TQF 3 Course Specifications

Section 1 General Information

1. Course code and course title

Thai	ICBI 101 ชีววิทยา
English	ICBI 101 Biology

2. Number of credits — 4 (4-0-8)

3. Program and type of subject

3.1 Program	Undergraduate Degree (International Program)
3.2 Type of Subject	Required major course

4. Course Coordinator and Course Lecturer

4.1 Course Coordinator	Tumnoon Charaslertrangsi, Ph.D.
4.2 Course Lecturer	Tumnoon Charaslertrangsi, Ph.D.

5. Trimester/ Year of Study

5.1 Trimester	TBD
5.2 Course Capacity	45 students

6. Pre-requisite — N/A

7. Co-requisites — Recommend ICBI102

8. Venue of Study — 12-14:00, Tuesday, Thursday
Mahidol University Salaya Campus

Section 2 Goals and Objectives

1. Course Goals

This first-year biology course is a series of two courses (e.g., ICBI101 and ICBI 103) that aims to introduce key and fundamental concepts in biology to the students of various disciplines. Appreciation of the complexity of life will be emphasized. Starting from small to large, the concepts include properties of life, chemical basis of life, cell and metabolism, genetics, and evolution. The content is then expanded into ICBI 103 Biology, where diversity of life, animal forms and functions, plant forms and functions, and ecology and behavior are described. Along with subject-specific knowledge, soft skills will be introduced.

2. Objectives of Course Development/Revision

2.1 Course Objectives

Objectives of this development/revision is to align with the Biological Sciences Program's Expected Learning Outcomes.

2.2 Course-level Learning Outcomes (CLOs)

By the end of the course, students will be able to (CLOs)

CLO1 - Describe the properties and chemical context of life, including water, carbon, macromolecules

CLO2 - Explain concepts in cells, metabolism, and energy transformation for life (e.g., respiration and photosynthesis)

CLO3 - Discuss key concepts in genetics and chromosomes and its application in biotechnology

CLO4 - Describe the basic concepts and mechanisms in evolution

CLO5 - Recognize ethical and moral issues in biological sciences

CLO6 - Apply and integrate knowledge in biology to solve problems in biological sciences in health, societal, and environment

Section 3 Course Management

1. Course Description

(Thai) คุณสมบัติของสิ่งมีชีวิต การจัดระบบสิ่งมีชีวิต ระเบียบวิธีวิทยาศาสตร์ สารเคมีของชีวิต เซลล์และเมแทบอลิซึม พันธุศาสตร์ กลไกของวิวัฒนาการ

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

2. Credit hours per trimester

Lecture (Hour(s))	Laboratory/field trip/internship (Hour(s))	Self-study (Hour(s))
4 hr	0 hr	8 hr

3. Number of hours that the lecturer provides individual counseling and guidance.

4 hours per week

Section 4 Development of Students' Learning Outcome

1. Short summary on the knowledge or skills that the course intends to develop in students (CLOs)

With the stated course-learning objectives (Section 2.2), the students who have learned biology from secondary school whether it may be high school, A-level, IGCSE, IB, or AP, will re-visit what they already knew, what they knew but have forgotten, or explore further into concepts in biology that they have not explore. It is reminded that students may have different educational background, varying in the degree of prior knowledge. Prior knowledge of biology is not expected upon enrolling in this course. Basic concepts in biology will be emphasized. Issues whether it may be technical or ethical will be introduced. Soft skills including written and oral communication will be introduced.

2. Teaching methods for developing the knowledge or skills specified in item 1 and evaluation methods of the course learning outcomes

ICBI101	Teaching methods	Evaluation Methods
CLO1	Lectures, class discussion, study problem	Written assessment, VDO presentation
CLO2	Lectures, class discussion, study problem	Written assessment, VDO presentation
CLO3	Lectures, class discussion, study problem	Written assessment, VDO presentation
CLO4	Lectures, class discussion, study problem	Written assessment, VDO presentation
CLO5	Lectures, class discussion, and oral presentation	Written assessment, written assignment, oral presentation
CLO6	Written assignment, class discussion, oral presentation	Oral presentation, VDO presentation, written assignment

Section 5 Teaching and Evaluation Plans

1. Teaching plan

Week	Topic	Number of Hours		Online/On-campus	Teaching Activities/ Media	Lecturer
		Lecture Hours	Lab/Field Hours			
1	Introduction; Biology and Its Themes	2	0	Online	Lecture, multi-media presentation, case study	TC
	Atoms and Molecules; The Chemistry of Water	2	0	On-campus	Lecture, multi-media presentation, case study	TC
2	Carbon: The Basis of Molecular Diversity	2	0	Online	Lecture, multi-media presentation, case study	TC
	Biological Macromolecules and Lipids	3	0	On-campus	Lecture, multi-media presentation, case study	TC
3	Biological Macromolecules and Lipids	1	0	Online	Lecture, multi-media presentation, case study	TC
	Energy and Life	2	0	On-campus	Lecture, multi-media presentation, case study	TC
4	Cell Structure and Function	3	0	Online	Lecture, multi-media presentation, case study	TC
	Cellular Respiration; Quiz 1	3	0	Online	Lecture, multi-media presentation, case study	TC
5	Cellular Respiration	2	0	On-campus	Lecture, multi-media presentation, case study	TC
	Photosynthesis	2	0	On-campus	Lecture, multi-media presentation, case study	TC
6	Mitosis and Meiosis	2	0	Online	Lecture, multi-media presentation, case study	TC

	Review	2	0	Online	Review	TC
7	Mid-term review and assessment period			On-campus		
	Mendelian Genetics	2	0	Online		
8	Linkage and Chromosomes	2	0	On-campus	Lecture, multi-media presentation, case study	TC
	Nucleic Acids and Inheritance	2	0	Online	Lecture, multi-media presentation, case study	TC
9	Expression of Genes	2	0	On-campus	Lecture, multi-media presentation, case study	TC
	DNA Technology	2	0	Online	Lecture, multi-media presentation, case study	TC
10	How Evolution Works and Natural Selection; Quiz 2	2	0	On-campus	Lecture, multi-media presentation, case study	TC
	Phylogenetic Reconstruction	2	0	Online	Lecture, multi-media presentation, case study	TC
11	Microevolution	2	0	On-campus	Students' presentation	TC
	Species and Speciation	2	0	Online	Students' presentation	TC
12	Macroevolution	4	0	On-campus	Lecture, multi-media presentation, case study	TC
	Review	2	0	Online	Review	TC
	Total	48	0			

2. Plan for Assessing Course Learning Outcomes

2.1 Assessing and Evaluating Learning Achievement

a. Formative Assessment

CLOs	Assessment Method	Assessment Activity	Assessment Ratio	Remark

CLO1,2,3,4,5,6	Presence, effort, quality	Active learning and other assignments	15%	Rubric
CLO1	Quiz 1	Quiz	2.5%	MUIC E-learning
CLO3	Quiz 2	Quiz	2.5%	MUIC E-learning
CLO5, 6	Assignment 1: Written assignment	Writing assignments	10%	Individual
CLO1, 2, 3, 4	Assignment 2: A recorded presentation	A recorded presentation	10%	Pre-selected group of 3
CLO1, 2, 3, 5	Mid-term assessment	Mid-term assessment	30%	Individual
Total			70%	

b. Summative Assessment

(1) Tools and Percentage Weight in Assessment and Evaluation

Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)
CLO1	Written assessment – MCQ, short answer, long answer	2
CLO2		3
CLO3		5
CLO4		14
CLO5		3
CLO6		3
Total		30

(2) Grading System

Grade	Achievement	Final score (% range)	GPA
A	Excellent	90-100	4.0
B+	Very good	85-89	3.5
B	Good	80-84	3.0
C+	Fairly good	75-79	2.5
C	Fair	70-74	2.0
D+	Poor	65-69	1.5
D	Very poor	60-64	1.0
F	Fail	Less than 60	0.0

*Other letter grades, without credit points, are assigned as follows: I – Incomplete (awaiting evaluation); T – Transfer of credit; X – No report from the instructor; P – In progress (the study is incomplete); S – Satisfactory; U – Unsatisfactory; AU – Audit (study which leads to no credit); W – Withdrawal

**Assignment of other letter grades will follow the policies and rules set forth in Mahidol University International College Student Handbook 2020-2021.

(3) Re-examination (If course lecturer allows to have re-examination)

N/A - (Not applicable with MUIC)

3. Student Appeals

Student's appeal process will be according to the policy set forth by MUIC and those stated in the Student Handbook

Section 6 Teaching Materials and Resources

1. Textbooks and/or other documents/materials

- Reece JB, et al. Campbell: Biology. 11th ed. Boston, US: Pearson; 2017.
- Marsh J. Project Nim: Man on wire [digital videodisc]. BBC Films and UK Film Council, 2011. Available from: LIIC DVD P964 2011
- Marshall M. The secret of how life on Earth began. BBC Earth, 31 Oct 2016. Available from: http://www.bbc.com/earth/story/20161026-the-secret-of-how-life-on-earth-began

2. Recommended textbooks and/or other documents/materials

- Khan Academy -- http://khanacademy.org/
- Mader S, Windelspecht M. Biology. 13th ed. New York: McGraw Hill; 2019.
- Choi J, Clark MA, Douglas M. Biology 2e. Rice University: OpenStax; 2018. Available from: https://openstax.org

3. Other Resources (If any)

N/A

Section 7 Evaluation and Improvement of Course Management

1. Strategies for evaluating course effectiveness by students

Post course evaluation by students using the SKY System. Post course evaluation include course content, course management (management of teaching, learning, and grading), qualification and responsibility, teaching techniques and methods, and overall satisfaction.

2. Strategies for evaluating teaching methods

Student's feedback using Start-Stop-Continue. Post course evaluation.

3. Improvement of teaching methods

Student's verbal feedbacks and post course evaluation. Faculty peer observation of teaching.

4. Verification process for evaluating students' standard achievement outcomes in the course

Analysis of grade distribution of written examination (e.g., mean, median, mode, standard deviation)

5. Review and plan for improving the effectiveness of the course

Review the course before each trimester and address the teaching and learning concerns

Appendix

Alignment between Courses and Program

Table 1 The relationship between course and Program Learning Outcomes (PLOs)

Biology	Program Learning Outcomes (PLOs)					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
ICBI 101	I	I	I	I	I	I

Note: I - Introduced, R - Reinforced, P - Practice or M - Mastery

Table 2 The relationship between CLOs and PLOs

ICBI 101 Biology	Program Learning Outcomes (PLOs)					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 - Describe the properties and chemical context of life, including water, carbon, macromolecules	1.1, 1.2		3.2			
CLO2 - Explain concepts in cells, metabolism, and energy transformation for life (e.g., respiration and photosynthesis)	1.1, 1.2		3.2			
CLO3 - Discuss key concepts in genetics and chromosomes and its application in biotechnology	1.1, 1.2	2.2	3.2	4.2		
CLO4 - Describe the basic concepts and mechanisms in evolution	1.1, 1.2	2.2	3.2	4.2		

CLO5 - Recognize ethical and moral issues in biological sciences			3.1	4.2	5.1, 5.2	
CLO6 - Apply and integrate knowledge in biology to solve problems in biological sciences in health, societal, and environment	1.5		3.1, 3.2	4.2	5.1, 5.2	6.1

Table 3 The description of PLOs and Sub LOs of the course

Program Learning Outcomes (PLOs)	SubPLOs
1. Apply knowledge and technical skills of diverse biological disciplines to address health, societal and environmental issues	1.1 Explain the fundamental and detailed knowledge of biological sciences
	1.2 Apply knowledge in biological sciences to address health, societal and environmental issues
	1.3 Perform experimentation in laboratory or field
	1.4 Apply technical skills in biological sciences to address health, societal and environmental issues
	1.5 Integrate biological sciences knowledge and technical skills across different disciplines to solve problems in biological sciences
2. Critically appraise information from scientific articles/journals, biological research methodology and experimentation to draw meaningful conclusion from the materials	2.1 Explain qualitative and quantitative data and/or ideas in basic biological sciences
	2.2 Draw meaningful conclusion from the learning materials such as scientific articles, research methodology, and scientific findings
	2.3 Retrieve relevant scientific information independently from textbooks, literatures and databases
	2.4 Manage scientific literatures using a reference-management program
	2.5 Assess the scientific relevance of information acquired to the objective at hand

Program Learning Outcomes (PLOs)	SubPLOs
3. Proficient in oral and written communication of biological sciences concepts formally and informally to both scientific community and general audience	3.1 Proficient in oral communication of ideas, concepts and findings in biological sciences to both the scientific community and the wider society
	3.2 Proficient in written communication of ideas, concepts and findings biological sciences to both the scientific community and the wider society
4. Apply scientific integrity, professionalism, and competencies to function independently as well as a team player	4.1 Maintain data integrity using appropriate tools and acceptable methods
	4.2 Work independently or coordinate with others to complete tasks at hand
	4.3 Apply concepts of lab and fieldwork safety when carrying out the tasks
	4.4 Set, plan and accomplish the assigned project in a timely manner
5. Apply moral and ethical values when dealing with issues relating to humans, animals and the environment, enabling actions based on moral and ethical judgment	5.1 Recognize ethical issues in human and animal experimentation
	5.2 Recognize emerging ethical issues in biological sciences
	5.3 Apply accepted ethical standards to resolve ethical dilemma
	5.4 Implement the course of action in accordance with moral and ethical judgement
6. Demonstrate innovative mindset to formulate and create solutions for situations relevant to oneself, the well-being of others, and the natural environment	6.1 Formulate lines of enquiry to drive problem solving relevant to oneself, the well-being of others, and the natural environment
	6.2 Formulate a process for data acquisition based on scientific methodology
	6.3 Demonstrate systematic and logical thinking in formulating solutions through the application of knowledge

Program Learning Outcomes (PLOs)	SubPLOs
	and technical skills acquired from the different biological science disciplines
	6.4 Explain the potential for knowledge transfer to innovation
	6.5 Create networks to learn from others and create new ideas