

**Macao Polytechnic Institute**  
**School of Health Sciences and Sports**  
**Bachelor of Science in Biomedical Technology**  
**(Medical Laboratory Technology and Pharmacy Technology)**  
**Module Outline**

Academic Year 2021 / 2022 Semester 2

<b>Learning Module</b>	Organic Chemistry(有機化學)			<b>Class Code</b>	BSOC1102
<b>Pre-requisite(s)</b>	Nil				
<b>Medium of Instruction</b>	Chinese / English			<b>Credit</b>	3
<b>Lecture Hours</b>	33 hrs	<b>Lab/Practice Hours</b>	12 hrs	<b>Total Hours</b>	45 hrs
<b>Instructor</b>	Dr. Lo Veng Meng / Dr. Yitao		<b>E-mail</b>	vmlo@ipm.edu.mo / yitao@ipm.edu.mo	
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**Description**

This module is one of the fundamental subjects of biomedical program. There includes lecture hours and demonstration/experiment classes.

This module is designed to provide of basic principles and applications of current organic chemistry topics.

**Learning Outcomes**

After completing the learning module, students will be able to:

1. Understand background knowledge of organic chemistry
2. Understand the operation procedure of organic compounds analysis.
3. Study successive subjects; Biochemistry, Analytical chemistry, Clinical chemistry, Medicinal chemistry, pharmaceutical analysis, etc.

## Content

### **Theory (33 hours)**

1. An introduction to Organic Chemistry (1 class hours)

- 1.1 Carbon Chemistry
- 1.2 Properties of Organic compounds

*(COMPREHEND : The students obtain the basic concept of organic chemistry)*

2. Class Organic Compounds & Naming Organic Compounds (2 class hours)

- 2.1 Hydrocarbons: Aliphatic & Aromatic Hydrocarbons.
- 2.2 Derivatives of Hydrocarbons:
- 2.3 Naming Organic Compounds: IUPAC system.

*(MASTER: Through Lecture, students master the naming system of simple organic compounds )*

3. Structure of Organic Compounds (4 class hours)

- 3.1 Structural formula of organic compounds
- 3.2 Isomers: Structural and Stereo isomers
- 3.3 Conformations of Organic compounds.

*(UNDERSTAND : The students memorize the basic structure of organic compounds)*

4. Reactions of Organic Compounds (4 class hours)

- 4.1 Substitution reactions.
- 4.2 Addition reactions
- 4.3 Elimination reactions
- 4.4 Rearrangement reactions
- 4.5 Oxidation-Reduction reactions

*(UNDERSTAND : The students memorize the basic reactions of organic compounds)*

5. Aliphatic Hydrocarbons (2 hours)

- 5.1 Introduction to Alkane
- 5.2 Preparation and properties of Alkane
- 5.3 Cycloalkanes
- 5.4 Reactions of Alkanes and Cycloalkanes
- 5.5 Introduction to Alkene & Alkyne
- 5.6 Preparation and properties of Alkene & Alkyne
- 5.7 Reactions of Alkenes and Alkynes.

*(COMPREHEND : The students obtain the basic concept of aliphatic hydrocarbons)*

6. Aromatic Hydrocarbons (3 class hours)

- 6.1 Introduction to Aromatic hydrocarbons

6.2 Polynuclear Aromatic Hydrocarbons

6.3 Reaction of Aromatic Hydrocarbons

6.4 Heterocyclic Aromatic Compounds

*(COMPREHEND : The students obtain the basic concept of aromatic hydrocarbons)*

7. Alcohols, Phenols, and Ethers(2 class hours)

7.1 I.U.P.A.C. Names and common names

7.2 Structure and properties

7.3 Reaction of Alcohols

7.4 Phenols, Ethers and Thiols

*(COMPREHEND : The students obtain the basic concept of alcohols, phenols & ethers)*

8. Aldehydes and Ketones (2 Class hours)

8.1 Structure and Physical properties.

8.2 I.U.P.A.C. Names and common names

8.3 Reactions of Aldehydes and Ketones

*(COMPREHEND : The students obtain the basic concept of aldehydes & ketones)*

9. Carboxylic Acids and Carboxylic Acid Derivatives (3 class hours)

9.1 Structure and properties

9.2 I.U.P.A.C. Names and common names

9.3 Reactions of Carboxylic Acids

9.4 Esters, Acid Chlorides and Acid Anhydrides

*(COMPREHEND : The students obtain the basic concept of carboxylic acids & their derivatives)*

10. Amines (3 class hours)

10.1 Structure and properties

10.2 I.U.P.A.C. Names and common names

10.3 Reactions of Amines and Amides

10.4 Heterocyclic Amines

*(COMPREHEND : The students obtain the basic concept of amines)*

11. Organic analysis (6 class hours)

11.1 Introduction to Qualitative organic analysis

11.2 General Scheme of Analysis

11.2.1 Preliminary Tests

11.2.2 Physical Constants

11.2.3 Solubility tests

11.2.4 Analysis for elements present

11.2.5 Molecular weight determination

11.2.6 Group Classification Test

11.2.7 Consultation of Literature

11.2.8 Preparation of Derivatives

11.3 Examples

*(UNDERSTAND : The students memorize the basic procedure of organic analysis methods)*

12. Introduction to Organic Synthesis (1 hours)

12.1 Carbon – Carbon single bonds formation

12.2 Carbon –Carbon double bonds formation

12.3 Degradations

12.4 Total Synthesis

*(COMPREHEND : The students obtain the basic concept of organic synthesis)*

### **Practice (12 hours)**

**Class activity:** 5 - 7 students per group

1. Class activity in Molecular Modelling of organic compounds (2 hour)

*(Master: Through class activity, the students master the structure of organic compounds)*

2. Presentation (4 hours)

*(COMPREHEND : The students obtain the ideas of the uses of organic chemistry)*

**Laboratory Practice:** 5 - 7 students per group

1. Common Organic Reactions (2 class hours)

*(MASTER: The students familiar laboratory techniques through practice)*

2. Organic Analysis (2 class hours)

*(MASTER: The students familiar laboratory techniques through practice)*

3. Simple Organic synthesis (Synthesis of Perfume from Aspirin) Infrared (2 class hour)

*(MASTER: The students familiar laboratory techniques through practice)*

### **Teaching Method**

Lectures, Interactive activities, Discussion, Videos

## **Attendance**

Attendance requirements are governed by the “Academic Regulations Governing Bachelor’s Degree Programmes of Macao Polytechnic Institute”. Furthermore, for Laboratory Classes, attendance requirements must be over 50% (no matter reasonable or non reasonable absences). An “F” grade will be given as the final grade to students who have less than the stated attendance for this enrolled module

## **Assessment**

The whole module & all papers are graded according to the percentage, with 100 being full score. The passing score of the whole module is 50% or above, and the two exercises in average must be at least over 35%. Students with a score of less than 35 in the final examination must take the re-sit examination even if the overall score for the course is 50 or above.

<b>Item</b>	<b>Description</b>	<b>Percentage</b>	<b>Submit Date</b>
Lab Reports	Lab Reports	10%	A week after Lab.
In Class oral Tests	Molecular Modeling	10%	17 <sup>th</sup> Jan.22
2 Exercises	Answering questions	25% + 25%	28 <sup>th</sup> Mar 22
Report	Written & Oral Presentation	30%	14 <sup>th</sup> Mar 22

## **Teaching Material(s)**

Power point notes, relative videos, laboratory equipments & reagents, ... etc.

### **Text Book(s):**

1. General, organic, and biological chemistry 7<sup>th</sup> ed./2010 K. J. Denniston, J. J. Topping and R. L. Caret McGraw-Hill,c2010 ISBN 978-0-07-122187-0

## **Reference**

### **Reference Books:**

1. Klein's Organic Chemistry 3<sup>rd</sup> ed. / 2017 Global Edition, David R. Klein John Wiley & Sons, Inc., ISBN: 978-1-119-45105-1
2. Instant Notes Organic Chemistry 2<sup>nd</sup> ed. G. L. Patrick BIOS Scientific Publishers, 2005, ISBN 0-203-42761-0 Master e-book ISBN
3. Chemical Nomenclature Hong Kong Examinations Authority updated version