

University of Macau
Faculty of Science and Technology
Department of Electrical and Computer Engineering

Part A: Course Outline

Course Title:	Biology		
Course Code:	ELEC254	Year of Study:	2 to 4
Compulsory/Elective:	Elective		
Course Prerequisites:	None		
Prerequisite Knowledge	None		
Class/Laboratory Schedule:	3 lecture hours, with occasionally lab practice		
Duration	One semester	Credit Units	3
Text Books and References:	<p>Text: Stanley E. Gunstream “Anatomy and Physiology with Integrated Study Guide” 5th Ed. McGraw-Hill@2013</p> <p>Ref.:</p> <p>[1] Eric Widmaier, Hershel Raff and Kevin Strang, “<i>Vander’s Human Physiology: The Mechanisms in Body Function</i>”, McGraw-Hill, 12th Ed. or newer.</p> <p>[2] Dee Unqlaub Silverthorn, “<i>Human Physiology: An Integrated Approach</i>”, 5th Ed. Or newer</p>		
Course Description:	<p>This course guides students to know knowledge of cellular biology and physiology, including function, dysfunction, and the mechanisms that underlie treatment from biomedical engineering point of view. The course also addresses briefly professional and ethical responsibility associated with the development, testing, and implementation of biomedical devices or treatments. Topics in this semester include the chemicals, cell, tissues and membranes, nervous system, striated and smooth muscle, respiratory, cardiovascular systems, senses and etc.</p>		
Topics Covered	<ol style="list-style-type: none"> 1. Human Body and homeostasis Introduction 2. Chemical Aspects of Life (brief) 3. Brief Cellular Biology 4. Tissues & Membranes 5. Cover, Support, Movement of the body – Integumentary & Musculoskeletal Systems 6. Senses & Nervous System 7. Engineering Aspects: Electrodes, Stimulations and Safety Concerns 8. Other Organ Systems (such as Blood, Cardiovascular& Respiratory, Digestive & Urinary systems) or professional ethics 9. Guest lecture (<i>ad hoc</i> topic) by invited experts (clinical professionals) 		
Course Objectives:	1. To provide students fundamental knowledge of physiological system		

	<p>function and dysfunction [h, j, i]]</p> <ol style="list-style-type: none"> 2. To analyze physiological systems from both biologist and engineering perspectives [a, b, e] 3. To know some biological disorders and apply engineering practice to monitor and/or to relax them [a, d, e] 4. To understand how solutions manifested in biological systems may potentially be applied to the solution of traditional engineering problems or vice versa [a, e, h] 5. To recognize the safety and ethical issues associated with testing and implementation of biomedical devices and treatments [f, h] 															
Course Assessment:	<p>Pop Quizzes : 8%</p> <p>Home-work Assignments: 8%</p> <p>Experiments or simulation, or presentation: 24%</p> <p>Mid-term Exam. : 20%</p> <p>Final Exam.: 40%</p>															
Relationship to Program Objectives and Outcomes	<p>This course primarily contributes to ECE program outcomes that develop students abilities to:</p> <ol style="list-style-type: none"> a. Ability to apply knowledge of mathematics, science and engineering. h. Broad education necessary to understand the impact of engineering solutions in global and societal context. j. Knowledge of contemporary issues. <p>This course secondarily contributes to ECE program outcomes that develop students abilities to:</p> <ol style="list-style-type: none"> e. Ability to identify, formulate and solve engineering problems. f. Understanding of professional and ethical responsibility. g. Ability to communicate effectively. i. Recognition of the need for and an ability to engage in life-long learning. k. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice. 															
Course Contents and Relationship to Program Criteria:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Week no.</th> <th style="width: 60%;">Topics</th> <th style="width: 30%;">Program Criteria</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Human Body and homeostasis Introduction</td> <td>BS, ES</td> </tr> <tr> <td>1.5</td> <td>Chemical Aspects of Life (brief)</td> <td>DIC, CS</td> </tr> <tr> <td>1</td> <td>Brief Cellular Biology</td> <td>ES, CS,</td> </tr> <tr> <td>1</td> <td>Tissues & Membranes</td> <td>ES, DE, BS</td> </tr> </tbody> </table>	Week no.	Topics	Program Criteria	1	Human Body and homeostasis Introduction	BS, ES	1.5	Chemical Aspects of Life (brief)	DIC, CS	1	Brief Cellular Biology	ES, CS,	1	Tissues & Membranes	ES, DE, BS
Week no.	Topics	Program Criteria														
1	Human Body and homeostasis Introduction	BS, ES														
1.5	Chemical Aspects of Life (brief)	DIC, CS														
1	Brief Cellular Biology	ES, CS,														
1	Tissues & Membranes	ES, DE, BS														

	2.5	Cover, Support, Movement: Integumentary & Musculoskeletal Systems	CS, ES, BS,
	0.5	Safety and Ethics	BS, ES
	3	Integration and Control: Senses & Nervous System, etc.	ES
	2	Maintenance of the Body: Blood, Cardiovascular & Respiratory Systems, Digestive & systems	DIC, ES, CS,
	1	Guest lecture & Midterm	
Contribution of Course to meet the professional component:	This course prepares students to enter the professional world in the Biomedical Engineering related fields with basic background of human physiology. Students should be able to understand the human biological functions (and malfunctions) with the perspectives of Electrical and Computer Engineering. Also this may attribute to one's life-long health knowledge!		
Course Instructor(s):	Dr. Mak, Peng Un, and/or et al.		
Prepared by:	Dr. Mak, Peng Un		

Part B: General Course Information and Policies

(2015 Spring) **Class times & venue:**

Mon: 16:30 – 18:15 at E11-1025

Thu: 14:00 – 15:45 at E11-1028 or labs

Lab or Tutorial times: class time/venue above or at Lab (with advance notice)

Instructor: Dr. Mak, Peng Un

Contact → Phone: 4393 Office: E11-3037 E-mail: fstpum@umac.mo

Office hour: Wednesday 11-12 noon

TA: SHI, Zheng (Y-B3-7406-0)

Contact → Phone: ext.: 2528 **Office:** E11-3103 E-mail: YB37406@umac.mo

TA office hour: Friday 2-3 p.m.

Programme Educational Objectives

1. **Problem Solving:** Graduates have the ability to think in a critical and evaluative manner and to consider a broad perspective, in order to solve technical and nontechnical problems.
2. **Leadership and Communication:** Graduates will provide effective leadership, act in an ethical manner and skills will include the ability to communicate well and to work successfully within diverse groups.
3. **Market Acceptance:** Graduates will have successful careers in the academic environment, industrial and government organizations.
4. **Technical Competence:** Graduates will be technically competent and have a thorough

grounding in the fundamentals of math and science in electrical and computer engineering and experience in engineering design. They will be able to use modern engineering techniques, skills, and tools to fulfill societal needs.

Scale: 1 (Highest) to 4 (Lowest)

	Problem Solving	Leadership and Communication	Market Acceptance	Technical Competence
Biology	2	2	3	3

Remark:

- Objective for “Problem Solving” can be achieved by assignments, quizzes, mid-term exam, final exam and projects.
- Objective for “Leadership and Communication” can be achieved by report writing and presentation. However, leadership training is not formally given by this course.
- Objective for “Market Acceptance” can be achieved by the course subject that is related to electronic circuit design careers.
- Objective for “Technical Competence” can be achieved by using fundamentals of math and electrical and computer engineering and experience in engineering HW, computer simulation and assignments.

Program Criteria Policy:

Course VS Program Criteria

Scale: 1 (Highest) to 4 (Lowest)

Course	PS	DIC	BS	CS	ES	DE	LA	CV	DM
Biology	4	4	1	3	2	4	4		

Terms:

Probability and Statistics (PS), Differential and Integral Calculus (DIC), Basic Science (BS), Computer Science (CS), Engineering Science (ES), Differential Equation (DE), Linear Algebra (LA), Complex Variables (CV), Discrete Mathematics (DM)

Relationship of Course to Programme Outcomes:

Course VS Course Outcomes

***T – TEACH; P – PRACTICE; M – MEASURED**

	Program Outcomes											
	a	b	c	d	e	f	g	h	i	j	k	l
ECEB254 Biology	T	P		TP	TP	T		T	T	TP		

The electrical and electronics engineering program outcomes are:

- Ability to apply knowledge of mathematics, science and engineering.
- Ability to design and conduct experiments.
- Ability to design a system, component or process to meet desired needs.
- Ability to function on multidisciplinary teams.
- Ability to identify, formulate and solve engineering problems.
- Understanding of professional and ethical responsibility.
- Ability to communicate effectively.
- Broad education necessary to understand the impact of engineering solutions in global and societal context.
- Recognition of the need for and an ability to engage in life-long learning.
- Knowledge of contemporary issues.
- Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
- Ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations

Curriculum Detail:

ECEB 254 Biology

Timetabled work in hours per week (on average)			No of teaching weeks	Total hours	No /Duration of exam papers	Max marks available from:	
Lecturer	Tutor	Practice				Exams	Course
2.5		0.5	14	56	2/2-3hours	60	40

Term: 4th (Spring Semester)

Hours			Percentage content of					
Lecturer	Lab/tut	Other	Maths	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies
35	7/7	0	5	60	25	5	3	2

Design Elements

% of Design Content	Design Content in Course Work	Design Project	Design Content in Laboratories
12%	X		X

X: has some

Course Assessment Policy:

- Homework assignments will be given to students according to the course progress, no late homework is accepted. Zero mark will be given when homework is copied.
- A number of pop quizzes will be held during the semester randomly.
- Some experiments will be performed during the semester. 2 students form one group and group report should be handed in.
- Commercial circuit simulation tools shall be used to perform engineering calculation with visualization
- 1 mid-term exam and 1 final exam will be performed with 1.5 hour and 3 hours respectively.
- If time is permitted, on-site visit to nearby company or facilities shall be arranged!

STUDENT DISABILITIES SUPPORT SERVICE

The University of Macau is committed to providing an equal opportunity in education to persons with disabilities. If you are a student with a physical, visual, hearing, speech, learning or psychological impairment(s) which substantially limit your learning and/or activities of daily living, you are encouraged to communicate with your instructors about your impairment(s) and the accommodations you need in your studies. You are also encouraged to contact the Student Disability Support Service of the Student Counselling and Development Section (SCD) in Student Affairs Office, which provides appropriate resources and accommodations to allow each student with a disability to have an equal opportunity in education, university life activities and services at the University of Macau. To learn more about the service, please contact SCD at scd.disability@umac.mo, or 8822 4901 or visit the following website: http://www.umac.mo/sao/scd/sds/aboutus/en/scd_mission.php.