

# Brazosport College

## Syllabus for Biol 2402 Anatomy & Physiology 2

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**Best Office Hours: 10-12 Monday, 11-1:30PM Tuesday, 10:00-12:30 Wednesday, 11:00 - 1 Thursday,**

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### Course Description

Human Anatomy and Physiology II is a study of various organ systems of the human body including: cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems. Emphasis is on understanding the physiology of negative and positive feedback mechanisms associated with these organ systems.

Weekly laboratory activities are designed to complement and/or coincide with lecture topics. Laboratory activities will include use of various organ system models, group activities, and dissections of preserved or fresh specimens of hearts, lungs, etc. No live animal experiments are used. The students will be guided through a study of the structural anatomy of the organs as well as the physiological processes involved in each organ system.

### Prerequisites

Students must have successfully completed BIOL 2401(3-3) [2607065124] at an accredited college.

Certain EMS or medical work experiences may be substituted to fulfill this requirement.

See your instructor today if you have not successfully completed BIOL 2401 (A&P I).

### Course Goals

1. Students will demonstrate knowledge of the properties of cardiac muscle fibers as well as how the intrinsic conduction system coordinates contractions of the myocardium.
2. Students will demonstrate knowledge of the path of blood flow through the chambers, valves, and vessels of the heart.
3. Students will demonstrate knowledge of how the autonomic nervous system influences heart rate and contractility to adjust cardiac output to meet the needs of the body.
4. Students will demonstrate knowledge of the short-term and long-term mechanisms for adjusting and maintaining blood pressure via changes in peripheral resistance, blood volume, and blood viscosity.
5. Students will demonstrate knowledge of the principles of tissue perfusion and capillary exchange.
6. Students will demonstrate knowledge of the roles of various cells and chemical substances involved in our nonspecific and specific defense responses.
7. Students will demonstrate knowledge of the anatomy and functions of the components of the respiratory system.
8. Students will demonstrate knowledge of the principles involved in the mechanics of pulmonary ventilation.
9. Students will demonstrate knowledge of the principles associated with external and internal respiration as well as the transport of oxygen and carbon dioxide in the blood.
10. Students will demonstrate knowledge of the various factors influencing the respiratory control centers resulting in compensatory and noncompensatory hyperventilation and hypoventilation.
11. Students will demonstrate knowledge of the anatomy and functions of the gastro-intestinal tract.
12. Students will demonstrate knowledge of how the hypothalamus serves as a thermostat controlling heat gain and heat loss to regulate body temperature.
13. Students will demonstrate knowledge of the anatomy and functions of the urinary system including

detailed functions of each segment of the nephron.

14. Students will demonstrate knowledge of the principles involved in net filtration pressure, glomerular filtration rate, as well as the intrinsic and extrinsic regulations thereof.
15. Students will demonstrate knowledge of how the kidneys regulate the volume and concentration of extracellular fluids via the formation of concentrated or dilute urine.
16. Students will demonstrate knowledge of the principles of pH, acids and bases, as well as the three methods (chemical buffers, respiratory adjustments, & renal adjustments) by which the body tries to maintain proper pH of ECF.
17. Students will demonstrate knowledge of the causes and consequences of respiratory acidosis, respiratory alkalosis, metabolic acidosis, and metabolic alkalosis.
18. Students will demonstrate knowledge of how ABGs (arterial blood gas values) are interpreted to determine the cause of acidosis and alkalosis.
19. Students will demonstrate knowledge of how fluids and electrolytes are distributed among the "fluid compartments" as well as the causes of fluid and/or electrolyte shifts between compartments.
20. Students will demonstrate knowledge of the negative feedback mechanisms regulating potassium, calcium, and sodium concentrations in the ECF as well as the effects of electrolyte imbalances upon neuromuscular irritability.
21. Students will demonstrate knowledge of the anatomy and functions of male/female reproductive organs.
22. Students will demonstrate knowledge of the hormonal controls of the ovarian and menstrual cycles.
23. Students will demonstrate knowledge of the hormonal controls associated with pregnancy and childbirth.

### Textbook and Other Resources

**Required Text:** Human Anatomy & Physiology, 8<sup>th</sup> Ed.(7<sup>th</sup> OK), by Elaine Marieb. This is the #1 most popular A&P text in the USA. This is the same text used in both lecture and lab for both A&P 1 & 2. Detailed **Study Guides** will be provided to help you identify the most important topics in the text.

**CD Rom – Interactive Physiology 10 Disk.** This CD comes with your text and is full of great tutorial animation clips, explanations, and practice quizzes.

**Optional text:** Encyclopedia & Dictionary of Medicine, Nursing, and Allied Health, 5<sup>th</sup>, 6<sup>th</sup>, or 7<sup>th</sup> Ed., by Miller-Keane. This is a great resource for terminology definitions as well as for the causes, signs & symptoms, and treatments of many diseases and disorders. Equally good information is becoming increasingly available online at a variety of websites.

**Lecture Material:** Most of my class notes, and lab handouts will be posted online on my website. Go to: [www.darylbeatty.org](http://www.darylbeatty.org) , or access it through the college website.

**Favorite Websites:** I get a lot of my own questions answered at the following websites. If you find others that are also very helpful please share this information with your instructor and other students.

<http://mayoclinic.com/>

<http://www.medicinenet.com/script/main/hp.asp>

<http://www.rxlist.com/>

<http://www.emedicinehealth.com/script/main/hp.asp>

<http://www.drkoop.com/home/93/default.html>

<http://www.wikipedia.com> (Caution: Wikipedia is not an authoritative source, as it is user edited. It is very useful for getting quick answers and is usually in a user friendly, easy to understand format.)

### Lab Requirements

This course has a weekly 3 hour laboratory. The required textbook for the course will be used in the laboratory. You will receive a handout at the beginning of each laboratory to be used as a study guide along with instructor notes and other activities to provide an opportunity to learn the anatomy and physiology of various organ systems in a “hands on” environment.

## Students with Disabilities

BC is committed to providing equal education opportunities to every student. BC offers services for individuals with special needs and capabilities including counseling, tutoring, equipment, and software to assist students with special needs. Please contact Phil Robertson, Special Populations Counselor, 979-230-3236 for further information.

## Academic Honesty

BC assumes that students eligible to perform on the college level are familiar with the ordinary rules governing proper conduct including academic honesty. The principle of academic honesty is that all work presented by you is yours alone. Academic dishonesty including, but not limited to, cheating, plagiarism, and collusion shall be treated appropriately. Please refer to the BC Student Guide for more information, this is available online at <http://www.brazosport.edu>, click on the link found on the left side of the homepage. **A violation of this policy, in either lab or lecture will result in a student being dropped from the course, or failing the course.**

## Attendance and Withdrawal Policies

Regular attendance in both lecture and lab is critical for the comprehension of material and successful completion of the course. Every student is responsible for everything covered both lecture and lab whether you are present that day or not. Attendance records are kept to fulfill college requirements and are a 10% component of the final grading.

1. If a student has 4 or more absences (cumulative from both lecture and lab) the instructor may at his or her discretion withdraw the student from the course.
2. If the student decides to withdraw for whatever reason **it is the student's responsibility to officially withdraw from the course.** To officially withdraw from the course, students must complete and sign a withdrawal form, available in the Registrar's Office. **Failure to do so will result in the student remaining enrolled and receiving a grade – most likely an 'F'.**

## Course Requirements and Grading Policy

Students will demonstrate evidence of what they have learned by a combination of lecture exams and lab quizzes. There are typically 5 lecture exams and 12 lab quizzes. In general, lecture exams test your knowledge of the topics covered in lecture while lab quizzes test your knowledge of topics covered in lab.

Course lectures are in Power Point format and are available for you to print out at any time online on my web site. They are not all inclusive and I will not cover all of the material in lecture. You are strongly encouraged to take notes. You must also read and study the textbook.

## Testing and Grading:

Lab quizzes are given weekly at the beginning of lab. Come early. Questions are not repeated for late arrivals. The 10 best scores of your 12 are used to calculate your average. If you miss one, it will be one of your two to be dropped from the average.

If you take all five lecture exams at their scheduled times you have the option of taking the comprehensive final exam to replace a lower exam score.

If you miss one of the five lecture exams you will take the comprehensive final exam during finals week as a "makeup" to replace the missing score.

We will most likely have a NEW online homework component to the class Spring 2010. If this is implemented, the online homework will count as an additional test grade.

If you miss more than one lecture exam only one score can be replaced. The other(s) will remain as zeros. (A zero on an exam which is not dropped would reduce your course average by about one full letter grade). You may wish to consider withdrawing from the course and retaking it another semester.

Grades for the course are based 60% on lecture exams, 40% in lab. Factored into those ratios are approximately 10% for attendance and appropriate participation in class and lab. You may take lecture exams and lab quizzes during your scheduled lecture and lab times, or with the instructor's permission with the other lecture section.

For course grades the grading scale is:

- 90% and above = A
- 80% and above = B
- 70% and above = C
- 60% and above = D
- Below 60% = F

### **Make up Policy**

There are no makeup lab quizzes or lecture exams. If you have a good reason to miss your lab or lecture section, you may arrange with me IN ADVANCE to attend one of the other sections taught by me (Daryl Beatty). If you are unable to attend the test at the scheduled time for either lecture section, and inform the instructor ahead of time, you may take the test in the LAC, until the time the test is given in class. No make up tests are given after the time the test is given in class.

### **Projects, Assignments, Portfolios, Service Learning, Internships, etc.**

None

### **Student Responsibilities**

Students are expected to fully participate in lectures and labs. You are responsible for your own success or failure. Good time management, punctuality, initiative, and teamwork are keys to success.

**The most successful students are usually the ones who:**

- have a "Let's Go For It!!" attitude
- come to lecture early and often ask questions
- come to every lab and use their lab time productively and return to lab later for review
- read the text and view the CD-ROM video clips
- search for answers on websites
- participate in study groups
- meet with tutors or the instructor for help

### **Other Student Services Information**

- Information about the **Library** is available at <http://www.brazosport.edu/~lib/Information.htm> or by calling 979-230-3310.
- **Free seminars** to improve study skills are offered in the Learning Assistance Center (LAC), see [www.brazosport.edu/~lac](http://www.brazosport.edu/~lac) or call 979-230-3253.
- **Free** tutoring for math, reading, writing, biology, chemistry, and other subjects is available in the Learning Assistance Center (LAC), see [www.brazosport.edu/~lac](http://www.brazosport.edu/~lac) or call 979-230-3253.
- To contact the **Life Sciences Department** call Connie Davis at 979-230-3225.
- The Office of Student Services provides assistance in the following:
  - **Counseling and Advising** 979-230-3040
  - **Financial Aid** 979-230-3294
  - **Student Activities** 979-230-3355.
- To reach the **Information Technology Department** for computer, email, or other technical assistance call the helpdesk at 979-230-3266.

# **Biology 2402 – A&P II – Spring 2010**

## **The Whole Semester at a Glance**

6 Class Periods:

Chapter 17 – Blood

Chapter 18 – Cardiovascular System: The Heart

Chapter 19 – Cardiovascular System: Blood Pressure

**EXAM 1 – 8 AM Tuesday, February 2 and 5 PM Wednesday, February 3**

4 Class Periods:

Chapter 20 – Lymphatic System

Chapter 21 – Immune System: Innate and Adaptive Body Defenses

**EXAM 2 – 8 AM Tuesday, February 23 and 5 PM Wednesday, February 24**

6 Class Periods:

Chapter 22 – Respiratory System

Chapter 23 – Digestive System

Chapter 24 – Body Temperature Regulation & Heat Related Illnesses

**EXAM 3 – 8 AM Thursday, March 25 and 5 PM Monday, March 29**

5 Class Periods:

Chapter 25 – Urinary System

Chapter 26 – Fluid, Electrolyte, and Acid-Base Balance

**EXAM 4 – 8 AM Thursday, April 15 and 5 PM Monday, April 19**

2 Class Periods:

Chapter 27 – Reproductive Systems

Chapter 28 – Pregnancy and Childbirth

**EXAM 5 – 8 AM Tuesday, April 27 and 5 PM Wednesday, April 28**

**FINAL EXAMS – offered Monday May 3 at 5:00 p.m.**

**or Tuesday May 4 at 8:00 a.m. (You may take the test at either time)**

# Study Guide for Blood & Cardiovascular System

Page #s for 8<sup>th</sup> edition with 7<sup>th</sup> edition in () indicate where the topic begins.

## 1<sup>st</sup> Day

Course overview

Erythrocytes (RBCs) p. 637 (p.649)

Structural Characteristics

Hemoglobin

Production of RBCs (Erythropoiesis)

Fate and Destruction of RBCs

## 2<sup>nd</sup> Day

Regulation of Erythropoiesis (Homeostasis)

Anemias, Polycythemias (OYO)

Leukemia (OYO)

Hemostasis p. 649 (661)

A User-friendly Sequence of Events

## 3<sup>rd</sup> Day

Clot Retraction and Fibrinolysis

Preventing Undesirable Clotting

Hemostasis (cont'd)

Clinical applications

Disorders of Hemostasis

Properties of Cardiac Muscle Fibers p. 672 (689)

OYO Interactive Physiology CD:

Cardiovascular System, Cardiac Action Potential, #11-17

## 4<sup>th</sup> Day

Mechanism & Events of Contraction

Setting the Basic Rhythm p. 676 (692)

Intrinsic Conduction System

Autorhythmicity

Clinical Applications (OYO?)

The Cardiac Cycle

Systole vs. Diastole

EDV vs. ESV

## 5<sup>th</sup> Day

Cardiac Output p. 682 (700)

Regulation of Stroke Volume

Preload, Afterload, & Contractility

Congestive Heart Failure

Regulation of Heart Rate

Modifying the Basic Rhythm

(a.k.a. Extrinsic Innervation) p. 679 (695)

ANS Regulation p. 685 (702)

Chemical Regulation p. 686 (702)

Other Factors p. 686 (704)

## 6<sup>th</sup> Day

Physiology of Circulation p. 703 (723)

Maintaining Systemic Blood Pressure p. 704 (724)

Short-Term Mechanisms

Neural Controls

Hormonal Controls

Long-Term Mechanisms

Renal Regulation

## 7<sup>th</sup> Day EXAM 1 –

TEST 1 – Tuesday February 5<sup>th</sup> 8 AM, or  
Wednesday February 6<sup>th</sup> 5 PM.

## 8<sup>th</sup> Day – This info to be included on Exam #2

Tissue perfusion p. 713 (733)

Local Regulation of Blood Flow at tissues

Blood Flow in Special Areas

Capillary Dynamics p. 717 (738)

Circulatory Shock p. 719 (740)

Stages of Circulatory Shock

**Study Guide for The Immune System**  
Page #s 8<sup>th</sup> edition (7<sup>th</sup> in ()) indicate where topic begins.

**9<sup>th</sup> Day**

**INNATE (Nonspecific) IMMUNITY - summary in Table 21.2 p. 767 (Table 21.2 in 7<sup>th</sup>)**

**First Line of Defense: Surface Membrane Barriers**

**Second Line of Defense: Nonspecific Cellular and Chemical Defenses**

**Other terms: mast cells, perforins, leukocytosis, diapedesis, chemotaxis, and pyrogens.**

**Fever: Explain how a mild or moderate fever is beneficial.**

**ADAPTIVE (Specific) IMMUNITY –summary in Table 21.4 p. 790 (p.817)**

**Ask me for list of recommended readings in text. Pg. (798-818)**

**LYMPHOCYTES P. 777 (800)**

**Immunocompetence: Positive and Negative Selection**

**B cells and T cells**

**Review Exam #1 (25 min)**

**10<sup>th</sup> Day**

**ANTIGEN-PRESENTING CELLS (APCs) P. 779 (803)**

**Antigens and MHC/Antigen Complexes**

**THE HUMORAL IMMUNE RESPONSE - via B CELLS and ANTIBODIES p. 780 (804)**

**Activation**

**Clonal Selection yields Plasma cells and Memory cells**

**Antibodies (effects of...) (helpful Film clip 11:14973→ antibody actions)**

**Immunological Memory**

**Antibody Production in Primary and Secondary Responses**

**Vaccines**

**THE CELL MEDIATED IMMUNE RESPONSE - via T CELLS P. 786 (810)**

**T cell Activation**

**Clonal Selection of T cells**

**Helper Ts, Cytotoxic Ts, Suppressor Ts, Memory Ts**

**11<sup>th</sup> Day**

**Antibiotics**

**Transplant Rejections and Immunosuppression**

**AIDS due to HIV**

**Autoimmune Diseases**

**Hypersensitivities**

**Immediate Hypersensitivities**

**Anaphylaxis, Anaphylactic Shock, and Atopy**

**Delayed Hypersensitivities**

**12<sup>th</sup> Day EXAM 2 – 8 AM Tuesday, February 23 and 5 PM Wednesday, February 24**

**Study Guide for Respiration**  
**Page #s indicate where topic begins.**

**MECHANICS OF BREATHING p. 819 (846)**

**PRESSURE RELATIONSHIPS IN THE THORACIC CAVITY p. 819 (846)**

Atmospheric (a.k.a. barometric)

Intrapulmonary (a.k.a. alveolar)

Intrapleural

Lung Recoil due to lung elasticity

Surface tension of alveolar fluid

**PULMONARY VENTILATION: INSPIRATION AND EXPIRATION p. 820 (847)**

Boyle's Law (a.k.a. The General Gas Law)

Inspiration

Surface tension of pleural fluid

Lung Compliance p. 824 (849)

Expiration

Clinical Applications: Atelectasis, pneumothorax, and IRDS

**DALTON'S LAW OF PARTIAL PRESSURES p. 827 (854)**

**HENRY'S LAW p. 827 (854)**

**GAS EXCHANGES BETWEEN BLOOD, LUNGS, AND TISSUES p. 827 (855)**

External Respiration p. 828 (855)

The Respiratory membrane p. 815 (842)

Ventilation – Perfusion Coupling

Internal Respiration p. 830 (858)

**TRANSPORT OF RESPIRATORY GASES BY BLOOD p.830 (858)**

O<sub>2</sub> Transport: affinity, saturation, oxyhemoglobin, deoxyhemoglobin

Effects of P<sub>O<sub>2</sub></sub>, P<sub>CO<sub>2</sub></sub>, temperature, and pH on affinity

Carbon monoxide poisoning

Cyanosis

CO<sub>2</sub> Transport: carbaminohemoglobin, carbonic acid, bicarbonate ions, and carbonic anhydrase

The CO<sub>2</sub> – pH “see-saw” relationship

**CONTROL OF RESPIRATION p.834 (863)**

Control Centers

Genesis of the Respiratory Rhythm

Hyperventilation & Hypoventilation

(compensatory vs. noncompensatory)

Factors Influencing Rate and Depth p.836 (865)

Influence of Higher Brain Centers

Chemical Factors

CO<sub>2</sub> (and therefore pH of CSF)

Arterial Blood pH

O<sub>2</sub>

**CLINICAL APPLICATIONS – COPD, Obstructive Emphysema, Chronic Bronchitis, TB, WHAT IF...?**

**Study Guide for: Digestion, Body Temperature, and Hyperthermia**  
Page #s indicate where topic begins. (7<sup>th</sup> Edition in ())

**DIGESTIVE SYSTEM DISORDERS (some from handout and some OYO)**

- Constipation
- Diarrhea
- Lactose Intolerance
- Diverticulosis & (-itis)
- Peptic Ulcers
- Appendicitis
- Peritonitis
- IBS

**CHOLESTEROL p. 943-944 (978)**

- Uses of cholesterol
- Cholesterol Transport
  - Lipoproteins
    - Chylomicrons
    - VLDLs
    - LDLs
    - HDLs
- Factors Influencing Plasma Cholesterol Levels

**REGULATION OF BODY TEMPERATURE p. 947-952 (985)**

- Mechanisms of Heat Exchange – OYO p. 950 (986)
- The Control Center = Hypothalamus
- Heat Promoting Mechanisms – OYO p. 952 (987)
- Heat Loss Mechanisms – OYO p. 953 (988)

**HYPERTHERMIA p. 953 (989)**

- Heat Exhaustion
- Heat Stroke
- Fever

**HYPOTHERMIA – p. 953**

**EXAM 3 – 8 AM Thursday, March 25 and 5 PM Monday, March 29**

# Study Guide for The Urinary System

Page #s indicate where topic begins.

## GLOMERULAR FILTRATION p. 969-974 (1007)

The Filtration Membrane

Net Filtration Pressure

Glomerular Filtration Rate

Clinical Applications – What if...

Regulation of NFP and therefore GFR

Intrinsic Controls (Renal Autoregulation)

Extrinsic Controls (Sympathetic stimulation and Hormonal Controls)

## REGULATION OF ECF (and therefore Urine) CONCENTRATION AND VOLUME p. 978-983 (1015)

The Countercurrent Multiplier and Exchanger

Formation of Dilute urine

Formation of Concentrated Urine

Diuresis and Diuretics

SOLVENT DRAG (not in text)

RENAL CLEARANCE p. 984 (1021) (a.k.a. Plasma Clearance)

TUBULAR MAXIMUM (not in text)

Related Terms you should know:

micturition	diuresis	GFR	polyuria	ADH
inulin	diuretic	NFP	ACE	reabsorption
	aldosterone	solvent drag	secretion	angiotensin I & II
tubular max.	renin	filtrate	urine	glucosuria
anuria	proteinuria	osmolality	dysuria	renal clearance
pH of blood	acidosis	alkalosis	furosemide	renal calculi
hematuria	acid vs. base	urea	creatinine	dialysis & how it works

MICTURITION (OYO from text)

pH AND ACID-BASE BALANCE (OYO from lab, 2 weeks)

Know the concept of pH, pH values for blood, sources of H<sup>+</sup>, pH values for urine, and how each of the 3 compensatory mechanisms works to maintain proper pH of the blood.

This was covered in two labs. That information from lab is fair game for the lecture exam.

# **Study Guide for Fluid, Electrolyte, and Acid-Base Balance**

**Page #s indicate where topic begins.**

## **FLUID COMPARTMENTS**

**Identify the fluid compartments and the percentages of fluids they contain.**

## **COMPOSITION OF BODY FLUIDS**

**Learn which components are most abundant in each compartment**

**Osmolality – how to predict it.**

## **FLUID MOVEMENT AMONG COMPARTMENTS**

### **WATER BALANCE**

**Input vs. Output (OYO)**

**Thirst**

**Dehydration, Hypotonic hydration, Edema (OYO)**

**Water intoxication – Hyper....**

### **ELECTROLYTE BALANCE**

**Potassium, Calcium, Sodium**

**Hyponatremia**

### **ACIDOSIS: Criteria, Causes, and Effects**

**Respiratory Acidosis**

**Metabolic Acidosis**

### **ALKALOSIS: Criteria, Causes, and Effects**

**Respiratory Alkalosis**

**Metabolic Alkalosis**

### **THE ABCs of ABGs**

**EXAM 4 – 8 AM Thursday, April 15 and 5 PM Monday, April 19**

# **Study Guide for Reproduction**

Page #s indicate where topic begins.

**The following lab topics on reproduction are fair game for the lecture exam.**

**Male Anatomy and functions, Female Anatomy and functions,  
Fertilization, Implantation, Placentation, Hormones of Pregnancy,  
Parturition – the hormonal controls**

**The OVARIAN CYCLE p. 1049-1052 (1093)**

**Events and Phases**

**Hormonal Regulation by FSH and LH**

**(Know the source, target tissue, effect, & stimulus for release for each H.)**

**The UTERINE (MENSTRUAL) CYCLE p. 1054-1056 (1096)**

**Events and Phases**

**The Endometrium**

**Effects of ESTROGEN and PROGESTERONE**

**(Know the source, target tissue, effect, & stimulus for release for each H.)**

**Menses**

**PMS Premenstrual Syndrome**

**PREGNANCY RELATED TOPICS**

**Preeclampsia and Eclampsia**

**Lactation**

**OCCCLUSION OF FETAL BLOOD VESSELS AND VASCULAR SHUNTS**

**Ventricular septal defect VSD**

**Atrial septal defect ASD**

**Coarctation of the Aorta**

**NEURAL TUBE DEFECTS: Anencephaly and Spina bifida**

**RESPIRATORY DISTRESS SYNDROME (RDS) in premature infants**

**STAGES OF LABOR**

**PLACENTA PREVIA**

**PLACENTA ABRUPTIO**

**MENOPAUSE**

**EXAM 5 – 8 AM Tuesday, April 27 and 5 PM Wednesday, April 28**