

## 课程大纲 COURSE SYLLABUS

1.	<b>课程代码/名称</b> <b>Course Code/Title</b>	高级动物生理学/Advanced Animal Physiology
2.	<b>课程性质</b> <b>Compulsory/Elective</b>	专业选修课/Elective
3.	<b>开课单位</b> <b>Offering Dept.</b>	生物系/Department of Biology
4.	<b>课程学分/学时</b> <b>Course Credit/Hours</b>	3 学分, 48 学时
5.	<b>授课语言</b> <b>Teaching Language</b>	中英文
6.	<b>授课教师</b> <b>Instructor(s)</b>	程龙珍
7.	<b>开课学期</b> <b>Semester</b>	春季/Spring
8.	<b>是否面向本科生开放</b> <b>Open to undergraduates or not</b>	否
9.	<b>先修要求</b> <b>Pre-requisites</b>	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)  无
10.	<b>教学目标</b> <b>Course Objectives</b>	<p>《高级动物生理学》是生命科学的核心, 为一门研究动物机体基本生命活动及其规律的学科。通过课程的学习, 使学生掌握动物在适应环境变化的过程中所发生的包括行为、各器官系统、细胞及其组成物质分子在内的活动变化与机制的基本规律、基本理论; 了解动物生理的理论在动物医学、动物生产、动物资源保护与利用等实践活动中的作用; 了解动物生理和其它相关学科间的相互关系及该学科发展的前沿热点问题, 为今后从事动物生理学及其相关学科的研究、发展打下宽厚的理论基础。</p> <p>This course will study the physical and chemical principles governing the lives of animals with an emphasis on understanding the physiological problems animals face, how those problems vary in relation to animals' environments, and the processes by which animals solve their problems.</p>
11.	<b>教学方法</b> <b>Teaching Methods</b>	讲授 45 小时, 课程项目 presentation 3 小时
12.	<b>教学内容</b> <b>Course Contents</b>	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)
	第一章 细胞的基本功能 学时: 6 学时  Chapter 1 Basic Functions of Cells  Hours: 6 h	1 细胞物质转运功能 Cell material transport function  2 细胞的跨膜信号转导功能 Cell transmembrane signal transduction function  3 细胞的兴奋性和生物电现象 Cell excitability and bioelectric phenomena

	4 兴奋在细胞间的传递 Transmit of excitement between cells
<p>第二章 血液 学时：3 学时</p> <p>Chapter 2 Blood Hours: 3 h</p>	<p>1. 体液、细胞外液、内环境和内环境稳态（血液的组成与理化特性，血浆渗透压，血浆的酸碱平衡，血液的机能，等）Body fluids, extracellular fluid, internal environment and the steady state (blood composition and physicochemical properties, plasma osmotic pressure, plasma pH, blood function, etc.).</p> <p>2. 血细胞生理 Blood cell physiology</p> <p>3. 白细胞的生理特性、功能 Physiological characteristics and function of leukocytes</p> <p>4. 血小板的生理特性、功能 Physiological characteristics and function of platelet</p> <p>5. 生理止血，血液凝固与纤维蛋白溶解 Physiological hemostasis, blood coagulation and fibrinolysis</p> <p>6. 血型 and 红细胞凝集 Blood type and erythrocyte agglutination</p>
<p>第三章 血液循环 学时：3 学时</p> <p>Chapter 3 Blood circulation Hours: 3 h</p>	<p>1. 心脏的泵血功能 Heart pump function</p> <p>2. 心肌的生物电现象和生理特性 Myocardial electrical phenomena and physiological characteristics</p> <p>3. 血管生理 Vascular physiology</p> <p>4. 心血管活动的调节 Regulation of cardiovascular activity</p>
<p>第四章 呼吸 学时：4 学时</p> <p>Chapter 4 Respirator Hours: 4 h</p>	<p>1. 呼吸器官的通气活动（包括：哺乳动物的肺通气，肺通气的原理，肺通气功能的评价，肺容量与肺通气量，等）Respiratory organ ventilation (including: mammalian lung ventilation, pulmonary ventilation principle, pulmonary ventilation function evaluation, lung volume and lung ventilation, etc.)</p> <p>2. 气体交换：气体交换的原理，气体交换的过程 Gas exchange: the principle of gas exchange, gas exchange process</p> <p>3. 气体运输：气体在血液中的存在形式，氧的运输，Hb 的氧合作用，氧离曲线，影响氧离曲线的因素，CO<sub>2</sub> 的运输，碳酸氢盐，氨基甲酸 Hb</p> <p>Gas transportation: the form of gas in the blood, the transport of oxygen, the oxygenation of Hb, the oxygen evolution curve, the influence factors of oxygen curve, the transport of CO<sub>2</sub>, bicarbonate, carbamate Hb</p> <p>4. 呼吸运动的调节（包括：神经调节，呼吸中枢，呼吸运动的反射性调节，化学因素对呼吸的调节，化学感受器，Pco<sub>2</sub>、pH、Po<sub>2</sub> 对呼吸的影响）</p> <p>The regulation of respiratory movement (including: neuromodulation, respiratory centre, the reflective regulation of respiratory movement, chemical factors on the regulation of respiration, chemical receptors, the impact of Pco<sub>2</sub>, pH and Po<sub>2</sub> on breathing)</p>

第五章 消化与吸收  
学时: 4 学时

Chapter 5 Digestion and Absorption

Hours: 4 h

1.概述 Introduction

- 1) 消化的方式 Digestive way
- 2) 消化道平滑肌的特性 Characteristics of digestive tract smooth muscle
- 3) 消化道的神经支配 Innervation of the digestive tract
- 4) 胃肠道激素 Gastrointestinal hormones

2. 机械性消化 Mechanical digestion

- 1) 胃肠运动形式及作用 Gastrointestinal movement form and function
- 2) 胃的排空 Emptying the stomach

3. 化学性消化 Chemical digestion

- 1) 口咽腔的消化酶 Digestive enzymes in oropharyngeal cavity
- 2) 胃液及其分泌调节 Gastric juice and its secretion regulation
- 3) 胰液的分泌调节 Secretion of pancreatic juice regulation

4. 胆汁的分泌与排出 Bile secretion and discharge

5. 小肠液的分泌 Small intestine secretion

6. 复胃(微生物)消化 Microbial digestion

7. 吸收 Absorption

- 1) 吸收途径与方式 Absorption routes and methods
- 2) 小肠内主要营养物质的吸收 The absorption of major nutrients in the small intestine
- 3) 水的吸收 Water absorption
- 4) 无机盐的吸收 Inorganic salt absorption
- 5) 糖的吸收 Sugar absorption
- 6) 蛋白质的吸收 Absorption of protein
- 7) 脂质的吸收 Absorption of lipids
- 8) 胆固醇的吸收 Absorption of cholesterol

第六章 能量代谢及体温  
学时: 3 学时

Chapter 6 Energy Metabolism and Body Temperature  
Hours: 3 h

1.能量的来源与消耗 The source and consumption of energy

2.能量消耗的路径 The path of energy consumption

3.能量代谢的测定 Determination of energy metabolism

4.影响能量代谢的因素 Factors that affect energy metabolism

5.基础代谢和静止能量代谢 Basic metabolic and resting energy metabolism

	<p>6.动物的体温及其调节 Animal's body temperature and its regulation</p> <p>7.体表温度和体核温度 Body surface temperature and body temperature</p> <p>8.动物体温的正常变动 Normal changes in animal body temperature</p> <p>9.动物体温恒定的原理 Animal body temperature constant principle</p> <p>10. 体温调节 Temperature regulation</p>
<p>第七章 肾脏与排泄 学时: 4 学时</p> <p>Chapter 7. Kidney and Excretion Hours: 4 h</p>	<p>1.肾的功能解剖特征（肾单位和集合管，皮质肾单位和近髓肾单位，球旁器，血液供应特征） Functional anatomical characteristics of the kidney (nephron and collecting ducts, cortical neonatal units and myeloid neonatal units, squares, blood supply)</p> <p>2. 尿的生成 Urine generation</p> <p>3. 尿的生成的调节 Regulation of urine generation</p> <p>4 动物机体的水盐平衡和渗透压调节 Balance of water and salt in animal body and osmotic pressure regulation</p>
<p>第八章 神经系统 学时: 12 学时</p> <p>Chapter 8. Nervous System Hours: 12 h</p>	<p>I. Synaptic transmission and plasticity 突触传递和可塑性</p> <ol style="list-style-type: none"> <li>1. Two Classes of Synapses</li> <li>2. Properties of Neurotransmitters</li> <li>3. Release of Neurotransmitters</li> <li>4. Neurotransmitter Receptors</li> <li>5. Postsynaptic Membrane Permeability Changes during Synaptic Transmission</li> <li>6. Relationship between Ion Fluxes and Postsynaptic Potential Changes</li> <li>7. Excitatory and Inhibitory Postsynaptic Potentials</li> <li>8. Summation of Synaptic Potentials</li> <li>9. Summary of Synaptic Transmission</li> <li>10. Synaptic plasticity</li> </ol> <p>II. Sensory processes 感觉信息处理</p> <ol style="list-style-type: none"> <li>1. Organization of the sensory systems</li> <li>2. Mechanoreception and touch</li> <li>3. Chemoreception and taste</li> <li>4. Olfaction and smell</li> <li>5. Photoreception and vision</li> <li>6. Visual Sensory Processing</li> </ol>

	III. Advanced functions of the brain 脑的高级功能
<p>第九章 内分泌 学时 3 学时</p> <p>Chapter 9. Endocrine Hours: 3 h</p>	<ol style="list-style-type: none"> <li>1. Introduction to Endocrine Principles 内分泌原理介绍</li> <li>2. Synthesis, Storage, and Release of Hormones 激素的合成、储存和释放</li> <li>3. Control of Endocrine Secretion: The Vertebrate Pituitary Gland 内分泌分泌的控制：脊椎动物垂体</li> <li>4. The Mammalian Stress Response 哺乳动物的应激反应</li> <li>5. Endocrine Control of Salt and Water Balance in Vertebrates 脊椎动物盐和水平衡的内分泌控制</li> <li>6. Endocrine Control of Nutrient Metabolism in Mammals 哺乳动物营养代谢的内分泌控制</li> <li>7. Endocrine Control of Calcium Metabolism in Mammals 哺乳动物钙代谢的内分泌控制</li> </ol>
<p>第十章 生殖与泌乳 学时 3 学时</p> <p>Chapter 10. Reproduction and Lactation</p> <p>Hours: 3 h</p>	<ol style="list-style-type: none"> <li>1. Female reproduction 雌性生殖</li> <li>2. Male reproduction 雄性生殖</li> <li>3. Fertilization 受精</li> <li>4. Pregnancy and lactation 妊娠和哺乳</li> </ol>
<b>13. 课程考核</b> <b>Course Assessment</b>	
<p>(① 考核形式 Form of examination; ②. 分数构成 grading policy; ③ 如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)</p> <ol style="list-style-type: none"> <li>1. 出勤/Attendance: 10%</li> <li>2. 课堂表现/Class Performance: 10%</li> <li>3. 课程项目/Projects: 30%</li> <li>4. 期末考试/Final Exam: 50%</li> </ol>	
<b>14. 教材及其它参考资料</b> <b>Textbook and Supplementary Readings</b>	
<p>教材(Teaching material): 《Animal Physiology, 3rd Edition, 2012》 Sinauer by Hill, Wyse, and Anderson</p> <p>参考书 (Reference book): 《动物生理学(第2版)》 杨秀平, 肖向红, 主编</p>	