



Student Handbook

2024 – 2025

The Grossmont College Cardiovascular Technology Program is accredited by the Commission on Accreditation of Allied Health Education Programs ([CAAHEP](#)) upon the recommendation of the Joint Review Committee on Education in Cardiovascular Technology ([JRC-CVT](#)).

Commission on Accreditation of Allied Health Education Programs

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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 thousands of 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 Philosophy

The college Vision and Mission statements are at the root of process and planning at the college. A college education means many things to many people. As a career technical program, the CVT Program will enable you to join the workforce, earning a livable wage while earning your associate degree in Cardiovascular Technology. This is where the CVT Program fits into the college's mission statement.

Grossmont College Vision Statement

Empowered through a culture of inclusivity, Grossmont College strives to maintain our student-centered philosophy while working to support the ever-changing needs of our students. Along with ensuring student success, Grossmont College continues to advance our antiracism and equity work as we venture further into the 21st century.

Grossmont College Mission Statement

Grossmont College serves the diverse population of our surrounding community and beyond by creating clear and accessible pathways to degrees and jobs leading to social and economic mobility for our students. We work collaboratively to cultivate an equitable student-centered learning environment, and we hold ourselves accountable for improving student outcomes through ongoing assessment, evaluation, and data-informed decision making. Grossmont College offers associate degrees; transfer preparation, including Associate Degrees for Transfer; certificate programs; career education and workforce development.

Grossmont College Student Services

The college attempts to support students in as many ways as possible. Please look into the offerings for students which include but is not limited to:

- Accessibility Resource Center – ARC
- CalWORKs
- Counseling Center
- EOPS
- Financial Aid
- Health & Wellness
- Mental Health Services
- Success Coach
- Tutoring Center
- Veterans Services

The information about these services can be found on the college website.

Start here: <https://www.grossmont.edu/student-support/index.php>

Also know that the college is concerned and supportive of our students' **basic needs**:

<https://www.grossmont.edu/student-support/basic-needs/index.php>

The Cardiovascular Technology Program

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, Adult Echocardiography, and Non-invasive 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, 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 (Cardiac Sonography)

- 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.

Noninvasive Vascular Study

- 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.

Each CVT cohort begins with the “Core Curriculum” and at the end of the first semester of the program, the students will determine their area of emphasis and will select **one** of these three tracks to follow to the successful completion of the program.

The Cardiovascular Technology Program at Grossmont College leads to an Associate in Science Degree and prepares graduates to enter the allied health field as entry-level

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.

Specialty Selection

Specialty selection in the CVT Program is prioritized 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.

Sequence of Major Courses

Semester I Fall Core Curriculum	
Subject & No.	Units
CVTE 100	2
CVTE 101	4
CVTE 102	3
CVTE 103	2
CVTE 107 (optional)	0.5
Total	11 (11.5)

**Continued next page*

Plus Courses in Selected Areas of Emphasis

Semester II Spring Adult Echocardiography		Semester II Spring Invasive Cardiology		Semester II Spring Vascular Technology	
CVTE 110	3	CVTE 109	3	CVTE 110	3
CVTE 111	4	CVTE 111	4	CVTE 111	4
CVTE 113	1	CVTE 113	1	CVTE 113	1
CVTE 115	4	CVTE 116	4	CVTE 117	4
Total	12	Total	12	Total	12

Summer Session Adult Echocardiography		Summer Session Invasive Cardiology		Summer Session Vascular Technology	
CVTE 114	2	CVTE 114	2	CVTE 114	2
CVTE 130	2	CVTE 130	2	CVTE 130	2
Total	4	Total	4	Total	4

Semester III Fall Adult Echocardiography		Semester III Fall Invasive Cardiology		Semester III Fall Vascular Technology	
CVTE 221	5	CVTE 222	5	CVTE 223	5
CVTE 220	5	CVTE 220	5	CVTE 220	5
Total	10	Total	10	Total	10

(Optional Winter Session clinical course CVTE 225)

Semester IV Spring Adult Echocardiography		Semester IV Spring Invasive Cardiology		Semester IV Spring Vascular Technology	
CVTE 251	5	CVTE 252	5	CVTE 253	5
CVTE 250	5	CVTE 250	5	CVTE 250	5
Total	10	Total	10	Total	10

See college catalog for course descriptions:

<https://www.grossmont.edu/academics/catalog/index.php>

Veteran students have strict unit guidelines and may need to register for extra units to meet those guidelines. It is strongly recommended that Veteran students seek guidance from [Veterans Services](#) department as soon as possible.

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 are 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 at: <https://www.grossmont.edu/student-support/index.php>.

Grading Criteria

The CVT Program has adopted the following grading criteria for all courses. When a course is a combination of lecture and lab, both parts of the course must be passed with a grade of "C" or better to advance in the program. This is to assure competence in both cognitive and psychomotor components of Lecture-Lab courses. 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.

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

An "I" or incomplete grade is sometimes used for special circumstances and the qualifications and requirements of an incomplete grade will be discussed with the instructor and program director before the incomplete grade is given.

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.

Notification of Academic Jeopardy

In the spirit of complete transparency, instructors will meet with students who are in jeopardy of academic failure, have failed an exam, or that there is strong concern about the student's success.

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.

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.

Classroom and Lab Policies

Classroom Attendance/Tardy Policy

You have worked hard and waited to enter this program! Attendance is usually not an issue because most of the CVT students want to be here. Part of your training as a CVT includes professional behaviors and coming to class on time and being ready to "work" is an example of this behavior. Here are the program policies on attendance for your information:

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 ensure 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 caseloads 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.

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 (and will be provided). **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

The consent of the instructor is necessary for audio recording in the classroom. (Accommodation 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.

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 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 lectures 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 “Grossmont College Cardiovascular Technology” in gold. The La Mesa location of Scrub Mart has our specifications. 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.
- A student picture ID card (available from the Admissions & Records - Building 10), giving the student's name and identification as a Grossmont College CVT student.
- 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, 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.

Two patient gowns will be assigned to each student for use 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.

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.

Being hired before graduation

On occasion we have students who are hired before they complete the program, most often at their clinical site. You cannot be paid for clinical time, which is part of your CVT clinical course, and can only be paid on days that you are there as an employee. For example, if your assigned clinical days were Tuesday and Wednesday, then you can be there at clinical on those days, but you cannot be paid for those days. You can be paid for Thursday and Friday (or any day that is not a scheduled clinical day).

Health and Safety

Complio

CVT students will be required to participate with Complio, an immunization and compliance tracking system. There is a fee for the two years of use that will be required due the summer before classes begin in August.

Complio is used by our clinical sites to verify your clinical compliance which will include your immunizations, CPR, TB, etc. as well as the clinical rotation site requirements. For example, if you are assigned to Scripps, then you will need to complete the clinical compliance requirements unique to Scripps Healthcare.

Complio will notify you, the program, and your clinical site if any of your compliance items are about to expire. Please address these notifications as soon as possible as you will be removed from your clinical site if you are not compliant. Often these requirements such as TB may take a few weeks to complete, so once again please be vigilant about notifications from Complio and keep your clinical compliance up to date.

Reentry applications – Please note that approved reentry into the program may require a repeat background check and drug screen as well as any other clinical placement requirements.

CVT student program file

The program maintains a student file for each student including the application to the program, emergency contact information, and various other documents such as any remediation, academic jeopardy, etc. forms. These student files are in part to meet accreditation standards, and for the program to keep a record of students enrolled in the program.

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, the Grossmont-Cuyamaca Community College District will supplement and/or cover subsequent treatment needed.

If you need immediate medical attention:

1. Notify your clinical site supervisor (the person you report to at the clinical site or who immediately supervises you.) Follow the protocol at your clinical site for treatment for work injury.
2. As soon as possible, **but within 24 hours**, notify your Program Track Instructor, the program director, or the CVT Office: 619-644-7303, or College Health Professions Office: 619-644-7149. Injury insurance forms are posted in Canvas for your clinical course.
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.

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.

Disciplinary Policies and Procedures

Student Code of Conduct

As an adult-learner in the CVT program, there is an assumption that you recognize your responsibility as an allied health provider which includes ethical behaviors, understanding of "right and wrong" and accepted social norms.

Actions such as cheating, sexual harassment, attending class or clinical while intoxicated, plagiarism, entering false data on clinical records, or other unacceptable behaviors will be addressed with remediation and/or dismissal from the program.

The CVT Program utilizes the college's "Student Code of Conduct" which can be found in the college catalog and each semester class schedule.

Catalog: <https://www.grossmont.edu/academics/catalog/>

Class Schedule: <https://www.grossmont.edu/academics/schedule/index.php>

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 <https://www.grossmont.edu/student-support/student-affairs/>. All students are responsible for all content of the College Catalog.

Clinical Incident Policy - Unsafe Clinical Practice/Unprofessional Behaviors

A 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/Remediation Plan 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.
- 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.**

Please note that Clinical Incident Reports are retained in the student's record.

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:
 - 1) Unsafe clinical practice: Examples of unsafe practice may include (but are limited to) the following:
 - Failure to display stable mental, physical or emotional behavior(s) which may affect the well-being of others.
 - Failure to follow through on a mandatory remediation plan.
 - Failure to provide proof of current immunizations, flu shot, TB test or CPR card.

- Acts of omission/commission in the care of patients, such as (but are not limited to): physical, mental or emotional harm; jeopardizing patient safety.
 - Lack of verbal and/or psychomotor skills necessary for carrying out safe clinical practice.
 - Attempting activities without adequate orientation or theoretical preparation or appropriate supervision/assistance.
 - 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.
- 2) Violations of professional, legal, or ethical conduct: Examples of violations may include (but are not limited to) the following:
- Dishonesty
 - Falsification of patient records, clinical reports and/or student clinical logs.
 - Unprofessional behaviors with agency staff, co-workers, peers, or faculty which result in miscommunications or disruption of patient care and/or unit functioning.
 - Failure to maintain patient confidentiality according to HIPAA regulations.
 - Academic Fraud.
 - Any violation of the "Student Code of Conduct" as outlined in the College Catalog.
- 3) 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.

Student 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 and 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 an email or written 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 email/letter.
4. The email/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 (unless dismissed from clinical, or removed from class) until the Appeals Committee meets and formulates a decision concerning the appeal.
1. 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 in class, lab or clinical will be up to the recommendation of the faculty member involved with the issue.
2. 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.
3. The Chair of the Appeals Committee will notify the student by phone and email as to the date and time of the appeals hearing.
4. The student may bring a support person to the hearing. The advocate may not participate in the hearing but serves simply as support for the student.
5. 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.
6. The student will have no more than 30 minutes to present to the Appeals Committee which includes witness statements.
7. 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 the 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 of 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.

***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

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 the 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 fail academically must meet with the program director to determine if reentry is appropriate. The CVT Faculty as a whole will discuss and recommend reentry or program dismissal. Please note readmission will require a repeat background check and drug screen as well as any other clinical placement requirements.

Re-entry Procedure for Students

- Meet with the program director as soon as academic failure is identified.
- 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 reentry 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. It is advised that the student submits a letter of recommendation with their petition to repeat any CVT courses.

Program Completion

Associate in Science Degree (Awarded by the College)

It is highly recommended that all CVT students make an appointment with the Grossmont College Counseling Center to ensure all required courses in general education sections have been met.

There is a counselor situated here in our Health Science offices dedicated to the allied health and nursing students only. Please contact the Health Professions Specialist for information on making an appointment.

It is the student's responsibility to ensure 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 with the deadline usually in March for a June graduation date. <https://www.grossmont.edu/admissions/how-to-graduate-with-a-degree-or-certificate/index.php>.

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.

Registry Credential Exams

There are two credentialing companies that offer registry credential exams for the CVT student/graduate: CCI (Cardiovascular Credentialing International) and ARDMS (American Registry for Diagnostic Medical Sonography).

For Invasive students/grads there is only one option, CCI, for the RCIS (Registered Cardiovascular Invasive Specialist) credential.

For Echo and Vascular, there are credential exams with both organizations. CCI has the RCS (Registered Cardiac Sonographer) and the RVS (Registered Vascular Specialist). ARDMS has RDCS (Registered Diagnostic Cardiac Sonographer) and RVT (Registered Vascular Technologist). With the ARDMS exams you must first pass the SPI exam

(Sonography Principles and Instrumentation) which is focused on ultrasound physics. The program recommends students taking the ARDMS route, should plan for the SPI exam during the summer between their first and second year of the CVT Program.

The CVT Program at Grossmont College is CAAHEP accredited, and this allows you to sit for your credential exams before you complete the program – usually up to 60 days before your graduation date.

These exams have fees ranging from \$250 - \$375. Once you achieve your registry credential, you will maintain an active status by meeting continuing education requirements and paying a fee on a triannual basis.

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 (now UCSD) 6655 Alvarado Road San Diego, CA 92120	3
KAISER PERMANENTE ZION MEDICAL CENTER 4647 Zion Avenue San Diego, CA 92120	4
KAISER PERMANENTE SAN DIEGO MEDICAL CENTER 9455 Clairemont Mesa Blvd San Diego, CA 92123	13
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
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

Curriculum and Competencies

The Standards and Guidelines set forth by the JRC-CVT for educational programs in Cardiovascular Technology are in the process of revision and are expected to be approved by CAAHEP in January 2023. In anticipation of this change, the Grossmont College CVT Program will be listing these standards in place of our previous competency listings. The formatting of these competencies is different from our previous student handbooks, but still designed to develop our students into “entry-level” technologists within their chosen CVT specialty.

The General Education requirements will be met between the GE courses required of the AS degree as well as content within the CVT curriculum.

Curriculum for Educational Programs in Cardiovascular Technology

1. General Education

a. Mathematics

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) demonstrate knowledge of mathematics relevant to the practice of cardiovascular technology;
- 2) Apply mathematical computations to solve equations relevant to the practice of cardiovascular technology; and
- 3) explain appropriate strategies/procedures when solving mathematical problems.

b. Written and oral communications

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) Identify styles and types of verbal communication;
- 2) Recognize elements of fundamental writing skills;
- 3) Identify types of non-verbal communication;
- 4) Recognize barriers to communication; and,
- 5) Identify techniques to overcome communication barriers.

c. Social and Behavioral Sciences

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) Develop an understanding of self and the world by examining the dynamic interaction of individuals, groups, and societies as they change and are shaped by history, culture, institutions, and ideas; and
- 2) Identify differences among and between individuals, cultures, or societies across space and time.

d. Computer Science

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) demonstrate the ability to use computers hardware and applications relevant to cardiovascular education and patient care;
- 2) identify computer applications used in health care.

e. Critical Thinking

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) define critical thinking
- 2) identify the skills used in critical thinking;

- 3) Identify the barriers to critical thinking in terms of beliefs, attitudes, feelings, and behaviors;
- 4) analyze concepts for problem solving; and
- 5) demonstrate the ability to draw reasonable conclusions and decisions.

f. Human Anatomy and Physiology

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) describe the structural organization of the human body;
- 2) identify body systems and describe body planes, directional terms, quadrants, and body cavities;
- 3) list major organs and identify the anatomical location in each body system;
- 4) compare the structure and function of the human body across the life span; and,
- 5) describe the normal function of each body system.

h. Physics

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) demonstrate foundational knowledge of general physics principles and concepts, and the application of this knowledge in solving problems in cardiovascular technology.

i. Microbiology

Upon completion of an educational program in cardiovascular technology, the student will:

- 1) discuss the role of microbiology and infection control in our society, industry, research, health, and medicine;
- 2) identify the major types of pathogens;
- 3) explain the relationship between microorganisms and the human host.

2. Competencies required in all concentrations.

* Indicates a skill that the terminal competency assessment must occur in a clinical setting with a patient.

a. Professional Behaviors			
1)	*Show awareness of a patient's concerns related to the diagnostic procedure(s) being performed.		
2)	*Show awareness of a patient's concerns related to pathologic conditions and the associated functional changes.		
3)	*Demonstrate cultural awareness when working with patients and other health care team members. .		
4)	*Use therapeutic communication when working with aging patients and their caretaker(s)/family.		
5)	*Use sound judgment and clinical decision making to ensure safety and prevent errors during all therapeutic and diagnostic procedures.		
6)	*Demonstrates time management.		
7)	*Adheres to personal hygiene standards.		
8)	Demonstrates initiative by performing tasks without prompting.		
9)	Demonstrates confidence by upholding personal choices.		
10)	Demonstrates active listening as evidenced by not asking for instructions to be repeated.		
11)	Implements alternative communication strategies based on situation.		
12)	Demonstrates teamwork by implementing changes to benefit others.		
	Cognitive	Psychomotor	Affective
b. Basic Life Support			
1)	Apply knowledge of the electrocardiogram.	3)	Demonstrate basic life support skills.
2)	Obtain BLS certification.	4)	Reflect and promote the importance of a healthy heart and lungs.
c. Industry Standards and Safety			
1)	Discuss industry safety standards and OSHA guidelines related to safety in the clinical laboratory.	4)	*Use effective ergonomics during all therapeutic and diagnostic procedures.
2)	Identify types of work-related musculoskeletal disorders.	5)	Apply radiation protection and safety principles by:
3)	Demonstrate knowledge of radiation protection and safety by describing:	a.	properly placing the dosimetry badge;
	a. the proper placement of a dosimetry badge;	b.	applying ALARA principles; and
	b. ALARA principles; and,	c.	properly fitting lead.
	c. how to properly fit lead.		
d. Ethics			
1)	List and explain the patients' rights and safety including: a. Informed consent b. Patient identification	3)	Communicate appropriate information to a member of the healthcare team during a hand-off.

	c. Confidentiality d. HIPAA e. Patient Bill of Rights				
	2) Describe the communication that must occur during hand-off.				
e. Documentation and the Medical Record					
	1) Discuss the documentation needed for a. preprocedural activities and b. postprocedural activities.	2) Complete appropriate documentation a. preprocedural b. postprocedural	4) *Show respect for confidentiality of the medical record.		
		3) Protect the integrity of the medical record.			
f. Preprocedural activities					
	1) Discuss the importance of reviewing physicians' orders.	7) *Identify orders that need clarification and communicate with the ordering provider.			
	2) State the rationale for identifying patient allergies.	8) *Perform pre-procedural teaching.			
	3) Define informed consent.	9) Obtain informed consent.			
	4) Identify pre-procedural teaching that is required for the procedure.				
	5) Define procedural time-out for overall safety.				
	6) State the rationale for using sterile technique.				
g. Infection Control					
	1) Define Standard Precautions.	4) Demonstrate asepsis and proper hand-washing techniques.	7. *Adhere conscientiously to required precautions when participating in patient care.		
	2) Discuss isolation procedures used to prevent transmission of infections.	5) Select PPE for various categories of precautions and isolations.			
	3) Identify personal protective equipment (PPE) used for specific barriers.	6) Demonstrate proper procedures for donning and doffing PPE.			
h. Vascular flow and hemodynamics					
	1) Relate the relevance of the following concepts/equations on the circulatory system: a. resistance equation; b. volumetric flow equation; c. simplified law of hemodynamics;				

	d. Poiseuille's Law; e. Ohm's Law; and, f. Reynold's number				
	2) Contrast steady, pulsatile, and phasic flow.				
	3) Discuss the arterial system, including: a. normal physiology; b. pathophysiology; and, c. hemodynamics.				
	4) Discuss the venous system, including: a. normal physiology; b. pathophysiology; and, c. hemodynamics.				
i. Quality Assurance					
	1. Correlate clinical findings with other imaging findings.	2. Participate in quality assurance activities.			
		3. Monitor equipment for safety.			

3. Adult Echocardiography concentration

**Indicates a skill that the terminal competency assessment must occur in a clinical setting with a patient.*

a. Cardiovascular anatomy and physiology					
	Cognitive		Psychomotor	Affective	
1)	Identify the:		4) Use 2-dimensional (2D) echocardiographic views to identify:	6) Reflect and promote the importance of a healthy heart and lungs.	
	a.	cardiac chambers and concomitant septa;	a.	cardiac chambers and concomitant septa;	7) Show awareness of a patient's concerns related to diagnostic procedures being performed.
	b.	valvular anatomy and accompanying apparatus;	b.	valvular anatomy and accompanying apparatus;	
	c.	arterial and venous circulation;	c.	arterial and venous circulation;	
	d.	coronary artery anatomy and distribution; and,	d.	coronary artery anatomy and distribution; and	
	e.	relationship between cardiac chambers and great vessels.	e.	relationship between cardiac chambers and great vessels.	
2)	Describe the structure and function of the:		5) Use 2D, M-mode, color Doppler, pulsed wave, wave and continuous wave Doppler to identify:		
	a.	cardiac chambers and concomitant septa;	*a. venous circulation (e.g., IVC, collapse and flow);		
	b.	valvular anatomy and accompanying apparatus;	b. valvular function (e.g., stenosis, regurgitation, HOCM, diastology);		
	c.	arterial and venous circulation;	c. pericardial disease (e.g., inflow variation, RC diastolic collapse);		
	d.	coronary artery anatomy and distribution; and,	d. cardiac restriction; and		
	e.	relationship between cardiac chambers and great vessels	*e. cardiac chamber volumetric and linear dimensions and function (e.g., bi-plane volumes, internal dimensions, TAPSE)		
3)	Identify normal/abnormal embryologic cardiac development.				
b. Cardiac hemodynamic principles to evaluate normal cardiac flow					
1)	Compare right and left ventricular systolic and diastolic function, relative to loading conditions and filling pressures.		7) Use echocardiography to assess right and left ventricular systolic and diastolic function		

2)	List the normal intracardiac pressures		8) *Assess intracardiac pressures.	
3)	Recognize abnormal intracardiac pressures.		9) *Use Doppler to assess valvular velocity and pressures.	
4)	Calculate hemodynamics, including: a. stroke volume; b. cardiac output; c. cardiac index; d. pressure gradients; and e. valve area;		10) *Use Doppler to calculate a. stroke volume b. cardiac output c. cardiac index d. pressure gradients e. valve area	
5)	Discuss electrophysiology, including		11) *Perform 3-lead ECG	
	a.	ECG waveform;		
	b.	identify cardiac rhythms;		
	c.	identify ECG changes associated with physiologic events;		
	d.	electrical pathway of the heart; and,		
	e.	recognize ECG artifacts.		
6)	Analyze the components of the Wigger's diagram.			
c. Cardiovascular Pathophysiology				
1)	Contrast how the cardiovascular system coordinates its functions under normal and abnormal conditions.		6) * Assess the cardiopulmonary status of a patient.	8) Show awareness of a patient's concerns related to pathologic conditions and the associated functional changes.
2)	Describe the most common cardiovascular disorders and the functional changes that occur with each disorder.		7) Adjust the echocardiography imaging protocol appropriately for the specific cardiovascular pathology being assessed (e.g., stenosis, regurgitation, tamponade, constriction, HOCM).	
3)	Identify pathologic changes commonly seen on echocardiography.			
4)	Identify pathology changes commonly seen on other imaging modalities (e.g., cardiac MRI, chest radiograph).			
5)	Describe the clinical findings seen in patients with cardiopulmonary disease.			
d. Indications and limitations of echocardiography				
1)	Identify appropriate use of:			

	<ul style="list-style-type: none"> a. transthoracic echocardiography b. stress echocardiography c. transesophageal echocardiography d. intraoperative echocardiography e. ultrasound enhancing agents f. 3-D echocardiography g. interventional echocardiography g. 2-D myocardial strain imaging i. ultrasound respirogram j. color M-mode 				
e.	Pharmacology				
	1)	Discuss intravenous administration of echo enhancing agents.			
	2)	Discuss the medications commonly used for cardiac stress testing.			
f.	Discuss cardiac changes that occur in the athletic heart.				
g.	Describe the most common artifacts seen in cardiography.				

4. Invasive Cardiovascular Technology concentration

**Indicates a skill that the terminal competency assessment must occur in a clinical setting with a patient.*

a. Anatomy and Physiology		Psychomotor		Affective	
Cognitive		Psychomotor		Affective	
1)	Identify the	7)	Manipulate the imaging equipment to obtain appropriate views of the		
	a. cardiac chambers and concomitant septa;		a. cardiac chambers and concomitant septa;		
	b. valvular anatomy and accompanying apparatus 1. central 2. peripheral;		b. valvular anatomy and accompanying apparatus 1. central 2. peripheral;		
	c. arterial and venous circulation 1. central 2. peripheral;		c. arterial and venous circulation 1. central 2. peripheral;		
	d. coronary artery anatomy and distribution; and,		d. coronary artery anatomy and distribution; and,		
	e. relationship between cardiac chambers and great vessels.		e. relationship between cardiac chambers and great vessels		
2)	Describe the structure and function of the:	8)	Select and prepare the appropriate equipment for cardiac hemodynamic measurements.		
	a. cardiac chambers and concomitant septa;				
	b. valvular anatomy and accompanying apparatus;				
	c. arterial and venous circulation 1. central 2. peripheral;				
	d. coronary artery anatomy and distribution;				
	e. relationship between cardiac chambers and great vessels; and				
	f. sympathetic and parasympathetic nervous system.				
3)	Describe cardiovascular circulation.				
4)	Analyze the components of the Wigger's diagram.				

5)	Identify coronary artery physiology, including:				
	a. coronary perfusion pressure;				
	B determinates of coronary flow; and,				
	c. microcirculation and autoregulation				
6)	Discuss the mechanism by which the kidney regulates blood pressure.				
b. Perioperative Patient Management					
1)	Describe the activities included in preparing a patient for a procedure.	8)	*Prepare a patient for the procedure.		
2)	Discuss the activities and purpose of a time out.	9)	Perform time out.		
3)	Recognize cardiac monitoring activities that occur during the procedure.	10)	*Monitor the patient and respond appropriately during the procedure.		
4)	Describe postprocedural care activities.	11)	Perform postprocedural care.		
5)	Recognize complications associated with cardiovascular procedures.	12)	Respond to patient emergencies that occur during invasive cardiovascular procedures.		
6)	Discuss the signs and symptoms of compromised respiratory status.	13)	Establish a patent airway and apply supplemental oxygen.		
7)	Discuss electrophysiology, including	14)	Perform a 12-lead ECG.		
	a. The ECG waveform;				
	b. identifying cardiac rhythms;				
	c. identifying ECG changes associated with physiologic events;				
	d. the electrical pathway of the heart;				
	e. recognizing ECG artifacts; and,				
	f. The cardiac action potential.				
c. Radiation physics, biology and safety					
1)	Identify the X-ray tube components and imaging chain.	7)	Position a patient in relation to the imaging equipment.		
2)	Describe radiation science, including a. production; b. units; and, c. physics	8)	Operate the fluoroscopic X-ray machine.		
3)	Discuss the biological effects of radiation.				
4)	Discuss intraprocedural strategies to protect patients and personnel from				

		radiation (e.g., shielding, collimation, magnification).			
	5)	Identify technical strategies to reduce radiation dose (e.g., reduce pulse rate).			
	6)	Identify strategies to reduce exposure to radiation including a. ALARA and b. sentinel event.			
d. Diagnostic and Interventional Procedures					
	1)	Describe safety procedures for the hospital/cardiovascular catheterization, including	6)	Safely transfer a patient from the procedure table to a stretcher.	
		a. regulatory compliance and	7)	Perform safety checks on equipment in the procedure room (e.g., crash cart).	
		b. procedure room prep.	8)	Select and obtain equipment needed for the procedure table.	
	2)	Describe the equipment used during a cardiac catheterization, including	9)	Maintain sterile technique while preparing the table.	
		a. disposable and	10)	Position and secure a patient for an invasive cardiovascular procedure.	
		b. non-disposable.	11)	Palpate the patient's pulse and position appropriately.	
	3)	Describe aseptic and sterilization techniques used in the cath lab.			
	4)	Identify proper patient positioning for safety during the procedure.			
	5)	Identify the areas used for percutaneous access.			
		a. femoral			
		b. radial			
e. Cardiovascular Diseases, Assessment, and Treatments					
	1)	Discuss the	8)	Review case studies to identify	
		a. pathologies;	a.	pathologies;	
		b. Complications;	b.	complications;	
		c. etiologies;	c.	etiologies;	
		d. signs and symptoms; and.	d.	signs and symptoms; and.	

		e. treatment of cardiovascular diseases (e.g., CAD, STEMI, cardiomyopathies, athlete's heart).		e. treatment of cardiovascular diseases (e.g., CAD, STEMI, cardiomyopathies, athlete's heart).		
	2)	Discuss the types of percutaneous coronary interventions (PCI) (e.g., angioplasty, atherectomy, thrombectomy, laser, fibrinolytic)	9)	Select the correct equipment needed for each procedure (e.g., guide catheter, wire, balloon, stent)		
	3)	Discuss the use of supportive devices (e.g., LVAD, balloon pump, embolic protection).	10)	Select the correct supportive device that provides optimal treatment for the patient's situation		
	4)	Describe the different types of structural heart repair and replacement (e.g., TAVR, TMVR, valvuloplasty, PFO/ASD/PDA/LAA closure).	11)	Select the equipment required for a procedure based on the patient's diagnosis		
	5)	Discuss the transeptal route and what devices use it (e.g., PFO, ASD, PDA, LAA closure)	12)	Select the repair devices that use the transeptal approach.		
	6)	Discuss the indications for pericardiocentesis (e.g., perforated coronary artery, perforated myocardium, cardiac tamponade, pericarditis)	13)	Select the correct equipment needed for a pericardiocentesis		
	7)	Explain the Mallampati classification.	14)	Evaluate the patient's airway and determine the Mallampati classification.		
f. Pharmacology						
	1)	Discuss the concepts of pharmacokinetics and pharmacodynamics as they relate to drug response and disposition in the body.	6)	Monitor vital signs (e.g., SpO2 and ETCO2, activity, respiration, circulation, consciousness, skin color) and calculate the Aldrete score.	10)	Demonstrate cultural awareness when working with patients.
	2)	Define Indications and contraindications for medications used in the management of cardiac diseases.	7)	Select appropriate route of administration (e.g., intracoronary, IV bolus, or IV drip).	11)	Show awareness of a patient's concerns related to pathologic conditions and the associated functional changes.
	3)	Describe the mode of action of medications used in the management of cardiac diseases.	8)	Calculate the amount of medication to administer based on the concentration and dosage ordered.		
	4)	Discuss the calculations required for administration of medications.	9)	Communicate with the team medication administration and route.		

	5)	Discuss the proper way to chart the administration of medications used in cardiac diseases.			
	6)				
g. Congenital/Pediatrics					
	1)	Discuss fetal circulation and transition at birth.			
	2)	Identify the normal anatomical fetal shunts from a diagram of fetal circulation.			
	3)	Describe the congenital anomalies of the heart.			
	4)	Discuss the surgical and palliative treatment for congenital cardiac anomalies.			
	5)	Compare adult and pediatric catheterization techniques.			
h. Electrophysiology					
	1)	Describe the types of implantable devices (e.g., permanent pacemaker, implantable cardioverter defibrillator, bi-ventricular pacemaker).	3)	Identify and select a specific implantable device.	
	2)	Discuss the indications and contraindications for cardioversion.	4)	Select and prepare the equipment used during cardioversion.	
i. Hemodynamics					
	1)	Recognize normal hemodynamics of the heart (e.g., parts of a pressure waveforms, vascular resistance).	7)	Identify systole and diastole when viewing a pressure waveform.	13) Show awareness of a patient's concerns related to pathologic conditions
	2)	Describe the function of a transducer.	8)	Flush a transducer with fluid to remove all the air.	
	3)	Describe the process of preparing a bubble free transducer.	9)	When viewing a waveform, identify the cardiac chambers and vessels	
	4)	Discuss the purpose of advancing and withdrawing a catheter across a valve.	10)	Calculate the pressure gradient across the valve.	
	5)	Describe abnormal pressures in various cardiac diseases.	11)	Use a pressure waveform to identify a cardiac disease.	
	6)	Discuss the types of hemodynamic calculations (e.g., Fick equation, MAP, shunts).	12)	Given a case study, identify and select the clinical components required to calculate various hemodynamics.	

5. Noninvasive Vascular Concentration

**Indicates a skill that the terminal competency assessment must occur in a clinical setting with a patient.*

	Cognitive	Psychomotor	Affective
a. Identify vascular anatomy, including the			
1) extracranial cerebrovascular;			
2) Intracranial cerebrovascular;			
3) peripheral arterial (upper and lower);			
4) peripheral venous (upper and lower);			
5) abdominal vasculature, including arterial and venous; and,			
6) cardiac structures, including chambers, valves, and vessels.			
b. *Obtain diagnostic images to demonstrate the following anatomy using grey scale and color Doppler of the:			
	1) *extracranial cerebrovascular;		
	2) Intracranial cerebrovascular;		
	3) *peripheral arterial (upper and lower);		
	4) *peripheral venous (upper and lower); and,		
	5) Abdominal vascular, including arterial and venous.		
c. Recognize sonographic appearances, normal imaging measurements, and Doppler flow characteristics of the following normal and abnormal vascular structures:			
1) extracranial cerebrovascular;			
2) intracranial cerebrovascular;			
3) peripheral venous (upper and lower);			
4) peripheral arterial (upper and lower);			
5) abdominal vasculature, including arterial and venous;			
6) cardiac structures, including chambers, valves, and vessels; and,			
7) pulmonary circulation.			
d. *Obtain diagnostic images to demonstrate grey scale, measurements and Doppler flow characteristics of the following normal and abnormal vascular structures:			
	1) *extracranial cerebrovascular;		
	2) Intracranial cerebrovascular;		
	3) *peripheral arterial (upper and lower);		
	4) *peripheral venous (upper and lower); and,		
	5) abdominal vasculature (arterial and venous).		
e. Analyze accurately the following noninvasive vascular exams:			
1) cerebrovascular duplex;			
2) transcranial Doppler/imaging;			
3) Physiologic testing, including			
a. ankle/brachial index;			
b. plethysmography;			
c. continuous wave and pulsed Doppler wave;			
d. segmental pressures and waveform analysis;			
e. exercise treadmill testing; and,			
f. pneumoplethysmography (PVR);			
g. venous and arterial mapping;			
h. peripheral venous duplex studies,			
i. patency and			
ii. insufficiency;			
i. peripheral arterial duplex studies; and,			
j. abdominal duplex studies, including			
i. renal;			
ii. mesenteric;			
iii. hepatoportal; and			
iv. aortoiliac.			
f. *Perform the following examinations:			
	1) *cerebrovascular duplex;		
	2) transcranial Doppler/imaging;		
	3) *physiologic testing on the upper and lower extremities;		
	4) *venous and arterial mapping of the upper and lower extremities;		

				5)	*peripheral venous duplex studies, including		
				a.	*patency (upper and lower) and		
				b.	insufficiency.		
				6)	*peripheral arterial duplex studies (upper and lower); and,		
				7)	*abdominal duplex studies, including		
				a.	*renal;		
				b.	*mesenteric;		
				c.	*hepatoportal; and,		
				d.	*aortoiliac.		
				g.	Comprehend application of quantitative principles of vascular testing including:		
				1.	acceleration time;		
				2.	ankle/wrist brachial pressure ratios;		
				3.	aorta/renal ratios;		
				4.	area and diameter reduction measurements;		
				5.	digital/brachial indices;		
				6.	velocity change across stenosis for grading arterial lesions;		
				7.	pulsatility index;		
				8.	resistive index;		
				9.	segmental pressures, including digits;		
				10.	velocity ratios; and,		
				11.	venous reflux time.		
				h.	Use grey scale and Doppler to assess the following principles:		
					*acceleration time;		
					*ankle/wrist brachial pressure ratios;		
					*aorta/renal ratios;		
					*area and diameter reduction measurements;		
					*digital/brachial indices;		
					*resistive index;		
					*segmental pressures, including digits;		
					*velocity ratios; and,		

					*venous reflux time.		
				i.	Identify outcomes and potential complications of vascular		
				1.	procedures and		
				2.	surgeries.		
				j.	Discuss scanning protocols based on patient specific factors, including:		
				1.	history, including location, of prior vascular procedures;	7.	*Modify protocols properly based on patient-specific factors.
				2.	physical examination and assessment of patient-specific factors;		
				3.	relating imaging, laboratory, and functional testing procedures;		
				4.	contraindications;		
				5.	relating imaging, laboratory, and functional testing procedures; and,		
				6.	pharmacological effects on the patient.		
				k.	Discuss the protocols for post-procedure and post-surgical patients.		
				1.	angioplasty;		
				2.	atherectomy;		
				3.	coil embolization;		
				4.	dialysis fistula/graft;		
				5.	embolectomy;		
				7.	endograft;		
				8.	endovascular aortic aneurysm repair (EVAR).		
				9.	endovenous ablation;		
				10.	inferior vena cava filter;		
				11.	patch angioplasty;		
				12.	stents (venous and arterial);		
				13.	synthetic grafts;		
				14.	thrombolysis and thrombectomy;		
				15.	trans-jugular intrahepatic porto-systemic shunt; and,		
				16.	venous bypass grafts.		