**Instructor:** Ajchara Aksomboon Vongsawan

**The Goal:**

The three-year Biology curriculum serves as a pre-requisite for Science-Math majors in preparation for entering biomedical sciences as well as other science fields.

**Mathayom 4 (Secondary Grade 10) - Year 1 Biology 1, 2**

Mathayom 5 (Secondary Grade 11) - Year 2 Biology 3, 4

Mathayom 6 (Secondary Grade 12) - Year 3 Biology 5, 6

The study approach follows the Thai curriculum using combination of US and Singaporean textbooks. English is the language of instruction in the English Program. Students planning to enter the biomedical field or medical field within the Thai university system are advised to read a Thai version of textbook in preparation for their entrance exam due to technical term discrepancy that may be used in Thai exams. Pre-med and biomedical science students will be expected to pay close attention to current knowledge of bioscience technology for future use at undergraduate university level.

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| **Grade 10 (M4): Year 1 Biology 1****Semester 1: (SCI 31241) 1.5 Credits, 60 hours** |
| **Course Content** | **Details** |
| **Unit 1: Maintaining stability of living things** **Homeostasis**  | • Science and Biology• Structure and Function Characteristics of Living Things • Research Methodology and Ethics |
| **Unit 2: Cell and Cellular Function** | • Subunit of life: cell• Cell Specialization and Structure • Microscope: types and application in research studies, component and proper usage• Cellular Reproduction and Inheritance: Mitosis, Meiosis |
| **Midterm Exam**  | **Material Covered from Units 1 and 2** |
| **Unit 3: Chemistry of Life** **Basic Molecules of Living Things** | • Organic and Inorganic molecules in the human body• Biomolecules that are Macromolecules: Carbohydrate, Protein, Lipid, Nucleic acid• Small biomolecules such as water and ions• Chemical Reactions and Processes within living cells• Enzymatic reactions  |
|  **Unit 4: Cellular Respiration** | • Biomolecules within Cells of Living Organisms• Breakdown using Aerobic and Anerobic process• Biomolecule in which Cells use Energy: glucose• Basic Biomolecules in Living Things• Cellular Respiration |
| **Final Exam** | **Material Covered from Units 3 and 4** |
| **Grade 10 (M4): Year 1 Biology 2****Semester 2: (SCI 31242) 1.5 Credits, 60 hours** |
| **Course Content** | **Details** |
| **Unit 1: Heredity** | • Gregor Mendel: also known as the Father of Modern Genetics.• Mendel’s experiments with pea plants• Mendel’s Laws of Inheritance• The Chromosomal Basis of Inheritance• Genetic Material and Gene Expression• Mechanisms leading to Mutations |
| **Unit 2: Genes and Chromosome** | • History of Genetic Material: experiments leading to unraveling Genetic Material, DNA structure and function.• DNA Replication• Central Dogma: Gene flow from DNA- RNA-Protein |
| **Midterm Exam**  | **Material Covered from Units 1 and 2** |
| **Unit 3: Genetics and DNA Technology** | • Errors during Gene Expression giving rise to Mutations• Genomics and Biotechnology• Genetic Engineering/  Recombinant DNA Technology |
| **Unit 4: Evolution** | • Darwin’s Theory of Natural Selection• Genotype Frequency• Hardy-Weinberg Theory • Origin of Species |
| **Final Exam** | **Material Covered from Units 3 and 4** |
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**Expectations from students:**

(1) to always attend class and sign in roll call attendance (for online teaching roll call through

 class line)

(2) to critically read the assigned material before class

(3) to enthusiastically participate in class discussions and problem-solving sessions (for online by zoom meetings).

(4) to diligently prepare for all exams

**Evaluation**

**Video Clip Presentation** with prepared dialogue will be assigned via classroom 15 points

**Lab and Lab Reports** 15 points

**Test with** **Mindmap** 20 points

**Class Attendance/ Class Participation** 10 points

**Midterm** 20 points

**Final** 20 points

**Study and Reading Materials**

**(1) Campbell PowerPoint Lectures and uploads given in conjunction with textbooks**

**(2) Textbooks**

2.1. Biology: A Global Approach, Global Edition, 10/E

Neil A. Campbell, University of California, Riverside

Jane B. Reece, Palo Alto, California

Lisa Urry

Michael L Cain, Bowdoin College, Brunswick, Maine

Steven A Wasserman, University of California, San Diego

Peter V Minorsky, Mercy College, Dobbs Ferry, New York

Robert B Jackson, Duke University, Durham, North Carolina

**or equivalent version**.

2.2. New Century Elective Biology: Secondary 4,5, and 6.

 Hodder Education Singapore, 2019 Edition.

 Beverly Tay, Loo Kwok Wai, Ong Bee Hoo, and Janlin Chan