



FACULTY OF HEALTH SCIENCES AND SPORTS
BACHELOR OF SCIENCE IN BIOMEDICAL TECHNOLOGY (MEDICAL LABORATORY TECHNOLOGY)
LEARNING MODULE OUTLINE

Academic Year	2023 / 2024	Semester	1
Module Code	BSIL4101		
Learning Module	Internship I		
Pre-requisite(s)	BSCC2101, BSCI2102, BSCM2101, BSHM2102 BSPH3101, BSPH3102		
Medium of Instruction	Chinese / English		
Credits	5	Contact Hours	500
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MODULE DESCRIPTION

The objective of the internship are the followings:

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 with certain professional skills.
3. Through teaching & training: students are capable to carry out data analysis, to make correct judgment and explanation to the obtained results.
4. Students should understand the work flow, structure & standard of the work of laboratory. Students learn how to do Laboratory management and Quality Control.
5. Students can understand the current applied technology, the frontier of professional development, the professional prospect of local & nearby area.
6. Students are educated to be: team spirited, friendly, orderly, punctual, responsible, tidy, honest etc., and with professional conducts.

This internship training covers the following areas: Medical laboratory Science (clinical chemistry, clinical haematology, blood banking, immunoserology, clinical microbiology, virology. Students will be assigned to various laboratories, such as the clinical laboratories in government or private hospitals, or in private institutions. Students are trained under 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 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

Practice	Contact Hours
1. General Clinical Laboratory operations 1.1 General knowledge education: 1.2 Clinical 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. Clinical chemistry laboratory 2.1 General Clinical Chemistry tests - General routine test: Protein , Albumin, Blood glucose Renal Function Test (RFT), Liver Function Test (LFT),Lipid panel, etc. - Electrolytes, Minerals and Trace elements - Blood gas and Acid _Base balance 2.2 Manual operation skills training - Vanilmandelic Acid (VMA) - SLE Latex Test - Procalcitonin - Serum Protein Electrophoresis (SPE) - Immunofixation Electrophoresis (IFE) - Semen Fructose Test - Total Iron Binding Capacity (TIBC)	100 hrs



- Renal stone analysis 2.3 Instruments operation training - Basic principle and safety of instrument (Autoanalyzer) operation - Instruments calibrations, quality control and other work training - Maintenance - Reagent changing and storage 2.4 Quality Control 2.5 Result analysis & interpretation	
3. Immunoserology laboratory operation training: 3.1 Manual operation skills training - Immuno fluorescence Assay (IFA): - Anti-Nuclei Anitbody (ANA) 、 Anti-double chain DNA antibody (Anti-dsDNA) 、 20 Respiratory Tract Profile - Polymerase Chain Reaction (PCR) : - HBV_DNA 、 Chlamydia DNA 、 EBV_DNA - Agglutination : Rapid Plasma Reactor (RPR), Mycoplasma pneumonia, Syphilis test Treponema pallidum particle agglutination assay (TPPA), heterophile agglutination Monospot - Immunoblot : Anti allergen test 、 Anti Epstein-Barr Virus –(IgM, IgG). 3.2 Instruments operation training: - Basic principle and safety of instrument operation - Instruments calibrations, quality control and other work training - Maintenance - Reagent changing and storage 3.3 Microbiology Laboratory & NAT HTLV - HBsAg, Anti-HCV Anti-HIV screening tests. - Use of micro plate washer and micro plate reader. - Quality control and External Quality Assurance. - Nucleic acid testing for HCV RNA and HIV RNA. 3.4 Quality Control 3.5 Result analysis & interpretation	60 hrs
4. Clinical haematology laboratory operation training 4.1 Routine haematology test - Cell counting (red cell and white) and classification with cell counter (CELL-DYN 3700). Complete blood count (CBC) and its clinical meaning. - Flow cytometer (normal and abnormal cell). - Blood smear, stain and microscope observation. - Preparation of LE cell (Lupus Erythematosus) - Enzymatic staining methods. - Prothrombin time (PT), Activated partial prothromboplastin time (APTT), Fibrinogen tests and principles. - Fibrin degradation product (FDP), D-dimer, Inhibitor Latex Test. - Introduction to Erythrocyte sediment rate (ESR). 4.2 Thalassemia tests: - Haemoglobin electrophoresis and High performance liquid chromatography (HPLC) methods. - Glucose-6-phosphate dehydrogenase test	100 hrs



• Red blood cell inclusion. • Polymerase chain reaction (PCR) methods. 4.3 Blood bank(in hospital) operation training: • Urgent blood transfusion and respond. • Immunohematology Laboratory training: ABO / Rh grouping using micro plate method. • Antibody screening and identification. • Quality control of reagents. • Direct Comb's & Indirect Comb's . • Cross Matching Test. 4.4 Result analysis & interpretation	
5. Clinical microbiology laboratory 5.1 Routine clinical specimens: Urine, stool, sputum, vaginal secretion and blood) incubation and treatments. • Specimen reception and checking. • Sample requirement. • Specimen routine incubation and treatments. • Staining procedure. • Specimen storage and placing. 5.2 Microbiology tests besides incubation: 5.3 Auxiliary identification tests of bacteria. 5.4 Bacteria identification and relative biochemistry instrument (VIDAS 、VITEK) 5.5 Drug sensitivity tests. 5.6 Result analysis & interpretation	80 hrs
6. Urine, stool and other specimens test and microscope inspection practice: 6.1 Urinalysis: • Type of urine samples (random urine, first morning urine, 24 hours urine, etc.) • Biochemistry test of Urine samples. • Dry chemical test of urine sample (Reagent strip) • Urine sample auto analyzer principle and procedure. • Microscopic inspection of urine sediments. (various cells, crystal, fugues, candidiasis, trichomonas, etc) • Urine pregnancy test (HCG) 6.2 Stool inspection: • Color and properties of stool. • Stool clinical significant components analysis through microscope (blood cells, eggs and parasites) • Stool routine test and eggs collection. • Amoeba inspection and stain • Stool Occult Blood Test. 6.3 Semen and other body fluids inspection: • Properties of various body fluid: outlook, cell count, morphologically classification. • Microscopic inspection of semen. • Biochemical test and microscopic inspection of other body fluids (e.g. CSF). • Renal stone analysis.	60 hrs



6.4 Other clinical specimen analysis: cerebrospinal fluid (CSF), synovial, stones, ..etc.	
6.5 Result analysis & interpretation	
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. <i>Interactive demonstration & Discussion</i> Demonstration & Talk: Teach student different kind of knowledge & skills. ■ Q & As Discussion: Raising different questions can draw student interest to the lecture they learn.	✓	✓	✓
T2. <i>Laboratories</i> ■ Students learn technical skills through laboratory operations	✓	✓	
T3. <i>Assignments</i> ■ 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

- The attendance of each training session must be over 90%. (no matter accepted or unaccepted leave should never be over 10%, otherwise an “F” grade will be awarded finally.
- If the 90% attendance requirement does not fulfill, but absence is due to the following conditions: illness, natural disasters or other irresistible business. A letter request for leave should be presented. School supervisor will consider exemption of this requirement according to the following conditions:
 - Absent is less than 3 days.
 - Training period of the training site is less than 3 weeks.
 - Make up training will be done before the end of the semester. (Make up training must be agreed by the training institution)
 - 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 school supervisor. Proof of training should be presented.



ASSESSMENT

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

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

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

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

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



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): _____.

MARKING SCHEME

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

REFERENCES

1. Ramnik Sood, 2009 Concise Book of Medical Laboratory Technology Methods and Interpretations, 1st ed., Jaypee Brothers Medical Publishers (P) LTD.
2. 全國衛生專業技術資格考試專家委員會, 2009 年, 臨床醫學檢驗技術, 第 1 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/.