

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

Academic Year 2021 / 2022 Semester 1

Learning Module	General Chemistry			Class Code	BSGC1101
Pre-requisite(s)	Nil				
Medium of Instruction	Cantonese / English			Credit	3
Lecture Hours	21 hrs	Lab/Practice Hours	24 hrs	Total Hours	45 hrs
Instructor	Dr. Tong Hoi Yee Dr. Lo Veng Meng Dr. Yi Tao		E-mail	henrytong@ipm.edu.mo vmlo@ipm.edu.mo yitao@ipm.edu.mo	
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Description

This is a fundamental learning module. Basic knowledge in chemistry will be introduced.

Learning Outcomes

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

1. Understand basic chemistry theory
2. Understand how daily life is related to chemistry.
3. Equip with the knowledge to understand advanced subjects in organic chemistry, analytical chemistry, biochemistry, and etc.

Content (1)

Dr. Lo Veng Meng, Richard's session

1	20/9/2021 14:30-15:00 Class Introduction Basic concept in Chemistry	1 hr
2	20/9/2021 15:00-17:00 Nomenclature of simple inorganic compounds	3 hr
3	27/9/2021 14:30-15:30 Class activity - Questions Answering Competition	1 hr
4	27/9/2021 15:30-16:30 Chemistry Laboratory & Analytical Balance +Lab	3 hr
5	11/10/2020 16:30-18:30 Volumetric Glassware & Solution Preparation + Lab	4 hr
6	18/10/2021 14:30-16:30 Filtration and filter paper , Titration + Lab	4 hr
7	25/10/2021 16:30-18:30 Recrystallization Distillation Extraction Concentrating Solute, Drying Organic Solvent Heating and cooling	3hr

Theory (12 hours) Practice (7 hours)

Theory (12 hours)

Laboratory Principles and Instrumentation

1. Basic concept in Chemistry (1 hours)

Areas of chemistry and its application.

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

2. Nomenclature of simple inorganic compounds (3 hours)

2.1 Binary compounds

2.2 Oxides

2.3 Hydroxides

2.4 Acids

2.5 Salts

(Master: Through Lecture and class activity practice, students master the naming system of simple inorganic compounds)

3. Chemistry Laboratory (1 hour)

- 3.1 Basic Equipment
- 3.2 Basic Laboratory Operation
- 3.3 Laboratory Safety

(UNDERSTAND : Students memorize the basic equipment, basic operation and concept of Laboratory Safety. Students can work safely and effectively in Chemistry Laboratory)

4. Analytical Balance (1 hour)

- 4.1 Classification of Balance
- 4.2 Unpacking and set up of balance
- 4.3 Weighing
 - 4.3.1 Direct and Indirect weighing
 - 4.3.2 Accurate weighting
- 4.4 Sources of error
- 4.5 Calibration of balance
- 4.6 Performance Inspection

(Master: Through Lecture and Laboratory practice, students master the skill to operate analytical balance)

5. Volumetric Glassware (1 hour)

- 5.1 Common feature Volumetric Glassware
- 5.2 Operation of Volumetric Glassware
 - 5.2.1 Pipettes
 - 5.2.2 Burette
 - 5.2.3 Volumetric Flask
- 5.3 Cleaning of Volumetric Equipment
- 5.4 Calibration of Volumetric Glassware

(Master: Through Lecture and Laboratory practice, students master the skill to operate volumetric glassware)

6. Solution Preparation (1 hour)

- 6.1 Different definition of solution concentration
- 6.2 Concentration Calculation
- 6.3 Solution preparation
- 6.4 Buffer Solution Preparation

(Master: Through Lecture and Laboratory practice, students master the skill of solution preparation)

7. Filtration and filter paper (1 hour)

- 7.1 Basic concept of Filtration
- 7.2 Filter Paper and Kinds of filter paper
- 7.3 Preparation of a filter Paper
 - 7.3.1 Quadrant folded
 - 7.3.2 Pleated (Fluted) folded
- 7.4 Gravity Filtration
- 7.5 Vacuum Filtration
- 7.6 Washing Precipitates

(Master: Through Lecture and Laboratory practice, students master the skill of Filtration)

8. Titration (1 hour)

- 8.1 Basic concept of Titration
- 8.2 Analytical Standards
- 8.3 Equivalence Point and End Point
- 8.4 Indicators
- 8.5 General procedure for Titration

(Master: Through Lecture and Laboratory practice, students master the skill of Titration)

9. Recrystallization (0.5 hour)

- 9.1 Basic concept of Recrystallization
- 9.2 Procedure for Crystallization
- 9.3 Treatment of the Crystal

(Master: Through Lecture, students master the technique of Recrystallization)

10. Distillation (1 hour)

- 10.1 Basic Concept of Distillation
- 10.2 Set Up a Distillation
- 10.3 Fractional Distillations
- 10.4 Vacuum Distillations
- 10.5 Steam Distillation

(Master: Through Lecture, students master the technique of Distillation)

11. Extraction (1 hour)

- 11.1 Basic Concept of Extraction
- 11.2 Multiple Extractions
- 11.3 Extraction Procedure
- 11.4 Solid Phase Extraction

(Master: Through Lecture, students master the technique of Extraction)

12. Concentrating Solute, Drying Organic Solvent, Heating and Cooling in Chemistry Laboratory
(1 hours)

12.1 Concentrating Solutes: Different methods to Remove Solvents from Samples

12.2 Drying: Different methods to Remove Water from Organic Solvent

12.3 Heating: Different heating methods in Chemistry Laboratory

12.4 Cooling: Different cooling methods in Chemistry Laboratory

(Master: Through Lecture, students master the technique of Concentrating Solute, Drying Organic Solvent, Heating & Cooling in Chemistry Laboratory)

Practice (7 hours)

Laboratory Practice: 4 - 8 students per group

1. Class activity in Nomenclature of simple inorganic compounds (1 hour)

(Master: Students master the naming system of simple inorganic compounds)

2. Basic Laboratory Operation (0.5 hour)

(Master: Students master the basic skills in Chemistry laboratory)

3. Analytical Balance (0.5 hour)

(Master: Students master the skill to operate analytical balance)

4. Volumetric Glassware (1 hour)

(Master: Students master the skill to operate volumetric glassware)

5. Solution Preparation (1 hour)

(Master: Students master the skill of solution preparation)

6. Filtration (1 hour)

(Master: Students master the skill of Filtration)

7. Titration (1 hour)

(Master: Students master the skill of Titration)

Content (2)

Dr. Tong Hoi Yee, Henry's session

Date	Time	Topic	Lecturer
2021.08.23	14:30-16:30	<ul style="list-style-type: none">Understanding chemical properties via MSDS (Lecture - 2 hours)	Henry
MLT class 2021.08.31	MLT class 14:30-18:30	<ul style="list-style-type: none">Fragrance & essential oil chemistry (Lecture & Practical - 2 hours)	Henry
PT class 2021.08.30	PT class: 14:30-18:30	<ul style="list-style-type: none">Novice perfumer (Practical - 2 hours)	
MLT class 2021.09.07	MLT class 14:30-18:30	<ul style="list-style-type: none">Measurement of aqueous solubility data in berberine chloride (Practical - 4 hours)	Henry
PT class 2021.09.06	PT class: 14:30-18:30		
MLT class 2021.09.14	MLT class 14:30-18:30	<ul style="list-style-type: none"><i>In-vitro</i> evaluation of cosmetic whitening activity in selected compounds (Practical – 4 hours)	Henry
PT class 2021.09.13	PT class: 14:30-18:30		

Content (3)

Dr. Yi Tao, Aaron's session

Theory (4 hours)

Date	Time	Content
08/10/2021	14:30-18:30	Lecture 1: Solution <ul style="list-style-type: none">● Basic Terms of Solution● Solubility of Solution● Solution Concentration● Colligative Properties of Solutions Lecture 2: Colloidal System <ul style="list-style-type: none">● Colloidal Dispersions● Formation of Colloidal Particles● Properties of Colloidal Dispersions

Practice (8 hours)

Date & Time	Practice Item	Title	Students / Group	Mode of Practice	Requirement
2021/10/15 14:30-18:30	Weighing, mixing, dissolution, crystallization and observation of compounds	Principle and preparation of Storm Glass	Grouping	Operating in the laboratory	Each group should complete the preparation of one bottle and submit the experimental report.
2021/10/22 14:30-18:30	Preparation of nanoemulsions and gel beads, content determination and particle size analysis	Preparation and characterization of self-emulsifying enteric gel beads	Grouping	Operating in the laboratory	Each group should complete the experiment and submit the experiment report.

Teaching Method

Lectures, videos demonstration and laboratory

Attendance

Attendance requirements are governed by the “Academic Regulations Governing Bachelor’s degree programmes of Macao Polytechnic Institute”. An “F” will be given as the final grade to students who have less than the stated attendance for the enrolled learning module.

Teaching Material

Text book:

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

Reference Books:

1. Chemical Nomenclature Hong Kong Examinations Authority updated version

Assessment

The whole learning module & all papers are graded according to the percentage, with 100 being full score. The passing score of the whole learning module is 50% or above, and the final exam must be at least over 35%. To enter the re-sit examination, must meet the attendance requirement of over 70%.

Dr. Lo Veng Meng, Richard's sessions (40%)

Item	Description	Percentage	Submit Date
1	Class activity	10%	Sep. 27, 2021
2	Lab Report of Basic Laboratory Operation	5%	One week after lab
3	Lab Report of Analytical Balance	5%	One week after lab
4	Lab Report of Volumetric Glassware	5%	One week after lab
5	Lab Report of Solution Preparation	5%	One week after lab
6	Lab Report of Filtration	5%	One week after lab
7	Lab Report of Titration	5%	One week after lab

Notice: Zero mark will be given to the students with late submission of reports, or absence in laboratory sessions or class activities, without any formal justification according to MPI regulations.

Dr. Tong Hoi Yee, Henry's session (35%)

Item	Description	Percentage	Submit Date
1	Practical H-1	11%	2 weeks after the experiment
2	Practical H-2	12%	2 weeks after the experiment
3	Practical H-3	12%	2 weeks after the experiment

Dr. Yi Tao, Aaron's sessions (25%)

Item	Description	Percentage	Submit Date
1	Assignment	15%	2 weeks after the class
2	Lab Report Y-1	5%	2 weeks after the experiment
3	Lab Report Y-2	5%	2 weeks after the experiment