

**SEMESTER II**  
**LSM3262 ENVIRONMENTAL ANIMAL PHYSIOLOGY**

**Prerequisite: LSM1104**

**Workload: 26 lecture hours + 4 tutorial hours + 20 laboratory hours**

This module aims to examine the physiological and biochemical adaptations of animals which permit them to thrive in diverse environments. It focuses on how animals adapt to natural (e.g. oxygen availability, salinity changes, water availability) and anthropogenic (e.g. greenhouse effect, UV radiation and oxidative stresses, xenobiotics) environmental challenges. This module hopes to offer students clues to what are the fundamental ways in which basic biological structures and functions of living systems are actively modified to allow organisms to exploit the full range of natural environments and to maintain the radically different modes of life we see in nature. Efforts will be made to teach how environmental physiology can be applied to biomedicine, agriculture, ecology and environmental conservation in the last part of the module.

S/N	Topics	Lecture hours
1.	<b>Introduction.</b> Overview on the course structure and content.	1
2.	<b>Earth's atmosphere, and UV and oxidative stress adaptations.</b> Reducing atmosphere, chemical evolution, evolution of oxygen and ozone, UV radiation, oxidative stress, oxidative defence.	2
3.	<b>Respiratory adaptations.</b> Ascorbic acid and ROS, water-land transition, gas solubility, transport of oxygen and carbon dioxide in the blood, respiratory pigments, comparison of gills and lung, regulation of blood pH, artificial blood.	4
4.	<b>Hypoxic/anoxic adaptations.</b> Redox balance, regulation of glycolytic rate, Pasteur effect, reversed Pasteur effect, mountain sickness, hypoxia and cancer.	4
5.	<b>Osmoregulatory adaptations.</b> Osmotic and ionic regulation in freshwater or seawater, euryhalinity and branchial osmoregulatory acclimation, urea as an osmolyte, aquaculture, water purification; salt gland and mammalian kidney, survival in the desert.	4
6.	<b>Excretory adaptations.</b> Ammonia. Urea. Uric acid. Water-land transition.	4
7.	<b>Pressure adaptations.</b> Adaptations in deep sea.	4
8.	<b>Temperature adaptations.</b> Adaptations to temperature extremes.	3
<b>Total lectures :</b>		<b>26h</b>
<b>Tutorials :</b>		<b>4h</b>
<b>Practicals:</b>		<b>5x4=20h</b>
<b>Total hours:</b>		<b>50h</b>

**TEXT BOOK** (Reference books): Research papers and review articles will be used as course materials.

**MODE OF ASSESSMENT:** 2 tests 20% each; final exam 60%

**MODULE CO-ORDINATOR:** Prof Ip Yuen Kwong (Tel: 6516-2702, E-mail: dbsipyk@nus.edu.sg)

**LECTURER:** Prof Ip Yuen Kwong