

Subject Description Form

Subject Code	ABCT1103
Subject Title	General Laboratory Techniques and Safety
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	NIL
Objectives	To introduce the basic techniques commonly used in biological and chemical experimental studies, as well as safety practices in biological and chemical laboratories.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) understand the basic and common techniques used in biological and chemical laboratories; (b) prepare laboratory records and make accurate observations in the form of a laboratory notebook; (c) analyze and interpret properly data obtained from laboratory work; and (d) report the laboratory work in a properly written form; (e) understand the general laboratory safety, the biological safety and the chemical safety practices. (f) pass the online safety training for both Chemical and Biological Safety
Subject Synopsis/ Indicative Syllabus	<p><u>Laboratory Safety</u> The PolyU Health and Safety Policy; General laboratory safety practices; Hazards and risk assessment; General principles of biosafety; Basic laboratories – Biosafety Levels 1 and 2; Equipment designed to reduce biological hazards; Safe laboratory techniques; disinfection and sterilization; Hazards associated with chemicals and chemical waste; General knowledge on the handling, storage and disposal of chemicals and chemical wastes; Personal protection and protective clothing for handling of potentially hazardous chemicals, chemical wastes and spillages; Laws pertaining to the handling and storage of chemicals: dangerous goods, controlled chemicals, dangerous substances used in industry, disposal of chemical waste and others; Use of emergency facilities.</p> <p><u>Basic Laboratory Measurements</u> Measurement of weight, volume, temperature, pH; uncertainty in measurements and statistics; basic mathematical techniques, proportional relationships, relationships and graphs</p> <p><u>Basic Solution Techniques</u> Use of analytical balances, graduated glassware; water for laboratory use; concentrations and calculation; preparation of laboratory solutions, reagents and standard solutions; dilutions and serial dilutions; biological / physiological solutions, sterilization of solutions</p>

	<p><u>General Laboratory Techniques</u></p> <p>Microscopy: principles of light microscopy and electron microscopy; proper use and care of light microscopes. Staining of chromosomes; staining of animal and plant cells; preparation of slides for microscopy.</p> <p>Centrifugation: principle of centrifugation, different modes of centrifugation, use of centrifugation in separation of cells or subcellular particles.</p> <p>Measurements involving light: transmission, absorption, principle of spectrophotometry, use of spectrophotometer; standard curves and calibration.</p> <p>Bacterial culture medium and culture plates, culture transfer and cultivation, plate streaking/spreading; growth curve.</p> <p>Qualitative techniques for inorganic analysis, crystallization, gravimetric analysis, acid-base titration, , precipitation titration</p> <p>Proper record keeping and documentation;</p> <p>Proper data analysis and report writing</p>																																																						
<p>Teaching/Learning Methodology</p>	<p>The basic principles and concepts of the basic laboratory techniques and laboratory safety will be delivered in the form of lectures. To practice, students will work individually or in teams in the laboratory sessions, and each session will be supplemented with in-lab briefing and demonstration. Each student will be required to keep up-to-the-minute record of the laboratory works in the form of a laboratory notebook.</p>																																																						
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> </tr> </thead> <tbody> <tr> <td>1. Laboratory reports</td> <td>30</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>2. Laboratory Notebook</td> <td>20</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. Laboratory performances</td> <td>30</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>4. Quizzes</td> <td>20</td> <td>✓</td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="6"></td> </tr> </tbody> </table> <p>Learning outcomes will be gauged through quizzes, laboratory notebook, and laboratory reports. Student will also be assessed on their laboratory practices in selected laboratory sessions.</p> <p>Through the quizzes, students will be assessed on their understanding of the basic concepts and principles of the common laboratory techniques and safety.</p> <p>Through the laboratory notebook, students will be assessed on their record keeping and accuracy in observation.</p> <p>In the laboratory reports, students are expected to perform analysis on the data obtained as well as to interpret their findings. Their abilities in these aspects</p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e	f	1. Laboratory reports	30	✓		✓	✓			2. Laboratory Notebook	20		✓	✓				3. Laboratory performances	30	✓	✓			✓		4. Quizzes	20	✓				✓	✓	Total	100 %						
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	<p>may thus be assessed.</p> <p>The performance of students during the laboratory sessions will be monitored and assessed to gauge their mastering of the basic techniques and their practice of laboratory safety.</p>	
Student Study Effort Expected	Class contact:	
	▪ Lectures	14 Hrs.
	▪ Laboratory session (4 hr per session X 10 weeks)	40 Hrs.
	Other student study effort:	
	▪ Self-study	50 Hrs.
	▪ Laboratory reports	30 Hrs.
	Total student study effort	134 Hrs.
Reading List and References	<p>Fleming & Hunt (Editors) Biological Safety Principles and Practices 4th Edition ASM Press 2006</p> <p>Laboratory Biosafety Manual, Second Edition (Revised); World Health Organization, Geneva 2003</p> <p>U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention and National Institutes of Health; Biosafety in Microbiological and Biomedical Laboratories, Fourth Edition; U.S. Department of Health and Human Services Washington 1999</p> <p>Hall, Stephen K.; Chemical Safety in the Laboratory; Boca Raton, Fla.: Lewis Publishers, 1994</p> <p>United Nations Environment Programme, The International Labour Organisation, and the World Health Organization; Assessing human health risks of chemicals: derivation of guidance values for health-based exposure limits; World Health Organization, Geneva 1994</p> <p>HKSAR Justice Department; HKSAR Bilingual Laws Information System; http://www.justice.gov.hk/Home.htm HKSAR Justice Department Webpage</p> <p>Seidman & Moore Basic Laboratory Methods for Biotechnology: Textbook and Laboratory Reference Prentice-Hall 2000</p> <p>Norrell & Messley Microbiology Laboratory Manual Second Edition Pearson 2003</p> <p>Vogel, A. I.; Barnes, J. D.; Denney, R. C.; Mendham, J.; Thomas, M. J. K. Vogel's Quantitative Chemical Analysis, 6th edition, Harlow: Prentice Hall, 2000</p> <p>Svehla, G. Vogel's Qualitative Inorganic Analysis, 7th edition, Harlow: Longman, 1996</p>	