FACULTY OF HEALTH SCIENCES AND SPORTS

BACHELOR OF SCIENCE IN BIOMEDICAL TECHNOLOGY (MEDICAL LABORATORY TECHNOLOGY)

LEARNING MODULE OUTLINE

Academic Year	2024 / 2025	Semester	1
Module Code	BSPH3101		
Learning Module	Public Health Analysis (Chemistry)		
Pre-requisite(s)	**BSAC2101**		
Medium of Instruction	Chinese / English		
Credits	3	Contact Hours	45
Instructor	Lin Chong In Veng Meng , Richard Lo Ip,Peng Kei	Email	T1883@mpu.edu.mo vmlo@mpu.edu.mo T1609@mpu.edu.mo
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MODULE DESCRIPTION

This Module is divided into 3 sections by 3 teachers: 25 hrs of food chemistry by Mr. Lin, Chong I and 10 hrs of water chemistry by Dr. Lo Veng Meng, 10 hrs of general public health chemistry by Mr. Ip, Peng Kei.

Food Chemistry

This part of the subject is designed to give students a foundation technology in chemical laboratory analysis. It will introduce basic analysis methods of food, standards of food determination and quality assurance related to food analysis. It also includes the knowledge of laboratory Accreditation and management.

Water chemistry

This part of subject first introduces some basic knowledge about water analysis: sampling, analytical tests. Related laboratory classes will be set for students to learn about these tests procedures.

General public health chemistry

Basic knowledge of public health Analysis in Macao, Dairy Product Analysis, Chinese Medicine / Drug and Health Supplements Analysis, Tobacco Analysis.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

On completion of this learning module, students will be able to:

M1.	Understand background knowledge of public health analysis
M2.	Understand the application of chemical analysis on public health issue
M3.	Understand the practical techniques of chemical analysis on public health issue

These ILOs aims to enable students to attain the following Programme Intended Learning Outcomes (PILOs):

PILOs	M1	M2	M3
P1. To demonstrate understanding of a range of subjects, fields, principles and approaches relevant to medical laboratory technology	✓	✓	✓
P2. To demonstrate understanding of theories, analytical approaches and practices that underpin medical laboratory operations and management	✓	✓	✓
P3. To demonstrate understanding of major trends and issues related to medical laboratory technology	✓	✓	✓
P4. To apply professional knowledge and skills to analyse, interpret and solve problems, challenges and risks in medical laboratory practice	✓	✓	✓
P5. To critically appraise and interpret scientific and clinical literature and apply evidence-based practice	✓	✓	✓
P6. To acquire and apply research skills in medical laboratory technology	✓	✓	✓
P7. To demonstrate effective communication and teamwork skills	✓	✓	✓
P8. To maintain professional and ethical standards in medical laboratory practice and research	✓	✓	✓

MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Content

Food Chemistry	Contact Hours
1. Introduction to Food Analysis 1.1 Standards of food analysis in different country and Area 1.2 Law and standard related to food analysis in Macao 1.3 Types of food analysis and analysis method	**3 hrs**
2. Sampling , sample preparation & quality control 2.1 Methods of sampling & Store of food samples 2.2 Pretreatment method of food Analysis • Wet Digestion • Dry Ash • Extration 2.3 Quality control of food analysis • Evaluation of analytical Data • Measures of quality control • Management and Accreditation of Lab	**3 hrs**

3. Spectroscope Analysis Method 3.1 Basic Principles of Spectroscopy 3.2 Spectroscope Analysis Method Applied in the Food Analysis • AAS (Atomic Absorption Spectrometry) • ICP-MS (Inductively Coupled Plasma Mass Spectrometry) • AFS (Hydride-generation Atomic Fluorescence Spectrometry) 3.3 Ultraviolet and Visible Absorption Spectroscopy • Basis of Quantitative Absorption Spectroscopy • Procedural Considerations • Calibration Curves	**3 hrs**
4. Chromatograph Analysis Method 4.1 Basic Principles of Chromatography 4.2 Chromatograph Analysis Method Applied in the Food Analysis • HPLC(High Performance Liquid Chromatography, HPLC-MS/MS) • Determination of Additives(Preservatives, colors and Antioxidants) • GC (Gas Chromatography, GC-MS/MS) • Determination of Pesticide, Veterinary drugs and Toxin • Detector of GC and HPLC	**3 hrs**
5. Compositional Analysis of food 5.1 Compositional Analysis of foods 5.2 Water Analysis 5.3 Fat Analysis 5.4 Protein Analysis 5.5 Carbohydrate Analysis	**2hrs**
6. Analysis of Food Contaminants, Residues and Additives 6.1 Types of food analysis 6.2 Contaminants and Hazardous Material in food 6.3 Food Additives 6.4 Chemical Residues of Food 6.5 Analysis of Adulteration 6.6 Analysis of food containers and packaging materials	**3 hrs**
7. **Test**	**2 hrs**
	19 hrs

Water Chemistry	Contact Hours
1. Introduction to water quality	**1 hr**
2. Sampling & sample treatment for water analysis	**1 hr**
3. Water Quality Tests 3.1 Appearance tests: Color, Smells & Tastes 3.2 Transparency, Turbidity, Total Dissolved Solid, Temperature 3.3 Alkalinity, Acidity, Hardness, pH, Conductivity 3.4 Chlorine, Nitrate, Sulfate, Ammonia, Phosphate, Sulfide 3.5 Metals: Na, Ca, Mg, Cu, Fe, Pb, … etc. 3.6 Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD),Chemical Oxygen Demand (COD), Total Organic Carbon (TOC)	**2 hrs**
Total	**4 hrs**

General public health chemistry	Contact Hours
1. Public Health Analysis in Macao 1.1 Introduction to Public Health Analysis in Macao **1.2** Law and regulation on Dairy Products, Chinese Medicine, Health Supplement and Tobacco product in Macao	**2 hrs**
2. Dairy Product Analysis 2.1 Protein and Fat Content 2.2 Heavy Metals Contamination (Hg, Cd, Pb, Cr, Cu, As) 2.3 Melamine Contamination	**2 hrs**
3. Chinese Medicine/Drugs/Health Supplements Analysis 3.1 Adulterated Western Drugs Ingredient 3.2 Heavy Metals Contamination (Hg, Cd, Pb, Cr, Cu, As) 3.3 Plasticizer Contamination	**3 hrs**
4. Tobacco Analysis 4.1 Sampling 4.2 Smoking Machine 4.3 Nicotine & Tar Content	**2 hrs**
5. Student Group Presentation	**1 hr**
Total	**10 hrs**

Practice (Laboratory3-5 students per group)	**Duration**
1. Harmful substances- Nitrate	**3 hrs**
2. Food Additives - Colours	**3 hrs**
3. Water Sample Analysis	**6 hrs**
Total	**12 hrs**

Teaching and Learning Activities

In this learning module, students will work towards attaining the ILOs through the following teaching and learning activities:

Teaching and Learning Activities	**M1**	**M2**	**M3**
T1. *Interactive lectures* ■ Lectures: PowerPoint slides is presented and other supplementary materials provided if necessary ■ • Q & As: Raising different questions can draw student interest to the lecture they learn.	✓	✓	✓
T2. Laboratories ■ Students learn technical skills through laboratory operations		✓	✓
T3. *Assignments* ■ In- depth knowledge learning can be attained by actively learning from students through their assignments	✓	✓	

Alignment of MILOS with Teaching and Learning Activities

Activities	**M1**	**M2**	**M3**
Interactive lectures	✓	✓	✓
Laboratories		✓	✓
Assignments	✓	✓	

Attendance

Attendance requirements are governed by the Academic Regulations Governing Bachelor's Degree Programmes of the Macao Polytechnic University. Students who do not meet the attendance requirements for the learning module shall be awarded an 'F' grade.

Asssessment

In this learning module, students are required to complete the following assessment activities:

Assessment Activities	Weighting (%)	ILOs to be Assessed
A1. Examination	40%	M1, M2, M3
A2. Oral Presentation	20%	M1, M2
A3. Laboratory Report	40%	M3

Any students scoring less than 35% of the total mark in the final examination will be given an "F" grade for the module even if the overall grade is 50% or higher.

The assessment will be conducted following the University's Assessment Strategy (see www.mpu.edu.mo/teaching_learning/en/assessment_strategy.php). Passing this learning module indicates that students will have attained the ILOs of this learning module and thus acquired its credits.

MARKING SCHEME

Marks Ranges	Grade	Grade Point	Grade Definitions**
93–100 88 – 92	A A-	4.0 3.7	Excellent
83 – 87	B+	3.3	Very Good
78–82 73 – 77	B B-	3.0 2.7	Good
68–72 63–67 58 – 62	C+ C C-	2.3 2.0 1.7	Satisfactory
53 – 57 50 – 52	D+ D	1.3 1.0	Passed
0 – 49	F	0	Failed

Generic descriptions of each grade are given below:

Excellent: Strong evidence of original thinking; good organisation, capacity to analyse and systemise; superior grasps of subject matter; strong evidence of extensive knowledge base.

Very Good: Evidence of grasps of subject; strong evidence of critical capacity and analytical ability; good understanding of issues; evidence of familiarity with literature.

Good: Evidence of grasp of subject; some evidence of critical capacity and analytical ability; reasonable understanding of issues; evidence of familiarity with literature.

Satisfactory: Profiting from the study experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Pass: Sufficient familiarity with the subject matter to enable the student to progress without repeating the learning module.

Fail: Little evidence of familiarity with the subject matter; weak in critical and analytical skills; limited, or irrelevant use of literature.

REQUIRED READINGS

1. 王永華 戚穗堅, 食品分析, 第四版, 中國輕工業出版社有限公司
2. 康维钧 张翼翔, 水质理化检验, 第二版, 人民衛生出版社

REFERENCES

1. Belitz, H.D., Grosch, W. & Schieberle, P., 2009, Food Chemistry 4th ed., Berlin: Springer.
2. 江漢全, 2005, 水質分析, 革新二版, 新世紀科技叢書 三民書局
3. 杜曉燕, 2009, 現代衛生化學, 第二版, 人民衛生出版社

STUDENT FEEDBACK

At the end of every semester, students are invited to provide feedback on the learning module and the teaching arrangement through questionnaires. Your feedback is valuable for instructors to enhance the module and its delivery for future students. The instructor and programme coordinators will consider all feedback and respond with actions formally in the annual programme review.

ACADEMIC INTEGRITY

The Macao Polytechnic University requires students to have full commitment to academic integrity when engaging in research and academic activities. Violations of academic integrity, which include but are not limited to plagiarism, collusion, fabrication or falsification, repeated use of assignments and cheating in examinations, are considered as serious academic offenses and may lead to disciplinary actions. Students should read the relevant regulations and guidelines in the Student Handbook which is distributed upon the admission into the University, a copy of which can also be found at www.mpu.edu.mo/student_handbook/.