Bachelor of Science Program
in Chemistry (International Program)

1. Code and Program Title

In Thai : หลักสูตรวิทยาศาสตรบัณฑิต สาขาเคมี (หลักสูตรนานาชาติ)

In English : Bachelor of Science Program in Chemistry (International Program)

2. Degree Offered and Field of Study

In Thai   Full Name :   วิทยาศาสตรบัณฑิต (เคมี)

                      Abbreviation : วท.บ. (เคมี)

In English   Full Name :   Bachelor of Science (Chemistry)

                      Abbreviation : B.Sc. (Chemistry)

3. Major Subject (If Applicable) –

4. Total Credits Required

Plan A – No less than 159 credits from Mahidol University

Plan B – No less than 83 credits from Mahidol University and no less than 96 trimester credits (72 units) from Flinders University.

5. Graduates' advancement

Career opportunities	Graduates of the international bachelor chemistry program can find employment in
	1) Quality control or quality assurance positions or as a research scientist in local and multinational chemical, petrochemical, environmental, renewable energy, pharmaceutical and cosmetic science manufacturing and related industries
	2) Research assistant in private sector and governmental services department.
	3) Customer relations and technical supports in sales and marketing team for local and international chemical, petrochemical, renewable energy, pharmaceutical and cosmetic science related companies
	4) Entrepreneurship in applied chemical and cosmetic industries.

	Establishing regional office for multinational science-related companies.
Further fields of study	Graduates of the international bachelor chemistry program can study M.Sc., M.A. or Ph.D. abroad or in Thailand in chemistry, chemical engineering, petroleum, materials, pharmaceutical, renewable energy, environment, cosmetic science and related fields including science education, patent laws, innovation management and MBA abroad or in Thailand.

6. Curriculum Structure

Course Category	Plan A (credits)	Plan B (credits)
1) Foundation courses (non-credit)	0	0
2) General Education*		
1. English Communication	$10\text{-}14^a$	$10\text{-}14^{a,\,b}$
2. GE Literacies		
- MU Literacy	2	2
- Health Literacy	2	2
- Science and Environment Literacy	2	2
- Intercultural and Global Awareness Literacy	2	2
- Civic Literacy	2	2
- Finance and Management Literacy	2	2
3. GE Electives	4-8	4-8
3) Specific Courses		
- Core Courses	42	42^b
- Major Required Courses	55	$11^b + 44^c$
- Major Elective Courses	4	16^c
4) I-Design Electives	20	24^c
5) Free Electives	8	12^c

   * Students may choose General Education courses provided by other programs/departments/faculties to fulfill the credit requirements.

   [a] Students who are placed in FE and GC tracks are required to complete 14 credits of English Communication and 4 credits for GE Electives, while students in GC2 track are required to complete 10 credits of English Communication and 8 credits for GE Electives.

   [b] Credits while studying at Mahidol University (students who select plan B track are required to complete 42 credits of Core Courses and 11 credits of Major Required Courses:

ICCH 100 Chemistry and Careers 1(1-0-2), ICCH 221 Organic Chemistry I 4(4-0-8), ICCH 222 Organic Chemistry II 4(4-0-8) and ICCH 224 Organic Chemistry Laboratory 2(0-4-2).)

[c] Credits while studying at Flinders University

Plan selection

With their academic advisors' consultation, students can nominate their plan at any time during the first two years of their study in the program. After three trimesters of study, the Program director of chemistry approves the student's nominated plan in consultation with the partners (Flinders University, University of Canterbury, and Siriraj for Plan B and 4+1 plan respectively). It is expected that high performing students (GPAX >= 3.20 for Plan B and GPAX >= 3.00 for Siriraj) will be able to choose any plans of his/her choice. For other students, the default option is Plan A. Students may need to pass additional interviews and/or demonstrate further evidence of their commitment towards Plan B or 4+1 track to be approved.

1) Foundation Courses		Non-credit
ICMA100	Foundation Mathematics	0
ICMA101	Precalculus	0

Note I: For B.B.A. students**,** students whose Mathematics placement is below ICMB151 Business Mathematics are required to take ICMA100 Foundation Mathematics and pass the course with the grade of "S" before moving to ICMB151 Business Mathematics.

For B.Sc. and B.Eng. students, students whose Mathematics placement is below ICMA106 Calculus I and/or ICMA151 Statistics for Science I are required to take ICMA101 Precalculus and pass the course with the grade of "S" before moving to ICMA106 Calculus I and/or ICMA151 Statistics for Science I.

For B.A.Sc. students, students whose Mathematics placement is below ICMA106 Calculus I and ICMA151 Statistics for Science I are required to take ICMA101 Precalculus and pass the course with the grade of "S" before moving to ICMA106 Calculus I and ICMA151 Statistics for Science I.

ICME101	Foundation English: Communication Skills	0

Note I: Based on their achievement on the essay portion of the MUIC entrance exam, students whose English placement is below ICGC104 English Studies I: The Writer's Toolkit will be placed into the "FE Track". These students will be required to take ICME101 Foundation English: Communication Skills and pass the course with the grade of "S" before moving to ICGC104 English Studies I: The Writer's Toolkit.

2) General Education Courses　　　　　　　　　　　30 Credits
English Communication　　　　　　　　　　　10 –14 Credits

Note I: Based on their achievement on the essay portion of the MUIC entrance exam, students will be placed into 3 following tracks: 'FE Track', 'GC Track' and 'GC2 Track'.

• 'FE Track' – Students who are placed into 'FE Track' will be required to take ICME101 (a non-credit course) and complete14 credits in English Communication: ICGC104, ICGC105, ICGC106 in order, and finally, any200+ level English courses.

• 'GC Track' – Students who are placed into 'GC Track' will be required to complete14 credits in English Communication: ICGC104, ICGC105, ICGC106 in order, and finally, any 200+ level English courses.

• 'GC2 Track' – Students who are placed into 'GC2 Track' will be required to complete10 credits in English Communication: ICGC105, ICGC106 in order, and finally, any200+ level English courses.

ICGC104	English Studies I: The Writer's Toolkit	4
ICGC105	English Studies II: The Writer's Voice	4
ICGC106	English Studies III: Public Speaking	4
ICGC221	English Studies IV: The World of English - Global Realities	2
ICGC222	English Studies IV: The World of English - Literary Analysis	2
ICGC223	English Studies IV: The World of English - Creative Writing	2
ICGC224	English Studies IV: The World of English - Advanced Oral Communication	2
ICGC226	English Studies IV: The World of English - Literature Into Film	2
ICGC228	English Studies IV: The World of English - Language and Culture	2
ICGC230	English Studies IV: The World of English - First and Second Language Acquisition	2
ICGC231	English Studies IV: The World of English - Poetry	2
ICGC232	English Studies IV: The World of English - The Short Story and the Novel	2
ICGC233	English Studies IV: The World of English - Drama	2
ICGC234	English Studies IV: The World of English - Literary Non-fiction	2
ICGC235	English Studies IV: The World of English - Writing for Research	2

GE Literacies   **12 Credits**

Note I: Students must complete courses in the following six categories: MU Literacy, Health Literacy, Science & Environment Literacy, Intercultural & Global Awareness Literacy, and Finance & Management Literacy. Each category requires a minimum of 2 credits.

Note II: If a student selects a 4-credit course to fulfill a 2-credit literacy requirement, the excess 2 credits cannot be allocated or applied toward GE Elective or Free Elective credits. Instead, these excess credits will be entirely allocated to the literacy for which they were originally intended.

- **MU Literacy**   **2 Credits**

ICGB101	Project Management for Impacts	2
ICGB108	Event for Good	2
ICGN139	Scientific Inquiry and the Community	2
ICGS169	Learning by Doing	2
ICGS171	Digital Campaign for Gender Issues	2

ICGS172	Service Learning - Making Change	4
ICGS173	Service Learning - Campaigning for a Cause	4
ICGS175	Social Innovation and Sustainability	2
ICGS176	Sustainable Cooking	2
ICGS177	Social Innovation: Empowering Sustainable Communities	2
ICGT107	Innovation: Inside Out	2

- **Health Literacy**   **2 Credits**

ICGH136	Sound & Soul: A Journey of Music, Emotion, and Well-being	2
ICGH143	Flowers and Fragrances for Health	2
ICGN135	Personal Health and Well being	2
ICGP101	American Flag Football	1
ICGP102	Badminton	1
ICGP103	Basketball	1
ICGP104	Body Fitness	1
ICGP105	Cycling	1
ICGP106	Discover Dance	1
ICGP107	Golf	1
ICGP108	Mind and Body	1
ICGP109	Selected Topics in Sports	1
ICGP110	Self Defense (Striking)	1
ICGP111	Self Defense (Grappling)	1
ICGP112	Soccer	1
ICGP113	Social Dance	1
ICGP114	Swimming	1
ICGP115	Tennis	1
ICGP116	Volleyball	1
ICGP118	Health and Wellness	2
ICGP119	Mindful Food and Well-being	2
ICGP120	Mind and Body: Navigating the Interplay of Brain, Behavior, and Well-being	2
ICGS121	Abnormal Colleagues: how do I make this work?	4
ICGS126	Introduction to Psychology	4

ICGS155	Pathway to Purpose: Life Design and Self-Exploration	4
ICGS164	Positive Psychology	2
ICGS178	Unmasking Human Behaviour: Exploring Psychological Truths about Behaviour	2
ICGS179	Health and Society	2
ICLL100	Self Development	2

- **Science & Environment Literacy**   2 Credits

ICGH131	Unraveling the Anthropocene: A Philosophical Critique of Earth's Shifts and Humanity's Roles	2
ICGH142	Fantasy Literature's Environmental Message	2
ICGH144	A Candle in the Dark: How to Tell Fact from Fiction	2
ICGN105	Ecology, Ecosystems and Socio-Economics in Southeast Asia	4
ICGN107	The Chemistry of Everyday Life	4
ICGN108	Essentials of Culinary Science for Food Business	4
ICGN111	Physics for CEO	4
ICGN113	Plants, People and Poisons	4
ICGN114	The Scientific Approach and Society	4
ICGN115	Human Evolution, Diversity and Health	4
ICGN116	Understanding and Visualizing Data	4
ICGN119	Computer Essentials	4
ICGN123	The Earth's Dynamic Structure	4
ICGN124	Climate Change and Human Society	4
ICGN126	Plant Society	2
ICGN127	Practical Mathematics	2
ICGN128	Climate Emergency, Biodiversity Crisis, and Humanity at Risk	2
ICGN129	Programming for Problem Solving	4
ICGN130	Cryptography: The Science of Making and Breaking Codes	2
ICGN134	Introduction to Artificial Intelligence	2
ICGN136	Creator Workshop	2
ICGN137	Star Wanderer	2
ICGN138	Cosmetics Chemistry	2
ICGN140	Food Energy for Health	2

ICGN141	Life in the Sea	2
ICGN142	Energy and the Environment	2
ICGN143	Gaia: Life on Earth	2
ICGT101	Technology-Enhanced Learning: Harnessing AI & Digital Tools for Academic Success	2
ICGT102	Digital Document Management	2
ICGT103	Computational Thinking	2
ICGT104	Tell a Great Story with Data	2
ICGT105	No-Code Application Development	2
ICGT106	Data and Spreadsheets	2
ICLL102	Skills for a Digital World	2

- **Intercultural & Global Awareness Literacy**   2 Credits

ICGH107	Contemporary Art and Visual Culture	4
ICGH109	Creative Thinking Through Art and Design	4
ICGH110	Drawing as Visual Analysis	4
ICGH115	Cinematic Language and Applications	4
ICGH116	World Cinemas	4
ICGH117	Drawing as Creative Expression	4
ICGH118	Photography Visualizing in the Digital Age	4
ICGH120	Thai and ASEAN Cinema	4
ICGH124	Life Drawing and Anatomy	4
ICGH128	Internet Celebrity, Culture and the Media	4
ICGH130	The Logic Lab: Crafting Coherent Arguments	2
ICGH132	The Rise and Fall of Ancient Athens	2
ICGH135	The Horror Film	2
ICGH137	Apocalypse Now, or Never, or Maybe?	2
ICGH139	Spirituality, Sustainability, Ecosystems	2
ICGH141	SPQR—Glimpses of Rome	2
ICGH145	Essentials to Photography, Skills and Practices	2
ICGH146	Acting for Self-Discovery and Empathizing with Others	2
ICGH147	Myth and the Masks of the Divine	2
ICGH148	Quest for Global Justice: A Philosophical Inquiry	2

ICGL101	Elementary German I	4
ICGL102	Elementary German II	4
ICGL103	Elementary German III	4
ICGL111	Elementary Japanese I	4
ICGL112	Elementary Japanese II	4
ICGL113	Elementary Japanese III	4
ICGL121	Elementary French I	4
ICGL122	Elementary French II	4
ICGL123	Elementary French III	4
ICGL131	Elementary Chinese I	4
ICGL132	Elementary Chinese II	4
ICGL133	Elementary Chinese III	4
ICGL141	Elementary Spanish I	4
ICGL142	Elementary Spanish II	4
ICGL143	Elementary Spanish III	4
ICGL160	Introduction to Thai Language and Culture	4
ICGL161	Elementary Thai I	4
ICGL162	Elementary Thai II	4
ICGL163	Elementary Thai III	4
ICGL164	Thai Writing for Specific Purposes in Workplace *for native Thai students	2
ICGL171	Diversities in Multilingual Societies	2
ICGL172	Chinese Influence in Thai Society	2
ICGL173	Introduction to Japanese Societies	2
ICGL174	From Siesta to Fiesta: Introduction to Spanish and Latin American Culture	2
ICGL201	Pre-Intermediate German I	4
ICGL202	Pre-Intermediate German II	4
ICGL203	Pre-Intermediate German III	4
ICGL211	Pre-Intermediate Japanese I	4
ICGL212	Pre-Intermediate Japanese II	4
ICGL213	Pre-Intermediate Japanese III	4
ICGL221	Pre-intermediate French I	4

ICGL222	Pre-intermediate French II	4
ICGL223	Pre-intermediate French III	4
ICGL231	Pre-Intermediate Chinese I	4
ICGL232	Pre-Intermediate Chinese II	4
ICGL233	Pre-Intermediate Chinese III	4
ICGL241	Pre-Intermediate Spanish I	4
ICGL242	Pre-Intermediate Spanish II	4
ICGL243	Pre-Intermediate Spanish III	4
ICGN125	Games and Learning	2
ICGS112	Geography of Human Activities	4
ICGS128	Global Gastronomy and Cuisines	4
ICGS131	Introduction to International Studies	4
ICGS132	Career Preparation in a Globalized World	4
ICGS133	Foundation of Mediterranean Cultures	4
ICGS137	Witchcraft and Gender Representation	4
ICGS143	Introduction to Air Transport and Tourism	4
ICGS156	Fashion and Society	2
ICGS157	Asian Religious Traditions	2
ICGS159	The Self and Modern Media	2
ICGS161	Skills in Dealing with People Across Cultures	2
ICGS162	Arts, Culture and Tourism Development	2
ICGS165	Tea Studies	2
ICGS167	Coffee Studies	2
ICGS168	Faith a Lifestyle	2
ICGS180	Cafe Story and Slow food	2
ICGS181	Cuisine and Culture	2
ICGS182	Humor Horizons	2

- **Civic Literacy** **2 Credits**

ICGH126	Behavioral Ethics: Why Good People Do Bad Things	2
ICGH129	Searching for Meaning	2
ICGH133	Socrates, His Predecessors and Successors	2
ICGH134	Digital Media Literacy: Skills for21st Century Learning	2

ICGH138	The Philosophies of Asia	2
ICGH140	Ethics and Evolution	2
ICGH149	Law, Technology, and Society	2
ICGH150	Global Perspectives on Free Expression in the Digital Age	2
ICGN131	Digital Search Literacy	2
ICGN132	Digital Security and Privacy	2
ICGN144	Environmental Ethics	2
ICGN145	Food Integrity and Food Fraud: When a Food Product Is Not What It Seems	2
ICGS134	Is Democracy Good?	4
ICGS136	Social and Health Issues in Thailand	4
ICGS140	Fake News, Censorship and the Politics of Truth	4
ICGS147	Women in Leadership	4
ICGS158	Contemporary Issues in Thailand	2
ICGS160	Self and Society	2
ICGS163	Popular Media and Conflicts	2
ICGS166	Power and Politics	2
ICGS170	Civic Action in Thailand	2
ICGS183	Media and Community	2

- **Finance & Management Literacy**   **2 Credits**

ICGB102	Navigating the Market Landscape	2
ICGB103	Decoding Economic News	2
ICGB104	Entrepreneurship in a Disruptive Environment	2
ICGB105	Personal Finance Literacy	2
ICGB106	The Business of Fashion	2
ICGB107	Tourism Management Perspectives	2
ICGB109	Business Event Essentials	2
ICGB110	Management Styles of Effective Leaders	2
ICGB111	Leadership in a Global Society	2
ICGB112	The Art of Pricing	2
ICGB113	Crisis Management in Service Businesses	2
ICGB114	Cultural Strategies for Success: Unveiling Eastern Business Dynamics	2

ICGB115	Money: Deciphering Currencies of Value	2
ICGB116	Managing Self and Working with Others	2
ICGH101	Biotechnology: from Science to Business	4
ICGS102	Business Sustainability and the Global Climate Change	4
ICGS135	Entrepreneurial Accounting	4
ICGS153	Social Media Management for Service Sector	2
ICGS174	The Art of Leadership in Practice: Inspiration	2
ICGS184	Healthy Habits, Happy Shoppers: Exploring Health Literacy in Consumer Decisions	2
ICLL101	Professional Development	2

General Education Elective Courses   **4-8 Credits**

Students need to take remaining courses in any GE category to fulfill their 30 credits requirement of GE:4 credits for students whose English Communication track are placed into 'FE track' or 'GC Track' and 8 credits for students whose English Communication track are placed into 'GC2 Track'. Partial credits of GE course that exceed the GE requirements cannot be counted towards Free Electives.

3) Specific Courses   **no less than 101 Credits**
1. Core Courses   **42 Credits**

ICBI 105	Molecules to Living Cells	4
ICBI 106	Organisms to Ecosystems	2
ICCH 101	General Chemistry I	4
ICCH 102	General Chemistry II	4
ICCH 103	Integrated Laboratory in Chemistry	2
ICCS 102	Coding for All	4
ICMA 106	Calculus I	4
ICMA 151	Statistics for Science I	4
ICMA 218	Multivariable Calculus	4
ICPY 101	Physics I	4
ICPY 102	Physics II	4
ICPY 105	Integrated Laboratory in Physics I	2

2. Major Required Courses   55 Credits

ICCH 100	Chemistry and Careers	1
ICCH 221	Organic Chemistry I	4
ICCH 222	Organic Chemistry II	4
ICCH 224	Organic Chemistry Laboratory	2
ICCH 231	Biochemistry	4
ICCH 232	Biochemistry Laboratory	2
ICCH 261	Analytical Chemistry and Instrumental Analysis	4
ICCH 262	Analytical Chemistry Laboratory	2
ICCH 321	Chemical Spectroscopy	4
ICCH 322	Polymer Science and Technology	2
ICCH 363	Physical Chemistry A	4
ICCH 364	Physical Chemistry B	4
ICCH 365	Physical Chemistry Laboratory	2
ICCH 391	Inorganic Chemistry A	4
ICCH 392	Inorganic Chemistry B	4
ICCH 393	Inorganic Chemistry Laboratory	2
ICCH 471	Chemical Unknown Detective	2
ICCH 472	Senior Project in Chemistry	4

3. Major Elective Courses   at least 4 Credits

Elective major courses are designed to provide advanced and contemporary knowledge in various disciplines of chemistry. The program offered both specific courses and extemporaneous topics. These courses include pure, applied and multidisciplinary chemistry topics such as biophysical, materials, medicinal, theoretical or mathematical chemistry. These are also used for credit equivalency of courses transferred from other institutions and graduate programs with approval from the program committee. In addition to the listed courses, students may take any relevant courses offered by the partner institutions (with MOU) as major elective courses with the approval from the program director.

ICCH 340	Current Topics in Chemistry A	4
ICCH 341	Current Topics in Chemistry B	4
ICCH 342	Current Topics in Chemistry C	4
ICCH 343	Current Topics in Chemistry D	4

ICCH 344	Current Topics in Chemistry E	4
ICCH 345	Special Topics in Chemistry A	2
ICCH 346	Special Topics in Chemistry B	2
ICCH 347	Special Topics in Chemistry C	2
ICCH 348	Special Topics in Chemistry D	2
ICCH 349	Special Topics in Chemistry E	2
ICCH 350	Contemporary Topics in Chemistry A	1
ICCH 351	Contemporary Topics in Chemistry B	1
ICCH 352	Contemporary Topics in Chemistry C	1
ICCH 353	Contemporary Topics in Chemistry D	1
ICCH 354	Contemporary Topics in Chemistry E	1
ICCH 355	Special Practice in Chemistry A	1
ICCH 356	Special Practice in Chemistry B	1
ICCH 357	Special Practice in Chemistry C	1
ICCH 358	Special Practice in Chemistry D	1
ICCH 359	Special Practice in Chemistry E	1
ICCH 402	Undergraduate Thesis	6
ICCH 403	Field Study A	1
ICCH 404	Field Study B	1
ICCH 407	Internship	8
ICCH 408	Summer Internship	2
ICCH 451	Advanced Organic Chemistry	2
ICCH 452	Materials Science	2
ICCH 453	Computational Chemistry	2
ICCH 454	Biophysical Chemistry	2
ICCH 455	Advanced Inorganic Chemistry	2
ICCH 456	Chemistry Innovation and Entrepreneurship	2
ICCH 457	Advanced Analytical Chemistry	2
ICCH 458	Bioinorganic Chemistry	2
ICCH 459	Supramolecular Chemistry	2
ICCH 460	Petroleum and Petrochemical Industry	2

4) I-Design Electives   **20 Credits**

The purpose of the I-Design electives is to promote multidisciplinary learning. Students are encouraged to explore courses offered by diverse disciplines across MUIC, Mahidol University, and partner institutions. The I-Design electives can be satisfied upon the completion of the following course categories:

1. Minor courses offered by any program in MUIC
2. Certificate courses offered by any program in MUIC
3. Any major courses offered by any program in MUIC
4. Any major courses offered in Mahidol University (including undergraduate and graduate level courses). Courses must be approved by the student's advisor.
5. Any major courses offered at partner institutions (who have MOU with Mahidol University and/or MUIC). Courses must be approved by the student's advisor.

5) Free Electives   **8 Credits**

Students can take any courses offered by MUIC / Mahidol University or any major courses offered by the partner institutions (with MOU) as free elective courses with the approval from the advisor.