

McLennan

C O M M U N I T Y

C O L L E G E

WACO, TEXAS

COURSE SYLLABUS

AND

INSTRUCTOR PLAN

CARDIOPULMONARY DIAGNOSTICS

RSPT - 2325 - 01

AMBER HENDRICKSON

NOTE: This is a 16-week course.

COVID 19 Notice:

McLennan Community College is committed to providing you with every resource you need to reach your academic goals including your safety. We will continue to monitor the evolving situation with COVID 19 and adjust our safety guidelines to make sure we offer a safe environment for you and our faculty. Please make sure to consult your faculty and the MCC website at <https://www.mclennan.edu/crisis-management/coronavirus-updates/index.html> on any changes to these guidelines.

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

Course Description:

A study of physical, radiological, hemodynamic, laboratory, nutritional, and cardiopulmonary diagnostic assessments.

Prerequisites and/or Corequisites:

RSPT 1411 and RSPT 2310

Course Notes and Instructor Recommendations:

You will need a computer and Internet access daily. If your home computer becomes unusable for any reason, you will need a backup plan. You may use MCC campus computers or local library computers.

Instructor Information:

Instructor Name: Amber Hendrickson MSRC, RRT-ACCS

MCC Email: ahendrickson@mclennan.edu

Office Phone Number: 254-299-8369

Office Location: HP # 131

Office/Teacher Conference Hours:

- Tuesday 8:00 AM – 9:30 AM
- Thursday: 8:00 AM – 9:30 AM
- Friday: 10:00 AM- 12:00 PM

Required Text & Materials:

1. Title: Ruppel's Manual of Pulmonary Function Testing
Author: Carl D. Mottram
Edition: 12th
Publisher: Elsevier
ISBN: 978-0-323-76261-8
2. Title: Egan's Fundamentals of Respiratory Care
Authors: Kacmarek, Stoller and Heuer
Edition: 12th
Publisher: Elsevier
ISBN: 978-0-323-81121-7
3. Title: Mosby's Respiratory Care Equipment
Author: J.M. Cairo
Edition: 11th
Publisher: Elsevier
ISBN: 978-0-323-09621-8

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

MCC Bookstore Website: <http://www.mclennan.edu/bookstore/>

Methods of Teaching and Learning:

Exams, Quizzes, Case Studies, and Application Problem

Course Objectives and/or Competencies:

Common Arrhythmias

1. Describe the impulse conducting system of the heart
2. Identify the basic electrocardiographic waves
2. Identify and treat:
 - a. Normal sinus rhythm
 - b. Sinus tachycardia
 - c. Sinus bradycardia
 - d. First-degree heart block
 - e. Second-degree heart block
 - f. Third-degree heart block
 - g. Atrial flutter
 - h. Atrial fibrillation
 - i. Premature ventricular contractions
 - j. Ventricular tachycardia
 - k. Ventricular fibrillation
 - l. Pulseless electrical activity

Capnography

1. Identify the technology incorporated into capnometers.
2. Describe the difference between the mainstream and side-stream capnometers.
3. Describe the use of the single patient use end tidal CO₂ detectors.
4. Identify 4 technical problems associated with capnometers.
5. Identify 3 clinical applications for capnography/capnometry.
6. Given a capnogram ('fast speed' and/or "slow speed"), identify:
 - a. normal graph
 - b. esophageal intubation
 - c. ventilator disconnection
 - d. cardiac arrest
 - e. pulmonary embolism
 - f. cardiopulmonary bypass
 - g. hemorrhage

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

- h. hypoventilation
 - i. increasing body temperature
 - j. partial airway obstruction
 - k. hyperventilation
 - l. ventilator circuit leak
 - m. partial ventilator circuit disconnection
 - n. distal end of the ET tube in the hypopharynx
 - o. recovery from neuromuscular blockade
 - p. contaminated sample cell
 - q. hypovolemia
 - r. decreasing cardiac output
 - s. hypovolemia associated with a widened $P(a-A)CO_2$
 - t. bronchospasm associated with asthma or COPD
 - u. emphysema
7. Describe the clinical application for overnight oximetry.

Sleep Studies

1. Compare and contrast the differences between Obstructive, Central, and Mixed Sleep Apnea.
2. Describe the measurements that are recorded during an overnight polysomnogram (PSG).
3. Describe the treatment for Obstructive Sleep Apnea.
 - a. describe how to apply CPAP to treat Sleep Disorders
 - b. describe the difference between CPAP and BIPAP for treatment
 - c. identify the different interfaces used with CPAP and BIPAP machines
 - d. describe titrating and auto-titrating the CPAP pressure
 - e. identify the side effects of CPAP and BIPAP
 - f. troubleshoot the CPAP and BIPAP machine and interfaces

Indirect calorimetry

1. Describe the purpose of indirect calorimetry.
2. Identify the indications for indirect calorimetry.
3. Describe the metabolic measurements required to determine the resting energy expenditure (REE) to assess and manage the patient's nutritional needs.
4. Apply the Harris-Benedict equation to estimate the REE.
5. Compare and contrast the difference between open and closed circuit calorimetry.
6. Modify nutritional nourishment based on indirect calorimetry in the presence of illness, or injury to evaluate therapeutic interventions.

Pulmonary Function Testing

1. Measure and interpret spirometry and lung mechanics-

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

- a. Vital Capacity (VC), Forced Vital Capacity (FVC), Forced Expiratory Volumes (Timed Forced Expiratory Volumes) (e.g., FEV₁) and Flows (e.g., FEF₂₅₋₇₅)
 - b. Flow- volume curves (flow-volume loops)
 - c. Peak expiratory flow (PF)
 - d. Maximum voluntary ventilation (MVV)
 - e. Before and after bronchodilator studies
 - f. Airway resistance and specific conductance
 2. Measure, calculate and interpret lung volumes
 - a. Functional residual capacity (FRC), residual volume (RV), total lung capacity (TLC), RV/TLC ratio
 - b. Thoracic gas volume (TGV), Body Plethysmography
 - c. Open circuit nitrogen washout
 - d. Closed circuit helium dilution
 3. Measure and interpret diffusing capacity by measuring the carbon monoxide diffusing capacity (DLCO)
 4. Explain the capabilities of
 - a. volume – displacement spirometers
 - b. flow - sensing (pneumotachometer) spirometers
 - c. peak flow meters
 - d. breathing valves
 - e. gas analyzers
 - f. gas conditioning devices
 5. Regarding cardiopulmonary exercise testing:
 - a. Select and apply an appropriate exercise protocol based on the reason for performing the test.
 - 1) Progressive multistage exercise test
 - 2) Steady state
 - 3) 6-minute walk
 - b. Identify the ventilatory/anaerobic threshold
 - c. Describe two methods for measuring ventilation, oxygen consumption and carbon dioxide production during exercise.
 - d. Identify indications when the cardiopulmonary stress test should be terminated.
 - e. Describe the normal physiologic changes that occur during exercise when the workload is increased.
 - f. Classify the cause of exercise limitation due to dyspnea as cardiac, ventilatory (gas exchange or blood gas abnormalities), deconditioning or poor effort.
 - g. Titrate oxygen with exercise.
 - h. Describe the importance of evaluating breathing kinetics during exercise
 - i. Evaluate exercise flow-volume loop data (dynamics during exercise).
 6. Regarding bronchoprovocation challenge testing:
 - a. Identify the rationale for bronchoprovocation challenging testing.
-

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

- b. Describe the two methods of performing bronchoprovocation challenge tests.
 - c. Identify a positive response to a methacholine challenge test.
 - d. Select an appropriate exercise challenge protocol to test for exercise induced asthma.
7. Evaluate the clinical implications of an elevated level of exhaled nitric oxide (eNO).
8. Regarding Maximum Expiratory (MEP) and Maximum Inspiratory Pressure (MIP):
 - a. Describe the measurement of MIP and MEP.
 - b. Evaluate the clinical significance of MIP and MEP measurements.
9. Regarding quality assurance (quality control procedures) in the pulmonary function laboratory, including blood gases:
 - a. Describe quality assurance (quality control procedures) in the pulmonary function laboratory, including blood gases.
 - b. Identify pre-analytic and analytic errors in pulmonary function testing and blood gas analysis.

Course Outline or Schedule:

Date	Topic	Reading Assignments
8/23	Orientation	
8/25	Common Cardiac Arrhythmias	Egan's- Ch. 18
8/30	<ul style="list-style-type: none"> • Parts 1 and 2 Capnography, Capnometer and Disposable colorimetric CO₂ detector • Pulse Oximeter as a unit; overnight pulse oximetry 	Egan's – pp.387-392, p.1150, Mosby's - pp.256-266, 324-326
9/1	<ul style="list-style-type: none"> • Parts 3, 4, and 5 Capnography, Capnometer, and Disposable colorimetric CO₂ detector 	Egan – pp.387-392, pp.1150, Mosby's - pp.256-266
9/6	Sleep Studies (Polysomnography)	Egan's – Ch.34 Mosby's – Ch.11, pp.335-350
9/8	Exam 1	Cardiac Arrhythmias, Capnography, Capnometer and Disposable colorimetric CO₂ detector; Pulse Oximeter as a unit; overnight pulse oximetry and Sleep Studies (Polysomnography)
9/13	Part 1 and 2 – Spirometry – Volume-Time Graph	Ruppel - Ch.1 & 2
9/15	Parts 3 and 4 – Spirometry – Volume-Time Graph	Ruppel - Ch.1 & 2
9/20	Spirometry – Flow-Volume Loops	Ruppel – Ch.2
9/22	Pre and Post Spirometry	Ruppel - Ch.2
9/27	DLCO	Ruppel – Ch.3
9/29	Interpretation of Spirometry	Ruppel – Ch. 2
10/4	Review	

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

10/6	Exam 2	Spirometry - Volume – Time Graphs, Flow-Volume Loops; Pre and Post Spirometry; Interpretation of Spirometry; DLCO
10/11	<ul style="list-style-type: none"> Lung volumes – Open Circuit Nitrogen washout, Closed Circuit Helium dilution (Gas dilution methods) Gas conditioning devices 	Ruppel – <ul style="list-style-type: none"> Ch.4 Ch.11 pp. 399-400
10/13	<ul style="list-style-type: none"> Lung volumes – Thoracic Gas Volume (plethysmography) Lung Volumes – Clinical Significance 	Ruppel – Ch.4
10/18	Lung Mechanics – <ul style="list-style-type: none"> Peak flow MVV MIP and MEP Airway resistance and conductance 	Ruppel – Ch. 10
10/20	Exam 3	Lung volumes – Nitrogen Washout, He Dilution, TGV; gas conditioning devices; Lung mechanics - Peak Flow, MVV, MIP, MEP, Airway resistance and Conductance
10/25	<ul style="list-style-type: none"> Indirect Calorimetry Cardiopulmonary exercise testing 	Ruppel – Ch. 7 & 10 Egan's- Ch. 23
10/27	<ul style="list-style-type: none"> Bronchoprovocation challenge testing Exhaled nitric oxide 	Ruppel – <ul style="list-style-type: none"> Ch. 9 Ch. 10
11/1	Exam 4 – OPEN BOOK	Indirect Calorimetry; Cardiopulmonary exercise testing; Bronchoprovocation challenge testing; Exhaled nitric oxide
11/3	PFT equipment – <ul style="list-style-type: none"> Volume Displacement Spirometers Flow sensor – pneumotachometer spirometers 	Ruppel – Ch.11
11/8	PFT Equipment – <ul style="list-style-type: none"> Peak Flowmeters Breathing Valves Gas Analyzers 	Ruppel – Ch.11

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

	• Body Plethysmographs	
11/10	Part 1 - QA in the PFT lab	Ruppel – Ch.12
11/15	Part 2 - QA in the PFT lab	Ruppel – Ch.12
11/17	Part 1 - QA – Blood gas analyzers Part 2- QA- Blood gas analyzers	Ruppel – Ch.12
11/22	Part 3 - QA – Blood gas analyzers Part 4 - QA – Blood gas analyzers	Ruppel – Ch.12 Ruppel – Ch.12
11/23-11/26	Thanksgiving Holiday	
11/29	Exam 5	PFT equipment; Gas analyzers; Computers and pulmonary function testing; QA in the PFT lab. And QA – Blood Gas analyzers
12/1	Review	
12/6	Comprehensive Final Exam 1:00 pm – 3:00 pm	

Course Grading Information:

The grading will be based on a percentage system. Each assignment or examination will be worth a total of 100%. The grade on any assignment or examination will be the percent correct of the total parts for that assignment or examination. The grade scale will be as follows:

A – 90 to 100%

B – 80 to 89%

C – 75 to 79%

D – 60 to 74%

F – less than 60%

NOTE: Grades will be posted on Brightspace. A grade of **“C” or better** defines a passing grade for this course and **all other RSPT courses**. Respiratory Care Technology Program students are required to maintain at least **75% average** in all respiratory care courses.

Evaluation:

IRA Quizzes – 20% of the course grade

TRA Quizzes –10% of the course grade

Exams – 70% of the course grade

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

- Exam 1- 16% of exam weight
- Exam 2- 16% of exam weight
- Exam 3- 16% of exam weight
- Exam 4- 16% of exam weight
- Exam 5- 16% of exam weight
- Final Exam- 20% of exam weight

Unit Exams including the Final Exam

Five Unit Exams and a Final Exam constitute 60% of the total grade. If a student fails to appear for the test date, a grade of zero (0%) will be awarded for that exam. Please see **Make Up Work Policy** below. **HINT:** a family vacation, a night on the town, a hang-over, a shopping trip, car trouble, a rainy day, a Thanksgiving family reunion, a Christmas event, a friend's wedding, rehearsal dinner, getting the date wrong in your planner, or not being ready for the test are **NOT** examples of a college approved absence. Any date/time conflicts must be resolved with the instructor **BEFORE** the exam.

Late Work, Attendance, and Make-Up Work Policies:

Students are responsible for all material presented or assigned in class and will be held accountable for such materials in the determination of course grades.

If a student misses an exam, the student will be permitted to make up the exam if the following occur: the student must **notify the instructor, and** provide proof of **1)** illness, or illness of a family member for whom the student is a caretaker (e.g., single parent), **2)** death in the family **3)** approved college activity or **4)** observance of a religious holy day. The student will be permitted to make up missed exams missed.

Exams will be made up in the MCC testing center **within one week** following the date the exam was administered. **If a student fails to follow these instructions for making up an exam, the student will receive a zero for that exam.**

Also, the instructor has the prerogative of determining whether a student may make up work missed due to absences for other reasons. It is the student's responsibility to inform the instructor of the reason for an absence and to do so in a timely fashion.

Student Behavioral Expectations or Conduct Policy:

"Students are expected to maintain classroom decorum that includes respect for other students and the instructor, prompt and regular attendance, and an attitude that seeks to take full advantage of the education opportunity."

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

All cellular phones, tablets, laptops, and smart devices must be turned off at the beginning of class and out of the teacher's sight.

Under extraordinary circumstances and with permission, the student may receive emergency phone calls if the cell phone is placed on vibrate. Responding to emergency phone calls must be conducted outside the classroom. Once you are finished with your emergency phone call please come back into the classroom quietly. No personal phone calls (non-emergency) will be allowed during class. If you need to use the restroom, while in class, please excuse yourself quietly and return to class in a timely and quiet fashion. **You may not leave the classroom during exams or quizzes.**

Texting during class not pertaining to classwork will result in a 0 for all graded items for that day.

Students may use laptop computers, tablets, or smartphones to access class work during class. Accessing other material or websites during class will result in a 0 for all graded items for that day. **NO EXCEPTIONS**

Students are expected to be in class on time. The students' cooperation is required and appreciated.

Absence from 25% of classes (8) will be taken as evidence that a student does not intend to complete the course, and the student will be withdrawn from the course with a grade of W. The instructor may reinstate the student if satisfied that the student will resume regular attendance and will complete the course.

If the student's 25 percent absences are reached after the official drop date, the instructor may assign a W, if the student is passing and requests to be withdrawn.

However, if a student who is not passing reaches the 25 percent point after the official drop date, the student will receive an F. In extenuating circumstances, the instructor may assign a W to a student who is not passing.

Academic Integrity

The term "cheating" includes, but is not limited to:

- (1) use of any unauthorized assistance in taking quizzes, tests or examinations.
- (2) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems or carrying out other assignments; or (3) the acquisition, without permission, of tests or other academic material belonging to a member of the MCC faculty or staff. The term "plagiarism" includes, but is not limited to, the use, by

CARDIOPULMONARY DIAGNOSTICS

RSPT 2325 01

paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

Collaboration in the completion of course work is prohibited unless explicitly permitted by the instructor. Where such collaboration is permitted by the instructor, students must acknowledge any collaboration and its extent in all submitted work.

Remediation Plan – Academic Courses

When a student is struggling in the classroom, the faculty will respond proactively. Students that consistently score less than 80% on their daily F2F quizzes or score less than 80% on any exam will be required to complete an activity of remediation assigned by the instructor of the course immediately following. The activity requirements will vary as they will be customized according to factors such as the students' needs, the purpose of the assignment, its content, etc., and the instructor will maintain all records of completion. Students that fail to complete the required remediation activities will receive an "Incomplete" ("I") grade for the course, regardless of overall passing grade point average, until all work is submitted. An "Incomplete" ("I") in any course must be resolved prior to the start of the following semester or the resulting grade will convert to an "F" and the student will not pass the course.

[Click Here for the MCC Attendance/Absences Policy](https://www.mclennan.edu/highlander-guide/policies.html)

(<https://www.mclennan.edu/highlander-guide/policies.html>)

Click on the link above for the college policies on attendance and absences. Your instructor may have additional guidelines specific to this course.



ACADEMIC RESOURCES/POLICIES

Accommodations/ADA Statement:

Any student who is a qualified individual with a disability may request reasonable accommodations to assist with providing equal access to educational opportunities. Students should contact the Accommodations Coordinator as soon as possible to provide documentation and make necessary arrangements. Once that process is completed, appropriate verification will be provided to the student and instructor. Please note that instructors are not required to provide classroom accommodations to students until appropriate verification has been provided by the Accommodations Coordinator. For additional information, please visit www.mclennan.edu/disability.

Students with questions or who require assistance with disabilities involving physical, classroom, or testing accommodations should contact:

disabilities@mclennan.edu

254-299-8122

Room 319, Student Services Center

Title IX:

We care about your safety, and value an environment where students and instructors can successfully teach and learn together. If you or someone you know experiences unwelcomed behavior, we are here to help. Individuals who would like to report an incident of sexual misconduct are encouraged to immediately contact the Title IX Coordinator at titleix@mclennan.edu or by calling Dr. Drew Canham (Chief of Staff for Diversity, Equity & Inclusion/Title IX) at (254) 299-8645. Individuals also may contact the MCC Police Department at 299-8911 or the MCC Student Counseling Center at MCC at (254) 299-8210. The MCC Student Counseling Center is a confidential resource for students. Any student or employee may report sexual harassment anonymously by visiting <http://www.lighthouse-services.com/mclennan/>.

Go to McLennan's Title IX webpage at www.mclennan.edu/titleix/. It contains more information about definitions, reporting, confidentiality, resources, and what to do if you or someone you know is a victim of sexual misconduct, gender-based violence or the crimes of rape, acquaintance rape, sexual assault, sexual harassment, stalking, dating violence, or domestic violence.

Student Support/Resources:

MCC provides a variety of services to support student success in the classroom and in your academic pursuits to include counseling, tutors, technology help desk, advising, financial aid, etc. A listing of these and the many other services available to our students is available at <http://www.mclennan.edu/campus-resource-guide/>

College personnel recognize that food, housing, and transportation are essential for student success. If you are having trouble securing these resources or want to explore strategies for balancing life and school, we encourage you to contact a Success Coach by calling (254) 299-8226 or emailing SuccessCoach@mclennan.edu. Students may visit the Completion Center Monday-Friday from 8 a.m.-5 p.m. to schedule a meeting with a Success Coach and receive additional resources and support to help reach academic and personal goals. Paulanne's Pantry (MCC's food pantry) provides free food by appointment to students, faculty and staff based on household size. Text (254) 870-7573 to schedule a pantry appointment. The Completion Center and pantry are located on the Second Floor of the Student Services Center (SSC).

MCC Foundation Emergency Grant Fund:

Unanticipated expenses, such as car repairs, medical bills, housing, or job loss can affect us all. Should an unexpected expense arise, the MCC Foundation has an emergency grant fund that may be able to assist you. Please go to <https://www.mclennan.edu/foundation/scholarships-and-resources/emergencygrant.html> to find out more about the emergency grant. The application can be found at https://www.mclennan.edu/foundation/docs/Emergency_Grant_Application.pdf.

MCC Academic Integrity Statement:

Go to www.mclennan.edu/academic-integrity for information about academic integrity, dishonesty, and cheating.

Minimum System Requirements to Utilize MCC's D2L|Brightspace:

Go to <https://www.mclennan.edu/center-for-teaching-and-learning/Faculty-and-Staff-Commons/requirements.html> for information on the minimum system requirements needed to reliably access your courses in MCC's D2L|Brightspace learning management system.

Minimum Technical Skills:

Students should have basic computer skills, knowledge of word processing software, and a basic understanding of how to use search engines and common web browsers.

Backup Plan for Technology:

In the event MCC's technology systems are down, you will be notified via your MCC student email address. Please note that all assignments and activities will be due on the date specified in the Instructor Plan, unless otherwise noted by the instructor.

Email Policy:

McLennan Community College would like to remind you of the policy (<http://www.mclennan.edu/employees/policy-manual/docs/E-XXXI-B.pdf>) regarding college email. All students, faculty, and staff are encouraged to use their McLennan email addresses when conducting college business.

A student's McLennan email address is the preferred email address that college employees should use for official college information or business. Students are expected to read and, if needed, respond in a timely manner to college emails. For more information about your student email account, go to www.mclennan.edu/student-email.

Instructional Uses of Email:

Faculty members can determine classroom use of email or electronic communications. Faculty should expect and encourage students to check the college email on a regular basis. Faculty should inform students in the course syllabus if another communication method is to be used and of any special or unusual expectations for electronic communications.

If a faculty member prefers not to communicate by email with their students, it should be reflected in the course syllabus and information should be provided for the preferred form of communication.

Email on Mobile Devices:

The College recommends that you set up your mobile device to receive McLennan emails. If you need assistance with set-up, you may email Helpdesk@mclennan.edu for help.

You can find help on the McLennan website about connecting your McLennan email account to your mobile device:

- [Email Setup for iPhones and iPads](https://support.microsoft.com/en-us/office/set-up-an-outlook-account-in-the-ios-mail-app-b2de2161-cc1d-49ef-9ef9-81acd1c8e234?ui=en-us&rs=en-us&ad=us) (<https://support.microsoft.com/en-us/office/set-up-an-outlook-account-in-the-ios-mail-app-b2de2161-cc1d-49ef-9ef9-81acd1c8e234?ui=en-us&rs=en-us&ad=us>)
- [Email Setup for Androids](https://support.microsoft.com/en-us/office/set-up-email-in-android-email-app-71147974-7aca-491b-978a-ab15e360434c?ui=en-us&rs=en-us&ad=us) (<https://support.microsoft.com/en-us/office/set-up-email-in-android-email-app-71147974-7aca-491b-978a-ab15e360434c?ui=en-us&rs=en-us&ad=us>)

Forwarding Emails:

You may forward emails that come to your McLennan address to alternate email addresses; however, the College will not be held responsible for emails forwarded to an alternate address that may be lost or placed in junk or spam filters.

For more helpful information about technology at MCC, go to [MCC's Tech Support Cheat Sheet](#) or email helpdesk@mclennan.edu.

Disclaimer:

The resources and policies listed above are merely for informational purposes and are subject to change without notice or obligation. The College reserves the right to change policies and other requirements in compliance with State and Federal laws. The provisions of this document do not constitute a contract.