentials	4
Prerequisites: -	
Digital literacy relating to computer literacy and 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	

Humanities

<ul style="list-style-type: none"> • Logical and Ethical Literacy 	
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 104 Moral Reasoning: How can we know what is good?

4

Prerequisites: -

A survey of philosophical, psychological, and scientific contributions to the understanding of moral values; a hands-on construction and an analysis of ethical argument regarding burning issues in applied ethics

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 the transistor

ICGH 106 The Greeks: Crucible of Civilization

4

Prerequisites: -

An introduction to and 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

- Arts and Media Literacy

ICGH 107 Contemporary Art and Visual Culture

4

Prerequisites: -

Current issues in society; the new media in art today; an analysis of images; social and historical contexts of contemporary art; creative thinking; the effects of globalization on the visual world; an investigation of broader social and cultural matters; subject matters related to ideology, gender, race, and ethnicity

ICGH 108 Creative Drawing Expression

4

Prerequisites: -

Drawing in a variety of medium; drawing as creativity; re-presenting, expressing, texturizing, sublimating, juxtaposing, appropriateness, redefining, constructing, illustrating, and describing; drawing from life: human form; developing cognitive learning skills; utilizing visual communication, the design and art principles (experimentation, exploration, application, techniques for mark making, proportion, gesture, contour, action,

weight, line, value, texture, composition); researching, interpreting, evaluating, and analysing contemporary artists; personal evaluation; personal expression

ICGH 109 Creative Thinking Through Art and Design

4

Prerequisites: -

Combining a hands-on studio experience 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; developing individual solutions to open-ended problems

ICGH 110 Drawing as Visual Analysis

4

Prerequisites: -

Developing creativity and cognitive learning skills; utilizing visual communication, the/a design and art principles; mark making; observing, analyzing, recording, representing plant and still life forms; practicing and applying, and using techniques for conventional pencil drawing tools (shape, form, perspective, lines, shading, value, negative space, texture, composition); scientific illustration; a realistic representational observation

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

ICGH 112 Photography

4

Prerequisites: -

An integration of visual literacy, photography techniques, and ethics; analyzing, evaluating, and authoring photographs; visual aesthetics; visual storytelling and narrative building techniques; the decisive moment; influencing audiences; maximizing the audience engagement; the ethical publications and the dissemination of photographs

ICGH 113 Moving Pictures: A History of Film

4

Prerequisites: -

An investigation of European, American, and Asian films as art, philosophy, social commentary, and propaganda; a focus not only on techniques, styles, and technological advances but on the interpretation, comparison, and criticism

ICGH 114 The Sound of Music: Form, Emotion, and Meaning

4

Prerequisites: -

A survey of a musical expressions and an analysis of its communicative force in light of current research; examples from a wide range of musical styles with a focus on classical music

Foreign Languages

- **German**

ICGL 101 Elementary German I

4

Prerequisites: Placement test

Greetings, introducing oneself or others; German alphabets and phonemes; personal information, numbers from 1 – 100 and price quotations; expressing wishes, telling the time and making appointments; the 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	
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	
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	
• Japanese	
 ICGL 111 Elementary Japanese I	4
Prerequisites: Placement test	
The Hiragana and Katakana characters; fundamentals of the 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); the description of Japan; the design of 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	
The Kanji characters (approximately 50); fundamentals of the 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; the design of written products in the target language; expressing simple points of view, describing people and daily life activities; comparing cultures	
 ICGL 113 Elementary Japanese III	4
Prerequisites: Placement test or ICGL 112	
The Kanji characters (approximately 50); fundamentals of the basic Japanese grammar concepts (verb conjugation (masu-form, te-form, nai-form, and dictionary form), and related sentence patterns; the polite style of speech, and the plain style of speech, particles); scaffolding of basic vocabulary; basic communication about various topics; the design of written products in the target language; expressing points of view, describing people and various activities; comparing cultures	
• French	
 ICGL 121 Elementary French I	4
Prerequisites: Placement test	
Fundamentals of the basic French grammar (pronouns, present tense conjugation, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); an identification and a description of French speaking countries; the design of 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	
Fundamentals of the simple French grammar (present and future tense, adjective gender, place and agreement, more complex prepositions, more complex questions); scaffolding of simple vocabulary; simple communication about daily life topics (in France and in their country); the design of 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**

Fundamentals of the more complex French grammar (present and future tense, adjective gender, place and 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); the design of written products in the target language; expressing point of view, describing people and daily life activities; comparing cultures

- **Chinese**

ICGL 131 Elementary Chinese I**4****Prerequisites: Placement test**

The Chinese phonetic system (Pinyin), the Chinese basic writing system (Stroke order), the Chinese characters (approximately 100) and fundamentals of the basic Chinese grammar (interrogative pronouns, particle “de”, Yes/No questions with “ma”, demonstrative pronouns, classifiers, adverb “ye”也, “dou”都); scaffolding of basic vocabulary; basic communication about personal topics (self and others); the description of China; the design of written product in the target language; expressing existence, preferences and agreement; comparing cultures

ICGL 132 Elementary Chinese II**4****Prerequisites: Placement test or ICGL 131**

The Chinese phonetic system (Pinyin), the Chinese writing system, the Chinese characters (approximately 100); fundamental Chinese grammar concepts (interrogative pronouns, classifiers, “de” particles, “de” phrase, adverbials, the continuation of an act sentence structures and the reduplication of verbs); scaffolding of basic vocabulary; basic communication about daily life topics; the design of written products in the target language; expressing simple points of view, describing people and daily life activities; comparing cultures

ICGL 133 Elementary Chinese III**4****Prerequisites: Placement test or ICGL 132**

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

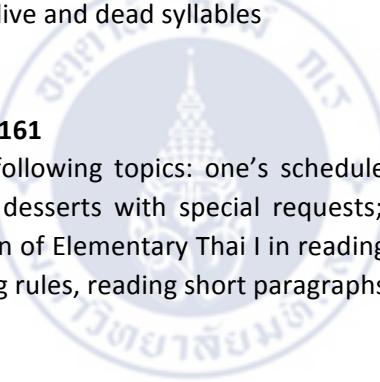
- **Spanish**

ICGL 141 Elementary Spanish I**4****Prerequisites: Placement test**

Fundamentals of the basic Spanish grammar (pronouns, present tense conjugation, gender/number, adjectives, prepositions); scaffolding of basic vocabulary; basic communication about personal topics (self and others); an identification and a description of Spanish speaking countries; the design of 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**

Fundamentals of the 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); an identification and a description of Spanish speaking countries; the design of written products in the TL; expressing existence, preferences and agreement; talking about daily habits

ICGL 143 Elementary Spanish III	4
Prerequisites: Placement test or ICGL 142	
Towns, quarters and cities; directions; past experience; 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	
• Thai	
ICGL 160 Introduction to Thai Language and Culture	4
Prerequisites: -	
A communication in basic situations such as introducing oneself, asking for and giving directions, ordering food and drinks, asking for prices and bargaining at the same time, understanding selected topics of Thai culture in daily life	
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	
Listening and speaking skills on the following topics: one's schedule, making appointments, favourite leisure activities, ordering food, drinks, and desserts with special requests; presentation of one's plan for activities during the school break; a continuation of Elementary Thai I in reading and writing skills; the consonant clusters, tone marks, words with special spelling rules, reading short paragraphs	
ICGL 163 Elementary Thai III	4
Prerequisites: Placement test or ICGL 162	
Communication of the four skills on the following topics: booking or renting accommodation, symptoms of illness and visiting a doctor; selected holidays and festivals; a presentation of a selected province in Thailand; a continuation of Elementary Thai II in reading and writing skills, writing short paragraphs and reading long passages on selected topics	
 Social Sciences	
• Financial, Economic, Business and Entrepreneurial Literacy	
ICGS 101 Accounting for Young Entrepreneurs	4
Prerequisites: -	
Fundamental accounting concepts; the basic accounting process used in small enterprises; the preparation of financial statements; the break-even analysis; business taxation	
ICGS 102 Business Sustainability and the Global Climate Change	4
Prerequisites: -	
A study of 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 103 Economics in Modern Business	4
Prerequisites: -	

Forces of demand and supply, elasticity, opportunity cost, market structures, pricing strategy, business enterprise, consumers' behavior; the Thai economy, the world economy, globalization and technological, profit maximizing, firm and organization, government policies, a business analysis and managerial decision-making, competitive advantage; the social media economy, innovation-based economy, digital sharing economy, aging society and dynamic business environment

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; the customer analysis, integrated marketing, funding, securing and managing capital, the human capital management under the disruptive environment

ICGS 105 Personal Financial Management

4

Prerequisites: -

Personal finance and investment; financial goals and planning process; financial statements and budgets; tax preparation; cash and savings management; investment planning; investing in stocks and mutual funds; making automobile and housing decisions; life insurance; protecting the property; retirement planning

ICGS 106 Fashion and Society

4

Prerequisites: -

The design elements of fashion, fashion terminology, fashion reflecting its temporal and spatial context, fashion and the development of art; fashion as a cultural expression, fashion as creativity; fashion requiring customers' approval and endorsements, fashion and consumer behaviour, fashion and consumerism, and ethical issues of fashion

ICGS 107 MICE 101

4

Prerequisites: -

An introduction to MICE industry; meetings; incentive travels; convention; exhibitions; decision-making criteria; special events; MICE event management; the venue management; logistics for MICE industry; service providers in MICE industry; standards in MICE industry; ethics for MICE

ICGS 108 Money Matters

4

Prerequisites: -

Financial issues related to money, rational choices, income and success; managing personal finances; markets and their functions; challenges in hard economic times; financial responsibility and basic money management skills

- **Global and Multicultural Literacy**

ICGS 109 American History, Film and Modern Life

4

Prerequisites: -

The history of modern America from the post reconstruction to the present; a survey history of the American political economy, society and international relations available in the modern media such as arts, film; influential thinking and writing; television channels and the social media; the state's power projection through hard and soft power; the American Innovative Industrialists; the Progressive Reformers; World War I; the Roaring Twenties; the Great Depression; Isolationism in the interwar years; Women's Suffrage; World War II; the Cold War; the Vietnam War; Racial Tensions; the Bush, Obama, Trump administrations and the future U.S. foreign policy

ICGS 110 Development and Conflicts

4

Prerequisites: -

Concepts of political and economic development; policies; production, and investment priorities; the consequences of economic transformation in poor countries; developmental failure since the 1980s; four development traps, including the conflict trap; the natural resource trap; the bad governance trap; and being landlocked with bad neighbours; solutions of how countries can achieve positive changes; the environmental and social development; the appropriateness and sustainability of the existing conventional development and growth trajectory

ICGS 111 Exploring Religions**4****Prerequisites:** -

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

ICGS 112 Geography of Human Activities**4****Prerequisites:** -

The interrelationship between humans and the spaces they create; human activities as interdisciplinary by nature; the physical and socially instructed environment people live in; human interactions shaping the human understanding of the environment; the utility of resources; the phenomena on the earth's surface related to human actions; concepts and geographical methodologies used to examine social organizations and environmental consequences

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 an interpretation of a range of primary sources dealing with the Thai past; understanding of how history is written

ICGS 114 Power, Money and Behavior of Powerful States**4****Prerequisites:** -

Understanding the motives behind the inter-state relations; the increase of power, wealth and international prestige; tools states use to achieve objectives and the challenges of decision-making; foreign policies of the great power states having permanent seats and veto power on the UN Security Council; middle-power states including economically and politically advanced countries; critical issues such as nuclear weapons in North Korea; the war in Afghanistan; democratization or terrorism in failing states; and world trade; patterns and trends of foreign policy making of powerful states during the last century individually and in comparison with other states; case studies illustrating the policy decision-making to meet the contemporary international challenges

ICGS 115 Sociology in the Modern World**4****Prerequisites:** -

Sociology as 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, social groups, socialization process, deviance, family, religion, social inequality, gender, economic, politics, the media, and social change

ICGS 116 Power and Politics**4****Prerequisites:** -

The understanding of the politics and the political systems of the current world; interactions and connections of different ideas; systems of thought and conflict in contemporary society; an analysis of political phenomenon

ICGS 117 Overcoming Stereotypes, Prejudice and Discrimination**4**

Prerequisites: -

An analysis of psychological theories; psychological approaches to stereotypes, discrimination and prejudice; the emotional, behavioral and cognitive implications; the impact on our behavior and society; debiasing and metacognition

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: communication across cultures; parenting in different cultures; understanding consumers from different cultural backgrounds; emotions and motivation across cultures as well as approaches to deal with cultural diversity at work

ICGS 119 World Politics

4

Prerequisites: -

Different disciplinary perspectives on world politics; historical, geographical, anthropological, economic, and political approaches; specific regions in the world politics

ICGS 120 Global Awareness

4

Prerequisites: -

The state of the world: key facts and trends of geography, economy, society, politics and the environment; global relationships: key economic, political, and environmental relations and trends; Thailand in the world: how Thailand impacts the world, and vice versa

- **Psychological Literacy**

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 122 Propaganda, Nudge Theory and Marketing: How to resist?

4

Prerequisites: -

An examination of the science behind the 'mind control' and its implementation in the current society; an investigation of real and possible counter-strategies; a detailed psychological and socio-economic analysis of subtle oppressions of human autonomy in institutional, social, political, and economic practices

Physical Education

ICGP 101 American Flag Football

1

Prerequisites: -

A ball based sport course emphasizing techniques; non-contact game play, including dodging, throwing, and catching and the 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 the 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	1
Prerequisites: -	
A course designed on cycling instruction for safety, fitness, riding techniques, posture, communication, knowledge of the 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 the 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 the 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: -	
An external martial arts (striking) course emphasizing hard physical impact and exertion, muscular strength and tension, maximizing speed and power, through the body coordination	
ICGP 111 Self Defense (Grappling)	1
Prerequisites: -	
An internal martial arts (grappling) course stressing timing, awareness, precision, and techniques, using the body leverage for throwing, 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 the International Ballroom (Standard) and the 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



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