

M.S. Ramaiah University of Applied Sciences

New BEL Road, MSR Nagar, Bangalore – 560054



**RAMAIAH
UNIVERSITY**
OF APPLIED SCIENCES

PO, PSO, PEO & CO

Programme: B.Sc. (Hons) in Cardiac Care Technology

Programme Code: 406

Programme Outcome (PO)

Programme Specific Outcome (PSO)

Program Educational Objectives (PEO)

Course Outcomes (CO)

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M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

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Faculty of Life and Allied Health Sciences
M.S. Ramaiah University of Applied Sciences
Bangalore-560054

Faculty of Life and Allied Health Sciences (FLAHS)

Programme Name: B.Sc. (Hons) in Cardiac Care Technology

Programme Outcomes (POs)

- PO 1- **Clinical care:** Acquire and apply knowledge of basic sciences to cardiovascular system.
- PO 2- **Communication:** Acquire effective verbal and written communication skills with the cardiac team members and patients.
- PO 3- **Membership of a multidisciplinary health team:** Discuss various case studies related to invasive & non –invasive cardiac care procedures & demonstrate the basic techniques in cardiac care.
- PO 4- **Ethics and accountability at all levels:** Understand and commit to high standards of ethics in line with the code of conduct of medical practice. Adopt various quality assurance and patient safety measures while working in community or hospitals.
- PO 5- **Commitment to professional excellence:** Identify, analyse and critically evaluate problems related to cardiac diseases and provide effective solutions and quality care.
- PO 6- **Leadership and mentorship:** Play active role in spear heading projects relating to prevention and diagnosis of cardiac diseases.
- PO 7- **Social accountability and responsibility:** Take responsibility for maintaining the highest quality of healthcare professionalism and effective interaction with patients community and health care workers.
- PO 8- **Lifelong learning:** Recognise the need for updating knowledge and upgrading technical skills to meet the current professional development. Self-motivate and enhance entrepreneurship skills for career development in technology for cardiac health care services.

Programme Specific Outcomes (POs)

At the end of the B.Sc. (Hons) Cardiac Care Technology Programme the graduate will be able to:

- PSO-1: Apply knowledge and skills of cardiac care to provide safe and effective care to the patients for achieving professional excellence.
- PSO-2: Adapt to the technological advancement in cardiac care by upgrading to the latest practices in the field of cardiac care technology.
- PSO-3: Demonstrate the leadership qualities and strive for the betterment of organization, environment and society.
- PSO-4: Demonstrate an understanding of the importance of lifelong learning through professional development, practical training and specialized certifications.

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Programme Education Objectives

- PEO -1:** Provide students with a strong foundation in Cardiac Care, to enable them to knowledgeable and technically competent cardiac technologist to meet the needs of patient care in cardiac centers & multidisciplinary hospitals.
- PEO -2:** Impart technical skills required to develop innovative solutions as per industry and societal requirements in cardiac care
- PEO-3:** Impart the required managerial and entrepreneurial skills to enable students to work in multidisciplinary cardiac teams and to contribute to the cardiac care needs of the society.
- PEO -4:** Instil human values, social, interpersonal and leadership skills required for professional success in evolving as global professionals.

Course Outcomes (COs)

Course Title & Code: General Anatomy (19AHG101A)

Upon completion of this course students will be able to:

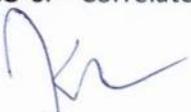
- CO-1. Describe the structure and functional organization of a basic human cell and the normal anatomical positions and planes of the body
- CO-2. Explain the structure and functions of basic tissues
- CO-3. Explain the components of the organ systems and its basic functions
- CO-4. Identify the parts of a compound microscope and differentiate microscopy of basic tissues
- CO-5. Demonstrate the parts and position of bones in the human body and early development of fetus
- CO-6. Demonstrate the surface anatomy of structures and interpret data obtained from various imaging techniques.

Course Outcomes (COs)

Course Title & Code: General Physiology (19AHG102A)

Upon completion of this course students will be able to:

- CO-1. Describe the functions of the organ systems in the body
- CO-2. Explain the mechanisms for the execution of these functions for homeostasis through the secretions of chemical and humoral factors
- CO-3. Explain the regulatory mechanisms in the control of blood pressure, urine formation maintenance of extracellular and intracellular volume
- CO-4. Perform to assess the normal values and parameters of the bodily function indicators such as blood indices, blood gases
- CO-5. Demonstrate the tests to assess the functional integrity of the respiratory and cardiovascular system
- CO-6. Correlate the disease condition with physiological aspects of bodily functions


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Course Outcomes (COs)

Course Title & Code: Health Care Delivery Systems of India (19AHG103A)

Upon completion of this course students will be able to:

- CO-1. Describe the Health Care delivery system in India at primary, secondary and tertiary level and identify their role in the health care team
- CO-2. Explain the AYUSH system of medicine
- CO-3. Explain the National Health programmes in terms of operation, achievements and constraints
- CO-4. Explain the importance of Demography and Vital statistics in planning health policy
- CO-5. Discuss role of epidemiology and epidemiological methods in health

Course Outcomes (COs)

Course Title & Code: General Microbiology (19AHG107A)

After undergoing this course students will be able to:

- CO-1. Describe the morphology, physiology and characteristics of microorganisms
- CO-2. Describe the principles and practice of sterilization and disinfection
- CO-3. Discuss immunology, and immunity
- CO-4. Demonstrate sterilization procedures and use of sterilization equipment
- CO-5. Demonstrate Collection and transport of specimens to the laboratory

Course Outcomes (COs)

Course Title & Code: Basic Electrical & Electronics (19AHG108A)

After undergoing this course students will be able to:

- CO-1. State various laws of electric and magnetic circuits and explain their significance in biomedical instrumentation
- CO-2. Explain DC machines, transformers and their applications
- CO-3. Solve simple numerical problems on electric circuits and magnetic circuits,
- CO-4. Explain working principles of PN junction diode, Zener diode, transistors and amplifier configurations
- CO-5. demonstrate electrical and electronic circuits for hardware modules using standard EDA tool

Course Outcomes (COs)

Course Title & Code: Applied Physics (19AHG116A)

After undergoing this course students will be able to:

- CO-1. Explain the basic concepts in sound, electricity and magnetism, laser physics and electromagnetic radiation
- CO-2. Describe concepts in optical fibers,


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- CO-3. Describe basic properties of fluids
- CO-4. Conduct experiments as per the standard procedures and tabulate the measured values
- CO-5. Calculate the required parameters and plot the results
- CO-6. Interpret, compare with standard results and draw conclusions

Course Outcomes (COs)

Course Title & Code: General Biochemistry

Upon completion of this course students will be able to:

- CO-1. Describe the various laboratory apparatus used, the steps in specimen collection and safety measurements to be taken in biochemistry laboratory
- CO-2. Explain different models of atomic structure, acids, bases, buffers and disturbances in acid base balance
- CO-3. Explain quality control, precision, specificity, sensitivity when conducting special investigations
- CO-4. Demonstrate qualitative and quantitative estimations of various analyses (urine, blood)
- CO-5. Interpret the various biochemical parameters in health and disease

Course Outcomes (COs)

Course Title & Code: General Pharmacology (19AHG112A)

Upon completion of this course students will be able to:

- CO-1. Describe pharmacokinetic principles in relation to drug administration
- CO-2. Explain the concept of pharmacodynamics in relation to drug utilization in therapeutics
- CO-3. Explain the concept of chemotherapy in relation to infectious diseases
- CO-4. Explain the importance of adverse effects in therapeutics of various drug usage
- CO-5. Identify drugs dosage forms and posology in management of diseases and calculate doses in various age groups
- CO-6. Interpret the importance of drug combinations with reference to therapeutic index and drug utilization

Course Outcomes (COs)

Course Title & Code: Concepts of Infection Prevention (19AHG XXX)

After undergoing this course students will be able to:

- CO-1. Explain the steps involved in infection prevention and control
- CO-2. Understand the working and application of CSSD
- CO-3. Explain the importance of antibiotic resistance in the patient care and ways to prevent it
- CO-4. Apply the concepts of biomedical waste management to ensure clean and hazard free hospital environment





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Course Outcomes (COs)

Course Title & Code: General Pathology (19AHG114A)

Upon completion of this course students will be able to:

- CO-1. Describe basic facts and concepts of pathology
- CO-2. Explain fundamental aspects of hematology and blood banking
- CO-3. Explain the various clinical pathology tests
- CO-4. Perform laboratory tests related to hematology and clinical pathology
- CO-5. Interpret the results of laboratory tests
- CO-6. Apply concepts of general pathology to understand pathological basis of disease

Course Outcomes (COs)

Course Title & Code: Basic Concepts of Cardiac Care Technology (20CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the basic principles of ECG, Echocardiography and X- Ray production in cathlab
- CO-2. Describe normal ECG deflections, methods to assess electrical axis & methods to overcome technical artifacts in the ECG
- CO-3. Describe clinical applications of 2D and Doppler ECHO, importance of echo views in diagnosis and types of artifacts in echocardiography
- CO-4. Explain guidelines for cardiac catheterization, vascular accesses and different contrast media used in cath lab
- CO-5. Perform ECG and interpret given ECG, basic views of 2D echo and identify cardiac structures and importance in diagnosing cardiac pathologies
- CO-6. Demonstrate different knobs on echo machine and explain its importance in image optimization

Course Outcomes (COs)

Course Title & Code: Clinical Cardiology (22CCCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the clinical examination of various cardiac diseases
- CO-2. Describe the cardiac and non-cardiac signs and symptoms
- CO-3. Explain the class of severity of cardiac disease based on symptoms
- CO-4. Describe the normal & abnormal Heart Sounds & murmurs
- CO-5. Interpret the chest X-ray findings
- CO-6. Illustrate the diagnosis & care for patients in cardiac diseases


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Course Outcomes (COs)

Course Title & Code: Entrepreneurship Development (22MCM201A)

After the successful completion of this course, the student will be able to:

- CO-1. CO-1. Discuss the concepts and process of entrepreneurship
- CO-2. Construct and apply the idea generation techniques
- CO-3. Examine the opportunities for launching of new venture and various entry strategies
- CO-4. Acquire the skills for creation and management of entrepreneurial venture
- CO-5. Present a viable business plan, for business success

Course Outcomes (COs)

Course Title & Code: Directed clinical education -1 (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the clinical & physical examination of cardiac patients
- CO-2. Demonstrate the working principle of ECG, ECHO & Cath lab machine
- CO-3. Discuss the materials used in cath lab
- CO-4. Adapt the Radiation safety protocols in Cath Lab
- CO-5. Analyze the Normal of ECG, TMT & ECHO Reports

Course Outcomes (COs)

Course Title & Code: Cardiac Evaluation & Therapies – I (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the etiology, morphology & classification of various cardiac diseases
- CO-2. Describe the hemodynamics & pathophysiology of heart diseases
- CO-3. Describe the diagnosis & management of cardiac diseases
- CO-4. Explain the Diagnosis, complications & management of peripheral vascular Diseases
- CO-5. Illustrate the clinical & physical examination myocardial infraction, Valvular heart diseases, Heart failure

Course Outcomes (COs)

Course Title & Code: Applied Cardiac Care Technology – I (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Describe the ECG features in various cardiac diseases
- CO-2. Explain Echocardiographic features of Valvular, cardiomyopathies & ischemic heart diseases
- CO-3. Describe the usefulness of intensive coronary care unit, CCU & ICCU
- CO-4. Explain the Cardiac catheterization procedures, complications & management
- CO-5. Interpret ECG findings & ECHO diagnosis of Heart diseases

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- CO-6. Apply the theoretical & practical skills in cardiac catheterization, interventional management

Course Outcomes (COs)

Course Title & Code: Directed Clinical Education-2 (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Interpret the ECG features in various cardiac diseases
- CO-2. Identify the structure & function of by Echocardiography
- CO-3. Illustrate the hemodynamics of cardiac chambers by catheterization
- CO-4. Discuss the diagnosis & complications of cardiac procedures
- CO-5. Formulate case study by observation different cardiac cases

Course Outcomes (COs)

Course Title & Code: Cardiac Evaluation and Therapies - II (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Explain cardiac embryology and its significance in classifying congenital heart diseases
- CO-2. Describe morphology, etiology, hemodynamics and clinical features of various congenital heart diseases
- CO-3. Describe etiologies, hemodynamics and clinical features associated with disease states including Ischemic, Myo - Pericardial & aortic heart diseases and Cardiac Masses
- CO-4. Explain the role of relevant screening and various diagnostic tests appropriate for cardiovascular risk stratification and management plan for patients with congenital and systemic heart diseases
- CO-5. Describe etiologies, clinical presentations of various non-cardiac diseases and its effect on cardiovascular system
- CO-6. Demonstrate how to approach and the role of non-invasive and invasive diagnostic tests in diagnosing and managing the underlying pathologies

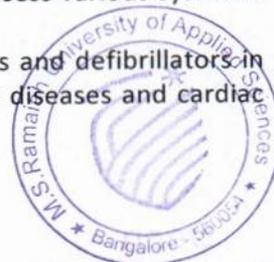
Course Outcomes (COs)

Course Title & Code: Applied Cardiac Care Technology - II (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the concept of cardiac arrhythmias its types, mechanism and ECG features of various congenital and systemic heart diseases
- CO-2. Describe 2D features and Doppler echocardiographic methods to assess various congenital heart diseases
- CO-3. Describe 2D features and Doppler echocardiographic methods to assess various systemic heart diseases and significance of contrast echo
- CO-4. Describe the role of various interventional procedures, pacemakers and defibrillators in management of disease states including congenital, systemic heart diseases and cardiac arrhythmias


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- CO-5. Demonstrate how to approach, perform and clinical importance of different echo views and various Doppler methods and its limitations in diagnosing congenital and systemic heart diseases
- CO-6. Demonstrate patient preparation, equipment handling and materials to be used and role of cardiac technologist during various interventional procedures performed for underlying cardiac pathologies

Course Outcomes (COs)

Course Title & Code: Project Management (22MCM202A)

Upon completion of this course students will be able to:

- CO-1. Explain the characteristics of projects, Operations and principles of Project Management
- CO-2. Discuss the Project Management Competency Elements as per PMA's Individual Competence Baseline Ver 4.0
- CO-3. Discuss the tools for Project Execution, Monitoring and control
- CO-4. Apply the tools for project planning and Create a Project Management Plan covering Project Charter, Work Breakdown Structure, Project Organisation, Time Management Plan and Risk Management Plan

Course Outcomes (COs)

Course Title & Code: Directed Clinical Education -3 (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Demonstrate how to perform physical examination which aids in diagnosing various cardiac pathologies
- CO-2. Demonstrate how to interpret given ECG and diagnose various cardiac pathologies
- CO-3. Demonstrate how to approach, perform and to know the importance of 2D and Doppler methods, their technical limitations in diagnosing the various cardiac pathologies
- CO-4. Prepare the patient and arrange the materials used in cathlab for various interventional procedures
- CO-5. Demonstrate the clinical utility and post procedural care of each interventional procedure and measures to overcome associated complications during the procedures

Course Outcomes (COs)

Course Title & Code: Nuclear cardiology (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Describe the basic principles and clinical importance of nuclear imaging in the field of cardiology
- CO-2. Explain equipment used, its working principle, procedure of MPI and clinical importance of myocardial viability for risk stratification
- CO-3. Explain equipment used, its working principle, procedure and clinical importance of PET & SPECT in diagnosing coronary artery disease


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- CO-4. Explain equipment used, its working principle, procedure and clinical importance of cardiac MRI in diagnosing various cardiac diseases
- CO-5. Demonstrate how to approach, patient preparation and equipment maintenance and clinical importance of myocardial perfusion imaging
- CO-6. Demonstrate how to approach, patient preparation and equipment maintenance and clinical importance of cardiac MRI in diagnosing cardiac pathologies

Course Outcomes (COs)

Course Title & Code: Advanced Cardiac Care Technology (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Describe basic concepts, equipment used, working principle, procedure and interpretation of newer modalities used in electrocardiography
- CO-2. Describe basic concepts, equipment used, working principle, procedure and interpretation of newer imaging techniques used in echocardiography
- CO-3. Explain clinical importance of Trans esophageal echo, TDI, Strain imaging, Intracardiac Echo in diagnosing various cardiac pathologies
- CO-4. Describe basic concepts, equipment used, working principle, clinical importance of newer interventional procedures
- CO-5. Demonstrate how to approach, patient preparation, maintenance of equipment protocols used, interpretation and post procedure care of special procedures used in echocardiography
- CO-6. Demonstrate how to approach, patient preparation, maintenance of equipment protocols used, interpretation and post procedure care of newer interventional procedures and their diagnostic utility

Course Outcomes (COs)

Course Title & Code: Directed clinical education -4 (22CCTXXX)

After the successful completion of this course, the student will be able to:

- CO-1. Outline clinical importance of newer modalities in field of cardiology
- CO-2. Demonstrate how to prepare, materials used, procedure and interpretation and post procedural care during Transesophageal echo
- CO-3. Demonstrate indications, how to perform and to know the importance of tissue Doppler and strain imaging & their technical limitations in diagnosing the various cardiac pathologies
- CO-4. Prepare the patient and arrange the materials used in cathlab for various interventional procedures
- CO-5. Impart knowledge of the clinical importance of newer interventional procedures over cardiac surgeries


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Course Outcomes (COs)

Course Title & Code: RESEARCH PROJECT (19CCT401A)

After undergoing this course students will be able to:

- CO-1. Refine the problem in Allied Health Science
- CO-2. Identify appropriate methodology to solve the problem
- CO-3. Propose solutions to the problem identified
- CO-4. Prepare a project report as per the specified guidelines
- CO-5. Presentation of the research finding in an appropriate forum

Course Outcomes (COs)

Course Title & Code: Internship (19CCT402A)

After undergoing this internship, student will be able to:

- CO-1. Describe the anatomy of heart, cardiac position , cardiac circulation
- CO-2. Discuss techniques of ECG recording, axis duration, and various rhythms
- CO-3. Explain principle of 2D imaging and echo views , basic principle of cath lab, radiation safety, vascular access, angiogram , device closure and its management
- CO-4. Diagnose and evaluate acute coronary syndrome , HF , arrhythmia and its management, cardiac emergency drugs and its uses
- CO-5. Evaluate Ischemic Heart disease, valvular Heart Disease, cardiomyopathy and other cardiac diseases
- CO-6. Describe clinical features of valvular Heart Disease and its complication

Course Outcomes (COs)

Course Title & Code: RESEARCH PROJECT (19CCT401A)

After undergoing this course students will be able to:

- CO-1. Refine the problem in Allied Health Science
- CO-2. Identify appropriate methodology to solve the problem
- CO-3. Propose solutions to the problem identified
- CO-4. Prepare a project report as per the specified guidelines
- CO-5. Presentation of the research finding in an appropriate forum

Course Outcomes (COs)

Course Title & Code: Internship (19CCT411A)

After undergoing this internship, student will be able to:

- CO-1. Describe the anatomy of heart, cardiac position , cardiac circulation
- CO-2. Discuss techniques of ECG recording, axis duration, and various rhythms
- CO-3. Explain principle of 2D imaging and echo views , basic principle of cath lab, radiation safety, vascular access, angiogram , device closure and its management

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- CO-4. Diagnose and evaluate acute coronary syndrome, HF , arrhythmia and its management, cardiac emergency drugs and its uses.
- CO-5. Evaluate Ischemic Heart disease, valvular Heart Disease, cardiomyopathy and other cardiac diseases
Describe clinical features of valvular Heart Disease and its complication



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