

Bachelor of Science Program in Biological Sciences (International Program)

1. Code and Program Title

In Thai	หลักสูตรวิทยาศาสตรบัณฑิต สาขาวิชาวิทยาศาสตร์ชีวภาพ (หลักสูตรนานาชาติ)
In English	Bachelor of Science Program in Biological Sciences (International Program)

2. Title of Degree and Field of Study

In Thai	Full Title	วิทยาศาสตรบัณฑิต (วิทยาศาสตร์ชีวภาพ)
	Abbreviation	วท.บ. (วิทยาศาสตร์ชีวภาพ)
In English	Full Title	Bachelor of Science (Biological Sciences)
	Abbreviation	B.Sc. (Biological Sciences)

3. Major Subject (If Applicable)

Applied Biology Concentration

Biomedical Science Concentration

4. Career Opportunities after Graduation

- 1) Graduates can work as teaching assistants in the field of Biological Sciences at any academic institutes or universities.
- 2) Graduates can pursue a teaching career as primary- and secondary-school teachers in the field of Biological Sciences at any international schools.
- 3) Graduates can work in research and development departments of any company or manufacturer dealing in biological products.
- 4) Graduates can work in quality control or quality assurance positions.
- 5) Graduates can work as research assistants in research institutes or on research programs/projects either in Thailand or abroad.
- 6) Graduates can work in scientific instruments trading and services in both private and governmental sectors.
- 7) Graduates can work as a bioinformaticist in any institutes nationally and internationally.
- 8) Graduates can work in customer relations departments for biological or biomedical product companies.
- 9) Graduates can work in customer relations departments for private hospitals that require personnel with good a command of English.
- 10) Graduates can continue their studies for a higher degree in any field of biological sciences.
- 11) Graduates can continue their studies for a professional degree in the related fields such as medicine, dentistry, veterinary science, pharmacy, etc.

12) Graduates can become the owner of companies that sell products and/or services in the field of biological sciences.

6. Program Structure

1) Foundation Courses	Non-credit
2) General Education Courses	40 credits
- English Communication	16 credits
- Natural Sciences	4 credits
- Humanities and Foreign Languages	8 credits
- Social Sciences	8 credits
- Physical Education	4 credits
3) Major Courses	126 credits
- Core Science Courses	38 credits
- Major Core Courses	32 credits
- Required Major Courses	40 credits
- Elective Major Courses	16 credits
4) Free Electives	8 credits

Foundation Courses		Non-credit
ICID 100	Freshman Seminar	0
ICME 100	English Resource Skills	0
ICMA 100	Foundation Mathematics	0

Note I: All students must take ICID 100 Freshman Seminar, a non-credit course.

Note II: Students whose English placement is below ICGC 101 Academic Writing and Research I are required to take ICME 100 English Resource Skills and pass the course with the grade of "S" before moving to ICGC 101 Academic Writing and Research I

Note III: Students whose Mathematics placement is below ICMA 106 Calculus I or ICMA 151 Statistics for Science I are required to take ICMA 100 Foundation Mathematics and pass the course with the grade of "S" before moving to ICMA 106 Calculus I or ICMA 151 Statistics for Science I.

English Communication		16 Credits
ICGC 101	Academic Writing and Research I	4
ICGC 102	Academic Writing and Research II	4

ICGC 103	Public Speaking	4
ICGC 111	Academic Writing and Research I (Advanced)	4
ICGC 112	Academic Writing and Research II (Advanced)	4
ICGC 201	Global Realities	4
ICGC 202	Literary Analysis	4
ICGC 203	Creative Writing	4
ICGC 204	Advanced Oral Communication	4
ICGC 205	Linguistics	4
ICGC 206	Literature Into Film	4
ICGC 207	Diverse English Speaking Cultures	4
ICGC 208	Language and Culture	4
ICGC 209	The Story of English	4
ICGC 210	First and Second Language Acquisition	4
ICGC 211	Topics in Comparative Literature A: Poetry	4
ICGC 212	Topics in Comparative Literature B: The Short Story and the Novel	4
ICGC 213	Topics in Comparative Literature C: Drama	4

Natural Sciences

4 Credits

● Scientific and Environmental Literacy

ICGN 101	Decision Mathematics	4
ICGN 102	Essential Mathematics	4
ICGN 103	Essential Statistics	4
ICGN 104	Mathematics and Its Contemporary Applications	4
ICGN 105	Ecology, Ecosystems and Socio-Economics in Southeast Asia	4
ICGN 106	Climate Change and Human Society	4
ICGN 107	The Chemistry of Everyday Life	4
ICGN 108	Essentials of Culinary Science for Food Business	4

ICGN 109	Food for Health	4
ICGN 110	Maker Workshop	4
ICGN 111	Physics for CEO	4
ICGN 112	Stargazer	4
ICGN 113	Plants, People and Poisons	4
ICGN 114	The Scientific Approach and Society	4
ICGN 115	Human Evolution, Diversity and Health	4

● **ICT and Digital Literacy**

ICGN 116	Understanding and Visualizing Data	4
ICGN 117	Technology behind E-Business and Digital Strategies	4
ICGN 118	Everyday Connectivity	4
ICGN 119	Computer Essentials	4

Humanities and Foreign Languages

8 Credits

Humanities

● **Logical and Ethical Literacy**

ICGH 101	Biotechnology: from Science to Business	4
ICGH 102	Famous Arguments and Thought Experiments in Philosophy	4
ICGH 103	Logic, Analysis and Critical Thinking: Good and Bad Arguments	4
ICGH 104	Moral Reasoning: How can we know what is good?	4
ICGH 105	Technology, Philosophy and Human Kind: Where Are We Now?!	4
ICGH 106	The Greeks: Crucible of Civilization	4

● **Arts and Media Literacy**

ICGH 107	Contemporary Art and Visual Culture	4
ICGH 108	Creative Drawing Expression	4
ICGH 109	Creative Thinking Through Art and Design	4
ICGH 110	Drawing as Visual Analysis	4

ICGH 111	Media Literacy: Skills for 21st Century Learning	4
ICGH 112	Photography	4
ICGH 113	Moving Pictures: A History of Film	4
ICGH 114	The Sound of Music: Form, Emotion, and Meaning	4

Foreign Languages

● German

ICGL 101	Elementary German I	4
ICGL 102	Elementary German II	4
ICGL 103	Elementary German III	4

● Japanese

ICGL 111	Elementary Japanese I	4
ICGL 112	Elementary Japanese II	4
ICGL 113	Elementary Japanese III	4

● French

ICGL 121	Elementary French I	4
ICGL 122	Elementary French II	4
ICGL 123	Elementary French III	4

● Chinese

ICGL 131	Elementary Chinese I	4
ICGL 132	Elementary Chinese II	4
ICGL 133	Elementary Chinese III	4

● Spanish

ICGL 141	Elementary Spanish I	4
ICGL 142	Elementary Spanish II	4
ICGL 143	Elementary Spanish III	4

● Thai

ICGL 160	Introduction to Thai Language and Culture	4
ICGL 161	Elementary Thai I	4
ICGL 162	Elementary Thai II	4
ICGL 163	Elementary Thai III	4

Social Sciences

8 Credits

● Financial, Economic, Business and Entrepreneurial Literacy

ICGS 101	Accounting for Young Entrepreneurs	4
ICGS 102	Business Sustainability and the Global Climate Change	4
ICGS 103	Economics in Modern Business	4
ICGS 104	Essentials of Entrepreneurship	4
ICGS 105	Personal Financial Management	4
ICGS 106	Fashion and Society	4
ICGS 107	MICE 101	4
ICGS 108	Money Matters	4

● Global and Multicultural Literacy

ICGS 109	American History, Film and Modern Life	4
ICGS 110	Development and Conflicts	4
ICGS 111	Exploring Religions	4
ICGS 112	Geography of Human Activities	4
ICGS 113	Perspectives on the Thai Past	4
ICGS 114	Power, Money and Behavior of Powerful States	4
ICGS 115	Sociology in the Modern World	4
ICGS 116	Power and Politics	4
ICGS 117	Overcoming Stereotypes, Prejudice and Discrimination	4
ICGS 118	Skills in Dealing with People Across Cultures	4
ICGS 119	World Politics	4

ICGS 120	Global Awareness	4
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● **Psychological Literacy**

ICGS 121	Abnormal Colleagues: how do I make this work?	4
ICGS 122	Propaganda, Nudge Theory and Marketing: How to resist?	4

Physical Education

4 Credits

ICGP 101	American Flag Football	1
ICGP 102	Badminton	1
ICGP 103	Basketball	1
ICGP 104	Body Fitness	1
ICGP 105	Cycling	1
ICGP 106	Discover Dance	1
ICGP 107	Golf	1
ICGP 108	Mind and Body	1
ICGP 109	Selected Topics in Sports	1
ICGP 110	Self Defense (Striking)	1
ICGP 111	Self Defense (Grappling)	1
ICGP 112	Soccer	1
ICGP 113	Social Dance	1
ICGP 114	Swimming	1
ICGP 115	Tennis	1
ICGP 116	Volleyball	1

Biological Sciences Courses

Major Course

132 credits

Core Science Courses

38 credits

ICBI 101*	Biology	4
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ICBI 102*	Integrated Laboratory in Biological Sciences I	2
ICBI 103*	Biology II	4
ICCH 210	General Chemistry I	4
ICCH 211	General Chemistry II	4
ICCH 224	Integrated Laboratory Techniques in Chemistry I	2
ICMA 106	Calculus I	4
ICMA 213	Calculus II	4
ICPY 101	Physics I	4
ICPY 102	Physics II	4
ICPY 105	Integrated Laboratory in Physics I	2

Note* ICBI 101 Biology, ICBI 102 Integrated laboratory in Biological Sciences I and ICBI 103 Biology II can be bypassed (with credits rewarded) if students have already taken equivalent courses that can be transferred according to Mahidol University's regulations.

Major Core Courses

32 credits

ICBI 207	Ethics for Bioscience	4
ICBI 214	General Microbiology	4
ICBI 215	General Biochemistry	4
ICBI 271	General Microbiology Laboratory	2
ICBI 272	General Biochemistry Laboratory	2
ICCH 221	Organic Chemistry I	4
ICCH 390	Organic Chemistry Laboratory Techniques	2
ICMA 151	Statistics for Science I	4
ICMA 252	Biological Statistics Laboratory	2
ICSC 302	Scientific Research and Presentations	4

Required Courses

40 credits

ICBI 211	Genetics and Molecular Biology I	4
ICBI 216	Cell Biology	4

ICBI 221**	Animal Biology	4
ICBI 231**	Plant Biology	4
ICBI 262	Practical Field Ecology and Conservation	4
ICBI 380	Introduction to Systems Biology and Bioinformatics	4
ICBI 381	Evolutionary Biology	4
ICBI 382	Systematic Biology and Biodiversity	4
ICBI 464**	Entrepreneurship and Innovation in Science	4
ICBI 465**	Internship in Biological Sciences	4
ICBI 499	Research Project and Seminar in Biological Sciences	8

Note** Students have the choice of completing either or of the following subjects to fulfill the credit requirement of the required courses.

- ICBI 221 Animal biology OR ICBI 231 Plant biology
 - ICBI 464 Entrepreneurship and Innovation OR ICBI 465 Internship in Biological Sciences
1. Both ICBI 221 and ICBI 231 are recommended for students undertaken the Biotechnology module.
 2. ICBI 465 is required for students undertaken the Ecology and Conservation module

Major Elective Courses

at least 16 credits

Four different modules within two concentrations are offered to students who are pursuing a specific area of Biological Sciences. However, students are not required to select a module as they can graduate without any concentration. Nevertheless, they still need to earn at least 26 credits from the Major Elective courses, of which 14 credits will be from courses in any one module and 12 credits from at least two other modules.

Applied Biology Concentration

The Ecology and Conservation Module

(16 credits)

Students under this module are required to take ICBI 443 Fungal Ecology and 12 credits from the other courses in this module.

ICBI 385	Freshwater Ecology and Conservation	4
ICBI 386	Practical Freshwater Ecology and Conservation	2
ICBI 387	Terrestrial Ecology and Conservation	4
ICBI 388	Practical Terrestrial Ecology and Conservation	2
ICBI 440	Marine Ecology and Conservation	4
ICBI 442	Practical Marine Ecology and Conservation	2
ICBI 443*	Fungal Ecology	4

*Required Course

The Biotechnology Module (26 credits)

Students under this module are required to take 20 credits from this module and 6 credits from other modules.

ICBI 315	Microbial Physiology and Genetics	4
ICBI 316	Environmental Microbiology	4
ICBI 372	Utilization of Water and Wastewater Treatment	4
ICBI 401	Genetics and Molecular Biology II	4
ICBI 404	Molecular Biology Laboratory	2
ICBI 414	Industrial Microbiology	4
ICBI 415	Biotechnology	4
ICBI 432	Plant Biotechnology	4
ICBI 433	Fermentation Technology	4
ICBI 434	Food Biotechnology	4
ICBI 435	Molecular Techniques in Biotechnology	4
ICBI 436	Industrial Enzymology	4
ICBI 437	Current Issues in Biotechnology	2
ICBI 461	Cell Technology	4

ICCH 222	Organic Chemistry II	4
ICCH 311	Analytical Chemistry	4
ICCH 316	Modern Methods of Analysis	4

The Bioinformatics Module

(32 credits)

Students under this module are required to take ICBI 325, ICCS 101, ICCS 161, ICCS 204, ICCS 205 and ICCS 206, and additional 8 credits from the other courses in this module.

ICBI 325*	Special Topics in Bioinformatics and Molecular Genetics	4
ICCS 101*	Introduction to Computer Programming	4
ICCS 161*	Introduction to Data Science	4
ICCS 204*	Data Structure and Object-Oriented Programming	4
ICCS 205*	Numerical Computation	4
ICCS 206*	Discrete Mathematics	4
ICCS 312	Algorithms and Tractability	4
ICCS 361	Data Mining	4
ICCS 461	Machine Learning	4

* Required Courses

Biomedical Science Concentration

The Medical Science Module

(30 credits)

Students under this module are required to take ICBI 305, ICBI 311, ICBI 401, ICBI 404, ICBI 405, ICCH 222 and 8 credits of any other courses under this module.

ICBI 204	Developmental Biology	4
ICBI 301	Functional Histology	4
ICBI 303	Basic Immunology	4
ICBI 305*	Human Anatomy I	4
ICBI 306	Human Anatomy II	4
ICBI 307	Nutrition and Dietetics	4

ICBI 309	Pathobiology	4
ICBI 311*	Human Physiology	4
ICBI 324	Introduction to Medical Toxicology	4
ICBI 328	Essential Pharmacology	4
ICBI 332	Medical Microbiology	4
ICBI 341	Neurobiology	4
ICBI 391	Health Psychology	4
ICBI 401*	Genetics and Molecular Biology II	4
ICBI 402	Epidemiology	4
ICBI 403	Introduction to Tropical Medicine	4
ICBI 404*	Molecular Biology Laboratory	2
ICBI 405*	Community Health	4
ICBI 406	Ergonomics	2
ICBI 407	Occupational Health and Safety	4
ICBI 411	Psychopathology	4
ICCH 222*	Organic Chemistry II	4

*Required Courses

The Health and Wellness Science module

(28 credits)

Students under this module are required to take ICBI 307, ICBI 391, ICBI 405 and 16 credits of any courses under this module.

ICBI 204	Developmental Biology	4
ICBI 301	Functional Histology	4
ICBI 305	Human Anatomy I	4
ICBI 306	Human Anatomy II	4
ICBI 307*	Nutrition and Dietetics	4
ICBI 309	Pathobiology	4

ICBI 311	Human Physiology	4
ICBI 324	Introduction to Medical Toxicology	4
ICBI 328	Essential Pharmacology	4
ICBI 332	Medical Microbiology	4
ICBI 341	Neurobiology	4
ICBI 391*	Health Psychology	4
ICBI 401	Genetics and Molecular Biology II	4
ICBI 402	Epidemiology	4
ICBI 403	Introduction to Tropical Medicine	4
ICBI 404	Molecular Biology Laboratory	2
ICBI 405*	Community Health	4
ICBI 406	Ergonomics	2
ICBI 407	Occupational Health and Safety	4
ICBI 411	Psychopathology	4
ICCH 222	Organic Chemistry II	4
ICPY 496	Biophysics	4

*Required Courses

Free Elective Courses

8 credits

Biological Science students can take any course offered by Mahidol University as a free elective, except the following

- The Chemistry of everyday life 4 (4-0-8)
- Physics for CEO 4 (4-0-8)
- Essential Mathematics 4 (4-0-8)
- Essential Statistics 4 (4-0-8)
- Mathematics and its contemporary applications 4 (4-0-8)