GROSSMONT
COLLEGE

Cardiovascular Technology Student Handbook

2019-2020

GROSSMONT COLLEGE
8800 Grossmont College Drive
El Cajon, CA 92020-1799
619-644-7000
Website: www.grossmont.edu

CARDIOVASCULAR TECHNOLOGY DEPARTMENT
Website: grossmont.edu/CVT
Email: GrossmontCVT.Info@gcccd.edu
Phone: 619-644-7303 ☎
FAX: 619-644-7961 🖷

TABLE OF CONTENTS

CARDIOVASCULAR TECHNOLOGY PROGRAM
GROSSMONT COLLEGE

STUDENT HANDBOOK

INTRODUCTION

Cardiovascular Technology is a highly technical allied health profession which provides an excellent career with the opportunity to contribute to the care of patients with cardiovascular disease. The Cardiovascular Technology Program at Grossmont College began in 1972 and has graduated approximately 2000+ technologists who are employed in clinical facilities throughout the United States. The Program is designed to guide you in a sequential acquisition of knowledge and skills to ensure competency in the specialties of the field.

This *Cardiovascular Technology Student Handbook* provides information relative to the structure of the Program, and the academic and professional policies of the Cardiovascular Technology Department. The handbook will serve as a reference guide throughout your course of studies. Read it carefully and do not hesitate to ask questions of the faculty and/or Program Director.

Welcome to the Cardiovascular Technology Program! Our goal is your success!

The CVT Faculty

Student Name: _____ Student I.D. Number: _____
(Please Print)

This is to certify that I have read the *Cardiovascular Technology Student Handbook* and have had an opportunity to clarify my questions. I understand that the *CVT Student Handbook* will serve as a guide as I progress through the CVT Program. I also understand that the policy and procedures of the CVT Program can change due to unforeseen circumstances, and that this Handbook is a "living document" which may be subject to modifications in the best interest of the students and the Program. I agree to adhere to the policies contained herein as well as changes that may become necessary during my enrollment in the CVT Program.

Student Signature: _____

Date: _____

This copy should remain in the Handbook.

GROSSMONT
COLLEGE

PHOTOGRAPHY AND VIDEOGRAPHY RELEASE

I, _____, hereby consent and authorize Grossmont-Cuyamaca Community College District to use and reproduce my name, biographical information and photograph in all forms of media including publications, videography and advertising materials. I will make no claim of any kind. I understand I will not receive any compensation as a result of the use of my name, biographical information and photograph.

This consent and release may be revoked only in writing delivered to the Public Information Office of the Grossmont-Cuyamaca Community College District. Any such revocation will apply only to materials to be distributed in the future and not to any materials already printed or otherwise created at the time of revocation.

I hereby warrant that I am of legal age and have the right to contract in my own name.

Signature _____ Date _____

Print Name_____ Student ID# _____

Address _____

City, State, Zip _____

Phone _____

This copy should remain in the Handbook.

HEALTH PROFESSIONS COMPUTER LAB POLICY

1. Computer lab usage by students in the CVT Program consists of specific assignments by individual instructors, and open lab hours during which students may work on Computer Aided Instruction and/or general word processing. Hardware/software maintenance and legal/licensure issues necessitate the following guidelines.

2. Students are prohibited from:
   a. Editing or copying any program, directory, or subdirectory.
   b. Adding personal software to the computer systems.
   c. Altering the hardware or software configuration of the computers in the lab.

3. Grossmont-Cuyamaca Community College District Computer System Security and Use Statement:

I understand that the Grossmont-Cuyamaca Community College District (GCCCD) network represents an essential asset of the district and that misuse of networking resources may result in the loss of privileges. Users may be held accountable for their conduct under any applicable District/campus policy, procedures, or collective bargaining agreement. Under California state law anyone who maliciously accesses, alters, deletes, damages or destroys any computer system, network, computer program or data is guilty of a felony. Complaints alleging misuse of network resources will be directed to those responsible for taking appropriate disciplinary action.

I understand that the GCCCD computing systems are provided for the use of Grossmont-Cuyamaca Community College District students, faculty, and staff, in support of the educational programs of the colleges, and are to be used for such related activities only. Commercial uses are specifically prohibited.

I agree to use the network in a legal and ethical manner which respects the rights, privacy, and needs of others, which honors copyright and license agreements, and which does not interfere with the operation, integrity, or security of the network. I understand that all communications are to reflect the mutual respect and civility expected in an academic community.

I understand that I am responsible for all activity under my user name, and understand that abuse of the network privilege will result in the immediate suspension of network access. I understand that I may not transfer or confer these privileges to another individual, unless I provide explicit written permission to another person access to my e-mail accounts. The authorized user is responsible for the proper use of the system, including any password protection.

I am aware that the network traffic may be subject to search under court order. System administrators may monitor network traffic or access user files as required to protect the integrity of the network. I am aware that all users have the right to be free from any conduct connected with the use of GCCCD computing systems which discriminates against any person on the basis of race, color, national origin, sex, sexual orientation, or disability or creates a hostile educational environment.

Nothing in this statement supersedes the right of a network service provider to impose more restrictive terms.

I have read the above GCCCD Computer System Security and Use Statement and agree to comply with all policies and procedures set forth by the Grossmont-Cuyamaca Community College District.

_____

Print Name/Student ID# Signature Date

For a complete statement clarifying District Computing operating guidelines and procedures, see District Operating Procedure IS8, *Computer Systems/User Rights and Responsibilities*. The Procedure is posted at all lab sites, the Learning Resource Centers and is available for Administrative Network users on the Public drive.

This copy should remain in the Handbook.

STANDARD PHYSICAL REQUIREMENTS FOR CLINICAL TRAINING

The following are the Standard Physical Requirements for working in the clinical environment as a student in the Cardiovascular Technology Program at Grossmont College. These requirements were established as a result of a survey of clinical affiliates that provide training to our students, and should be used as a guide to you and your physician.

STANDARD PHYSICAL REQUIREMENTS

A. Lift While Standing – Light to Moderate – Less than 50 pounds – **Frequent**

B. Lift While Sitting – Light – Under 25 pounds – **Frequent**

C. Lift with Assistance – Heavy – Over 50 pounds. (Patient Transfer, etc) – **Occasionally/Frequently**

D. Pushing – Heavy – Over 50 pounds – **Frequent**

E. Pulling – Heavy – Over 50 pounds – **Frequent**

F. Reaching (Full Extension – Elbow Flexion) At shoulder level – **Occasional/Frequent**

G. Reaching (Full Extension – Elbow Flexion) Above shoulder level – **Occasional/Frequent**

H. Standing for extended periods – **Frequent**

I. Sitting for prolonged periods – **Frequent (>60 min.)**

J. Walking (Moderate distances within clinical environment) – **Frequent**

K. Carrying – Light to Moderate – Less than 50 pounds – **Occasional**

L. Bending – **Occasional/Frequent**

M. Stooping – **Occasional/Frequent**

N. Kneeling – **Occasional**

O. Turning – **Frequently**

P. Hand Manipulation – (Hand controls, simple grasping, power grasping, fine manipulation) **-Frequent**

Q. Foot Controls – **Occasional**

R. Visual Requirements – Ability to observe alarms, indicators, measuring devices, patients and the public. Ability to recognize and respond to safety issues.

S. Auditory Requirements – Ability to hear and understand orders from a physician or other health care professionals. Ability to hear safety alarms and responds appropriately.

I have read and understand these requirements, and I am physically capable of fulfilling them in the clinical setting.

Student's Name:
Print Student Name: _____

(Signature) _____ **Date:** _____

This form to remain in Handbook

http://www.grossmont.edu/academics/programs-departments/cvt/physical-requirements.aspx

CARDIOVASCULAR TECHNOLOGY

STUDENT HANDBOOK

SECTION I - EDUCATIONAL PHILOSOPHY OF GROSSMONT COLLEGE

Grossmont College Vision Statement

Grossmont College - Changing lives through education.

Grossmont College Mission Statement

Grossmont College provides an exemplary higher education learning environment through comprehensive and innovative instructional programs and student support services.
By advancing equity and inclusion, we prepare our diverse student population to lead and engage with local and global communities.

We fulfill our mission by providing the people of East San Diego County and other communities with:

- Associate/transfer degrees and certificate programs
- Career education and workforce development
- Preparation for collegiate success
- Exploration of academic and career options
- Lifelong learning opportunities

The founders of the Grossmont-Cuyamaca Community College District believed that a community college should provide experiences which will greatly broaden the students' educational opportunities and strengthen the society's democratic institutions. The representatives of the community directed the college to provide an education through which students may create rewarding lives, productive for themselves and for society, based on an understanding of the relationship between the past and the challenge of the present and the future.

As part of its mission, Grossmont College pursues these values:

Learning and Student Success
We dedicate our resources and ourselves in support of our students and their pursuits to achieve their academic, professional, and personal goals.

Creativity and Innovation
We value the capacity for ingenuity and originality on our campus and within our community.

Pursuit of Excellence and Continuous Improvement
We strive for excellence in our programs and services. We believe in the capacity for continuous improvement in the pursuit of excellence. We accept the challenges of being accountable for our efforts.

Integrity
We commit to acting and speaking truthfully and responsibly and hold ourselves and other accountable to this standard.

Power of Diversity and Inclusion
We are committed to a climate for learning that considers diverse perspectives to be a powerful component in the education of every individual, valuing and accommodating both differences and commonalities.

Civility
We value fair, respectful, thoughtful interactions, based on a positive approach, that promote reflection, foster deeper understanding of phenomena, and permit achievement of common goals.

Balance
We value a nurturing and positive approach in all we do, embracing laughter and enthusiasm, as we nurture the development of the whole individual, including the intellectual, spiritual, emotional, and physical well-being of each individual.

SECTION II - DESCRIPTION OF THE CARDIOVASCULAR TECHNOLOGY PROFESSION

A Cardiovascular Technologist is a health care professional who, at the direction of a licensed physician, performs diagnostic tests which are used in the diagnosis, treatment, and serial follow-up of patients with cardiovascular disease. Cardiovascular Technology is a title used to describe three basic areas of expertise: Invasive Cardiology, Noninvasive Cardiology, and Vascular Technology. The role of the Cardiovascular Technologist includes, but is not

limited to one of the following:

Invasive Cardiovascular Technology

- Assisting the physician in the performance of diagnostic and interventional cardiac catheterization and angiography procedures, and measuring cardiovascular parameters such as cardiac output, blood flow velocity, cardiovascular dynamics, cardiac electrophysiology parameters, intracardiac shunt detection, and valve flow/valve area determinations.
- Preparing, calibrating and operating medical instrumentation utilized in the cardiac catheterization laboratory, open-heart surgical suite and cardiac research facilities.

Adult Echocardiography

- Recording and analyzing noninvasive cardiovascular data from M-Mode, 2-D, Doppler, transesophageal and stress echocardiograms, electrocardiograms, exercise stress tests and ambulatory ECG monitoring.
- Preparing, calibrating, and operating medical instrumentation utilized in the Noninvasive Cardiology Laboratory.

Vascular Technology

- Recording and analyzing diagnostic studies utilizing duplex ultrasonography, color-flow imaging, various forms of plethysmography, and other modalities.
- Preparing, calibrating, and operating medical instrumentation utilized in the Vascular Laboratory.

SECTION III - PHILOSOPHY OF THE CARDIOVASCULAR TECHNOLOGY PROGRAM

Cardiovascular Technology Vision Statement

Academic excellence through student-centered learning in a creative, supportive environment.

Cardiovascular Technology Mission Statement

The Cardiovascular Technology Department will provide competency-based education which links theoretical, professional, and ethical concepts to clinical practice in order to prepare graduates for the world of work and life-long learning.

The CVT faculty is committed to the philosophy of Grossmont College with special emphasis on student-centered learning, and to the premise that Cardiovascular Technology is a “profession” and those who enter clinical practice are accountable for their actions and continued professional growth. Teaching strategies are designed to promote critical thinking, an attitude of inquiry, personal responsibility, a commitment to keep pace with the evolution of the scope of practice, and sharing professional knowledge.

A multimedia approach to education is utilized when possible in order to accommodate variations in learning styles, and to provide an environment which stimulates, supports, and challenges the student. Emphasis is placed on self-assessment, evaluation, and motivation throughout the student's progress through the program. It is expected that students assume responsibility for their learning and contact the appropriate faculty if academic difficulty occurs. The specific needs of individual students are of concern to the faculty, and a wide range of resources designed to promote student success are listed in Section VI of this handbook.

SECTION IV - DESCRIPTION OF THE CARDIOVASCULAR TECHNOLOGY PROGRAM

General Information

The Cardiovascular Technology Program at Grossmont College leads to an Associate in Science Degree and prepares graduates to enter the allied health field as Cardiovascular Technologists. Students are educated in the theoretical and clinical concepts of a wide variety of diagnostic techniques used in modern medicine.

The first year of the program concentrates on cardiovascular anatomy, physiology and pathophysiology, electrocardiography, mathematics, physics, medical electronics and instrumentation and the clinical application of fundamental cardiovascular diagnostic techniques. After the first semester of the core curriculum, the three track specialties break into their own curriculum pathway. Classes include a rigorous program of on-campus and hospital-based learning activities within the student-selected specialty.

Students accepted to the Cardiovascular Technology Program at Grossmont College **are required to undergo a background check and a drug screening test before assignment to a clinical site.** The student is responsible for paying the fee for these services. It should be noted that failure to pass either of these tests will prevent acceptance of the student into their selected program specialty, thereby terminating participation in the CVT Program.

Please Note: Any felony conviction will prevent you from being placed in clinical rotation, and therefore, make you ineligible for entry to the CVT Program. Misdemeanor convictions may have similar consequences. If you have defaulted on a healthcare education loan, you cannot be placed in clinical rotation. If you think that you may be in one of these situations, please contact the Dean of Allied Health and Nursing (619-644-7149).

Prerequisites

Chemistry 115 - Fundamentals of Chemistry, 4 Units (or equivalent)
Biology 144 and 145 - Anatomy & Physiology, 8 Units (or equivalent)
OR
Biology 140, 141 and 141L – Anatomy, Physiology, Physiology Lab, 9 Units (or equivalent)

Cardiovascular Technology Major Courses

See college catalog for course descriptions: https://www.grossmont.edu/academics/schedulecatalog/default.aspx

First Year – Fall Semester All Students, Core Curriculum – 11 units

CVTE 100 - Physical Principles of Medicine I, 2 units
CVTE 101 - Cardiovascular Physiology I, 4 units
CVTE 102 - Medical Instrumentation I, 3 units
CVTE 103 - Laboratory Practicum I, 2 units
CVTE 107 – Introduction to Clinical Practicum (Optional), 1 unit

First Year – Spring Semester by Track Specialty – 12 units

CVTE 109 – X-ray Physics and Radiation Safety, 3 units – Invasive students only
CVTE 110 - Physical Principles of Medicine II, 2 units – Echo & Vascular students only
CVTE 111 - Cardiovascular Physiology II, 4 units – all students
CVTE 113 – Introduction to Clinical Practicum II, 1 unit – all students
CVTE 115 – Introduction to Adult Echocardiography, 4 units – Echo students only
CVTE 116 – Introduction to Invasive Cardiology, 4 units – Invasive students only
CVTE 117 – Introduction to Vascular Technology, 4 units – Vascular students only

Summer Session – by Track Specialty – 4 units

CVTE 114 - Cardiovascular Pharmacology, 2 units – all students
CVTE 121 - Clinical Practicum I, Adult Echocardiography, 2 units – Echo students only
CVTE 122 – Clinical Practicum I, Invasive Cardiology, 2 units – Invasive students only
CVTE 123 – Clinical Practicum I, Vascular Technology, 2 units – Vascular students only

Second Year – Adult Echocardiography

Fall Semester – 10 units
CVTE 221 – Diagnostic Procedures I, Adult Echocardiography, 5 units
CVTE 231 – Clinical Practicum II, Adult Echocardiography, 5 units
Spring Semester – 10 units
CVTE 251 – Diagnostic Procedures II, Adult Echocardiography, 5 units
CVTE 261 – Clinical Practicum III, Adult Echocardiography, 5 units

Second Year – Invasive Cardiology

Fall Semester – 10 units
CVTE 222 – Interventional Procedures I, Invasive Cardiology, 5 units
CVTE 232 – Clinical Practicum II, Invasive Cardiology, 5 units
Spring Semester – 10 units
CVTE 252 – Interventional Procedures II, Invasive Cardiology, 5 units
CVTE 262 – Clinical Practicum III, Invasive Cardiology, 5 units

Second Year – Vascular Technology

Fall Semester – 10 units
CVTE 223 – Diagnostic Procedures I, Vascular Technology, 5 units
CVTE 233 – Clinical Practicum II, Vascular Technology, 5 units
Spring Semester – 10 units
CVTE 253 – Diagnostic Procedures II, Vascular Technology, 5 units
CVTE 263 – Clinical Practicum III, Vascular Technology, 5 units

CVTE 225 – Extended Clinical Experience, (Optional 1 Unit) may be offered during Winter Break, budget permitting.

SPECIALTY SELECTION

Specialty selection in the CVT Program is determined by cumulative grade-point averages (GPA) in the four courses of the first semester Core Curriculum.

For initial track selection, students will submit their specialty preferences, in descending order, prior to the end of the first semester. In **some** years, **all** students receive their first choice. In other years, there will be more student requests for a track than open slots. This is typically due to the availability of clinical sites, and their inherent variable nature. In these cases, the slots in each track will be awarded based on GPA in the four core courses of the first semester. Students may not receive their first or even second choice.

The CVT Program cannot and will not guarantee that a student will receive their first choice of Track Specialty.

SECTION V - ACADEMIC AND PROFESSIONAL POLICIES OF GROSSMONT COLLEGE AND THE CARDIOVASCULAR TECHNOLOGY PROGRAM

GRADING CRITERIA

Didactic (Classroom) Coursework*
A = 90 - 100%
B = 80 - 89%
C = 75 - 79%
F = Less than 75%

Laboratory Coursework*
A = 90 - 100%
B = 80 - 89%
C = 75 – 79%
F = Less than 75%

To assure competence in both cognitive and psychomotor components of Lecture-Lab courses, students are required to achieve passing grades in **both** the lecture and laboratory sections. In other words, a passing grade in the lecture portion of the course will not compensate for a failing grade in lab, or vice versa.

**It is the individual instructor's preference to award +/- grades within the grading ranges presented here.*

Grossmont-Cuyamaca Community College District Student Discipline Procedures

The primary purpose of this policy is to provide information to all students in the Grossmont-Cuyamaca Community College District about the type of conduct that is expected of each student and to set forth procedures that are fair and timely, both to the student and to the District. The California Education Code requires every community college governing board to adopt specific rules governing student behavior along with applicable penalties for violation of these rules and regulations. The complete Student Code of Conduct is available in the office of Student Affairs 619-644-7600 as well as their webpage http://www.grossmont.edu/campus-life/student-affairs/default.aspx. The Code of Conduct is also printed in the Grossmont College Catalog. All students are responsible for all content of the College Catalog.

Methods for Addressing Concerns/Issues (GRIEVANCE POLICY):

The first step to resolving an issue should begin with the instructor of the course. Should the issue not be resolved then the student may make an appointment with the Program Director to discuss the concern. If the issue is not solved at this level the student may make an appointment with the dean and/or the student may file an appeal within the department.

APPEALS PROCEDURE

A student may request initiation of the appeal process for an unresolved problem involving a departmental rule. A departmental rule is defined as one made by the entire (Program) faculty, which affects more than one individual (program) course, e.g. clinical attendance or readmission policy. Theory and clinical grades are determined by the instructor of the course may not be appealed as per the education code section 76224.

INITIATION OF AN APPEALS HEARING

1. The student should first meet with the instructor involved and attempt to resolve the problem at that level.
2. If the issue is not resolved, the student meets with the CVT Program Director within 5 (five) working days of the situation.

3. If the issue is not resolved, the student initiates the appeal process by submitting a letter (see following form letter) to the CVT Program Director who will contact the Appeals Committee Chair. The intent to appeal, the nature of the problem and the requested outcome should be clearly stated in the letter.
4. The letter must be received within 5 (five) working days of the situation.
5. The student will be allowed to continue attending lecture/clinical/lab/seminar until the Appeals Committee meets and formulates a decision concerning the appeal.
4. For issues such as drugs, alcohol, potential criminal conviction, unsafe clinical practice or other behavioral issues, a student may not be allowed to remain in the classroom, lab or clinical. Attendance to class, lab or clinical will be up to the recommendation of the faculty member involved with the issue.
5. The Chair of the Appeals Committee will call a meeting to formally review the appeal within 5 (five) working days of the appeal request made by the student.
6. The Chair of the Appeals Committee will notify the student by phone and email as to the date and time of the appeals hearing.
7. The student may bring a support person to the hearing. The advocate my not participate in the hearing but serves simply as support for the student.
8. The student may call witnesses to the Appeal Hearing. The student must notify the CVT Program Director in writing with the names of the witnesses prior to the scheduled hearing.
9. The student will have no more than 30 minutes to present to the Appeals Committee which includes witness statements.
10. Grievances filed with the Appeals Committee during winter and summer session will be postponed until faculty return to campus during fall and spring semesters.

MEMBERSHIP OF APPEALS COMMITTEE

1. The chair of the Appeals Committee will be selected from a member of the full time Allied Health and Nursing faculty as needed when the Appeals process has been initiated by a student.
2. Each time the Appeals Committee convenes, the Chair will appoint two faculty members and one coordinator from the Allied Health and Nursing programs.
3. Neither the chair nor any faculty member serving on the Appeals committee will have been directly involved with the issue being appealed.

PROCEDURES FOR THE COMMITTEE

1. Chair duties:
    a. Appoint a recorder
    b. Convene the meeting 30-40 minutes prior to the hearing to review the policy in question and any documents submitted by the student filing the appeal.
    c. Introduce committee members
    d. Have all committee members sign a confidentiality statement
    e. State purpose of meeting and student's request
    f. Facilitate the appeal hearing
    g. Call for a vote based on student's request
    h. The Chair renders the decision of the Appeals Committee to the CVT Program Director. The CVT Program Director communicates the outcome of the hearing to the student by phone and in writing within 2 business days.
    i. Maintain minutes of the appeal in a secure file in the CVT Department
    j. Provide a summary or the meeting to include: a list of those on the committee; results of the vote; list of evidence presented by both parties; names of any witnesses that participate in the hearing.
2. The student should be prepared to discuss the issue and defend his/her position within the 30 minute time limit.
3. The instructor/s directly involved should be prepared to present data related to his/her position concerning the situation under appeal within the 30 minute time limit.
4. At the conclusion of the presentation of evidence by both parties, and any closing statements, the Chair will dismiss all participants from the hearing, except for the hearing panel, to begin confidential deliberation on the appeal.
5. The Appeals Committee decision will be made by secret ballot. A majority vote will be required in order to make an exception to departmental policy. If a tie, the Chair will cast the deciding vote.
6. The Chair will inform the CVT Program Director and the faculty member in writing of the committee's

decision.

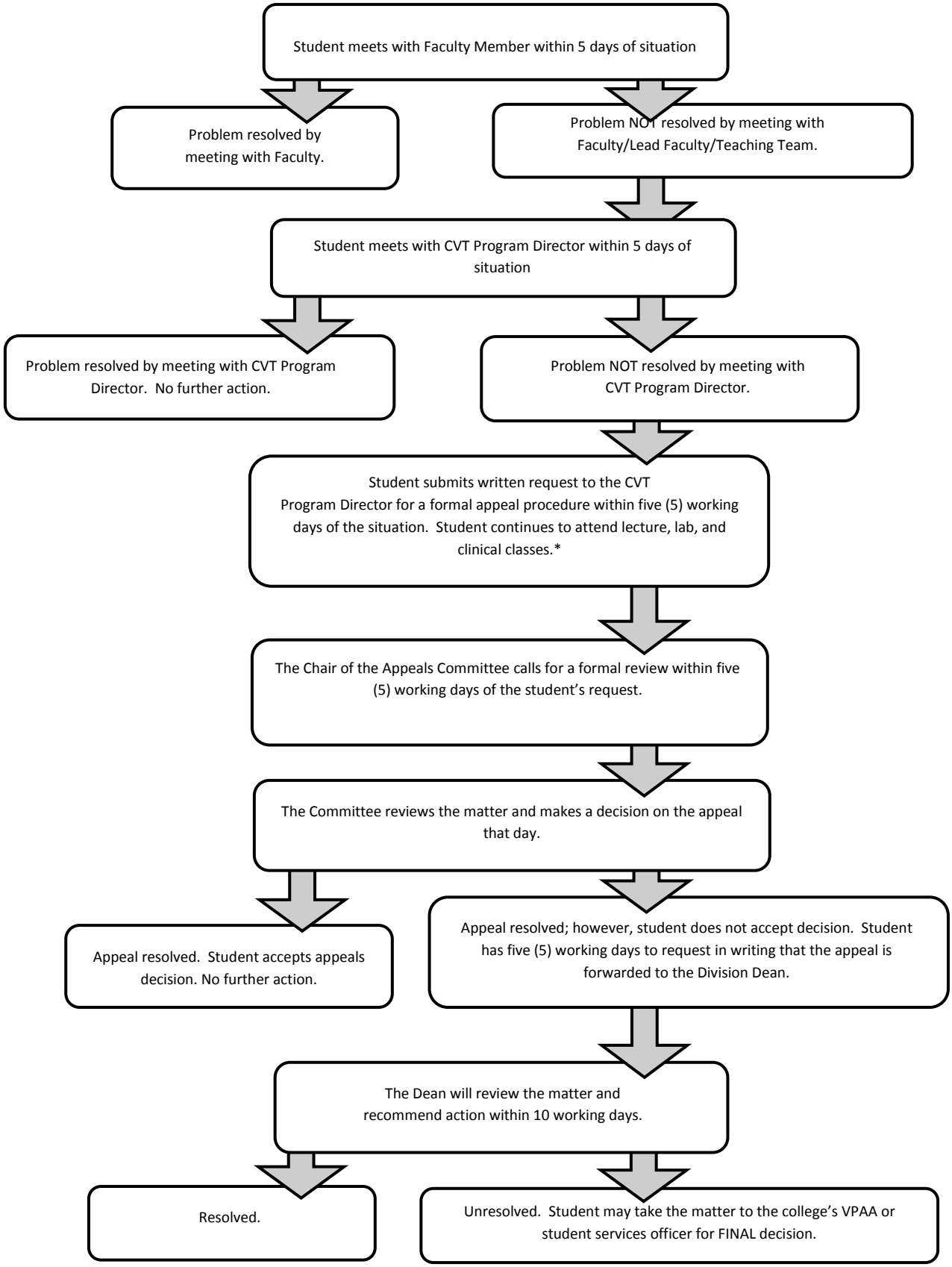
ADDITIONAL RECOMMENDATIONS

1. The Appeals Committee meeting takes priority over any other meeting.
2. Unresolved issues or any appeals of the hearing panel's decision at the departmental level may be taken to the Dean of the division with oversight for the program. The student has five (5) working days to make a written request to have the matter referred to the Division Dean.
3. The Division Dean will review and make recommendations for the unresolved issue within ten (10) working days. Any situation remaining unresolved at this point may be taken to the Associate Dean of Student Affairs as appropriate. ***Decision made by the chief academic/student services officer is FINAL.***
4. Refer to Program Appeal Procedure Flowchart (see following page)

***For issues such as drugs, alcohol, unsafe clinical practice, or other behavioral issues student may not be allowed to remain in the classroom, lab or in clinical.**

PLEASE NOTE:

- Theory and clinical grades are the sole discretion of the instructor and are regulated by the Education Code and are not subject to grievance.
- No participant in the Appeals Committee or a support person selected by the student may be a licensed attorney or trained as an attorney.
- No attorney may be in attendance during the meeting with the Appeals Committee


Student meets with Faculty Member within 5 days of situation
Problem resolved by meeting with Faculty.
Problem NOT resolved by meeting with Faculty/Lead Faculty/Teaching Team.
Student meets with CVT Program Director within 5 days of situation
Problem resolved by meeting with CVT Program Director. No further action.
Problem NOT resolved by meeting with CVT Program Director.
Student submits written request to the CVT Program Director for a formal appeal procedure within five (5) working days of the situation. Student continues to attend lecture, lab, and clinical classes.*
The Chair of the Appeals Committee calls for a formal review within five (5) working days of the student's request.
The Committee reviews the matter and makes a decision on the appeal that day.
Appeal resolved. Student accepts appeals decision. No further action.
Appeal resolved; however, student does not accept decision. Student has five (5) working days to request in writing that the appeal is forwarded to the Division Dean.
The Dean will review the matter and recommend action within 10 working days.
Resolved.
Unresolved. Student may take the matter to the college's VPAA or student services officer for FINAL decision.

Appeal Process Form

Please Note: The student must complete this form in its entirety and submit it to the CVT Department within 5 working days of the situation.

1. Describe with specific examples exactly what the issue it. Please provide specific examples that support the issue you are appealing.

2. Please state your desired outcome:

Print Name: _____ Date: _____

Sexual Harassment
Definition: Sexual harassment is defined in GCCCD Policy 3430 as the following:
Unwelcome sexual advances, requests for sexual favors, and other conduct of a sexual nature when:

- Submission to the conduct is made a term or condition of an individual's employment, academic status, or progress;
- Submission to or rejection of the conduct by the individual is used as a basis of employment or academic decisions affecting the individual;
- The conduct has the purpose or effect of having a negative impact upon the individual's work or academic performance, or of creating an intimidating, hostile or offensive work or education environment; or
- Submission to or rejection of the conduct by the individual is used as the basis for any decision affecting the individual.

Process: Complaints must be filed within 180 days of the date of the alleged unlawful discrimination occurred, except that this period shall be extended by no more than 90 days following the expiration of the 180 days if the complainant first obtained knowledge of the facts of the alleged violation after the expiration of the 180 days (California Code Regulations, Title 5 Section 59328e). If the alleged harasser is a student, initial action on the complaint shall be the joint responsibility of the Associate Dean, Student Affairs and the Director of Employee and Labor Relations.

Substance Abuse - Drugs and Alcoholic Beverages
The policies related to drug or alcohol abuse are defined by the Grossmont College Board of Trustees as follows:

- The Board recognizes that drug and alcohol abuse is an occupational hazard of medicine. It therefore recommends that students be apprised, at an early point in their instruction, that abuse of drugs, alcoholic beverages or other chemicals, can prevent them from continuing in the program and lead to criminal and civil censure. Students who exhibit this behavior will be referred to appropriate support services and may be dismissed from the Program.

- Any student who uses, sells, or distributes alcoholic beverages, narcotics, or hallucinogenic drugs or substances on any site of the Grossmont Community College District, or any affiliated clinical site, will be suspended immediately by the appropriate President for up to five days. In addition, action for dismissal from the college may be recommended to the Governing Board.

- It is the policy of the Board to prohibit the possession or drinking of alcoholic or malt beverages at college functions on campus, at college-sponsored events or official functions of college organizations in accordance with the California Administrative Code, Section 24.

Academic Integrity
The Cardiovascular Profession demands the highest moral and ethical standards. All students are expected to comply with the institution's high standards of academic integrity and avoid instances of dishonesty at all times. Academic fraud is a serious violation of the Student Code of Conduct, as published in the Grossmont College Catalog (http://www.grossmont.edu/academics/schedulecatalog/default.aspx). **Academic fraud** includes, but is not limited to the following situations:

Plagiarism is using someone else's ideas or work without proper or complete acknowledgement. Plagiarism encompasses many things and is by far the most common manifestation of Academic fraud. For example, copying a passage straight from a book into a paper without quoting or explicitly citing the source is plagiarism. In addition, completely rewording someone else's work or ideas and using it as one's own is also plagiarism. It is very important that students properly acknowledge all ideas, work, and even distinctive wording that are not their own. Students unsure of how or when to properly acknowledge sources are encouraged to consult their instructor.

Plagiarism on the Internet: Purchasing research papers on the internet and submitting them as your own constitutes a gross case of plagiarism. Cutting and pasting from a website without putting the text being used in quotation marks and/or without properly citing the sources also constitutes plagiarism.

Cheating is copying of any test or quiz question or problem by any means (such as a taking a picture), or work done in a class that is not the student's own work. It also includes giving or receiving unauthorized assistance during an

examination whether it was intentional or not. Obtaining or distributing unauthorized information about an exam before it is given is also cheating, as is using inappropriate or unallowable sources of information during an exam.

False Data is a fabrication or alternation or data to deliberately mislead. Examples include but are not limited to: falsifying vital signs, altering the medical record, falsifying data on the clinical log sheet.

Intentional Deception is the submission of false documentation (absence excuse, proof of attendance, etc.) or falsifying any official college record. A student who misrepresents facts in order to obtain exemptions from course requirements has committed an act of intentional deception and may be subject to disciplinary action.

Students who engage in academic fraud will be subject to authorized penalties at the discretion of the instructor of record in the class. Such penalties may range from an adjusted or failing (zero) grade on the particular exam, paper, project, or assignment, (which may lead to a failing grade in the course). The student may be placed on probation for the duration of their enrollment in the program; a second occurrence leading to program dismissal. The instructor may also summarily suspend the student from the class meeting when the infraction occurred, as well as the following class meeting. In addition, academic fraud can result in a suspension or expulsion from the Program, as stipulated by the District's Student Disciplinary Procedures administered by the Vice President of Student Services and Assistant Dean of Student Affairs.

The Cardiovascular Technology Profession demands the highest moral and ethical standards. Cheating will not be tolerated in the Program, just as it will not be tolerated in clinical practice. The official Grossmont College policy on cheating is detailed in the Student Code of Conduct which is available in the office of the Assistant Dean of Student Services. Refer to the Student Code of Conduct for additional information on this policy.

Notification of Academic Jeopardy

Initiation of the remediation plan process occurs when the faculty feels that academic failure is likely unless corrective measures are developed. The process includes preparation of a Student Performance Assessment/Behavioral Contract form which details the areas of concern, the recommended course of action, and the timeline for meeting appropriate standards. The form is signed by the student. The student will be provided a copy of the assessment form and a copy will be placed in the student's file. If a student receives a failing grade (less than 75%) on an exam, quiz or skills demonstration, the student must meet with the instructor to discuss a recommended course of action.

Tutoring

The student is responsible for identifying specific areas of educational need and contacting the instructor for assistance. The student and the appropriate faculty will define specific learning objectives and develop a plan within a specified time frame to meet the stated objectives of the course. In addition, there will be both professional expert (graduate) and student tutors in the Scan Lab during open Scan lab hours.

Clinical Incident Policy - Unsafe Clinical Practice/Unprofessional Behaviors

Professional attitude is absolutely essential at all times in the clinical setting. A clinical incident is defined as a situation in which a student places a patient in actual or potential danger, is unprepared to participate in clinical activities, or demonstrates unprofessional conduct. The student may be subject to program dismissal or a Student Performance Assessment may be prepared with any occurrence as noted above in order to:

- Identify those students who need assistance in performing the CVT Competencies for any given semester.
- Identify specific problems of unprofessional behavior.
- Determine remedial measures that will assist the student in successfully completing the program. Clinical Incident Reports are retained in the student's record.
- If the CVT Faculty determines that the incident is of such an unsafe or unprofessional nature, an Exit Interview will be conducted. **This will make the student ineligible for re-entry to the Program.**

Exit Interview Policy

If for any reason, it becomes necessary for a student to leave the Program prior to completion, it is the student's responsibility to schedule an exit interview with the Program Director. At this time an Exit Interview Form will be completed. This form will become part of the student's record.

Readmission

Students who leave the Program in good academic and clinical standing may be readmitted **one time,** upon recommendation of the CVT Faculty. Students who leave the Program due to academic failure will not be eligible for readmission. Special consideration may be given in extraordinary circumstances and at the discretion of the CVT Faculty and Program Director.

Re-entry Procedure for Students

- Submit a "Program Re-entry Request" to the CVT Office by December 1st for re-entry to the Fall Semester, and by June 1st for re-entry to the Spring Semester. If the student has chosen a track, they **must** re-enter that track. Application must be made so that there is no more than a one-year absence.
- The student may be requested to meet with the CVT faculty, and/or submit a detailed email, to present strategies developed and implemented to enhance chances for success.
- If the application is approved, the applicant will re-enter at a Faculty determined point in the Program.
- **The CVT Program is an integrated curriculum in which the content of each course interacts with and depends upon the content of the other courses.** Therefore, if the student is allowed to re-enter the Program, the Faculty will decide which course(s) is/are appropriate for the student to repeat so the student has the greatest chance at successful completion. A petition process through Admissions and Records is required to repeat courses previously completed with a satisfactory grade.

Dismissal

***Students dismissed for Unprofessional Conduct or Unsafe Clinical Practice are not eligible for re-admission.**

1. A student may be subject to dismissal from the Cardiovascular Technology Program based on, but not limited to, the following:

a. Unsafe clinical practice:

Examples of unsafe practice may include (but are limited to) the following:

1) Failure to display stable mental, physical or emotional behavior(s) which may affect the well-being of others.
2) Failure to follow through on a mandatory remediation plan.
3) Failure to provide proof of current immunizations, flu shot, TB test or CPR card.
4) Acts of omission/commission in the care of patients, such as (but are not limited to): physical, mental or emotional harm; jeopardizing patient safety.
5) Lack of verbal and/or psychomotor skills necessary for carrying out safe clinical practice.
6) Attempting activities without adequate orientation or theoretical preparation or appropriate supervision/assistance.
7) Behavior that endangers a patient's, staff-member's, peer's or instructor's safety. Note: this does not have to be a pattern of behavior and the student can be subject to dismissal for a single occurrence.

b. Violations of professional, legal, or ethical conduct:

Examples of violations may include (but are not limited to) the following:

1) Dishonesty
2) Falsification of patient records, clinical reports and/or student clinical logs.
3) Unprofessional behaviors with agency staff, co-workers, peers, or faculty which result in miscommunications or disruption of patient care and/or unit functioning.
4) Failure to maintain patient confidentiality according to HIPAA regulations.
5) Academic Fraud.
6) Any violation of the "Student Code of Conduct" as outlined in the College Catalog.

c. Academic failure

2. The proctor/instructor will communicate the problem area(s) to the Director of CVT Program. Documentation will include a description of the behavior and the status of the patient, if appropriate. The student also may provide written input for review.
3. If the student is dismissed, the student will have an opportunity to meet with the CVT Program Director and the faculty member involved to share his/her perception of the problem.
4. The lead instructor and/or the teaching team and the CVT Program Director will then confer and will present

recommendations to the student both verbally and in writing.

5. Should a student display unsafe clinical practice or have a violation of professional, legal, or ethical conduct they will be ineligible for reentry into the Grossmont College Cardiovascular Technology Program
6. All students dismissed from the program will be encouraged to schedule an exit interview with the CVT Program Director to discuss options.
7. Following the exit interview, the student will receive a written copy of the exit interview.

Children on Campus

It is against Grossmont-Cuyamaca Community College District policy to have children on campus in the classroom or a lab (unless the instructor has requested the child be present). Therefore, children may not be brought into the scan lab. Per the GCCCD policy, children are defined as under 18 years of age.

In settings outside the classroom, children may accompany a student or employee occasionally on the college site but must remain under continuous supervision of the adult responsible for them.

Dress Code: Clinical and On-Campus

All Grossmont College CVT students are required to adhere to the following dress code. It is the student's responsibility to present a professional image so as to reflect well on themselves, the clinical site and the CVT Program. All clothing must be clean, neat, and odor-free. Students not adhering to the guidelines will be counseled using the Student Performance Assessment/Behavioral Contract form.

- Scrubs are to be worn on campus for lecture and lab sections. Long-sleeved, short-sleeved, or sleeveless T-shirts may be worn under the scrub top, depending on weather, student preference, etc. In no case, shall graphics show within the "V" of the scrub top. The CVT uniform is Navy Blue embroidered with "Cardiovascular Technology" in gold. The La Mesa location of Scrub Mart has our specifications. Any matching scrub set is allowed. There are numerous styles and price points from which to choose. Three or four sets are suggested. More information will be provided by the CVT Office staff.
- Off-campus, all students will be neat and professional in appearance. Check with your Clinical Coordinator on whether you are allowed to wear your CVT scrubs to the clinical site. Invasive students may be asked to change into hospital scrubs, but the student is required to arrive on site dressed appropriately.
- All ultrasound students may be required to wear a clean, neatly-pressed, white lab coat at clinical (as advised by your clinical coordinator). The lab coat must have the Grossmont College student patch sewn to the left sleeve. A student picture ID card, available from the Admissions & Records - Building 10, will be worn on the left pocket of the lab coat at all times, giving the student's name and identification as a Grossmont College CVT student. Invasive Cardiovascular students must have their ID card available at all times and worn in a manner to be determined by each clinical site. The white lab coat is optional when on-campus.
- Hair will be neat and out of the way. Longer hair must be fastened behind for reasons of cleanliness. Hair must not come in contact with the front of the uniform, patients, or sterile fields. Hair must be a "natural" color; for example, colors such as purple, green and bright red would not be acceptable.
- Clean, low-top shoes must be closed toe, and soft-soled. Dress shoes are appropriate with anything but scrub sets. If wearing scrubs, inconspicuous clean walking shoes are acceptable. Sandals are never allowed. Socks are required footwear.
- Jewelry and makeup must be limited and understated. One set of simple, inconspicuous stud or post earrings are acceptable. No dangling earrings or hoops. No ornate rings, multiple chain necklaces or bracelets. Piercings of any other visible body part except ears are not acceptable and must be removed for clinical experience. Perfume or cologne must be understated, if worn at all. Some sites do not allow perfume or cologne.
- Artificial nails are not allowed in patient care areas. To comply with the policies of our clinical sites, artificial nails are not allowed while in the CVT Program.
- The formality of dress will vary at different clinical sites. The student is responsible for knowing and conforming to the expected dress code at all times. Regardless of the accepted practice at the clinical site, students are never to wear Levi's, blue jeans, T-shirts, boots, skirts or dresses shorter than knee length or other attire which exposes the midriff. Students are not to wear scrub attire unless specifically instructed to do so by the instructor or clinical supervisor.
- Dress codes specific to the individual clinical sites must be adhered to as well. Your clinical supervisor will provide guidance.

Dress Code for the Classroom Lab (ECG and Scan Labs)
All Grossmont College CVT students are required to adhere to the following dress code when assigned to a Lab. It is the student's responsibility to dress appropriately for the lab sections of the CVT Program. Your CVT navy scrubs must be worn while on campus. While in certain lab sections, the student will be required to have clothing suitable for scanning available at all times.

This will consist of clean, appropriately sized T-shirt, tank top, or sports bra top. Shorts, similar to those used in an exercise science activity class, must be clean and available for lab scan classes. Mid-drift shirts, bikini tops or bottoms, "Speedo" bottoms or any similar clothing items, including short pants, are not appropriate attire for **any** class activity. It will get cold in some of the labs and classrooms. Socks, closed toed shoes, jackets and sweaters should be available and are advised clothing options for use in class and lab settings on campus.

Patient gowns are also available in the lab classrooms to assist with access for scanning and ECG lead placement.

Failure to meet the requirements of this dress code will result in the student being sent home and recorded as absent. Refer to the Attendance Policy for ramifications of this type of policy violation.

ATTENDANCE POLICY

Classroom Attendance/Tardy Policy
The CVT Department adheres to the Grossmont College policy on attendance which states that the number of absences per semester cannot exceed the number of times a given class meets per week. Students exceeding the maximum permissible absences in a particular course may not receive credit **and may be dropped via the excessive absence process, without a re-entry option.**

If you do not attend a class, you will be considered absent. The Instructor-of record will make the final decision as to whether a student will be dropped from the course, and ultimately, the CVT Program due to excessive absences. Additionally, tardiness is not acceptable. Excessive tardiness will be addressed with the Student Performance Assessment/Behavioral Contract form and could lead to course failure.

Clinical Attendance Policy
The Cardiovascular Technology Program requires a major commitment of time and energy. Due to the variety of experiences and scheduling required, it is virtually impossible to be enrolled in the Program without reliable transportation. If it is necessary for the student to work while enrolled in the Program, it is expected that arrangements be made to insure no interference with assigned clinical time.

Students in the CVT Program have specific activities for which they must assume responsibility and maintain a certain degree of flexibility. If case-loads are particularly light, the clinical schedule may be altered. Advance notice of changes in scheduling will be made in the timeliest fashion possible.

Attendance requirements at clinical experience classes follow the same policy as for classroom work. (i.e., a student must not miss more clinical time in one semester than is assigned for one week.) Make-up time in clinical laboratories **MAY OR MAY NOT** be available, in which case the student's grade will be affected. Students must complete their assigned clinical hours. The student is responsible for notifying the clinical site and the Track Specialty instructor if an absence is required at a clinical assignment.

GRADES AND RECORDS

Grades
Grades will be assigned and processed in accordance with current College policy. All courses in the major and prerequisites must be completed with a grade of "C" or better. Grades and supporting documents required by the College are filed in the Admissions and Records Office at the end of the semester. As per California Education Code, Section 76224(a) "when grades are given for any course of instruction taught in a community college district, the grade given to each student shall be the grade determined by the instructor of the course and determination of the student's grade by the instructor, in the absence of mistake, fraud, bad faith, or incompetency, shall be final". The Grossmont College Catalog states: "In the absence of mistake, fraud, incompetency or bad faith, the determination

of the student's grades by the instructor shall be final once they have been filed. Questions regarding final grades should be brought to the attention of the Program Director and Director of Admissions and Records during the semester immediately following."

In order to assure competence in both the cognitive and psychomotor components of lecture/lab courses, students are required to achieve passing grades in both the lecture and laboratory sections in all courses (minimum of 75%). In other words, a passing grade in the lecture portion of the course may not be used to compensate for a failing grade in lab and vice versa.

Incomplete Grades

An Incomplete ("I") grade may be awarded at the discretion of the instructor when all of the following conditions exist:

- The student has contacted the course instructor and both have agreed to the provisions established in the Incomplete Grade Contract.
- The student has had an unforeseen emergency that prevents him/her from completing the remaining coursework. Evidence to verify the emergency will be required.
- The student has completed a minimum of 50% of the required coursework, as specified in the course syllabus, with regular attendance, and there is still the possibility of earning a passing grade.

The student is responsible for acknowledging the following:

- The student is responsible for completing the coursework as outlined in the Incomplete Grade Contract; upon satisfactory completion, the instructor will replace the "I" with a grade.
- The "I" is not used in calculating GPA or units.
- The "I" cannot be cleared by re-enrolling in the course.
- The grade earned on the portion of work completed for the course (as specified in the course syllabus) must be used to calculate the final grade for the course.
- A signed Incomplete Grade Contract, in which the student agrees to complete remaining coursework, must be filed by the instructor. In the case of an extreme emergency where the student is unable to meet with the instructor, the instructor may initiate and file the Incomplete Grade Contract, sending a copy to the student for signature. The contract is invalid without both instructor and student signatures. Without the student's signature, the "I" will revert to the default grade at the end of the following semester.
- Class time and/or assignments outlined in the Incomplete Grade Contract must be completed by the end of the 16-week semester following the date on the contract. If not, the "I" will revert to the default grade assigned on the Incomplete Grade Contract.
- An extension of time for removal of the "I" must be petitioned by the student. The petition must include evidence of approval from the instructor.

In the event that the original instructor of record on the Incomplete Grade Contract is unavailable, the student must see the appropriate department chair or dean for alternate arrangements. **Due to the CVT Program course sequence being offered only once per year, it may be impossible for a student in the Program to make up an incomplete grade. An Incomplete should be considered a last result, and the instructor and student should pursue other options first.**

Programmable Calculators/Cellular Phones

The Cardiovascular Technology Program does not allow the use of programmable electronic calculators in the first year of the program and the instructors will specify acceptable types of calculators for use during exams. **Text messaging is never allowed during class or exams, nor will a cell phone/smart phone substitute for a calculator.** The use of cellular phones is disruptive to class, so phones must be turned off or silenced when brought into the classroom. Basic function calculators are available for loan during exams. It is up to the individual instructors to determine if cell phones are or are not allowed in class.

Audio Recording in the Classroom

Consent of the instructor is necessary for audio recording in the classroom. (Accommodations will be made for students who have been determined eligible by A.R.C.). Due to some instructors not allowing cell phones in the classroom, an audio recorder is recommended. The student will agree that they will not copy or release any

recording or transcription of what they have recorded. The student must be present in class and personally record the material. The student will use the audio recording solely for their educational needs. The student will agree to destroy all recordings at the end of the semester. Students who do not comply with these stipulations may lose the right to audio record and/or face disciplinary action which may include dismissal from the CVT program.

Examination Makeup, Testing Situations and Absences
All quizzes and exams, including performance exams and finals, must be taken on the day the student is scheduled to take the test. For quizzes and exams in Lab Sections, including performance evaluations, students must take the test in the lab section in which they are officially enrolled.

If a student knows that they are going to miss an exam, quiz or performance evaluation, they ***must*** contact the instructor as soon as possible prior to the start of the test. The instructor will be responsible for deciding ***if*** a make-up test can be arranged. Instructors are ***not required*** to provide make-up tests, or to provide instructional materials from missed classes.

Advanced Placement
Due to didactic and clinical rotation requirements, and to adhere to accreditation guidelines, the CVT Program cannot accommodate advanced placement, nor will challenging or "testing-out" of courses be permitted.

HEALTH AND SAFETY

Your Student Records
During your matriculation through the CVT Program, you will be asked to complete and submit a myriad of paperwork. These requirements prepare you for clinical placement and what will be required of you during your career. Before you submit ANY paperwork to the CVT Department, it is highly recommended you make a copy for yourself.

This information may be requested at any time during your clinical rotation, and if not readily available, you may be denied clinical privileges by the clinical site including removal from the clinical site and possible program dismissal. In addition, some of this documentation may be requested by your future employer. The CVT Program will **NOT** copy your student file paperwork and fax that information to anyone, including to you.

Note: Beginning with CVT Class 2019, students will be required to participate with Complio, an immunization and compliance tracking system. There is a fee for the one year of use that will be required due the summer before classes begin in August.

Physical - All students are required to have a physical prior to entry into the program and/or annually. Participation in some components of the program requires physical exercise such as lifting when assisting patients from beds to wheelchairs or gurneys, gurneys to beds, and in some cases, pushing heavy equipment from one location to another. Persons prone to disorders such as tendonitis, carpal tunnel syndrome, or chronic neck/back pain which may impede performance of clinical tasks should obtain advice from their physician prior to entering the field. (See Standard Physical Requirements for Clinical Training – page 6 in this handbook).

Immunizations/Flu Shot/TB Test - A major component of the CVT curriculum involves clinical experience in local hospitals and clinics. In order to protect both students and patients, documentation of specified immunizations or seropositivity must be provided upon application to the program and remain current throughout the course of study. An annual flu shot and TB test will also be required. It is the students' responsibility to keep current and to provide proof to the CVT program.

Basic Life Support for Healthcare Provider (BLS-HCP) - All students are required to obtain and maintain a current **BLS-HCP** card before enrolling in the CVT program. The course must be approved by the American Heart Association. A copy of the card must be submitted to the CVT department Health Professions Specialist by the date specified before the beginning of the first semester of the program. No student will be allowed to attend clinical rotations without having a current, valid **BLS-HCP** card on file. Failure to keep your BLS card current will result in removal from your clinical assignment until the card is renewed.

Medical Malpractice Insurance - Medical Malpractice Insurance is **required** prior to beginning clinical training and

must be maintained throughout the CVT Program. Insurance forms are supplied by the Program in early May. The cost is approximately $25.00 per year and is paid by the student.

Background Check & Drug Screen – All students accepted to the CVT Program at Grossmont College are required to undergo a background check and a urine drug screening test before beginning the program. The cost of these procedures averages $65 - $100, but could be higher, dependent on various factors. The student will be responsible for paying these fees. **Failure to pass either of these procedures will prevent clinical placement and will terminate your continuation in the CVT Program.**

Please Note: Any felony conviction will prevent you from being placed in clinical rotation, and therefore, make you ineligible for entry to the CVT Program. Misdemeanor convictions may have similar consequences. If you have defaulted on a healthcare education loan, you cannot be placed in clinical rotation. If you think that you may be in one of these situations, please contact the Dean in charge of Health Professions.

Student Injury

The following procedures must be followed should injury occur while on campus or in approved clinical sites as part of the instructional program.

On Campus: When a Health Professions student is injured on-campus in a non-clinical work experience related accident or illness, that student would seek treatment and services as any other student. The campus Health Services Office will provide treatment, insurance services and make an accident report. Contact the CVT Program as soon as is reasonable: 619-644-7303.

Clinical Rotation: Any blood borne pathogen exposure incident is serious and needs an **immediate response and medical evaluation.** If you are injured at a clinical site while doing your clinical experience, you are covered for Workers Compensation by Grossmont-Cuyamaca Community College District and eligible for subsequent treatment at a Sharp Occupational Health Services facility after the emergency.

1. Notify your clinical site supervisor (the person you report to at the clinical site or who immediately supervises you.)
2. As soon as possible, **but within 24 hours**, notify your Program Track Instructor or the CVT Office: 619-644-7303, or College Health Professions Office: 619-644-7149. Download the Workers Compensation forms from the CVT website **at your clinical location**, complete and fax paperwork to the CVT Office: 619-644-7910.
3. If convenient, do this before going for medical treatment. If it is medically urgent to seek medical evaluation and treatment first, you can receive a referral by phone after you decide which facility you will go to and complete steps 1 and 2 above. Forms at: http://www.grossmont.edu/academics/programs-departments/cvt/student-forms.aspx
4. Proceed to one of the Occupational Health Services clinics. Locations are available from the CVT website or from Risk Management.
5. The Occupational Health clinic will begin medical treatment. If you had a blood borne pathogen exposure incident, you will be given counseling and a schedule for appropriate testing, treatment and follow up. Return visits may be necessary. It is important to follow through on the recommended course of action.
6. Within 24 hours, pick up from the Health Professions office the forms and instructions you will need. Return the forms along with copies of any forms received from Sharp to the Health Professions office.

Extended Sick Leave or Pregnancy Leave

Background:

A student who is pregnant may remain active in the CVT Program as long as she is able to meet the weekly laboratory objectives and her attendance record remains satisfactory. A pregnant student is expected to meet the same objectives as all other students in both theory and clinical.

Ante Partum Recommendations:

- The student has the responsibility to notify the Program Director and/or specialty track instructor as soon as pregnancy is determined, along with any other restrictions from the physician as some clinical experiences may need to be modified for her safety.

- The student has the responsibility to notify both the CVT department and the specialty instructor if problems arise that could limit the student's ability to safely meet clinical objectives.
- If the student requests a leave of absence during the pregnancy, the student must schedule an exit interview with the CVT Program Director and request a formal leave of absence in writing.
- At the end of the leave of absence, the student can re-enter the CVT program.
- The student will be required to follow the re-entry process.

Postpartum
A physician's clearance to continue is required.

Extended Illness or Post-Operative
A physician's clearance is required and restrictions stipulated by the physician will be honored, provided progress in the program continues. The maximum absence policy of the College and CVT Program will apply unless judged inappropriate by faculty review, on a case-by-case basis. Students who are required to stop out of program due to extended illness will be counseled by their instructors and the Program Director about reentry.

Radiation Exposure
Invasive Cardiology students will be protected against and monitored for exposure to ionizing radiation during their clinical rotations in cardiac catheterization laboratories. Radiation Badges will be assigned to all Invasive students, and lead glasses and thyroid collars are available for check out from the Lab Techs on campus.

Health Professions Computer Lab Policy
Computer lab usage by students in the CVT Program consists of specific assignments by individual instructors, and open lab hours during which students may work on Computer Aided Instruction and/or general word processing. Hardware/software maintenance and legal/licensure issues necessitate the following guidelines:

- Students are prohibited from entering any directory or subdirectory.
- Students are prohibited from editing or copying any program, directory, or subdirectory.
- Students are prohibited from adding personal software to the computer systems.
- Students are prohibited from altering the hardware or software configuration of the computers in the lab.
- All students are required to review and sign the **Grossmont–Cuyamaca Community College District Computer Security and Use Statement** during the first week of the program. The form will be provided by the program.

Graduation Requirements http://www.grossmont.edu/commencement/

Associate in Science Degree (Awarded by the College)
Students pursuing the Associate in Science Degree should make an appointment with the Grossmont College Counseling Center to develop a program of studies as appropriate to reach your goal. This should be accomplished early in your program of studies to insure completion of required courses in general education sections. Students requesting a modification of major via courses taken at other colleges/universities must provide a completed request form and a course outline/description of the substituted course. It is the student's responsibility to assure all official transcripts have been received by the Admissions and Records department to assure that the Evaluations office can make a proper assessment for the Associate of Science Degree.

CVT students must apply for graduation. Deadline dates are posted on Student Services website (http://www.grossmont.edu/student-services/graduation/default.aspx). Generally for a June graduation the deadline falls in the preceding March.

Please Note: Make copies of your diploma when received. Because the College prints diplomas, the CVT Program is incapable of recreating a diploma should you lose or destroy it.

SECTION VI - STUDENT SERVICES

Cardiovascular Technology Office – 619-644-7303
The Cardiovascular Technology Office and faculty offices are located in Building 34, Second Floor, North Wing. The CVT classrooms and laboratories are located in Building 34, Second Floor, South Wing. To reach members of the

faculty, dial the following numbers:

Liz Barrow	Program Director	619-644-7895	liz.barrow@gcccd.edu
Lisa Vargas Dan Dyar	Echo Track	619-644-7352	Lisa.vargas@gcccd.edu Dan.dyar@gcccd.edu
Dan Rosen	Vascular Track	619-644-7451	daniel.rosen@gcccd.edu
Chad Farmer	Invasive Track	619-644-7317	chad.farmer@gcccd.edu
Denise Gilbert	Health Professions Specialist	619-644-7303	Grossmontcvt.info@gcccd.edu

Cardiovascular Technology Laboratory – 619-644-7316
Located in Building 34, Second Floor, South Wing, the CVT Laboratory maintains a comprehensive library of registry examination study materials, CD, software, and DVD presentations. These materials are available from the laboratory technicians for limited loan to all CVT students. The lab techs are Pat Murray and Dan Lopez.

Cardiovascular Club
The Cardiovascular Club of Grossmont College is chartered by the ASGC and is organized to promote student interaction, enhance visibility of the Program and conduct fund-raising activities to promote the educational program. Each CVT class elects a slate of officers during the first semester of the program that will provide leadership and coordination of the club's activities.

Learning Resources Center – 619-644-7355
http://www.grossmont.edu/student-services/library/default.aspx
The Learning Resources Center (LRC) is the large building in the center of the campus located directly behind the administration complex. It is organized into the Library and the Tech Mall. The library is well supplied with a variety of reference books, periodicals and medical journals for student use and is continually updated

Tutoring Center – 619-644-7387
http://www.grossmont.edu/student-services/tutoring/default.aspx
The tutoring center is located in the Tech Mall. The center provides tutoring in designated subject areas. The Tutoring Center may or may not be funded due to the current fiscal situation in the State.

Accessibility Resource Center – A.R.C. (formerly DSP&S) – 619-644-7112
http://www.grossmont.edu/student-services/offices-and-services/dsps/default.aspx
The Disabled Students Services department provides services to students with various disabilities including learning disability, speech impairment, hearing or visual impaired and provides transportation for students with orthopedic problems. The Center provides diagnostic testing and specific tutoring for students with learning difficulties.

Health Services Office – 619-644-7192
http://www.grossmont.edu/student-services/offices-and-services/health-services/default.aspx
Health counseling, the interpretation of health problems, health guidance, and referral is available through the college Health & Safety Officer. Services including immunizations & TB testing, first aid, vision screening, hearing screening and optometry are available upon request. On-campus and school related activities insurance coverage for accidents is handled through this office. Coverage is at the Workers' Compensation rate.

Counseling Center – 619-644-7208
http://www.grossmont.edu/student-services/offices-and-services/counseling/default.aspx
The Counseling Center is available to assist students with academic planning, career exploration, crisis situations, personal adjustment, interpersonal relations, marriage and family concerns, divorce adjustment and stress reduction. Personal development classes for college credit focusing on careers and study skills are available.
The Counseling Center is staffed by educationally qualified, professional, licensed and credentialed counselors. Appointments may be made by calling the Center at 619-644-7208, Monday through Thursday, 8:00 AM - 7:30 PM, and Friday from 8:00 AM - 1:00 PM. All contacts are confidential.

Financial Aid – 619-644-7129
http://www.grossmont.edu/student-services/offices-and-services/fa/default.aspx
Students who need financial assistance to remain in school may apply for aid in the form of grants, scholarships,

loans and the college work study program. Information and applications for financial aid may be obtained from the Financial Aid Office in Room 108. Students who are members of the Associated Students of Grossmont College (ASGC) are also eligible for short-term, interest-free book loans. Book loan applications are available in the Student Government Office.

Student Job Placement Center – 619-644-7611
http://www.grossmont.edu/student-services/offices-and-services/careercenter/studentempservices/job-placement.aspx
The Student Job Placement Office coordinates campus-wide full-time and part-time placement for Grossmont College students. Work experience positions which will enhance the student's course of instruction are also offered. Part-time job placement serves students seeking jobs to provide income while completing their education. The Placement Office is located in the Counseling Center.

Veterans Resource Center – 619-644-7165
http://www.grossmont.edu/student-services/offices-and-services/veterans/default.aspx
The Veterans Affairs Office serves to assist veterans in qualifying, applying for and maintaining VA educational benefits.

Student Affairs Office-619-644-7600
http://www.grossmont.edu/campus-life/student-affairs/default.aspx
The Student Affairs Office oversees student life programming including student activities and services as well as administrative oversight of the Associated Students of Grossmont College and affiliated student organizations and clubs. The Office also manages student discipline issues related to the classroom, instruction, staff, faculty, department functions and overall campus environment. The Student Affairs Office also coordinates the Colleges' annual Commencement Ceremony.

EOPS/CARE – 619-644-7617
http://www.grossmont.edu/eops/
State funded program for economically and educationally disadvantaged students.

Public Safety – Parking Lot 5 – 619-644-7654
Lost and found, Safety/Security concerns, Parking Services

Associated Students of Grossmont College (ASGC) – 619-644-7604
http://asgcinc.org/
The Associated Students of Grossmont College (ASGC) supports activities such as clubs, dances, concerts, rallies, speakers, films and other cultural events in addition to providing discount services to ASGC members. The ASGC offices are located in the Student Center and all CVT students are encouraged to support their activities. They in turn provide support for our department through financial donations, as well as equipment and services.

SECTION VII - CLINICAL FACILITIES/AFFILIATIONS

Currently, the Cardiovascular Technology Program at Grossmont College maintains clinical affiliations with the following hospitals/clinics in the San Diego area. Unique clinical experiences may be established during any given semester and students will be given the address in a timely fashion. Students are responsible for their own transportation to and from clinical sites.

Clinical Site	Miles
ALVARADO COMMUNITY HOSPITAL 6655 Alvarado Road San Diego, CA 92120	3
KAISER-PERMANENTE MEDICAL CENTER 4647 Zion Avenue San Diego, CA 92120	4
PALOMAR MEMORIAL HOSPITAL 2185 Citracado Parkway Escondido, CA 92029	33
RADY'S CHILDREN'S HOSPITAL 8001 Frost Street San Diego, CA 92123	12
SAN DIEGO CARDIAC CENTER 8010 Frost Street San Diego, CA 92123	12

SCRIPPS GREEN HOSPITAL 10666 North Torrey Pines Road La Jolla, CA 92037	25
SCRIPPS MERCY – SAN DIEGO 4077 Fifth Avenue San Diego, CA 92103	10
SCRIPPS MERCY - CHULA VISTA 435 H Street Chula Vista, CA 92010	15
SCRIPPS MEMORIAL - ENCINITAS 354 Santa Fe Drive Encinitas, CA 92023	30

Clinical Site	**Miles**
SCRIPPS MEMORIAL – LA JOLLA 9888 Genesee Avenue La Jolla, CA 92037	22
SCRIPPS PREBYS CARDIOVASCULAR INSTITUTE 9888 Genesee Avenue La Jolla, CA 92037	22
SCRIPPS CLINIC - ANDERSON MEDICAL PAVILION 9898 Genesee Avenue La Jolla, CA 92037	22
SHARP CHULA VISITA HOSPITAL 751 Medical Center Court Chula Vista, CA 91911	14
SHARP GROSSMONT HOSPITAL 5555 Grossmont Center Drive La Mesa, CA 92041	3
SHARP MEMORIAL HOSPITAL 7901 Frost Street San Diego, CA 92123	12
UCSD MEDICAL CENTER, HILLCREST 200 West Arbor San Diego, CA 92103	12
UCSD SULPIZIO CARDIOVASCULAR CENTER 9434 Medical Center Dr. La Jolla, CA 92037	21

Grossmont College
Cardiovascular Technology
Program

APPENDIX 1

Competencies for Graduation

GROSSMONT COLLEGE

Competencies will be verified through examinations in variable formats including but not limited to multiple choice, essay, short answer, outside class written assignments and student projects. Performance examinations will also be utilized in the classroom labs and the hospital-based labs in both single and group settings.

COMPETENCIES REQUIRED FOR GRADUATION
CORE CURRICULUM

COGNITIVE SKILLS

Mathematics

- Define and apply mathematical formulas to solve problems involving fractions, decimal fractions, fundamental algebraic operations and scientific notation.
- Define and apply systems of measurement and measurement conversion as utilized in the calculation of data for evaluation of the cardiovascular system.
- Define and apply formulas for force, energy, velocity, and pressure with regard to cardiovascular hemodynamics.
- Define and apply Poiseuille's Law for fluid dynamics.
- Define and apply formulas for measurement of pressure, pressure gradients, and resistance within the cardiovascular system.

Physics

- Define and apply the Law of LaPlace in the evaluation of cardiovascular dynamics.
- Define and state applications for the Bernoulli Effect in cardiovascular evaluation.
- Describe the principles of air-filled, strain-gauge, pulse, impedance, photo and ocular plethysmography.
- Describe the principles of amplitude, intensity, frequency, attenuation as they relate to the recording, analysis and measurement of sound, infrasound and ultrasound.
- Define principles of wave length, velocity, and frequency as related to acoustic impedance of sound and its relationship to diagnostic imaging.
- Define the principles of Doppler ultrasound and its utilization in diagnostic imaging.
- Define and apply the Doppler equation as related to diagnostic imaging.
- Define the principles of pulse wave and continuous wave Doppler as related to pulse repetition frequency and Nyquist limit.
- Define the principles of ultrasound diagnostic imaging utilizing A-mode, M-mode, 2-Dimensional and Doppler techniques.
- Describe the physical composition of single and multi-crystal, mechanical and phased-array.
- Describe and define the principles of axial and lateral resolution of ultrasound beams.
- Describe methods of display of ultrasound signals in relation to amplification, depth/gain compensation, compressions and rejection.
- Describe memory storage devices as related to analog and digital scan converters.

Anatomy and Physiology

- Describe the anatomic components and functional relationships of the chambers, valves and tissues of the human heart.
- Define normal values for intracardiac oxygen saturation levels.
- Recognize and define normal values of intracardiac and intravascular dynamic pressures.
- Recognize and define the individual components of recordings of intracardiac pressure waveforms.
- Define and state the principles for measurement of cardiac output, cardiac index, stroke volume and stroke volume index.
- Define and state the principles for measurement of valve flow and valve area.
- State and define "Starling's Law" of the heart.
- Describe the structure and distribution of the coronary artery system in the human heart.
- Describe the structure, distribution and function of the arterial, venous and pulmonary circulations.
- Recognize and define the normal heat sounds and the characteristics of systolic and diastolic murmurs.
- Recognize and define the components of recordings of the carotid artery tracing, jugular pulse and apex cardiogram.

Electrocardiography (EKG)

- Describe the components and functional relationships of the specialized conduction system of the heart.
- State and define the electrophysiological principles of the heart with regard to cellular potentials, depolarization and repolarization.
- Recognize the waves, segments and intervals of the standard electrocardiogram.
- Define the patterns of electrode placement for the bipolar limb leads, augmented vector leads and precordial leads of the standard electrocardiogram.
- Describe and define standard timing and voltage criteria of the components of the electrocardiogram.
- Describe the technique for determining atrial and ventricular rates and the mean axis of depolarization.

Congenital Heart Disease

- Describe the process of the embryologic formation of the heart.
- Describe and define the anatomical characteristics and pathophysiology of the following cyanotic congenital heart diseases:
    - Anomalies of the Atrial Septum
    - Endocardial Cushion Defects
    - Anomalies of the Tricuspid Valve
    - Anomalies of the Ventricular Septum
    - Anomalies of the RV Outflow Tract
    - Anomalies of the LV Outflow Tract
    - Transposition of the Great Vessels
    - Anomalies of the Great Vessels
    - Anomalies of the Truncus Septum
    - Anomalous Pulmonary Venous Return
    - Anomalous Left Coronary Artery
    - Coarctation of the Aorta

- Describe and define the indications and characteristics of the following surgical procedures used in the treatment of congenital heart disease:
    - Waterston Shunts
    - Blalock-Taussig
    - Blalock-Hanlon
    - Pott's Operation
    - Brock Procedure
    - Glen Operation

Medical Instrumentation

- Describe the fundamental concepts and principles of electricity.
- State safety procedures for prescribed laboratory protocols.
- Define the basic parameters of current, voltage and resistance within an electrical circuit.
- State, define and apply Ohm's Law in the analysis of electrical circuits.
- State, define and apply Medical Statistics, including Sensitivity/Specificity, Incidence/Prevalence, and P values.
- Define the fundamental concepts of electromagnetism.
- Describe basic concepts of amplifier operation.
- Describe and define macro and micro electrical hazards related to Cardiovascular Technology.
- Describe and define the principles of operation of various galvanic and electrochemical transducers utilized in cardiovascular evaluation.
- Describe the principles and operation of signal filtration.
- Describe the principle of operation of a cardiac defibrillator.
- Describe the principles of Medical Imaging modalities including ultrasound, fluoroscopy, MR, CT and x-ray.
- Describe the purpose, function, personnel, procedures and major devices utilized in the Cath Lab.

Principles of Aseptic Technique

- Describe the principles of Aseptic Technique and the maintenance of a sterile field.
- Describe the types of sterilization utilized in preparing surgical instruments, catheters, guide wires, solutions, drapes and dressings.
- Describe the methods of wrapping surgical packs, instruments, catheters and guide wires for sterilization.
- Describe the method of opening sterile packs and passing sterile supplies onto the sterile field.
- Describe the procedure for open and closed glove technique in preparing for assisting the physician in cardiac catheterization.

Pharmacology

- Describe the basic principles of pharmacology as related to Cardiovascular Technology.
- List the basic classes of pharmacologic agents used in the treatment or diagnosis of cardiovascular disease.
- Describe the mechanism of action of various types of pharmacological agents used in cardiovascular studies.
- Interpret written or verbal orders from the physician concerning pharmacologic agents during cardiac catheterization or other diagnostic procedures.
- Classify pharmacologic agents according to general mode of action in the human body.
- Describe pharmacologic agents commonly utilized in the treatment of a cardiac emergency in a cardiac diagnostic center.

Medical Terminology and Symbols

- Define specified medical terminology with regard to cardiovascular anatomy, physiology and cardiovascular testing.
- Define specified symbols and abbreviations with regard to anatomy, physiology, gases, blood flow and hemodynamics of the cardiovascular system.

PSYCHOMOTOR SKILLS

Medical Instrumentation

- Set up, calibrate and operate the following medical and electronic instruments:
  - Digital multi-meter
  - Waveform generator
  - Basic EKG recorder
  - Electrocardiograph
  - Treadmill
  - Echocardiographs
  - Catheterization hemodynamic monitoring/recording systems and pressure transducers
  - Cardiac output measurement systems
  - Doppler flow meters

Indirect Blood Pressure Measurement

- Measure and record heart rate utilizing the radial, brachial, apical or carotid pulse
- Utilize mercury-gravity or aneroid sphygmomanometer to measure and record systolic and diastolic blood pressure
- Calculate and record pulse pressure and estimated mean arterial pressure from indirect measurements

Electrocardiography (EKG)

- Perform a standard 12-lead electrocardiogram
- Measure atrial, ventricular rates and the mean electrical axis of depolarization
- Measure timing and voltage criteria for the P Waves, QRS complex and T wave
- Measure timing criteria for the PR segment, PR interval, ST segment and ST interval from the electrocardiogram
- Mount the ECG tracing in the prescribed format for physician interpretation

Peripheral Vascular Diagnostics

- Measure and record brachial and lower-extremity segmental blood pressure.
- Calculate ankle/arm index.
- Record analog Doppler waveforms from radial, brachia, superficial femoral, popliteal, posterior tibial, and dorsalis pedis arteries.
- Perform continuous-wave Doppler with spectral analysis of the common, internal, and external carotid arteries.
- Perform continuous-wave Doppler assessment of the superficial femoral, popliteal, and posterior tibial veins.

Echocardiography

- Demonstrate proficiency in preparation of the instrumentation, performance and recording an M-mode echocardiogram with display of right ventricle, ventricular septum, mitral valve, aortic root, aortic valve and left atrium.
- Measure/calculate mitral valve diastolic closing velocity, mitral valve excursion, LA/AO ratio, ejection fraction, E point/Septal separation, and mean velocity of circumferential fiber shortening.
- Demonstrate proficiency in preparation of the instrumentation, performance of, and recording of a 2-D Echocardiogram to demonstrate standard views of:
  - Parasternal Long Axis
  - Parasternal Short Axis at the level of the base of the heart, the mitral valve, and the papillary muscles.
  - Apical two- and four-chamber
  - Apical long axis
- Record M-mode tracings as prescribed from the 2-D echo image.

Aseptic Technique

- Perform surgical scrub technique in preparation for assisting the physician in performing cardiac catheterization.
- Set up and maintain a sterile field in accordance with procedures required for aseptic technique.
- Prepare operative site as directed by the physician for guide wire or catheter insertion.
- Assist the physician in performing cardiac catheterization by maintaining the sterile field and passing surgical instruments, guide wires or catheters as required.
- Identify, prepare and maintain surgical instruments utilized in cardiac catheterization procedures.
- Assist the physician in donning surgical gown and gloves in preparation for the catheterization procedure.

Hemodynamic Monitoring

- Identify and record normal and specified abnormal cardiac waveforms on a typical monitoring or recording system.

AFFECTIVE SKILLS

- Develop and maintain a professional attitude during all on-campus laboratory experiences.
- Display a professional attitude with regard to proper utilization of instrumentation and departmental supplies.
- Demonstrate a responsible attitude in proper cleanup and restoring equipment and supplies at the conclusion of lab sessions.
- Develop and maintain an attitude of striving for accuracy and excellence in diagnostic testing.
- Develop and maintain an attitude of a lifelong learner by attending workshops and conferences to acquire continuing medical education.
- Develop and practice good patient interactive skills, helping to calm fears, explaining procedures, and generally making the patient's test a positive experience.
- Develop and maintain an attitude of professional, cooperative, and pleasant interaction with coworkers and physicians.
- Develop and maintain an attitude of generosity in sharing one's knowledge of medical diagnostic skills.

COMPETENCIES FOR THE INVASIVE CARDIOVASCULAR SPECIALTY

COGNITIVE SKILLS

GENERAL

- Define the indications and standard protocols for:
  - Right Heart Catheterization
  - Left Heart Catheterization
  - Pediatric Catheterization
  - Generalized Angiography
  - Coronary Arteriography
  - Percutaneous Transluminal Coronary Angioplasty (PTCA) and Stenting
  - Percutaneous Laser Treatments
  - Atherectomy
  - Thombolytic Therapies
  - Balloon Valvuloplasty
  - Electrophysiology Studies
  - Pacemaker Insertion
  - Intra-Aortic Balloon and other Cardiac Assist Therapy
  - Coronary Artery Bypass Surgery
  - Valve Repair and/or Replacement
  - Repair of Congenital Heart Defects
- Describe the duties of the cardiovascular technologist in assisting the physician in the role of:
  - Physiologic Monitoring / Recording Technologist
  - Circulator
  - Scrub Technologist
- Describe instrumentation required to perform and monitor cardiac catheterization and open heart surgery.
- Recognize the normal anatomy of the cardiovascular system:
  - Internal Structure of the Heart
  - Coronary Arteries
  - The Great Vessels
- Define the normal physiologic limits of the cardiovascular system using:
  - Hemodynamic Pressures
  - Blood Gas Values
  - Oxygen Saturation Values
  - Acid-Base Conditions

Cardiopulmonary Assessment

- Describe the oxyhemoglobin dissociation curve, define the P-50 value, and explain the principles of oxygen transport.
- Recognize the manifestation of hypoxemia due to V/Q abnormalities.
- Recognize and characterize disturbances in acid-base balance.
- Interpret arterial blood gas results and correlate them with clinical findings.
- Identify and quantify the degree of intracardiac or intravascular shunt through analysis of physiologic data.

Physiologic Monitoring and Recording

- Recognize and categorize both normal and abnormal intracardiac and intravascular pressure recordings
- Recognize and categorize disturbances in cardiac rate and rhythm, including conduction defects and current of injury.
- Describe the measurement indices of cardiac function.

- Demonstrate calculation of cardiac indices, vascular resistances, pressure gradients and valve areas.
- Describe the equipment and protocols required to perform electrophysiology testing and the analysis of conduction defects.

X-ray Safety and Imaging Techniques

- Describe the sources and methods of production of ionizing radiation in the cardiac catheterization laboratory.
- Describe radiation safety procedures for the patient, physician and laboratory staff.
- Define the rotational and angulation x-ray projections of the heart, thorax and peripheral blood vessels.
- Recognize the chambers of the heart, valves and coronary arteries during angiographic procedures.
- Describe the interactions of contrast media with the human body, x-rays and the angiographic image.
- Describe methods for quantitative analysis of x-ray images of the heart.

Cardiovascular Pharmacology

- Identify pharmacologic agents utilized in the treatment of cardiovascular disease.
- Identify pharmacologic agents utilized in the cardiac catheterization laboratory by their category, mechanism of action, mode of administration, and dosage.
- Describe the expected and potential adverse effects of contrast media administration.
- Describe the potential indicators of allergic reaction to contrast media and the medications used both for pretreatment and to counteract allergic response.
- Describe the placement and use of intravenous lines as relates to administration of fluid therapy and medications during cardiac catheterization.
- Evaluate the patient chart for documentation of and physician orders for:
  - Preoperative Medications
  - Drug Allergy
  - Laboratory Tests and Results
  - Signed Operative Permit

Procedural Skills

- Describe the collection, storage and analysis of arterial blood gas and oximetry samples.
- Identify sterile field supplies, surgical instruments, cardiac catheters, introducers and guide wires utilized in invasive procedures.

Analytical Skills

- Recognize and describe the pathophysiology of both congenital and acquired cardiovascular disease.
- Correlate angiographic and physiologic data with the clinical diagnosis.

Patient Care Issues

- Describe the pre-procedure and post-procedure care of cardiac catheterization and surgical patients.
- Describe the potential complications to cardiac catheterization and open heart surgery.

PSYCHOMOTOR SKILLS

Physiologic Monitoring

- Calibrate, operate and perform quality assurance procedures on multi-channel physiologic recording systems to include:
  - Electrocardiogram amplifiers
  - Electronic blood pressure transducers and amplifiers
  - Indicator dilution cardiac output computers
  - Non-invasive pulse oximeters
  - Fiber optic reflectance oximeters
  - Paper recording systems
  - Digital data archiving devices
  - Intra-aortic balloon or other cardiac assist therapy
- Monitor physiologic data and notify the physician(s) of life threatening:
  - Brady or Tachyarrhythmia
  - Myocardial injury
  - Heart block
  - Hypo or Hypertension
  - Oximetry
- Maintain a complete chronological log of procedures, medications administered and any complications as requested by the physician(s) as part of the patient's medical record.
  - Calculate hemodynamic indicators:
    - Cardiac output and cardiac Index
    - Stroke volume and stroke volume index
    - Systemic and pulmonary vascular resistances
    - Systolic and end-diastolic ventricular volume
    - Ejection fraction
    - Valve area
    - Qp/Qs
- Create a summary report with examples of all hemodynamic waveforms, pressures, blood gases, oximetry and final calculations for the laboratory and patient's medical record.
- Electronically archive all physiologic and x-ray image data.
- Record and annotate indices of cardiac function.

Circulator

- Select appropriate surgical packs, disposable supplies, including catheters and guide wires for use during catheterization procedures.
- Attach monitoring equipment to patient:
  - ECG electrodes and non-invasive blood pressure cuff
  - Pulse oximetry sensor
  - Oxygen consumption monitor
  - Cardiac defibrillator electrodes
- Assist scrub technologist in establishing a sterile field.
- Open and pass surgical packs, instruments, catheters and guide wires using strict aseptic guidelines.
- Prepare pharmacologic solutions using strict aseptic technique.
- Calculate maximum contrast load for the patient based upon weight and creatinine level.

- Position intravascular ultrasound equipment during invasive procedure.
- Establish appropriate intravascular ultrasound image and/or Doppler signal, reducing artifact and establishing appropriate medical signal for physician review.
- Calculate appropriate IVUS and/or Doppler indices and record results.
- Store final image(s) resulting from IVUS or Doppler procedure.
- Assist with performance of transesophageal echocardiography (TEE), including documenting anatomic views and performing quantitative analysis.
- Perform sheath removal and post-procedure hemostasis procedures including holding site, assisting with collagen plug device or suture technique.

Scrub Technologist

- Perform a surgical scrub of hands and forearms.
- Perform open and closed gown and glove procedure.
- Assist physician in gown and glove procedure.
- Demonstrate proper technique in passing sterile supplies and equipment.
- Identify, prepare and maintain surgical instruments for catheterization procedures.
- Maintain a sterile field during catheterization procedures.
- Assist in preparing the operative site for catheterization using surgical drapes.
- Operate fluid delivery systems, contrast injection and hemodynamic monitoring systems in a sterile environment.
- Assist the physician in the performance of the catheterization procedure and with collagen plug closure device or suture technique.
    - Apply antiseptics, surgical dressings and bandages to the operative site as directed by the physician.

AFFECTIVE SKILLS

- Utilize an awareness of patient apprehension toward diagnostic procedures to provide support and comfort to the patient and family.
- Utilize an awareness of the hazards of working with ionizing radiation to protect patients and other health care workers.
- Develop and practice an awareness of the importance of maintaining strict aseptic technique during the performance of invasive procedures in the cardiac catheterization laboratory.
- Develop a professional attitude and exercise good judgment in:
    - All interactions with patients, families and other health care workers
    - A shared responsibility to provide a safe and efficient working environment
    - Timely reporting to work and preparation for daily activities
    - Maintaining a commitment to continuing education through:
- Participation in scientific and medical conferences and workshops
- Reading scientific and medical journals or periodicals

GROSSMONT COLLEGE
CARDIOVASCULAR TECHNOLOGY PROGRAM

ADULT ECHOCARDIOGRAPHY SPECIALTY
COMPETENCIES REQUIRED FOR GRADUATION

COGNITIVE SKILLS

Cardiac Exercise Stress Testing

- Describe and define common protocols utilized in Exercise Stress Testing.
- Describe and define electrode configurations for bipolar, augmented vector, precordial and orthogonal leads.
- Describe potential life-threatening situations associated with Exercise Stress Testing including changes in cardiac rhythm, systemic blood pressure, ST-T wave abnormalities or the patient's physical well being.
- Define the electrocardiographic findings which constitute a positive or negative stress test.
- Define the following terms or concepts as related to Exercise Stress Testing:
  - Multi-stage test
  - Single level test
  - Intermittent test
  - Continuous test
  - Maximal test
  - Submaximal (variable) test
  - Metabolic energy requirement (MET)
- Define the following electrocardiographic terms as related to exercise stress testing:
  - Isoelectric baseline
  - ST-2 point
  - ST-2 segment Level
  - J-point
- Recognize and define prescribed ST segment configurations that occur during exercise stress testing.
- Describe the technique required for patient preparation for exercise stress testing.

Ambulatory EKG Monitoring

- Describe standard electrode configurations used in ambulatory ECG monitoring.
- Describe Ambulatory ECG recording devices.
- Describe the function and operation of ambulatory ECG scanning devices.
- Define the clinical application and significance of the patient diary.
- Recognize and define cardiac arrhythmias encountered in ambulatory ECG analysis and processing.

Echocardiography

- Recognize, define and label all cardiac surfaces, chambers, valve leaflets and papillary muscles in the following 2-D and M-mode views:
  - Parasternal long axis
  - Parasternal RA/RV
  - Parasternal 4-chamber
  - Parasternal short axis at:
    - Base
    - Mitral Valve
    - Papillary muscles
    - Bifurcation of MPA

Apical 4 & 5 chamber
Apical 2 chamber
Apical long axis
Standard subcostal
Subcostal short axis
Subcostal IVC & hepatics
Suprasternal notch of LPA
Suprasternal notch long axis
Suprasternal notch short axis
M-mode views:
Aortic root & LA
Mitral valve
LV/RV
Pulmonic valve
Tricuspid valve

- Recognize and define cardiac murmurs for the following cardiac pathophysiology:
  Mitral stenosis
  Mitral regurgitation
  Acute mitral regurgitation
  Mitral valve prolapse
  Tricuspid stenosis
  Tricuspid regurgitation
  Aortic stenosis
  Aortic regurgitation
  Pulmonic stenosis
  Atrial myxoma
  Subacute bacterial endocarditis
  Ventricular septal defects
  Atrial septal defects
- Recognize and define the history, physical findings, and symptoms of the following cardiac pathophysiology:
  Mitral stenosis
  Mitral regurgitation
  Acute mitral regurgitation
  Mitral valve prolapse
  Tricuspid stenosis
  Tricuspid regurgitation
  Aortic stenosis
  Aortic regurgitation
  Pulmonic stenosis
  Pulmonic regurgitation
  Atrial myxoma
  Subacute bacterial endocarditis
  Ventricular septal defects
  Atrial septal defects
  Flail mitral valve
  Dissecting aortic aneurysm
  Pulmonary hypertension
  Papillary muscle dysfunction
  Thrombi
  Ruptured chordae
  Congestive heart failure

- Recognize and define the 2-D, M-mode and Doppler findings for the following cardiac pathophysiology:
  - Mitral stenosis
  - Mitral stenosis
  - Mitral insufficiency
  - Acute mitral regurgitation
  - Mitral valve prolapse
  - Tricuspid stenosis
  - Tricuspid regurgitation
  - Aortic stenosis
  - Aortic regurgitation
  - Pulmonic stenosis
  - Pulmonic regurgitation
  - Atrial myxoma
  - Subacute bacterial endocarditis
  - Ventricular septal defects
  - Atrial septal defects
  - Flail mitral valve
  - Dissecting aortic aneurysm
  - Pulmonary hypertension
  - Papillary muscle dysfunction
  - Thrombi
  - Ruptured chordae
  - Bicuspid aortic valve
  - Mitral valve annulus calcification
  - Redundant mitral valve
  - Ebstein's malformation
  - Tricuspid atresia
  - Cardiac sarcoma
  - Ultrasonic artifact
- Recognize and define the physical findings, symptoms and echocardiographic criteria of pericardial effusion, cardiac tamponade and constrictive pericarditis.
- Recognize and define the classifications of pericardial effusion.
- Recognize potential sources of error when attempting to identify pericardial effusion via echocardiography.
- Recognize and define the typical history, physical findings, symptoms and echocardiographic criteria for coronary artery disease.
- Recognize, define and distinguish between stable angina, unstable angina and Prinzmetal's angina.
- Differentiate factors which indicate coronary vs. non-coronary chest pains.
- Recognize, describe and define the symptoms and physical findings associated with myocardial infarction.
- Differentiate between transmural and subendocardial myocardial infarction.
- Define the electrocardiographic findings in acute, recent, age indeterminate and chronic myocardial infarction.
- Recognize and define electroca5rdiographic findings in specified types of myocardial infarction.
- Recognize, define and label the wall segments of the left ventricle in the parasternal short axis view at the level of the papillary muscles.
- Calculate and define the following left ventricular function indices:
  - Stroke volume, cardiac output, and cardiac index
    - Pompo
    - Tiechholz
    - Ellipsoid Biplane
    - Simpson's Rule
    - LV Mass
    - LV Chamber size
    - Percent posterior wall thickening
    - Percent ventricular septum thickening

Posterior wall/septum amplitude and excursion
Circumferential indices
Mean posterior wall velocity (contractility index)
Wall stress

- Define the following terms with regard to the cardiac wall motion:
  - Hyperkinetic
  - Hypokinetic
  - Akinetic
  - Dyskinetic
- Describe and define the following terms with regard to left ventricular aneurysm:
  - Anatomical
  - Functional
  - False or pseudoaneurysm
- Describe and define the history, physical findings, symptoms and echocardiographic findings of the following cardiomyopathies:
  - Dilated (Congestive)
  - Hypertrophic
  - Restrictive
  - Ischemic
- Describe and define the secondary causes for cardiomyopathy.
- Recognize and define the following types of prosthetic valves:
  - Starr-Edwards (Ball-cage)
  - St. Jude
  - Bjork-Shiley (Tilting Disc)
  - Porcine Heterograft
- Describe and define abnormal findings associated with prosthetic valves as demonstrated by echocardiographic data.
- Recognize and define the echocardiographic findings of right ventricular volume overload.
- Describe the echocardiographic/Doppler findings in the following heart lesions.
  - Tetralogy of Fallot
  - Transposition of the great arteries
  - Atrial septal defects
  - Ventricular septal defects
  - Truncus arteriosus
  - Double-outlet right ventricle
  - Patient ductus arteriosus
  - Hypoplastic left heart syndrome
- Calibrate and define Doppler equations for:
  - Mitral and tricuspid valve area using pressure halftime
  - Blood flow velocities and pressure gradients across all valves
  - Aortic valve area
  - Right and left ventricular ejection times.
  - Right and left ventricular pre-ejection periods
  - Cardiac output

- Identify the following transesophageal echocardiography views and describe the depths for the three basic levels:

Transgastric transducer position

Transverse	Longitudinal
Short-axis section of the left ventricle at the level of: Papillary muscles Mitral valve Apex	Two-Chamber view of the left ventricle showing: Postero-inferior walls Anterior wall Mitral valve leaflets

Mid-esophageal transducer position

Transverse	Longitudinal
Four-chamber view showing: Left atrium Mitral leaflets LV/IV septum lateral wall Right ventricle IA septum Right atrium	Two-Chamber view showing: Left atrium Mitral leaflets LV posteroinferior wall LV posteroanterior wall
LV outflow view showing: LVOT Aortic root and AV	LVOT view with longitudinal cuts of a LVOT: LVOT Aortic root and AV

Basal views transducer position

Transverse	Longitudinal
Aortic root, AV, and RVOT: Proximal coronary arteries, LAA, pulmonary veins SVC, aorta, upper LA and IA septum	Longitudinal section of proximal ascending aorta: Long axis of RVOT, MPA, and PV Long axis of SVC-RA and IA

Hospital Procedures

- Define and describe standard hospital procedures and protocols with regard to:
  - Transporting patients
  - Code Blue and Code Red
  - Patient restraints and side rails
  - Infectious disease precautions
  - Isolation and reverse isolation
  - Intravenous lines
  - Swan-Ganz catheters
  - Foley catheters
  - Nitro paste
  - Oxygen lines/ventilators
  - Monitoring electrodes
  - Aseptic techniques
  - Radiation safety

PSYCHOMOTORS SKILLS

Exercise Testing

- Explain the procedure in terms easily understood by the patient.
- Attach electrocardiographic electrodes to the patient's chest for monitoring and recording test.
- Calibrate instrumentation in preparation for exercise stress testing.
- Calculate and record the predicted maximum heart rate.
- Position the patient on the treadmill or bicycle ergometer.
- Measure and record resting systemic blood pressure.
- Perform and record resting, standing and hyper ventilation ECG.
- Monitor and record exercise systemic blood pressure during each stage of the examination.
- Monitor and alert the attending physician to changes in the electrocardiogram during any point of the examination.
- Monitor and record the patient's physical condition during performance of the exercise stress test.
- Locate, label and prepare the exercise stress test for physician interpretation.
- Perform echocardiography with treadmill stress testing.

Ambulatory Electrocardiographic Monitoring

- Explain the procedure in terms easily understood by the patient
- Explain the value and procedure of the patient diary.
- Attach electrocardiographic electrodes to patient.
- Prepare and activate electrocardiographic recording device.
- Scan, label and log the study for physician interpretation.

III. ECHOCARDIOGRAPHY

- Explain the procedure in terms easily understood by the patient.
- Position the patient to obtain parasternal, apical, subcostal and suprasternal views.
- Attach ECG electrodes to obtain a lead to configuration electrode.
- Adjust the electrocardiogram for position and size on the monitor screen.
- Calibrate and adjust 2-D echo controls for maximum definition of cardiac chambers, valves, valve leaflets and great vessels to include:
    - Time gain compensation
    - Pre- and post-processing curves
    - Master gain
    - Reject or compress
    - Depth settings
    - Sector angle
- Select the proper frequency transducer to obtain optimal images for various patients.
- Locate, display and record the following echo views:
    - Parasternal Long axis
    - Parasternal RA/RV
    - Parasternal 4-chamber
    - Parasternal short axis at:
        - Aorta (base)
        - Mitral valve
        - Papillary muscles
        - MPA with bifurcation
    - Apical 4 & 5 chamber
    - Apical 2 chamber
    - Apical long axis (RAO equivalent)
    - Subcostal 4-chamber

Subcostal long axis
Subcostal IVC & hepatics
Suprasternal notch of long axis (LPA)
Suprasternal notch long axis
Suprasternal notch short axis
M-mode Views:
Aortic root & LA
Mitral valve
LV/RM
Pulmonic valve
Tricuspid valve

- Record, measure and calculate the following parameters from the echocardiogram.
  Aortic root diameter
  Left atrium diameter
  Aortic valve excursion
  Mitral valve E-F slopes
  Mitral valve excursion
  Mitral valve E point to septum
  Left ventricle outflow track diameter
  Left ventricular end diastolic dimension
  Left ventricular end systolic dimension
  Left ventricular fractional shortening
  Left ventricular stroke volume
  Cardiac output
  Left ventricular fractional shortening
  Left ventricular posterior wall thickness in diastole and systole
  Left ventricular posterior wall amplitude
  Ventricular septum thickness at end diastole
  Ventricular septum amplitude
  Septal/LV thickness ratio
  Right ventricular end-diastolic dimension
  Pulmonic valve “a” wave depth
  Tricuspid valve closing velocity
- Record and interpret echocardiographic/Doppler findings in the following cardiac abnormalities:
  Mitral stenosis
  Mitral regurgitation
  Acute mitral regurgitation
  Mitral Valve prolapse
  Tricuspid stenosis
  Tricuspid regurgitation
  Aortic regurgitation
  Aortic stenosis
  Pulmonic stenosis
  Pulmonic regurgitation
  Atrial myxoma
  Subacute bacterial endocarditis
  Ventricular septal defect
  Atrial septal defects
  Flail mitral valve
  Dissecting aortic aneurysm
  Pulmonary hypertension
  Papillary muscle dysfunction
  Thrombi
  Ruptured chordae
  Bicuspid aortic valve

Mitral valve annulus calcification
Redundant mitral valve
Ebstein's malformation
Tricuspid atresia
Cardiac sarcoma
Ultrasonic artifact

- Position the patient for recording the Doppler echocardiogram.
- Display and record pulsed wave Doppler signal.
- Pre-set and adjust as required the following Doppler controls:
  Doppler transmit
  Gain
  Filters
  Grayscale
  Spectral display
  Zero line position
  Scale of spectral display
  Angle correction
  Trigger delay
- Display and record blood flow velocities across all cardiac valves.
- Display and interpret6 regurtitant blood flow across all valves.
- Detect, display and record arterial and ventricular septal defects.
- Measure and/or calculate the following hemodynamic data from Doppler echocardiograms:
  Peak velocities
  Instantaneous pressure
  Pressure half time (mitral valve area)
  Aortic valve area (continuity formula)
  Left ventricular ejection time and pre-ejection period
  Cardiac output
- Demonstrate proficiency in the use of continuous-wave Doppler with and without pulsed wave information.
- Perform 2-D and M-mode color flow mapping/recording
- Record and turn in to the instructor a complete 2-D and M-mode echocardiogram with calculations on a normal subject by the end of the first semester.
- Perform a complete 2-D and M-mode echocardiogram in a maximum time of 45 minutes by the end of the first semester.
- Perform and turn in by the end of the second semester a complete M-mode, 2-D and Doppler echocardiogram with required calculations on a patient with cardiac disease.
- Review three complete M-mode, 2-D and Doppler studies on abnormal patients and write a narrative with regard to findings.

AFFECTIVE SKILLS

- Demonstrate an attitude of caring and support for patients, and especially:
  Nervous patients
  Patients in pain
  Agitated patients
  Critically ill patients
  Concerned family members and friends
- Demonstrate the ability to communicate on a professional level with doctors, nurses, and fellow technologists.
- Develop and maintain an attitude of striving for accuracy and excellence in diagnostic testing.
- Demonstrate commitment to continuing education by attending workshops and conferences, and by reading pertinent journals, periodicals, and texts.
- Develop and practice good patient interactive skills, helping to calm fears, explaining procedures, and generally making the patient's test a positive experience.

- Develop and maintain and attitude of professional, cooperative, and pleasant interaction with coworkers and physicians.
- Participate in the education of students in allied health science.

GROSSMONT COLLEGE
CARDIOVASCULAR TECHNOLOGY PROGRAM

VASCULAR TECHNOLOGY SPECIALTY
COMPETENCIES REQUIRED FOR GRADUATION

COGNITIVE SKILLS

Anatomy

- Describe the location and distribution of the cerebrovascular circulation, including:
  Aorta, innominate, subclavian
  Common, internal, and external carotids
  Vertebral, basilar, circle of Willis
  Ophthalmic and periorbital branches
  Major external carotid branches
  Internal and external jugular veins; brachiocephalic veins; superior vena cava
- Describe the location and distribution of the systemic circulation of the upper extremities, including:
  Axillary, brachial, radial, and ulnar arteries and veins
  Palmar arches and digitals
  Cephalic, basilic, and median cubital veins
- Describe the location and distribution of the major abdominal vessels, including:
  Aorta, celiac trunk, splenic, hepatic, superior and inferior mesenteric, and renal arteries
  Inferior vena cava; hepatic, renal, and portal veins
  Common, internal, and external iliac arteries and veins
- Describe the location and distribution of lower-extremity circulation, including:
  Common femoral, superficial femoral and deep femoral arteries and veins
  Popliteal, anterior tibial, tibioperoneal trunk, posterior tibial and peroneal arteries and veins
  Dorsalis pedis, pedal arches, and digitals
  Greater and lesser saphenous veins, perforating veins, posterior arch vein, soleal sinuses, and gastrocnemius muscular veins
- Describe the individual vessels according to their proximal and distal landmarks.
- Describe the microscopic anatomy of the circulatory system with regard to the layers and the cellular composition of vessel walls.
- Define the five types of blood vessels and characterize the size, wall composition, and functional properties of each.
- Describe and define the fundamental components of blood, including red blood cells, platelets, white blood cells, plasma, plasma proteins, and electrolytes.

Physiology

- Describe the basic flow equation and resistance equation as they relate to vascular flow.
- Define Poiseuille's Equation, and describe the effect on blood flow of a change in each variable. Describe the three conditions pertaining to the equation that do not apply to the human circulatory system: steady vs. pulsatile flow, rigid vs. distensible tubes, Newtonian fluid vs. blood.
- Define the Law of LaPlace, and state its relevance to vascular anatomy and pathophysiology.
- Define Reynolds's equation, describing the factors that contribute to the likelihood of turbulent flow.
- Describe the types of energy manifested in the circulatory system, and describe normal and abnormal causes of energy loss in arterial flow.
- Describe and define the arterial energy wave and the effects of reflection and summing of these waves on blood pressure and pulsatility.

- Describe and define local and general control of blood flow, vascular resistance, and blood pressure.
- Describe and define types of arterial flow profiles, including where and when they occur.
- Describe flow patterns at arterial bifurcations, particularly the carotid bifurcation, and the implications for the development of atherosclerotic lesions.
- Describe the effect of distal resistance on diastolic flow.
- Describe the pressure drops along the different levels of the circulatory system. Compare normal venous resistance to arterial resistance, and describe the effect of venous anatomy on venous resistance.
- Describe the effects of respiration, hydrostatic pressure, venous valves, and the muscle pump on venous flow.

Pathophysiology: Arterial

- Describe and define the current theories of atherogenesis.
- List and define the risk factors and most common anatomical sites of atherosclerotic disease.
- Describe and distinguish among the four types of atheromatous lesions, including their appearance in the ultrasound scan.
- Describe the behavior of flow through varying degrees of arterial stenosis from mild to hemodynamically significant to severe stenosis and finally to total occlusion. Note the effect on velocity and flow profiles proximally, within the stenosis, and distally.
- Define the types and causes of bruits in the arterial system.
- Describe and define the mechanism of pressure drop after exercise, noting the effect of increased flow through arterial stenosis and of collaterals.
- Describe and define potential routes of collateral flow in the cerebrovascular circulation.
- Describe the two basic types of stroke: ischemic vs. hemorrhagic stroke. Describe the two basic etiologies of atherosclerotic stroke: hemodynamically significant lesion and thromboembolic lesion.
- Define and distinguish TIA, RIND, and CVA; list and distinguish between carotid territory and vertebrobasilar territory symptoms.
- Describe the diagnostic modalities for the detection of cerebrovascular disease, and define the rationale for each. (Noninvasive, MRI/MRA, angiography)
- Distinguish duplex characteristics of the different kinds of atherosclerotic plaque and grades of carotid stenosis, and describe the duplex signs of total occlusion.
- Describe possible treatments for patients with carotid artery disease.
- Describe possible symptoms and noninvasive findings for subclavian steal syndrome.
- Describe the clinical indications, instrumentation, and approaches used for the performance of transcranial Doppler.
- Describe the symptoms, possible causes, and treatment of acute lower-extremity arterial disease.
- Describe the physical signs and symptoms of the various stages of chronic lower-extremity arterial occlusive disease.
- Describe possible treatments for different locations and degrees of severity of chronic arterial occlusive disease.
- Define normal and abnormal findings in lower-extremity arterial Doppler waveforms and segmental blood-pressure measurements, describing how they can localize significant lesions. Interpret waveform-and-pressure (and volume recording) arterial studies to diagnose lower-extremity arterial obstruction.
- Describe the performance and interpretation of lower-extremity arterial duplex scanning.
- Describe the performance and interpretation of lower-extremity arterial bypass graft duplex scanning, for both vein graft and synthetic graft. Identify the most common sites of obstruction.

Pathophysiology: Venous

- List and define the events leading to hemostasis.
- Describe the mechanism of edema formation, including the role of venous pressure and osmotic gradients in the capillaries.
- Define Virchow's Triad. List and define the risk factors and common sites of initial and later involvement in deep vein thrombosis.
- Describe the signs, symptoms, and differential diagnosis for deep vein thrombosis and pulmonary embolus, and describe possible therapies for each.
- Describe the diagnostic modalities for the detection of deep vein thrombosis, defining the rationale for each.
- Describe chronic venous insufficiency and postphlebitic syndrome: symptoms, causes, diagnostic techniques, and treatment.
- Distinguish the duplex characteristics of acute DVT vs. chronic thrombus.

Pathophysiology: Abdominal

- Describe normal and abnormal flow patterns in the abdominal aorta (both supra- and infrarenal) and in the major abdominal arterial branches.
- Define abdominal aortic aneurysm, along with size thresholds for elective repair and diagnostic modalities for detection.
- Describe abdominal aortic endograft therapy. Define endoleaks Type I to Type IV.
- Describe mesenteric-artery disease: symptoms (acute vs. chronic), arteries involved, procedure for duplex diagnosis, and diagnostic criteria.
- Define renovascular hypertension. Describe procedures and diagnostic criteria for renal-artery, hilar-artery, and parenchymal Doppler diagnosis of renal artery stenosis.
- Describe the gross and vascular anatomy of the liver, identifying portal and hepatic vein branches, along with tributaries from abdominal veins.
- Describe the two most common vascular pathologies of the liver. Define normal and abnormal flow patterns in the hepatic and portal veins, describing possible pathological causes for abnormal flow.
- Describe portosystemic collateral pathways, along with their pathological significance. Define TIPS therapy for portal hypertension.

Pathophysiology: Miscellaneous

- Describe the symptoms, methods of detection, and possible treatment for thoracic outlet syndrome.
- Describe primary and secondary Reynaud’s disease, along with their etiologies, detection, and possible treatment.
- Describe signs and symptoms, etiologies, hemodynamics, detection, and possible treatment of arteriovenous fistula.
- Describe the etiologies, signs and symptoms, duplex imaging diagnosis, and possible treatment of pseudoaneurysm (a.k.a. “pulsatile hematoma”).
- Describe symptoms, risk factors, and possible treatment of Buerger's disease.
- Describe the pathology, signs and symptoms, and possible treatment of Takayasu's arteritis.
- Describe causes, common locations, types, diagnosis, and treatment of aneurysms.
- Describe causes, detection, and possible treatment for vasculogenic impotence.

Vascular drugs

- Describe drugs in the following categories; define patients in whom they might be indicated.
  Include the difference between Antiplatelet agents, Anticoagulants and Thrombolytic agents
  Relief of claudication
  Miscellaneous agents: ergotamine, diabetic drugs, Antivert, aspirin, Coumadin and Heparin.

Instrumentation

- Define and describe the fundamental principles of diagnostic ultrasound, including
  characteristics of waves
  frequency, period, wavelength
  propagation speed
  pulses and spatial pulse length
  attenuation
  reflection, refraction, scattering
- Describe the piezoelectric effect, the creation of a piezoelectric crystal, and the basic construction of transducers. Distinguish between continuous-wave and pulse-wave transducer construction and function.
- Describe the effect on the ultrasound beam and on resolution of:
  depth
  frequency and wavelength
  tissue density
  tissue interfaces
  beam width
  pulse length,
  focusing
- Distinguish among A-mode, B-mode, and M-mode methods of ultrasound display.
- Define the Doppler Effect and the Doppler equation, describing the effect of a change of any component of the equation.
- Define fast Fourier transform and describe the elements of the FFT spectral display as used in duplex scanning.
- Define and solve for pulse repetition frequency and Nyquist limit; describe and explain the influence of depth, operating frequency, and Doppler angle on the Nyquist limit and aliasing of the spectral display.
- Describe the production of color flow images, defining the influence of angle, direction, velocity, color maps, and PRF.
- Describe color flow controls and their effect on frame rate.
- Describe processing and methods of display of continuous-wave Doppler instruments.
- Define the established limits of safe ultrasound exposure, the bioeffects known to be caused by ultrasound, and suggested safe practice in the use of diagnostic ultrasound.
- Describe and define pulse detectors and methods of invasive and noninvasive blood pressure measurement.
- Describe protocol for lower- and upper-extremity blood-pressure measurement, including proper cuff placement, selection of cuff size, method of pulse detection, and possible causes for falsely high or low readings.
- Describe arterial plethysmography, defining normal and abnormal waveforms, and including its use in obtaining digital waveforms and pressures.
- Describe the physical principles of photoplethysmography and describe its use in arterial pressure measurement, waveform recording, and venous reflux testing.
- Describe $TcPO_2$ measurement:
  rationale
  instrumentation
  performance of the test
  normal and abnormal results

PSYCHOMOTOR SKILLS

Duplex Scanning

- Take patient history and explain the procedure in terms easily understood by the patient.
- Use the anterior, lateral, and posterior approaches to perform a transverse scan of the carotid arteries, including identification of:
  - Orientation of screen
  - Common carotid artery, proximal to distal
  - Bifurcation
  - Distal limit of internal and external carotid arteries
- Perform a longitudinal scan from a lateral approach according to the following procedure:
  - Orient the screen
  - Scan from proximal to distal common carotid artery
  - Identify the internal and external carotid arteries
  - Scan to the distal limit of the internal and external carotid arteries
  - Move back to proximal common carotid artery
  - Repeat with anterior and posterior approaches
- Record Doppler signals from the proximal and distal common, internal, and external carotid arteries.
- Record a continuous Doppler signal, moving the sample volume from the distal common carotid artery, through the bulb, and well into the internal carotid artery.
- Measure peak-systolic and end-diastolic frequencies and velocities in the internal and common carotid arteries.
- Record an optimal Doppler signal from the vertebral artery.
- Perform a lower-extremity venous scan, starting at the inguinal ligament in the transverse plane, identifying and demonstrating compressibility of:
  - Common femoral artery and vein
  - Saphenofemoral junction and division of superficial and deep femoral arteries
  - Division of superficial and deep femoral veins
  - Superficial femoral vein to distal thigh
  - Popliteal vein and takeoff of lesser saphenous vein
  - Division of anterior tibial, tibioperoneal trunk, peroneal, and posterior tibial veins
  - Entire course of posterior tibial and peroneal veins
  - Entire course of greater saphenous vein
- Scan the lower-extremity arteries (common femoral, superficial femoral, proximal deep femoral, popliteal, tibioperoneal trunk, and tibial arteries) in the longitudinal plane, obtaining and measuring peak frequencies and velocities of optimal Doppler samples at appropriate intervals.
- Obtain Doppler signals from abdominal arteries: suprarenal and infrarenal aorta, superior mesenteric, left and right renal, and iliac arteries.
- Scan the portal and hepatic veins, obtaining Doppler signals from each.
- Scan the upper-extremity veins (subclavian, auxiliary, brachial, radial, ulnar, cephalic, basilic, and median cubital), demonstrating patency and compressibility.
- Scan the subclavian, auxiliary, brachial, radial, and ulnar arteries, obtaining Doppler waveforms at appropriate intervals.
- Obtain optimal color-flow images of the appropriate vessels for each exam
  - carotid
  - lower-extremity arterial and venous
  - upper-extremity
  - abdominal

Continuous-wave Doppler

- Record Doppler waveforms from the common femoral, superficial femoral, popliteal, posterior tibial, and anterior tibial/dorsalis pedis arteries.
- Obtain Doppler signals from the veins accompanying these arteries (excepting AT), with the addition of the greater saphenous vein, evaluating for the following characteristics:
  - Patency
  - Spontaneity
  - Phasicity
  - Augmentation
  - Competence
  - Nonpulsatility
- Record arterial CW Doppler signals from the subclavian, auxiliary, brachial, radial, and ulnar arteries.
- Obtain continuous-wave Doppler signals with spectral analysis from the common, internal and external carotid arteries.

Transcranial Doppler

- Obtain and measure mean velocities of waveforms from the middle, anterior, and posterior cerebral arteries using the temporal window.
- Obtain and measure waveforms from the ophthalmic artery and carotid siphon using the orbital window.
- Obtain and measure waveforms from the vertebral and basilar arteries from the foramen magnum window.

Plethysmography

- Record volume pulse waveforms from the lower extremities using air-cuff plethysmography and from the digits with digital air cuffs.
- Perform the following tests using photoplethysmography:
  - Recording of digital arterial waveforms
  - Reynaud's disease/cold-sensitivity test
  - Thoracic outlet syndrome evaluation with the standard maneuvers
  - Allen test for palmar arch patency
- Perform and interpret the venous reflux test using the PPG.

Blood Pressure Measurements

- Measure and record blood pressures at four levels of the lower extremities, and at the upper arm and forearm, using the Doppler for detection of pulse return.
- Measure and record pressures of the digits using the PPG for the detection of pulse return.
- Perform post-exercise pressure measurements at the tibial and brachial arteries following treadmill or toe-raises, with repeat posterior tibial artery measurements at specified time intervals.
- Perform and record post-reactive-hyperemia measurements of ankle pressures.

AFFECTIVE SKILLS

- Develop and maintain an attitude of striving for accuracy and excellence in diagnostic testing.
- Develop and maintain the attitude of a lifelong learner by attending workshops and conferences, reading relevant journals and books, and generally pursuing further knowledge of the vascular diagnostic field.
- Demonstrate an attitude of caring and support for patients, especially
  - Nervous patients
  - Patients in pain
  - Agitated patients
  - Critically ill patients
  - Concerned family members and friends
- Demonstrate concern for those on whom you are performing procedures, whether real patients in clinical or fellow students when practicing techniques, showing respect for their privacy and dignity.
- Develop and maintain professional, cooperative, and pleasant interaction with coworkers and physicians.
- Develop and maintain an attitude of generosity in sharing one's knowledge of medical diagnostic skills.