Bergen Community College  
Division of Health Professions  
Department of Respiratory Care  
Cardio-Pulmonary Anatomy & Physiology

Date of Most Recent Syllabus Revision: January 2015

<table>
<thead>
<tr>
<th>Semester and Year: Spring 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course and Section Number: Cardio-Pulmonary Anatomy &amp; Physiology, RSP-222-001</td>
</tr>
<tr>
<td>Meeting Times and Locations: Wednesday, 12:00 pm to 1:55 pm, SA-120</td>
</tr>
<tr>
<td>Instructor: Professor Joseph Goss</td>
</tr>
<tr>
<td>Office Location: S-107</td>
</tr>
<tr>
<td>Phone: (201) 612-5319</td>
</tr>
<tr>
<td>Departmental Secretary: Mrs. Gerri Farrell, S-336</td>
</tr>
<tr>
<td>Office Hours: Tuesday 1 pm to 3 pm, Wednesday 2 pm to 3 pm, and Friday 3 pm to 4 pm off-site (Valley Hospital)</td>
</tr>
<tr>
<td>Email Address: <a href="mailto:jgoss@bergen.edu">jgoss@bergen.edu</a> or via MoodleRooms</td>
</tr>
</tbody>
</table>

Course Description

| Lecture hours, laboratory hours, and credits: 2 hours lectures, 0 hours lab, 2 credits |
| Prerequisites: BIO-109, RSP-110, RSP-119, and RSP-121. Co-requisites: RSP-210, RSP-220, and RSP-225 |
| Course Description: This course is a study of physiologic mechanisms of the cardiopulmonary system, including a review of the anatomy of the pulmonary and circulating systems; ventilatory physics / mechanics, gas diffusion, physiology of internal and external respiration, oxygen transport, carbon dioxide transport and elimination, ventilation / perfusion relationships; and the neurological control of ventilation. |

Student Learning Objectives: As a result of meeting the requirements in this course the student will:

1. Describe the size, configuration, border, and components of the thoracic walls.  
2. Describe the pleura, explain its location and function.  
3. Describe the size configuration, name the location, list the lobes, fissures and segments, and define the hilium of the lung.  
4. Describe the size, configuration, location, and contents of the mediastinum.  
5. Discuss the necessity of lung defense mechanisms and name some offending substances.  
6. Describe how offending substances may enter the lung and be retained.  
7. Name the defense mechanisms.  
8. Describe the cellular structure and define squamous, cuboidal, columnar cells.  
9. Define the components of mucus and describe the pulmonary mucus producing structures.  
10. Describe the structures of cilia and ciliated cells.  
11. Describe nares, septum, turbinates and nasal mucosa.  
12. Describe the structure of the nasopharynx and laryngopharynx.  
13. Define the cartilages and describe the vocal cords and internal lining.  
14. Describe the size, shape and wall structure of the trachea.  
15. Name the generation number and describe the size and configuration, wall structure and mucosa of the main stem bronchi, lobar bronchi, smaller bronchi, and terminal bronchi.
16. Discuss the structure of the respiratory unit.
17. Name and identify the generation number and describe the size and configuration, wall structure, supporting structure and epithelium of the respiratory bronchioles, alveolar ducts, alveolar sacs, and alveoli.
18. Describe the anatomical location, structure, and the means of support of the interalveolar septum.
19. Describe the location of the heart, its valves, chambers, and the great vessels.
20. Describe the coronary circulation.
21. Describe the myocardium and endocardium, and the pericardium.
22. Interpret and name the cardiac events associated with the electrocardiogram.
23. Describe the anatomy of the circulatory system.
24. Describe the structure of the arteries, arterioles, capillaries, venules, and veins.
25. Describe the anatomy, blood flow, and structure of the pulmonary circulation.
26. Describe and name the structures supplied by the bronchial circulation, name the origin of bronchial arteries and name the three possible venous drainage of the bronchial circulation.
27. Define and discuss the significance and relationship between of anatomical, alveolar, and physiological dead space.
28. Discuss the regulation of respiration.
29. Describe the medullary and pons centers.
30. Discuss the events occurring within the respiratory centers during the breathing cycle.
31. Discuss the mechanisms through which changes in pH, PCO₂ and PO₂ will alter ventilation.
32. Describe selected reflexes from the lung and chest wall which alter ventilation.
33. Describe how exercise alters ventilation.
34. Name and describe the characteristics features of selected breathing patterns.
35. Describe the pressure within the pulmonary blood vessels (systolic, diastolic, and mean).
36. Describe the source and magnitude of pressures surrounding the pulmonary blood vessels.
37. Describe pulmonary vascular resistance and discuss factors that alter resistance.
38. Discuss the Fick principle and given certain values calculate pulmonary blood flow.
39. Describe the distribution of blood flow and discuss factors that cause uneven distribution.
40. Discuss the metabolic role of the lung.
41. Discuss the diffusion of gases in the pulmonary system.
42. Discuss Graham’s, Fick’s, and Henry's Laws.
43. Discuss the perfusion and diffusion limitations of oxygen and carbon dioxide.
44. Describe conditions which would decrease the diffusion rate of the lung.
45. Understand the partial pressure, normal values, of the atmospheric gases, alveolar gases, arterial gases, and mixed venous gases.
46. Explain oxygen and carbon dioxide are transported in the body.
47. Explain the mechanisms involved whereby oxygen and carbon dioxide is dissolved in blood, and name the volume percent’s in normal and abnormal physiology.
48. Describe hemoglobin and explain how it combines with oxygen.
49. Given certain values, calculate the volume of oxygen combined with 100 ml of plasma.
50. Describe the nature of oxygen dissociation curve.
51. Discuss factors affecting the shifting of the curve and what affect the shifting of the curve has on the oxygen carrying capacity of the blood.
52. Calculate values using the alveolar-air equation.
53. Describe the process by which oxygen enters the cell tissue from the blood.
54. Explain the volumes percent difference between arterial and venous blood.
55. Discuss oxygen consumption and the respiratory quotient.
56. Know the chemical equation for the reaction that gives rise to the bicarbonate ion.
57. Discuss the role of carbonic anhydrase in the erythrocyte.
58. Discuss the significance of the ventilation-perfusion relationship.
59. Describe the effect of ventilation and partial pressure upon arterial oxygen and carbon dioxide content.
60. Define, calculate, and describe the shunt effect on arterial oxygen content.
61. Given certain values, use the Fick equation to determine shunt value.
62. Identify normal perfusion-ventilation ratios and values for all lung zones.
63. Discuss the effect of increasing and decreasing ventilation-perfusion ratios.
64. Discuss how alveolar-arterial oxygen differences, the shunt equation, and alveolar dead space measurements (Bohr equation) are used as indices of ventilation-perfusion inequality.
65. Discuss the nerve supply of the pulmonary system.
66. Describe the pulmonary afferent and efferent nerve pathways.
67. Discuss, describe, and locate the stretch, irritant, and J-receptors.

Course Content
This course will provide the foundational understanding of the respiratory and circulatory system. This will be completed through understanding the various pulmonary and cardiac (hemodynamic) tests and procedures performed.

Special Features of the Course
MoodleRooms is used to enhance the interaction with the student. The student will need to access MoodleRooms regularly throughout the week to review postings, emails, or other important class material.

Course Texts and Other Study Materials
- Required
  o Mosby's Respiratory Care Online (MRCO) for Egan's Fundamentals of Respiratory Care, 2nd Edition
- Recommended

Writing and Examination Requirements
Examinations:
In-class examinations that could require multiple choice, short answer, mathematic calculation, or brief essay questions that address topics related to the readings, lectures and class discussions covered.

ECG Group Presentation:
The students will present, as a group, their assigned electrocardiography rhythm. Each ECG will include the 6 step interpretation method, physical sign and symptoms, and applicable treatments. Grading will be in the following categories: Preparedness, Materials, Content, Enthusiasm, and Presentation. The grading rubric will be posted on Moodle. The presentations will be due on the day the medication category is scheduled.

Extra credit – Online Modules:
Students can earn extra credit by successfully completing (passing) the Mosby's Respiratory Care Online (MRCO) for Egan's Fundamentals of Respiratory Care online exam modules associated with course topics. The required assignments are listed on the online topic modules section. Students will earn points following this
scale: quiz score of 100% = 1 point, 90% = 0.9, 80% = 0.8; 75% = 0.75 points. No credit for grades less than 75%. Credit will be applied toward the final grade. Modules are setup with attempt and time limits.

Grading Policy

Grade Determinations

• Quizzes (6) 75%
• ECG Presentation 25%

Grading:

A  Student must show superior work and contribute positively to class discussions  92-100
B+  Student must show excellent work and contribute in class discussion  86-91.9
B  Student must show above average work  80-85.9
C+  Student must meet and attain the standard of achievement with reasonable theoretical knowledge  75-79.9
F  Student fails to meet acceptable standards  <75

Late work or Examinations:

Late work and make up examinations will be penalized with a grade being no greater than seventy-five percent (75%). Exams are scheduled at the end of semester but before last scheduled class. All late course work must be completed before the last scheduled class. If an exam is not completed before the last scheduled class day, a grade of zero (0) will be recorded.

Attendance / Academic Integrity Policy

BCC Attendance Policy:

All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

Academic dishonesty is a serious violation of BCC policy and personal ethics, and will be treated as such if reason for suspicion should arise. Students should be careful to avoid plagiarism, falsification, and compliance. Academic dishonesty also includes cheating on examinations. Refer to the BCC college catalog for additional information.

Course Attendance Policy:

It is expected that students will attend all class meetings. Poor attendance will affect your grade. If a student misses more than six classes throughout the semester, the student will not earn a grade higher than a ‘B’ in the course. Three lateness’s equal one absence; class days when tests are held are included as classes. Illness, accidents, and business emergencies sometimes occur; therefore, it befits everyone to anticipate these emergencies by being in class routinely. (If you are late, be sure to see the professor that class lest it be counted as an absence.)
Departmental Policy Statements

1. Acceptable quality of work and mature behavior are expected from every student at all times. Students are regarded as professionals and are expected to conduct themselves accordingly.

2. High standards of professional performance demand that students maintain good academic progress throughout their course of study in the program.

3. Students demonstrating chronic tardiness or absenteeism will be placed on academic warning or probation, and may be subjected to termination from the program.

4. Absence from a class during a scheduled exam will be subject to the policy of the instructor for that specific course. If the student is going to miss a scheduled exam it is expected that the student will contact the instructor ahead of time by e-mail or phone to the department office.

5. All students are required to adhere to the policies and procedures of the school as outlined in the college catalogue.

6. Additional department policies are located in the Student Policies and Procedures Manual.

Student and Faculty Support Services

1. The program faculty maintain office hours for counseling and are available to provide tutorial assistance to students.

2. Students must make appointments in advance to meet with the respective instructors.

3. Students may also obtain assistance from the College Tutoring Center. Appointments must be made in advance through this center.

4. The College has a personal counseling center for those students who may need personal assistance. Appointments are made directly through this center.

5. Any problems, concerns, or questions should be directed to the course instructor or the student’s advisor.

6. Statement on Civility
   a. Refer to the Standards of Conduct Subsection found in the Student Judicial Affairs Policies & Procedures Section found in the Student Handbook.

7. Academic Integrity
   a. Refer to the Academic Integrity Subsection; found in the Academic Regulations, Academic Policies Section found in the Academic Policies & Regulations Area of the College Catalog

8. Other possible College, Divisional, and/or Departmental Policy Statements to be referenced
   a. ADA statement.
   b. Sexual Harassment statement.
   c. Statement on acceptable use of BCC technology.
   d. Statement on the purpose and value of faculty office hours.

9. Student and Faculty Support Services
   a. List support services, e.g., the Writing Center, the Math Lab, the Tutorial Center, Online Writing Lab (OWL), Office of Specialized Services, etc.

10. BCC Library
The Sidney Silverman Library is committed to providing a quiet, welcoming, respectful atmosphere conducive to study and research in an environment that is comfortable, clean, and safe. The use of the library will be beneficial in providing resources on researching topic information, citation styles, finding current articles among many other media services available.

### Weekly Assignments / Objectives

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignments</th>
</tr>
</thead>
</table>
| January 21 | Anatomy and Physiology of the Respiratory System | • The Airways and Alveoli  
• The Lungs and Chest Wall |
| January 28 | Anatomy and Physiology (continued)            |                                                          |
| February 4 | Quiz 1                                         | • Control of Ventilation                                  |
|            | Control of Ventilation                         |                                                          |
| February 11 | Control of Ventilation (continued)             | • Control of Ventilation                                  |
|            | Mechanics of Ventilation                       | • Mechanics of Ventilation                               |
| February 18 | Quiz 2                                         | • Gas Diffusion                                           |
|            | Gas Diffusion                                  |                                                          |
| February 25 | Gas Diffusion (continued)                      | • Gas Diffusion                                           |
|            | Oxygen Equilibrium and Transport               | • Oxygen Equilibrium and Transport                        |
| March 4    | Oxygen Equilibrium and Transport (continued)  | • Oxygen Equilibrium and Transport                        |
| March 11   | Quiz 3                                         |                                                          |
| March 18   | Spring Break                                   |                                                          |
| March 25   | Carbon Dioxide Equilibrium and Transport       | • Carbon Dioxide Equilibrium and Transport               |
|            | Ventilation – Perfusion Relationship           | • Ventilation-Perfusion Relationships                    |
| April 1    | Quiz 4                                         | • Functional Anatomy of the Cardiovascular System         |
|            | Anatomy and Physiology of the Cardiovascular System |                                             |
| April 8    | Anatomy and Physiology of the Cardiovascular System (continued) | • Functional Anatomy of the Cardiovascular System         |
| April 15   | Quiz 5                                         |                                                          |
| April 22   | Cardiac Electrophysiology                      | • Cardiac Electrophysiology                              |
|            | ECG presentations                              | • The Electrocardiogram and Cardiac Arrhythmias           |
| April 29   | ECG presentations                              |                                                          |
| May 6      | Quiz 6                                         |                                                          |

Note to Students: This course outline is subject to change, depending upon the progress of the class.
Online Topic Modules

Egan Online Modules

<table>
<thead>
<tr>
<th>The Respiratory System</th>
<th>Gas Exchange and Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Cardiovascular System</td>
<td>Regulation of Breathing</td>
</tr>
<tr>
<td>Ventilation</td>
<td>Interpreting the Electrocardiogram</td>
</tr>
</tbody>
</table>

*Note to Students:* This Course Outline and Calendar is tentative and subject to change, depending upon the progress of the class.