



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	BSST3101-311		
Learning Module	Biostatistics		
Pre-requisite(s)	Nil		
Medium of Instruction	Chinese / English		
Credits	3	Contact Hours	45 hrs
Instructor	Dr Xin Wang, Amy	Email	amywang@mpu.edu.mo
Office	MingTek Building, Room M713A	Office Phone	8599 3478

MODULE DESCRIPTION

This is a necessary course for year three medical laboratory technology students. There are total 45 hours in 15 lectures for this course. The course will focus on the data collection, management and analysis and other statistic application. The students will get more understanding theoretically and practically in the statistics which include statistical tables, index, probability concepts and distributions, statistical hypothesis, correlation, regression, chi-square, t-test, ANOVA, multiple regression and non-parametric analysis etc.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

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

M1.	Understand and apply statistical methods for the design of biomedical research and analysis of biomedical research data
M2.	Understand and use mathematical and statistical theory underlying the application of biostatistical methods
M3.	Use and interpret results from specialized computer software for the management and statistical analysis of research data
M4.	Learn to participate in a research team setting in study design, data coordination and management, and statistical analysis and reporting of study results
M5.	Participate in a research team in the development and evaluation of new and existing statistical methodology

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

PILOs	M1	M2	M3	M4	M5
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

Week	Content Coverage	Contact Hours
1	Introduction to Medical Statistics; Concepts of biostatistics (population, sample, variables, types of data)	3
2	Descriptive statistic (Frequency distribution, graphics, percentile, central tendency and dispersion); Confidence interval	3
3	Normal distribution; Probability; Definition of statistical hypothesis, its classification and testing	3
4	Errors (Type I errors, Type II errors); Powers; Sample size calculation	2
5	SPSS basic and data management (1-2)	6
6	t test	3
7	Chi-square test	3
8	SPSS practice (1)	3
9	Mid-term exam	2
10	Analysis of Variance	3
11	Linear regression and correlation coefficient	3
12	Multiple regression and Logistic regression	3
13	SPSS practice (2)	3
14	Group Project presentation	3
15	Final exam	2



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	M4	M5
T1. Lecture	✓	✓	✓	✓	✓
T2. Computer applications	✓	✓	✓	✓	✓
T3. Group oral presentation	✓	✓	✓	✓	✓

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.

ASSESSMENT

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

Assessment Activities	Weighting (%)	ILOs to be Assessed
A1. Group Project	25%	M1,M2,M3,M4,M5
A2. Mid-term exam	25%	M1,M2,M3,M4,M5
A3. Final exam	50%	M1,M2,M3,M4,M5

This learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score.

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

The requirement of the mid-term, final and skill exam

Both the mid-term and final exam are close-book exams which composed of multiple-choice questions, calculations and case studies.

	Task	Criteira	Excellent (A, A-)	Very good, Good (B+, B, B-)	Satisfactory (C+, C, C-)	Pass (D+, D)	Fall
1	Mid-term exam	Demonstrate the ability to identify and apply appropriate concepts, methods, and analysis	High	Significant	Moderate	Basic	Not reaching marginal levels
2	Final exam	Demonstrate the ability to identify and apply appropriate concepts, methods, and analysis	High	Significant	Moderate	Basic	Not reaching marginal levels

The requirement of the group oral presentation

Areas of Assessment	Marking criteria	Weight	Score
1. Presentation contents	<p>Based on height and weight, create a new variable: BMI (5%)</p> <p>Based on the systolic and diastolic blood pressure, create a new categorical variable: Hypertension (1=yes, 2=no) (10%)</p> <p>Do univariate analysis of all the data that can be done (Including maximum, minimum, mean, standard deviation, 95% confidence interval, percentage, frequency, etc). (20%)</p> <p>Do bi-variate of all the data that can be done (t test, chi-square test, analysis of variance, correlation analysis, etc. and explain the results. (25%)</p> <p>Do multivariate analysis, and explain the results. (20%)</p>	80%	



2. Format requirements	<p>The report must be submitted in the form of a word file. (2%)</p> <p>The report should have a reasonable layout and be easy to read. (8%)</p> <p>A table of key results must be attached to each data analysis. (5%)</p>	15%	
3. Additional requirements	<p>The report submission date is the day before the official report. (5%)</p> <p>Students will have 50% of their marks deducted in the following cases: Those who did not attend the presentation; those who were complained by group members that they did not actively complete their homework.</p>	5%	
Total		100%	

REQUIRED READINGS

李康, 賀佳. (2018). *醫學統計學 (第七版)*. 北京: 人民衛生出版社 ISBN: 9787117266765

Tokunaga, H. T (2018). *Fundamental statistics for the social and behavioral sciences (Second Edition)*. SAGE Publications. ISBN-13: 9781506377483.

REFERENCES

- Agresti, A. 1996. *An Introduction to Categorical Data Analysis*. John Wiley; Sons, New York.
- Andersen, Per K., Ornulf Borgan, Richard D. Gill, and Niels Keiding. 1996. *Statistical Models Based on Counting Processes*. Springer Series in Statistics.
- Andrews, D. F., and A. M. Herzberg. 1985. *Data*. Springer-Verlag.
- Chance, Beth, and Allan Rossman. 2018. *Investigating Statistics, Concepts, Applications, and Methods*. 3rd ed. <http://www.rossmanchance.com/iscam3/>.
- Hastie, T., R. Tibshirani, and J. Friedman. 2001. *The Elements of Statistical Learning*. Springer.
- Kuiper, Shonda, and Jeff Sklar. 2013. *Practicing Statistics*. Pearson. <http://web.grinnell.edu/individuals/kuipers/stat2labs/>.
- Kutner, Nachtsheim, Neter, and Li. 2004. *Applied Linear Statistical Models*. 5th ed. McGraw-Hill.
- Legler, Julie, and Paul Roback. 2019. *Broadening Your Statistical Horizons: Generalized Linear Models and Multilevel Models*.
- Schulz, K, and D Grimes. 2005. "Multiplicity in Randomized Trials II: Subgroup and Interim Analyses." *Lancet* 365: 1657–61.



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/.



Appendix 1 Timetable of Biostatistics **Class Medical Laboratory Technology**

Session	Date	Time	Teacher	Topic
1	23/8/2024 (Fri)	10:00-13:00	Wang	Introduction to Medical Statistics; Concepts of biostatistics (population, sample, variables, types of data)
2	29/8/2024 (Thu)	10:00-13:00	Wang	Descriptive statistic (Frequency distribution, graphics, percentile, central tendency and dispersion)
3	11/9/2024 (Wed)	14:30-17:30	Wang	Normal distribution; Probability; Definition of statistical hypothesis, its classification and testing; Errors (Type I errors, Type II errors); Powers
4	19/9/2024 (Thu)	09:00-11:00	Wang	Confidence interval; Sample size calculation *
5	26/9/2024 (Thu)	10:00-13:00	Wang	SPSS basic and data management (1)
6	09/10/2024 (Wed)	14:30-17:30	Wang	SPSS basic and data management (2)
7	16/10/2024 (Wed)	10:00-13:00	Wang	T test
8	24/10/2024 (Thu)	10:00-13:00	Wang	Chi-square test
9	30/10/2024 (Wed)	14:30-17:30	Wang	SPSS practice (1)
10	06/11/2024 (Wed)	10:00-13:00	Wang	Analysis of Variance
11	07/11/2024 (Thu)	09:00-11:00	Wang	Mid-term test*
12	13/11/2024 (Wed)	10:00-13:00	Wang	Linear regression and correlation coefficient
13	21/11/2024 (Thu)	10:00-13:00	Wang	Multiple regression and Logistic regression
14	27/11/2024 (Wed)	14:30-17:30	Wang	SPSS practice (2)
15	04/12/2024 (Wed)	14:30-17:30	Wang	Group Project presentation
16	11/12/2024 (Wed)	14:30-16:30	Wang	Final exam*

* 2 hour course.