澳門理工大學
Universidade Politécnica de Macau
Macao Polytechnic University

FACULTY OF HEALTH SCIENCES AND SPORTS

BACHELOR OF SCIENCE IN BIOMEDICAL TECHNOLOGY (MEDICAL LABORATORY TECHNOLOGY/)

LEARNING MODULE OUTLINE

Academic Year	2025/2026	Semester	2
Module Code	BSIL4102		
Learning Module	Internship II		
Pre-requisite(s)	**BSCC2101, BSCI2102, BSCM2101, BSHM2102 BSHP3101**		
Medium of Instruction	Chinese/English		
Credits	5	Contact Hours	500
Instructor	LAM, Im Fong Cristina	Email	iflam@mpu.edu.mo
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MODULE DESCRIPTION

The objectives of the internship are the following:

1. Through practical training, students understand the knowledge from classes more comprehensively and more deeply. Students can apply this knowledge to practical work.
2. Through practical training, students are instilled with safety knowledge and are trained in certain professional skills.
3. Through teaching & training, students are capable of carrying out data analysis, to make correct judgments and explanations of the obtained results.
4. Students should understand the workflow, structure, and standard of the work of the laboratory. Students learn how to manage laboratories and Perform Quality Control.
5. Students can understand the current applied technology, the frontier of professional development, and the professional prospects of the local & nearby areas.
6. Students are educated to be: team spirited, friendly, orderly, punctual, responsible, tidy, honest, etc., and with professional conduct.

This internship training covers the following areas: Pathology (Histopathology, Cytopathology), Public health, and Environmental analysis. Students will be assigned to various laboratories, such as the Pathology laboratories in government or private hospitals, and Municipal laboratory. Students are trained under the instruction of internship supervisors.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	work independently, effectively, and safely
M2.	carry out laboratory management
M3.	comply with professional ethics

These ILOs aim 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

Practice	Contact Hours
1. General Clinical Laboratory Operations 1.1 General knowledge education 1.2 Specimen collection and reception 1.3 Specimen treatment and allocation 1.4 Safety in Clinical Laboratory 1.5 Result Reporting 1.6 Clinical Laboratory Management 1.7 Laboratory Information System (LIS)	**100 hrs**
2. Pathology (Histopathology, Cytopathology) 2.1 General information of anatomic pathology laboratory. • Work flow: Specimen reception and handling, reporting. • Rules of the department. Duties and Responsibilities of Technical Personnel. • Privacy. Moral and ethics. • Laboratory management and safety. Technical training 2.2 Specimen reception 2.3 Specimen fixation 2.4 Histopathological specimens handling techniques 2.5 Histochemical and Histoimmunotechnology 2.6 Cytopathological (Gynecological and non-gynecological) specimen: Basic theory and observation under the microscope. 2.7 Waste disposal. 2.8 Files build up.	**200 hrs**

2.9 Quality control 2.10 Result analysis & interpretation	
3. Public health and environment analysis: 3.1 General laboratory education • Duty of the public health laboratory. Working area, working flow. • Sample reception and treatment. • Quality control graph and requirement. 3.2 Chemical analysis of food and water: a. Sample pretreatment: • Sample concentration, e.g., solid phase extraction, liquid-liquid extraction. • Sample digestion. • Chemical treatment: derivatization, oxidation – reduction. b. Basic techniques training: • Titration – Dissolve oxygen (DO), chlorine detection. • Use of glassware. • Preparation of standard solutions and standardization of standard solutions. c. Small instruments: • Spectrophotometer – NH_4^+ detection (standard curve creation). • pH meter, conductimeter (calibration and operation). • Nephelometer (calibration and operation). • Microplate reader (Cl_2 and pH). d. Expensive instruments: • High-performance liquid chromatography (HPLC) tandem mass spectrometric (MS) detector, photodiode array (PAD). • Ion exchange chromatography (IC). • Gas chromatography (GC) tandem mass spectrometric (MS), flame ionization detector (FID), electron capture detector (ECD), phosphor and nitrogen detector (NP). • Graphite and flame atomic absorption spectrophotometer. (AAS), Inductively coupled plasma spectrometer (ICP-OES), Inductively coupled plasma mass spectrometer (ICP-MS) • Total organic carbon analyzer. e. Water and environment monitoring • Water sample pretreatment. • Appearance (color and turbidity) • Inorganic materials (Cl, Al, etc) detection. • Organic compounds (Phenol, THMS, etc) detection. • Quality control and quality evaluation. f. Pesticide residue on vegetable or fruit inspections: • Sample pretreatment. • Fast test – enzymatic inhibition rate. • Inorganic materials (Cl, Al, etc) detection. • Qualitative and quantitative analysis of organic phosphor. • Instrumentation. (calibration and operation) g. Physical and chemical analysis of food: • Sulfur dioxide analysis • Nitrites. • Preservatives (benzoic acid + sorbic acid or p-hydroxybenzoates) • Manual and instrumental operations training. h. Biochemical inspection: • Basic veterinary medicine residue analysis.	**200 hrs**

i. Various techniques (e.g., ELISA) training 3.3 Microbiological analysis on food and water: a. Sample reception, collection, and treatment: • Samples collection (various types of samples: air, water, and various kinds of food). • Sample inspection, information verification, and registration. • Sample treatment and storage. b. Basic techniques training: • Tools and containers cleaning and sterilizing. • Culture medium preparation, inoculation, and results observation. • Slide staining and microscope operation. c. Culture medium selection and preparation: • Various mediums for different samples (Coliforms: Coliert™, Petrilfilm ™ PEC plate, Petrilfilm™ HSCC plate) • Preparation of culture medium. d. Aseptic operation • Principle of aseptic condition. • Preparation for aseptic operation. • Training for aseptic operation. e. Bacteria culture techniques: • Culture condition (mediums, environment-temperature, duration, etc) • Result reading. f. Anaerobic bacteria: • Principle of anaerobic condition. • Anaerobic box and its operation. • Operation training. g. Bacterial count: PCA, Simplate™, PCA, Petrilfilm™ PAC plate, etc. h. Bacteriological identification: Pathogenic analysis workflow (enrichment, screening, confirmation, identification) i. Operation of various instruments (VIDAS、VITEK、API 20E, etc). • Principle of instruments. • Operation procedures. • Highlights of operations. • Methods to determine results. j. Food inspection (meat, shellfish). k. Water and environment monitoring: • Total bacteria count, E coli count, and Clostridium inspection. l. Veterinary inspection and related biochemical analysis techniques: H5 virus HI test and Flu A ELISA test. 3.4 Food Safety Monitoring: a. Food Safety Center introduction b. Food Safety Rules & Guidelines c. Market Sample collection d. Food Traceability System	
Total	**500 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 demonstration & Discussion* Demonstration & Talk: Teach students different kinds of knowledge & skills. ■ Q & A Discussion: Raising different questions can draw students' 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

1. The attendance of each training session must be over 90%. (No matter whether accepted or unaccepted, leave should never be over 10%; otherwise, an “F” grade will be awarded.
2. If the 90% attendance requirement is not fulfilled, but absence is due to the following conditions: illness, natural disasters, or other irresistible business. A letter requesting leave should be presented. The school supervisor will consider the exemption of this requirement according to the following conditions:
   a. Absence is less than 3 days.
   b. The training period of the training site is less than 3 weeks.
   c. Make-up training will be done before the end of the semester. (Make-up training must be agreed upon by the training institution)
   d. Compensate with another training site. (The training should be similar and the time must be longer than 3 days. The training should be accepted by the school supervisor. Proof of training should be presented.

Asssessment

Students will be assessed according to the assessment table provided by the school (see the table below). The following students will be assessed: attendance, manner, Tidiness, expression, operation skill, and report or examination, etc.. The final mark has to be confirmed by the School Supervisor.

實習評核表 Internship Assessment Table

實習部門(Department：_____.

學生姓名(Student name):_____.

	項目	比例	評分	備註
1	出席率及守時 Attendance	10%		
2	儀表及整潔 儀表 Appearance	10%		
3	工作態度及人際關係 Attitude	10%		
4	服從性 Obedience	15%		
5	表達能力 Expression	5%		
6	操作技巧 Operation Skills	25%		
7	考試、報告或演示 Report or Exam	25%		
總分 Total		100%		
評語 Comment				

*若有需要時 6, 7 項可合併計算 (item 6 and 7 can be combined if necessary)

導師(Instructor): _____ 日期(Date):_____.

The final mark of this module is calculated according to the following:

a. 90% of the total mark will be given by time averaging of all assessment tables from the training sessions within the semester.
b. 10% of the total mark will be given to the School Supervisor according to the student behaviors (4% Attendance, 2% Assignment submission, 4% other behaviors)
c. "F" grade will be awarded if 0% obtained from the School Supervisor's section.

Notice: *Student must pass (i.e., over 50%) all sessions' assessment, otherwise an "F" grade will be awarded finally and will be failed in this Module.*

No makeup internship arrangement(s) or resit examination for any rational or irrational absence(s). A "F" grade will be awarded, and the student will be considered to have failed this Module.

Notice: *No makeup internship arrangement(s) or resit examination for any rational or irrational absence(s), zero mark will be given for these(this) session(s).*

Assessment Activities	Weighting (%)	ILOs to be Assessed
A1. Attendance, Appearance, Attitude, Obedience, Expression	50%	M3
A2. Operation Skills	25%	M1, M2
A3. Report or Exam	25%	M1, M2, M3

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 grasp of subject matter; strong evidence of extensive knowledge base.

Very Good: Evidence of grasp 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.

REFERENCES

1. Ramnik Sood, 2014 Concise Book of Medical Laboratory Technology Methods and Interpretations, 2nd ed., Jaypee Brothers Medical Publishers (P) LTD.

2. 全國衛生專業技術資格考試用書編寫專家委員會, 2025 年, 臨床醫學檢驗技術(士), 人民衛生出版社. ISBN:9787117370257

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 formally with actions during 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, falsification, repeated use of assignments, and cheating on examinations, are considered serious academic offenses and may result in disciplinary actions. Students should read the relevant regulations and guidelines in the Student Handbook, which is distributed upon admission to the University. A copy of the handbook can also be found at www.mpu.edu.mo/student_handbook/.