PRESIDENCY UNIVERSITY

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REACH GREATER HEIGHTS

PROGRAMME REGULATIONS & CURRICULUM

2025-29

PRESIDENCY SCHOOL OF ALLIED HEALTH SCIENCES

B.SC. IN CARDIAC CARE TECHNOLOGY (CCT)

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PRESIDENCY UNIVERSITY
Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Presidency School of Allied Health Sciences

B.Sc. in Cardiac Care Technology

Program Regulations and Curriculum

Based on Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

Program: B.Sc. in Cardiac Care Technology

B.Sc. CCT

2025-2029

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PART A – PROGRAM REGULATIONS

1. Vision & Mission of the University and the School / Department

1.1 Vision of the University

To be a Value-driven Global University, excelling beyond peers and creating professionals of integrity and character, having concern and care for society.

1.2 Mission of the University

- Commit to be an innovative and inclusive institution by seeking excellence in teaching, research and knowledge-transfer.
- Pursue Research and Development and its dissemination to the community, at large.
- Create, sustain and apply learning in an interdisciplinary environment with consideration for ethical, ecological and economic aspects of nation building.
- Provide knowledge-based technological support and services to the industry in its growth and development.
- To impart globally-applicable skill-sets to students through flexible course offerings and support industry's requirement and inculcate a spirit of new-venture creation.

1.3 Vision of Presidency School of Allied Health Sciences

- To be a value-based, practice-oriented school committed to producing globally competent Allied Health Professionals who contribute to excellence in patient care, education, and community well-being.

1.4 Mission of Presidency School of Allied Health Sciences

- Foster a dynamic learning environment that integrates theoretical knowledge with hands-on clinical practice.
- Attract and develop highly qualified faculty committed to excellence in teaching, research, and healthcare innovation.
- Establish state-of-the-art laboratories and clinical training facilities to enhance practical learning experiences.
- Encourage interdisciplinary collaboration to promote holistic patient care and inter-professional education.
- Instill leadership, ethical values, and a spirit of community service among students to meet global healthcare challenges.

1.5 Vision of Program B.Sc. Cardiac Care Technology (CCT)

To emerge as a center of excellence in Cardiac Care Technology by nurturing skilled, ethical, and compassionate technologists who contribute to advanced cardiovascular healthcare and research.

1.6 Mission of Program B.Sc. Cardiac Care Technology

- To impart industry-relevant education and hands-on training in cardiac diagnostics, monitoring, and interventional procedures
- To cultivate a learning environment that encourages innovation, research, and evidence-based cardiac care practices.
- To foster professional ethics, empathy, and communication skills for effective patient-centered care.
- To build leadership, teamwork, and lifelong learning attitudes through interdisciplinary collaboration and continuous academic engagement.

2. Preamble to the Program Regulations and Curriculum

This is the subset of Academic Regulations, and it is to be followed as a requirement for the award of Bachelor of Science in Cardiac Care Technology (CCT).

The curriculum for the Bachelor of Science in Cardiac Care Technology (CCT) program is designed in alignment with the Choice Based Credit System (CBCS), emphasizing practical and career-oriented learning. It incorporates Social Project-Based Learning, Industrial Training, and Clinical Internships to ensure that students gain real-world experience in cardiac care. This practice-driven approach equips graduates with the necessary skills and competencies to pursue successful careers in hospitals, surgical centers, and healthcare industries, as well as opportunities for higher studies or entrepreneurship in the healthcare sector.

In exercise of the powers conferred by and in discharge of duties assigned under the relevant provision(s) of the Act, Statutes and Academic Regulations, of the University, the Academic Council hereby makes the following Regulations.

3. Short Title and Applicability

a. These Regulations shall be called the Bachelor of Science in Cardiac Care Technology (CCT) Degree Program Regulations and Curriculum 2025-2029.
b. These Regulations are subject to, and pursuant to the Academic Regulations.
c. These Regulations shall be applicable to the ongoing Bachelor of Science in Cardiac Care Technology (CCT)
d. Degree Programs of the 2025-2029 batch, and to all Bachelor of Science in Cardiac Care Technology (CCT). Degree Programs which may be introduced in future. These

Regulations shall supersede all the earlier Bachelor of Science in Cardiac Care Technology (CCT)

e. Degree Program Regulations and Curriculum, along with all the amendments thereto.

f. These Regulations shall come into force from the Academic Year 2025-2026.

4. Definitions

In these Regulations, unless the context otherwise requires:

- ***a.*** *"Academic Calendar" means the schedule of academic and miscellaneous events as approved by the Vice Chancellor;*
- ***b.*** *"Academic Council" means the Academic Council of the University;*
- ***c.*** *"Academic Regulations" means the Academic Regulations, of the University;*
- ***d.*** *"Academic Term" means a Semester or Summer Term;*
- ***e.*** *"Act" means the Presidency University Act, 2013;*
- ***f.*** *"Basket" means a group of courses bundled together based on the nature/type of the course;*
- ***g.*** *"BOE" means the Board of Examinations of the University;*
- ***h.*** *"BOG" means the Board of Governors of the University;*
- ***i.*** *"BOM" means the Board of Management of the University;*
- ***j.*** *"BOS" means the Board of Studies of a particular Department/Program of Study of the University;*
- ***k.*** *"CGPA" means Cumulative Grade Point Average as defined in the Academic Regulations;*
- ***l.*** *"Clause" means the duly numbered Clause, with Sub-Clauses included, if any, of these Regulations;*
- ***m.*** *"COE" means the Controller of Examinations of the University;*
- ***n.*** *"Course In Charge" means the teacher/faculty member responsible for developing and organizing the delivery of the Course;*
- ***o.*** *"Course Instructor" means the teacher/faculty member responsible for teaching and evaluation of a Course;*
- ***p.*** *"Course" means a specific subject usually identified by its Course-code and Course-title, with specified credits and syllabus/course-description, a set of references, taught by some teacher(s)/course-instructor(s) to a specific class (group of students) during a specific Academic Term;*
- ***q.*** *"Curriculum Structure" means the Curriculum governing a specific Degree Program offered by the University, and, includes the set of Baskets of Courses along with minimum credit requirements to be earned under each basket for a degree/degree*

with specialization/minor/honours in addition to the relevant details of the Courses and Course catalogues (which describes the Course content and other important information about the Course). Any specific requirements for a particular program may be brought into the Curriculum structure of the specific program and relevant approvals should be taken from the BOS and Academic Council at that time.

r. *"DAC" means the Departmental Academic Committee of a concerned Department/Program of Study of the University;*

s. *"Dean" means the Dean / Director of the concerned School;*

t. *"Degree Program" includes all Degree Programs;*

u. *"Department" means the Department offering the degree Program(s) / Course(s) / School offering the concerned Degree Programs / other Administrative Offices;*

v. *"Discipline" means specialization or branch of B.Sc. Degree Program;*

w. *"HOD" means the Head of the concerned Department;*

x. *"L-T-P-C" means Lecture-Tutorial-Practical-Credit – refers to the teaching – learning periods and the credit associated;*

y. *"MOOC" means Massive Open Online Courses;*

z. *"MOU" means the Memorandum of Understanding;*

aa. *NCAHP: National Commission for Allied Health Professionals*

bb. *"NPTEL" means National Program on Technology Enhanced Learning;*

cc. *"Parent Department" means the department that offers the Degree Program that a student undergoes;*

dd. *"Program Head" means the administrative head of a particular Degree Program/s;*

ee. *"Program Regulations" means the Bachelor of Science Degree Program Regulations and Curriculum, 2025-2029;*

ff. *"Program" means the Bachelor of Science (B.Sc.) Degree Program;*

gg. *"PSoAHS" means the Presidency School of Applied Health Science;*

hh. *"Registrar" means the Registrar of the University;*

ii. *"School" means a constituent institution of the University established for monitoring, supervising and guiding, teaching, training and research activities in broadly related fields of studies;*

jj. *"Section" means the duly numbered Section, with Clauses included in that Section, of these Regulations;*

kk. *"SGPA" means the Semester Grade Point Average as defined in the Academic Regulations;*

ll. *"Statutes" means the Statutes of Presidency University;*

mm. *"Sub-Clause" means the duly numbered Sub-Clause of these Program Regulations;*

nn. *"Summer Term" means an additional Academic Term conducted during the summer break (typically in June-July) for a duration of about eight (08) calendar weeks, with a minimum of thirty (30) University teaching days;*

oo. *"SWAYAM" means Study Webs of Active Learning for Young Aspiring Minds.*

pp. *"UGC" means University Grant Commission;*

qq. *"University" means Presidency University, Bengaluru; and*

rr. *"Vice Chancellor" means the Vice Chancellor of the University.*

5. Program Description

The Bachelor of Science in Cardiac Care Technology (CCT) Degree Program Regulations and Curriculum 2025-2029 are subject to, and, pursuant to the Academic Regulations. These Program Regulations shall be applicable to the following ongoing Bachelor of Science (B.Sc.) Degree Programs of 2025-2029 offered by the Presidency School of Allied Health Sciences (PSoAHS):

1. Bachelor of Science in Anaesthesia & Operation Theatre Technology (AOTT)
2. Bachelor of Science in Medical Laboratory Technology (MLT)
3. Bachelor of Science in Cardiac Care Technology (CCT)
4. Bachelor of Science in Respiratory Care Technology (RT)
5. Bachelor of Science in Medical Radiology & Imaging Technology (MRIT)

5.1 These Program Regulations shall be applicable to other similar programs, which may be introduced in future.

5.2 These Regulations may evolve and get amended or modified or changed through appropriate approvals from the Academic Council, from time to time, and shall be binding on all concerned.

5.3 The effect of periodic amendments or changes in the Program Regulations, on the students admitted in earlier years, shall be dealt with appropriately and carefully, so as to ensure that those students are not subjected to any unfair situation whatsoever, although they are required to conform to these revised Program Regulations, without any undue favor or considerations

6. Minimum and Maximum Duration

6.1 Bachelor of Science Bachelor of Science in Cardiac Care Technology (CCT)

The Bachelor of Science in Cardiac Care Technology (CCT) Degree Program is a Four-Year, Full-Time, Semester-Based Program. The minimum duration of the program is

four (04) years, comprising eight (08) semesters—each academic year consisting of two semesters (Odd and Even).

The academic structure includes:

- Theory Classes: 1590 Hours
- Practical Classes: 750Hours
- Internship: 1200 Hours Minimum
- Summer Internship: - 120 hours
- Total Hours: 3660 Hours.

6.2 Extension of Duration in Special Cases A student who, for any reason, is unable to complete the program within the prescribed minimum duration may be granted an additional two (02) years beyond the normal period to fulfill the mandatory minimum credit requirements.

In general, the **maximum allowable duration** for completion of the program is defined as **'N + 2' years**, where **'N'** denotes the **normal duration (i.e., 4 years)**. Therefore, the **maximum duration to complete the B.Sc. CCT program is 6 years**.

6.3 The time taken by the student to improve Grades/CGPA, and in case of temporary withdrawal/re-joining (Refer to Clause 16.1 of Academic Regulations), shall be counted in the permissible maximum duration for completion of a Program.

6.4 In exceptional circumstances, such as temporary withdrawal for medical exigencies where there is a prolonged hospitalization and/or treatment, as certified through hospital/medical records, women students requiring extended maternity break (certified by registered medical practitioner), and, outstanding sportspersons representing the

6.5 University/State/India requiring extended time to participate in National/International sports events, a further extension of one (01) year may be granted on the approval of the Academic Council.

6.6 The enrolment of the student who fails to complete the mandatory requirements for the award of the concerned Degree (refer Section 19.0 of Academic Regulations) in the prescribed maximum duration (Clauses 18.1 and 18.2 of Academic Regulations), shall stand terminated and no Degree shall be awarded.

7. Program Educational Objectives (PEO)

After four years of successful completion of the program, the graduates shall be:

PEO No.	Program Educational Objectives (PEO)
PEO1	**Professional Competence:** Graduates will demonstrate comprehensive knowledge and practical skills relevant to allied health care professions, enabling them to function effectively in diverse clinical settings.
PEO2	**Ethical and Responsible Practice:** Graduates will uphold professional ethics, patient confidentiality, and safety standards while delivering perioperative care.
PEO3	**Teamwork and Leadership:** Graduates will work effectively in multidisciplinary healthcare teams and demonstrate leadership qualities when required.
PEO4	**Lifelong Learning and Career Advancement:** Graduates will engage in continuous learning and professional development to adapt to evolving medical technologies and practices.
PEO5	**Research and Innovation:** Graduates will participate in clinical research and contribute to the advancement of allied health care practices through innovation and evidence-based approaches.

8. Program Outcomes (PO) and Program Specific Outcomes (PSO)

8.1 Program Outcomes (PO)

On successful completion of the Program, the students shall be able to:

PO No.	Program Outcome
PO1	**Disciplinary Knowledge:** Apply core knowledge of cardiovascular anatomy, physiology, diagnostics, and interventional procedures to assess and manage both acute and chronic cardiac conditions.
PO2	**Critical Thinking:** Analyze cardiac function and clinical data to make timely, evidence-based decisions in emergency, perioperative, and diagnostic cardiovascular care settings.
PO3	**Effective Communication:** Communicate clearly and empathetically with patients, families, and healthcare professionals to ensure safe and effective cardiovascular care delivery.
PO4	**Social Interaction:** Collaborate effectively within multidisciplinary healthcare teams, demonstrating professionalism, respect, and cultural sensitivity in various clinical environments.

PO5	**Effective Citizenship**: Promote cardiovascular health and contribute to public health initiatives by recognizing the societal role and responsibilities of cardiovascular technologists.
PO6	**Ethics:** Uphold professional and ethical standards by ensuring patient confidentiality, obtaining informed consent, and delivering patient-centered care with integrity.
PO7	**Environmental and Sustainability:** Implement sustainable practices in cardiovascular labs and procedures, including responsible use of consumables and proper biomedical waste management.
PO8	**Self-Directed and Lifelong Learning:** Engage in continuous professional development to stay current with innovations in cardiovascular diagnostics, therapeutic interventions, and patient monitoring technologies.
PO9	**Research-Related Skills:** Participate in or support clinical research initiatives aimed at improving cardiovascular health outcomes and advancing diagnostic or therapeutic methodologies.
PO10	**Scientific Interpretation:** Interpret cardiovascular diagnostic data such as ECG, echocardiograms, Holter monitoring, and angiographic images to assist in accurate clinical decision-making.
PO11	**Information and Digital Literacy:** Utilize digital systems, cardiovascular software, and electronic health records to enhance patient care, data accuracy, and workflow efficiency in cardiovascular practice.

8.2 Program Specific Outcomes (PSOs):

On successful completion of the Program, the students shall be able to:

PSO No.	Program Specific Outcome
PSO1	**Cardiovascular Diagnostic Proficiency:** Perform and interpret non-invasive and invasive cardiovascular diagnostic procedures such as ECG, echocardiography, Holter monitoring, and cardiac catheterization with technical accuracy and clinical understanding.
PSO2	**Therapeutic and Interventional Assistance:** Assist in cardiovascular therapeutic interventions including pacemaker implantation, defibrillation, and interventional cardiology procedures while ensuring patient safety, aseptic technique, and procedural readiness.

PSO3	**Equipment Operation and Maintenance:** Operate, maintain, and troubleshoot cardiovascular equipment like ECG machines, defibrillators, and echocardiography systems, ensuring adherence to quality control and safety standards.
PSO4	**Emergency and Critical Cardiac Care:** Respond effectively in cardiac emergencies by assisting in ACLS protocols, managing cardiac monitors, and supporting the cardiac care team in ICUs and cath labs during critical interventions.

9. Admission Criteria (as per the concerned Statutory Body)

The University admissions shall be open to all persons irrespective of caste, class, creed, gender, or nationality. All admissions shall be made on the basis of merit in the qualifying examinations and an entrance examination conducted by the University. The admission criteria for the B.Sc. in Cardiac Care Technology program are listed in the following sub-clauses:

9.1 An applicant who has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with Physics, Chemistry, and Biology (mandatory), and Mathematics (optional), securing a minimum of 50% marks in aggregate, shall be eligible for admission to the Program. ST/SC 45% marks in aggregate, shall be eligible for admission to the Program.

9.2 Candidates who have studied abroad and have passed the equivalent qualification, as determined by the Association of Indian Universities, must have passed Physics, Chemistry, and Biology (mandatory) and Mathematics (optional) up to the 12th standard level.

9.3 Foreign Nationals (FN), Persons of Indian Origin (PIO), and Children of Indian Workers in Gulf Countries (CIWGC) must have completed qualifying examinations considered equivalent by the Association of Indian Universities/Academic Council to be eligible for admission.

9.4 Reservation for the SC / ST and other backward classes shall be made in accordance with the directives issued by the Government of Karnataka from time to time.

9.5 Admissions are offered to Foreign Nationals and Indians living abroad in accordance with the rules applicable for such admission, issued from time to time, by the Government of India.

9.6 Candidates must fulfil the medical standards required for admission as prescribed by the University.

9.7 If, at any time after admission, it is found that a candidate had not in fact fulfilled all the requirements stipulated in the offer of admission, in any form whatsoever, including possible misinformation and any other falsification, the Registrar shall report the matter to the Board of Management (BOM), recommending revoking the admission of the candidate.

9.8 The decision of the BOM regarding the admissions is final and binding.

10. Lateral Entry / Transfer Students requirements

10.1 Lateral Entry

The University admits students directly to the second year (3rd Semester) of the Bachelor of Science in Cardiac Care Technology (CCT) degree program as per the provisions and/or regulations of the Government and the National Commission for allied and Healthcare Professions (NCAHP) pertaining to the "Lateral Entry" scheme. The general conditions and rules governing the provision of Lateral Entry to the B.Sc. Program of the University are listed in the following Sub-Clauses:

10.1.1 Admission to the 2nd year (3rd Semester) of the B.Sc. Degree program shall be open to candidates who have completed a minimum of two (02) years full-time Diploma in Cardiac Care Technology from a Government-recognized body and who have secured a pass in the qualifying diploma examination.

10.1.2 Provided that, such candidates must also have completed the Higher Secondary (10+2) or equivalent examination with Physics, Chemistry, and Biology as subjects.

10.1.3 Lateral Entry shall be permissible only if the subject studied at the Diploma level is the same as the one in which the admission is sought.

10.1.4 The number of students to be admitted under the Lateral Entry scheme shall not exceed twenty percent (20%) of the total annual intake for the B.Sc. Program.

10.1.5 Eligibility of candidates for Lateral Entry shall be based on performance in the qualifying diploma examination and the entrance examination conducted or approved by the NCAHP, as applicable.

10.1.6 Candidates admitted under the Lateral Entry scheme must adhere to all program-specific rules and regulations applicable from the 3rd semester onwards, including curriculum structure and credit requirements.

10.1.7 Foreign Nationals and candidates qualified from foreign Universities/Boards must obtain equivalence certification from the NCAHP

Commission prior to admission, confirming their qualification is equivalent to the Indian diploma standards.

10.1.8 All existing University regulations, including any bridge courses prescribed by the University for Knowledge Alignment, shall be binding on students admitted through the Lateral Entry scheme. Such bridge courses, if prescribed, will not be included in CGPA calculations.

10.1.9 All the Courses (and the corresponding number of Credits) prescribed for the 1st Year of the concerned Program shall be waived for the student(s) admitted to the concerned Program through Lateral Entry. Further, the *Minimum Credit Requirements* for the award of the B.Sc. Degree in the concerned Program shall be prescribed / calculated as follows:

The ***Minimum Credit Requirements*** for the award of the Bachelor of Technology Degree prescribed by the concerned Bachelor of Science Degree Program Regulations and Curriculum, 2025-2029, minus the number of Credits prescribed / accepted by the Equivalence Committee for the 1st Year (1st and 2nd Semesters) of the B.Sc. Program. For instance, if the *Minimum Credit Requirements* for the award of the Bachelor of Science (B.Sc.) Degree as prescribed by the Regulations for B.Sc. (Cardiac Care Technology) is "N" Credits, and, if the total credits prescribed in the 1st Year (total credits of the 1st and 2nd Semesters) of the Program concerned is "M" Credits, then the *Minimum Credit Requirements* for the award of the Bachelor of Science in Cardiac Care Technology for a student who joins the Program through the provision of the Lateral Entry, shall be "N – M" Credits.

10.1.10 Further, no other waiver except the Courses prescribed for the 1st year of the B.Sc. Program of the University shall be permissible for students joining the B.Sc. Program through the provision of Lateral Entry.

10.2 Transfer of student(s) from another recognized University to the 2nd year (3rd Semester) of the B. Sc. Program of the University

A student who has completed the 1st Year (i.e., passed in all the Courses / Subjects prescribed for the 1st Year) of the B.Sc., Three /Four-Year Degree Program from another recognized University, may be permitted to transfer to the 2nd Year (3rd Semester) of the B.Sc. Program of the University as per the rules and guidelines prescribed in the following Sub-Clauses:

10.2.1 The concerned student fulfils the criteria specified in Sub-Clauses 10.1.1, 10.1.2 and 10.1.3.

10.2.2 The student shall submit the Application for Transfer along with a non-refundable Application Fee (as prescribed by the University from time to time) to the University no later than July 10 of the concerned year for admission to the 2nd Year (3rd Semester) B.Sc. Program commencing on August 1 on the year concerned.

10.2.3 The student shall submit copies of the respective Marks Cards / Grade Sheets / Certificates along with the Application for Transfer.

10.2.4 The transfer may be provided on the condition that the Courses and Credits completed by the concerned student in the 1st Year of the B.Sc. Three/Four-year Degree Program from the concerned University, are declared equivalent and acceptable by the Equivalence Committee constituted by the Vice Chancellor for this purpose. Further, the Equivalence Committee may also prescribe the Courses and Credits the concerned students shall have to mandatorily complete, if admitted to the 2nd Year of the B.Sc. Program of the University.

10.2.5 The Branch / Discipline allotted to the student concerned shall be the decision of the University and binding on the student.

11. Specific Regulations regarding Assessment and Evaluation (including the Assessment Details of NTCC Courses, Weightages of Continuous Assessment and End Term Examination for various Course Categories)

11.1 The academic performance evaluation of a student in a Course shall be according to the University Letter Grading System based on the class performance distribution in the Course.

11.2 Academic performance evaluation of every registered student in every Course registered by the student is carried out through various components of Assessments spread across the Semester. The nature of components of Continuous Assessments and the weightage given to each component of Continuous Assessments (refer Clause 8.8 of Academic regulations) shall be clearly defined in the Course Plan for every Course, and approved by the DAC.

11.3 Format of the End-Term examination shall be specified in the Course Plan.

11.4 Grading is the process of rewarding the students for their overall performance in each Course. The University follows the system of Relative Grading with statistical

approach to classify the students based on the relative performance of the students registered in the concerned Course except in the following cases:

- Non-Teaching Credit Courses (NTCC)
- Courses with a class strength less than 30

Absolute grading method may be adopted, where necessary with prior approval of concerned DAC.

Grading shall be done at the end of the Academic Term by considering the aggregate performance of the student in all components of Assessments prescribed for the Course. Letter Grades (Clause 8.10 of Academic regulations) shall be awarded to a student based on her/his overall performance relative to the class performance distribution in the concerned Course. These Letter Grades not only indicate a qualitative assessment of the student's performance but also carry a quantitative (numeric) equivalent called the Grade Point.

11.5 Assessment Components and Weightage

Table 1: Assessment Components and Weightage for different category of Courses

Nature of Course and Structure	**Evaluation Component**	**Weightage**	**Minimum Performance Criteria**
Lecture-based Course *L component in the L-T-P Structure is predominant (more than 1) (Examples: 3-0-0; 3-0-2; 2-1-0; 2-0-2, 2-0-4 etc.)*	**Continuous Internal Evaluation (CIE)** (a) 50% of CIE from two notified formative written tests (b) 50% of CIE from internal assessments such as seminars, journal club presentations, case presentations, assignments, etc.	30% (CIE Total)	40% (in CIE to be eligible for ESE)
	End Semester Examination (ESE) University-conducted Theory exam with specified pattern, type, and weightage as per curriculum	70%	30% (in ESE)

Lab/Practice-based Course *P component in the L-T-P Structure is predominant (Examples: 0-0-4; 1-0-4; 1-0-2; etc.)*	**Continuous Internal Evaluation (CIE)** Laboratory work including records, performance, attendance, project reports, etc. along with two formative tests and internal assessments (seminars, case-based assessments)	30% (CIE Total)	40% (in CIE to be eligible for ESE)
	End Semester Examination (ESE) Practical exam: Spotters, equipment demonstration, case-based discussion, etc.	70%	30% (in ESE)
Skill-based Courses *Industry Internship, Capstone Project, Dissertation, Summer/Short Internship, Field Projects, Portfolio, etc., with non-L-T-P pedagogy*	**Guidelines for the assessment components and recommended weightages** will be specified in the concerned Program Regulations and Course Plans	As specified (typically 40%)	As per Program Regulations

The exact weightages of Evaluation Components shall be clearly specified in the respective Course Plan.

Normally, for Practice/Skill based Courses, without a defined credit structure (L–T–P) [NTCC], but with assigned Credits (as defined in Clause 5.2 of the Academic Regulations), the method of evaluation shall be based only on Continuous Assessments. The various components of Continuous Assessments, the distribution of weightage among such components, and the method of evaluation/assessment, shall be as decided and indicated in the Course Plan/PRC. The same shall be approved by the respective DAC.

11.6 Minimum Performance Criteria:

11.6.1 Theory only Course and Lab/Practice Embedded Theory Course

A student shall satisfy the following minimum performance criteria to be eligible to earn the credits towards the concerned Course:

a. A student must obtain a minimum of 30% of the total marks/weightage assigned to the End Term Examinations in the concerned Course.
b. The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of the components of Continuous Assessments, Mid Term Examinations and End Term Examinations in the concerned Course.

11.6.2 Lab/Practice only Course and Project Based Courses

The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of all assessment components in the concerned Course.

11.6.3 A student who fails to meet the minimum performance criteria listed above in a Course shall be declared as "Fail" and given "F" Grade in the concerned Course. For theory Courses, the student shall have to re-appear in the "Make-Up Examinations" as scheduled by the University in any subsequent semester, or, re-appear in the End Term Examinations of the same Course when it is scheduled at the end of the following Semester or Summer Term, if offered. The marks obtained in the Continuous Assessments (other than the End Term Examination) shall be carried forward and be included in computing the final grade, if the student secures the minimum requirements (as per Sub-Clause 8.9.1 and 8.9.2 of Academic regulations) in the "Make-Up Examinations" of the concerned Course. Further, the student has an option to re-register for the Course and clear the same in the summer term/ subsequent semester if he/she wishes to do so, provided the Course is offered.

12. Additional clarifications - Rules and Guidelines for Transfer of Credits from MOOC, etc. – Note: These are covered in Academic Regulations

The University allows students to acquire credits from other Indian or foreign institutions and/or Massive Open Online Course (MOOC) platforms, subject to prior approval. These credits may be transferred and counted toward fulfilling the minimum credit requirements for the award of a degree. The process of transfer of credits is governed by the following rules and guidelines:

12.1 The transfer of credits shall be examined and recommended by the Equivalence Committee (Refer ANNEXURE B of Academic regulations) and approved by the Dean - Academics.

12.2 Students may earn credits from other Indian or foreign Universities/Institutions with which the University has an MOU, and that MOU shall have specific provisions, rules and guidelines for transfer of credits. These transferred credits shall be counted towards the minimum credit requirements for the award of the degree.

12.3 Students may earn credits by registering for Online Courses offered by *Study Web of Active Learning by Young and Aspiring Minds* (SWAYAM) and *National Program on Technology Enhanced Learning* (NPTEL), or other such recognized Bodies/ Universities/Institutions as approved by the concerned BOS and Academic Council from time to time. The concerned School/Parent Department shall publish/include the approved list of Courses and the rules and guidelines governing such transfer of credits of the concerned Program from time to time. The Rules and Guidelines for the transfer of credits specifically from the Online Courses conducted by SWAYAM/ NPTEL/ other approved MOOCs are as stated in the following Sub-Clauses:

12.3.1.1 A student may complete SWAYAM/NPTEL/other approved MOOCs as mentioned in Clause17.3(as per Academic regulations) and transfer equivalent credits to partially or fully complete the mandatory credit requirements of Discipline Elective Courses and/or the mandatory credit requirements of Open Elective Courses as prescribed in the concerned Curriculum Structure. However, it is the sole responsibility of the student to complete the mandatory credit requirements of the Discipline Elective Courses and the Open Elective Courses as prescribed by the Curriculum Structure of the concerned Program.

12.3.1.2 SWAYAM/NPTEL/ other approved MOOCs as mentioned in Clause 17.3 (as per Academic regulations) shall be approved by the concerned Board of Studies and placed (as Annexures) in the concerned PRC.

12.3.1.3 Parent Departments may release a list of SWAYAM/NPTEL/other approved MOOCs for Pre-Registration as per schedule in the Academic Calendar or through University Notification to this effect.

12.3.1.4 Students may Pre-Register for the SWAYAM/NPTEL/other approved MOOCs in the respective Departments and register for the same Courses as per the schedule announced by respective Online Course Offering body/institute/ university.

12.3.1.5 A student shall request for transfer of credits only from such approved Courses as mentioned in Sub-Clause 13.3.2 above.

12.3.1.6 SWAYAM/NPTEL/other approved MOOCs Courses are considered for transfer of credits only if the concerned student has successfully completed the SWAYAM/NPTEL/other approved MOOCs and obtained a certificate of successful/satisfactory completion.

12.3.1.7 A student who has successfully completed the approved SWAYAM/NPTEL/ other approved MOOCs and wants to avail the provision of transfer of equivalent credits, must submit the original Certificate of Completion, or such similar authorized documents to the HOD concerned, with a written request for the transfer of the equivalent credits. On verification of the Certificates/Documents and approval by the HOD concerned, the Course(s) and equivalent Credits shall be forwarded to the COE for processing of results of the concerned Academic Term.

12.3.1.8 The credit equivalence of the SWAYAM/NPTEL/other approved MOOCs are based on Course durations and/or as recommended by the Course offering body/institute/university. The Credit Equivalence mapped to SWAYAM/ NPTEL approved Courses based on Course durations for transfer of credits is summarised in Table shown below. The Grade will be calculated from the marks received by the Absolute Grading Table 8.11. in the Academic regulations.

Table 2: Durations and Credit Equivalence for Transfer of Credits from SWAYAM-NPTEL/ other approved MOOC Courses

Sl. No.	Course Duration	Credit Equivalence
1	4 Weeks	1 Credit
2	8 Weeks	2 Credits
3	12 Weeks	3 Credits

12.3.2 The maximum permissible number of credits that a student may request for credit transfer from MOOCs shall not exceed 20% of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree.

12.3.3 The University shall not reimburse any fees/expense; a student may incur for the SWAYAM/NPTEL/other approved MOOCs.

12.3.4 The maximum number of credits that can be transferred by a student shall be limited to forty percent (40%) of the mandatory minimum credit

requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree. However, the grades obtained in the Courses transferred from other Institutions/MOOCs, as mentioned in this Section (13.0), shall not be included in the calculation of the CGPA.

13. Structure / Component with Credit Requirements Course Baskets & Minimum Basket wise Credit Requirements

The B. Sc. Cardiac Care Technology (CCT) Program Structure (2025-2029) totaling 171 credits. Table 3 summarizes the type of baskets, number of courses under each basket and the associated credits that are mandatorily required for the completion of the Degree.

Table 3: B. Sc. in Cardiac Care Technology (CCT): Summary of Minimum Credit Contribution from various Baskets

Sl. No.	Baskets/Category	Credit Contribution
1	**Core Courses (CC)**	68
2	**Ability Enhancement Compulsory Course (AECC)**	8
3	**Multi-Disciplinary**	9
4	**Minor**	21
5	**Skill Enhancement (SEC)**	13
6	**Internship (INT)**	40
7	**Value Added Course (VAC)**	8
8	**Summer Internship**	4
	Total Credits	**171 (Minimum)**

14. Minimum Total Credit Requirements of Award of Degree

The Minimum total credit requirement for the award of degree shall be as per the guidelines of NCAHP/ MoFHW.

15. Other Specific Requirements for Award of Degree, if any, as prescribed by the Statutory Bodies,

15.1 The award of the Degree shall be recommended by the Board of Examinations and approved by the Academic Council and Board of Management of the University**.**

15.2 student shall be declared to be eligible for the award of the concerned Degree if she/he:

a. Fulfilled the Minimum Credit Requirements and the Minimum Credits requirements under various baskets;

b. Secure a minimum CGPA of 4.50 in the concerned Program at the end of the Semester/Academic Term in which she/he completes all the requirements for the award of the Degree as specified in Sub-Clause 19.2.1 of Academic Regulations**;**

c. No dues to the University, Departments, Hostels, Library, and any other such Centers/ Departments of the University; and

d. No disciplinary action is pending against her/him.

16. Curriculum Structure – Basket Wise Course List:

List here all the courses Basket/Category wise as per the Credit Distribution shown in the Table 3.

Table 3.1 Core Courses (CC)

S. No	Course code	Course Name	L	T	P	C
1	BPAHAP101	Human Anatomy and Physiology – I	3	1	2	5
2	BPAHAP201	Human Anatomy & Physiology - II	3	1	2	5
3	BPAHAP202	Basic Electrocardiography	2	1	2	4
4	BPCTAP205	Anatomy, Physiology, Pharmacology in Cardiac Care	2	1	0	3
5	BPCTCD301	Cardiovascular diseases pertinent to Cardiac care Technology	2	1	2	4
6	BPCTMI302	Medical Instrumentation relevant to Cardiac care	2	1	2	4
7	BPCTEC304	Basic Echocardiography	3	1	0	4
8	BPCTPI401	Pediatric Interventions	2	1	2	4
9	BPCTEC403	Advanced Electrocardiography	2	1	2	4
10	BPCTEC403	Advanced Echocardiography	2	1	2	4
11	BPCTDC404	Development of Cardiovascular system: Fetal & Neonatal	2	1	0	3
12	BPCTCC502	Cardiac Catheterization	2	1	2	4

13	BPCTIC503	Invasive Cardiology	2	1	2	4
14	BPCTTE504	Treadmill exercise stress testing and 24 hour recording	2	1	2	4
15	BPCTPT601	Perfusion Technology	2	1	2	4
16	BPCTPU602	Principles of Ultrasonography	2	1	2	4
17	BPCTCC603	Cardiac catheterization laboratory advanced	2	1	2	4
Total No. of Credits						**68**

Table 3.2 Ability Enhancement Compulsory Course (AECC)

S. No	Course code	Course Name	L	T	P	C
1	BPAHIC154	Introduction to Computing	2	0	2	3
2	BPAHMD306T	Medical Documentation and Record Keeping	2	1	0	3
3	BPAHCC407	Campus to Corporate	2	0	0	2
Total No. of Credits						**8**

Table 3.3 MINOR (M)

S. No	Course cod	Course Name	L	T	P	C
1	BPAHAP101T	Biochemistry	3	1	2	5
2	BPAHGM203T	General Microbiology	2	1	2	4
3	BPAHPS303	Preventive and Social Medicine	2	0	0	2
4	BPAHDM405	Disaster Management	2	1	0	3
5	BPAHME406	Medical Ethics & Legal Aspects	2	1	0	3
6	BPAHHA654	Hospital Administration	2	1	2	4
Total No. of Credits						21

Table 3.4 Multi-Disciplinary

S. No	Course code	Course Name	L	T	P	C
1	BPAHQP103	Introduction to Quality and patient safety	2	0	2	3
2	BPAHES207	Environmental Sciences	2	1	0	3
3	BPAHCD305	Cultural Diversity in the Indian Society	2	1	0	3
Total No. of Credits						9

Table 3.5 Internship

S. No	Course code	Course Name	L	T	P	C
1	BPAHIP752	Internship-I	0	0	40	20
2	BPAHIP851	Internship-II	0	0	40	20
Total No. of Credits						40

Table 3.6 Skill Enhancement (SEC)						
S. No	**Course code**	**Course Name**	**L**	**T**	**P**	**C**
1	BPAHAF106	Accounting and Finance	2	1	0	3
2	BPRTPC203	Patient care and basic nursing	1	0	2	2
3	BPAHAI501	Advanced Intensive Care (ACLS, PALS & NALS)	2	1	2	4
4	BPAHRM605	Research Methodology & Biostatistics	3	1	0	4
					Total No. of Credits	**13**

Table 3.7 Value Added Courses (VAC)						
S. No	**Course code**	**Course Name**	**L**	**T**	**P**	**C**
1	BPAHCS106	Communication Skills for Healthcare Professionals	2	1	0	3
2	BPAHHI206	Healthcare Informatics and Data Analytics	2	1	0	3
3	BPAHMH307	Mental Health & Emotional Intelligence	2	0	0	2
					Total No. of Credits	8

Table 3.7 Value Added Courses (VAC)						
S. No	**Course code**	**Course Name**	**L**	**T**	**P**	**C**
1	BPAHIP555	Summer Internship	0	0	8	4
					Total No. of Credits	8

17. Practical / Skill based Courses – Internships / Thesis / Dissertation / Capstone Project Work / Portfolio / Mini project

Practical / Skill based Courses like internship, project work, capstone project, research project / dissertation, and such similar courses, where the pedagogy does not lend itself to a typical L-T-P-C Structure as defined in Clause 5.1 of the Academic Regulations, are simply assigned the number of Credits based on the quantum of work / effort required to full fill the learning objectives and outcomes prescribed for the concerned Courses. Such courses are referred to as Non-Teaching Credit Courses (NTCC). These Courses are designed to provide students with hands-on experience and skills essential for their professional development. These courses aim to equip students with abilities in problem identification, root cause analysis, problem-solving, innovation, and design thinking through industry exposure and project-based learning. The expected outcomes are first

level proficiency in problem solving and design thinking skills to better equip B.Sc. graduates for their professional careers. The method of evaluation and grading for the Practical / Skill based Courses shall be prescribed and approved by the concerned Departmental Academic Committee (refer Annexure A of the Academic Regulations). The same shall be prescribed in the Course Plan.

17.1 Internship

A student may undergo an internship for a period of 4-6 weeks in an industry / company or academic / research institution during the Semester Break between 4th and 5th Semesters or 6th and 7th Semesters, subject to the following conditions:

17.1.1 The Internship shall be in conducted in accordance with the Internship Policy prescribed by the University from time to time.

17.1.2 The selection criteria (minimum CGPA, pass in all Courses as on date, and any other qualifying criteria) as applicable / stipulated by the concerned Industry / Company or academic / research institution for award of the Internship to a student;

17.1.3 The number of Internships available for the concerned Academic Term. Further, the available number of internships shall be awarded to the students by the University on the basis of merit using the CGPA secured by the student. Provided further, the student fulfils the criteria, as applicable, specified by the Industry / Company or academic / research institution providing the Internship, as stated in Sub-Clause 18.1.2 above.

17.1.4 A student may opt for Internship in an Industry / Company or academic / research institution of her / his choice, subject to the condition that the concerned student takes the responsibility to arrange the Internship on her / his own. Provided further, that the Industry / Company or academic / research institution offering such Internship confirms to the University that the Internship shall be conducted in accordance with the Program Regulations and Internship Policy of the University.

17.1.5 A student selected for an Internship in an industry / company or academic / research institution shall adhere to all the rules and guidelines prescribed in the Internship Policy of the University.

17.2 Minor Project Work

A student may opt to do a Minor Project Work for a period of 4-6 weeks in an Industry / Company or academic / research institution or the University Department(s) during the 3rd / 5th / 6th / 7th Semester as applicable, subject to the following conditions:

17.2.1 The Minor Project Work shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

17.2.2 The student may do the Minor project work in an Industry / Company or academic / research institution of her / his choice subject to the above-mentioned condition (Sub-Clause 18.2.1). Provided further, that the Industry / Company or academic / research institution offering such project work confirms to the University that the project work will be conducted in accordance with the Program Regulations and requirements of the University.

17.3 Research Project / Dissertation

A student may opt to do a Research Project / Dissertation for a period of 12-14 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Capstone Project, subject to the following conditions:

17.3.1 The Research Project / Dissertation shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

17.3.2 The student may do the Research Project / Dissertation in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned condition (Sub-Clause 18.4.1). Provided further, that the Industry / Company or academic / research institution offering such Research Project / Dissertation confirms to the University that the Research Project / Dissertation work will be conducted in accordance with the Program Regulations and requirements of the University.

18. List of MOOC (NPTEL) Courses

NPTEL - Discipline Elective Courses for B.Sc. (Cardiac Care Technology)

Sl. No.	Course ID	Course Name	Duration
1	noc25-hs77	English Studies, Cultural Studies	12 Weeks
2	noc25-ge02	Basic Certificate in Palliative Care - 2	12 Weeks

3	noc25-ge38	Pulmonary Function tests - Interpretation and application in clinical practice	4 Weeks
4	noc25-ge12	Foundation Certificate In Palliative Care - 1	12 Weeks
5	noc25-ge36	Medical Law	12 Weeks
6	noc25-ge27	Qualitative Research Methods and Research Writing	12 eeks

19. Recommended Semester Wise Course Structure / Flow including the Program / Discipline Elective Paths / Options

Semester I								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPAHAP101	Human Anatomy & Physiology – I	3	1	2	5	6	CC
2	BPAHBC102	Biochemistry	3	1	2	5	6	MI
3	BPAHQP103	Introduction to Quality and patient safety	2	0	2	3	4	MD
4	BPAHIC104	Introduction to Computing	2	0	2	3	4	AEC
5	BPAHAF105	Accounting and Finance	2	1	0	3	3	SEC
6	BPAHCS106	Communication Skills for Healthcare Professionals	2	1	0	3	3	VAC
		Total Credit	**14**	**4**	**8**	**22**	**26**	

CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary, VAC= Value Added Course. INT – Internship

Semester II								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPAHAP201	Human Anatomy & Physiology - II	3	1	2	5	6	CC
2	BPCTBE202	Basic Electrocardiography	2	1	2	4	5	CC

3	BPAHGM203	General Microbiology	2	1	2	4	5	MI
4	BPCTBE 204	Basic Intensive Care (BLS, Vital Signs, Basic ECG Interpretation)	1	0	2	2	3	SEC
5	BPCTAP205	Applied Anatomy, Physiology, Pharmacology in Cardiac Care	2	1	0	3	3	CC
6	BPAHHI206	Healthcare Informatics and Data Analytics	2	1	0	3	3	VAC
	BPAHES207	Environmental Sciences	2	1	0	3	3	MD
		Total Credit	**14**	**6**	**8**	**24**	**28**	
CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary INT – Intership								

Semester III								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPCTCD301T	Cardiovascular diseases pertinent to Cardiac care Technology	2	1	2	4	5	CC
2	BPCTMI302T	Medical Instrumentation relevant to Cardiac care	2	1	2	4	5	CC
3	BPAHPS303	Preventive and Social Medicine	2	0	0	2	2	MI
4	BPCTEC304T	Basic Echocardiography	3	1	0	4	4	CC
5	BPAHCD305	Cultural Diversity in the Indian Society	2	1	0	3	3	MD
6	BPAHMD306	Medical Documentation and Record Keeping	2	1	0	3	3	AEC

7	BPAHMH307	Mental Health & Emotional Intelligence	2	0	0	2	2	VAC
		Total Credit	**15**	**5**	**4**	**22**	**24**	
CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary INT – Intership								

Semester IV								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPCTPI401T	Pediatric Interventions	2	1	2	4	5	CC
2	BPCTEK402T	Advanced Electrocardiography	2	1	2	4	5	CC
3	BPCTEC403T	Advanced Echocardiography	2	1	2	4	5	CC
4	BPCTDC404T	Development of Cardiovascular system: Fetal & Neonatal	2	1	0	3	3	CC
5	BPAHDM405	Disaster Management	2	1	0	3	3	MI
6	BPAHME406	Medical Ethics & Legal Aspects	2	1	0	3	3	MI
7	BPAHCC407	Campus to Corporate (Bedside Manners & PoSH)	2	0	0	2	2	AEC
		Total Credit	**14**	**6**	**6**	**23**	**26**	
CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary INT – Intership								

Semester V								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPAHAI501	Advanced Intensive Care (ACLS, PALS & NALS)	2	1	2	4	5	SEC
2	BPCTCC502	Cardiac Catheterization	2	1	2	4	5	CC
3	BPCTIC503	Invasive Cardiology	2	1	2	4	5	CC
4	BPCTTE504	Treadmill exercise stress testing and 24-hour recording	2	1	2	4	5	CC
5	BPAHIP555	Summer Internship	0	0	8	4	8	SI
		Total Credit	**8**	**4**	**16**	**20**	**8**	

CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary SI – Summer Internship INT – Internship

Semester VI								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPCTPT601T	Perfusion Technology	2	1	2	4	5	CC
2	BPCTPU602T	Principles of Ultrasonography	2	1	2	4	5	CC
3	BPCTCC603T	Cardiac catheterization laboratory advanced	2	1	2	4	5	CC
4	BPAHHA604	Hospital Administration	2	1	2	4	5	MI
5	BPAHRM605	Research Methodology & Biostatistics	3	1	0	4	4	SEC
Total Credit			**11**	**5**	**8**	**20**	**24**	

CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary SI – Summer Internship INT – Internship

Semester VII								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPAHFD751	Internship-I	0	0	40	20	28	INT
Total Credit			-	-	40	20	40	
					Total Credit	**20**		
CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary SI – Summer Internship INT – Internship								

Semester VIII								
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**	**Contact Hours**	**Basket**
1	BPAHFD752	Internship-II	-	-	40	20	40	INT
		Total Credit	-	-	40	20	40	
CC= Core Course, AECC= Ability Enhancement Compulsory Course, SEC= Skill Enhancement Course, MI – MINOR, MD- Multidisciplinary SI – Summer Internship INT – Internship								

20. Course Catalogue

Course Code: BPAHAP101T	**Course Title: Human Anatomy and Physiology – I** **Type of Course: Core Course**	**L-T- P- C**	3	1	2	5
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course introduces students to the fundamentals of human anatomy essential for allied health professionals. It covers basic anatomical terminology, detailed study of bones (osteology), muscular, thoracic, excretory, digestive, and nervous systems. The structure and function of the gastrointestinal tract and the central nervous system are also explained. Through practical training using mannequins and radiological tools, students gain critical skills in bone identification, surface anatomy, organ localization, and interpretation of X-rays. The course aims to develop a foundational understanding of human anatomy with practical application for operation theatre and anesthesia technology students.					
Course Objective	• To familiarize students with anatomical structures and terminology. • To enable identification and description of bones, muscles, and internal organs. • To understand the anatomical basis of physiological functions. • To apply anatomical knowledge in clinical and diagnostic settings. • To interpret surface and radiological anatomy for practical use in operation theatres.					
Basic skill sets required for the laboratory:	The students shall be able to develop: 1. An attitude of enquiry 2. Confidence and ability to tackle new problems 3. Ability to interpret events and results 4. Ability to work as a leader and as a member of a team 5. Assess errors and eliminate them 6. Observe and measure anatomical phenomena 7. Write structured reports 8. Select suitable models, mannequins, and anatomical tools 9. Locate anatomical faults or abnormalities in systems 10. Manipulative skills for handling anatomical models and tools 11. Ability to follow dissection/simulation procedures 12. Awareness of safety precautions in labs 13. Judgment of anatomical proportions and orientation without measurement					
Course Out Comes	**On successful completion of the course the students shall be able to:** Describe the basic anatomical terminology and identify major bones of the upper and lower limbs, including the vertebral column. CO. 1. Explain the anatomical structure of the thorax including intercostal sace, pleura, thoracic cage, and major thoracic bones.					

	CO. 2. Describe the anatomical components of the respiratory system with emphasis on the lungs, trachea, and bronchial tree. CO. 3. Illustrate the surface anatomy, chambers, valves, and blood vessels of the heart along with the pericardium and coronary arteries. CO. 4. Identify and describe the major skeletal muscles of the thorax and upper limb, focusing on the origin, insertion, and action of flexor and extensor groups. CO. 5. Explain the structure and function of the excretory system including kidneys, ureters, and urinary bladder. CO. 6. Discuss the anatomy and physiology of the digestive system, including oral cavity, gastrointestinal tract, digestion, absorption, and common disorders. CO. 7. Describe the structure and function of neurons and outline the organization of the central and peripheral nervous systems, including cranial and spinal nerves			
Course Content:				
Module 1	**Introduction to Anatomy**	Assignment		**Sessions**
1. **Topics:** Introduction to Anatomy: Basic Anatomical terminology a. Osteology- i. Upper limb – clavicle, scapula, humerus, radius, ulna, ii. Lower limb - femur, hipbone, sacrum, tibia, fibula &Vertebral column b. Thorax – Intercostal space, pleura, bony thoracic cage, ribs sternum &thoracic vertebrae Lungs – Trachea, bronchial tree.				
Module 2	**Heart**	Assignment		**Sessions**
Topics: Heart – Surface anatomy of heart, chambers of the heart, valves of the heart, and major blood vessels of heart, pericardium, and coronary arteries				
Module 3	**Skeleton-muscular system**	Assignment		**Sessions**
Topics: Skeleton-muscular system – Muscles of thorax, muscles of upper limb(arm & fore arm) Flexor and extensor group of muscles (origin, insertion, action)				
Module 4	**Excretory system**	Assignment		**Sessions**
Topics: Excretory system – Kidneys, ureters, bladder.				
Module 5	**Digestive System**	Assignment		**Sessions**
Digestive System:				

I. Structure and function of the digestive system
Oral cavity and digestive enzymes

II. Anatomy and function of the gastrointestinal tract
Absorption and digestion of nutrients

III. Common digestive disorders

Module 5	**Nervous System**	Assignment		**Sessions**

Topics: Nervous System:

- Structure and function of neurons
- Organization of the central nervous system (brain and spinal cord) Peripheral nervous system and its divisions
- Cranial nerves and spinal nerves Basic principles of neurophysiology

List of Laboratory Tasks:

Experiment No. 1: Gross Anatomy (Using Models and Charts)
Experiment No. 2: Identification of bones – upper limb: clavicle, scapula, humerus, radius, ulna
Experiment No. 3: Identification of bones – lower limb: femur, hip bone, sacrum, tibia, fibula
Experiment No. 4: Vertebral column – structure and types
Experiment No. 5: Surface anatomy – anatomical landmarks and orientations
Experiment No. 6: Heart, lungs, kidneys – external morphology and internal structures
Experiment No. 7: Digestive tract and accessory organs – liver, stomach, intestines
Experiment No. 8: Nervous system – brain, spinal cord, cranial nerves (models/charts)
Experiment No. 9: Radiological anatomy – interpretation of X-ray (Chest PA view)
Experiment No. 10: Identification of reproductive organs – male and female (models)

Targeted Application & Tools that can be used:

- Anatomical mannequins and charts
- Plastic and 3D printed bone and organ models
- Dissection videos and simulation software
- Radiological films and digital X-ray interpretation tools
- Surface anatomy tracing and virtual 3D anatomy apps (e.g., Visible Body, Kenhub)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

- **Create a labeled 3D model or diagram of the human heart, demonstrating its surface anatomy, chambers, valves, and major blood vessels.**
  (Type: Individual / Group Model-based Assignment)
- **Develop a detailed anatomical chart or digital presentation illustrating the bones of the upper and lower limbs with correct anatomical terminology and orientation.**
  (Type: Individual Visual Assignment)
- **Prepare a comparative chart on the structure and function of the central vs. peripheral nervous system, including cranial and spinal nerves.**
  (Type: Research-based Assignment / Poster Presentation)

▪ **Design a digestive system flowchart that maps the process of digestion and absorption along with the associated organs and enzymes.** *(Type: Diagrammatic / Concept Mapping Assignment)*
Text Book 1. *Anatomy and Physiology for Allied Health* by Kevin T. Patton 2. *Human Anatomy* by Marieb Wilhelm & Mallatt
References I. *Gray's Anatomy for Students* by Richard Drake II. *Clinically Oriented Anatomy* by Keith L. Moore III. *Atlas of Human Anatomy* by Frank H. Netter **Online learning resources:** 1. EBook: https://presiuniv.knimbus.com/user#/home 2. https://puniversity.informaticsglobal.com/ 3. https://www.visiblebody.com 4. https://www.kenhub.com 5. https://www.aheducation.co.in 1. https://www.anatomyzone.com
Topics relevant to "SKILL DEVELOPMENT": ● Skill development through experiential learning via anatomical model handling and surface tracing ● Identification and differentiation of human bones and organs ● Radiological anatomy interpretation ● Application of anatomical knowledge in real-life clinical environments such as operating theatres and diagnostic labs.

Course Code: BPAHBC102	**Course Title:** Biochemistry **Type of Course: Core Course**	**L-T- P- C**	3	1	2	5
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course introduces the fundamental concepts of biochemistry with a focus on the molecular basis of life. It covers the structure and function of biomolecules, enzymatic activity, metabolism, and biochemical pathways essential for cellular processes. The course also highlights the clinical relevance of biochemical principles, helping students understand how molecular mechanisms relate to health and disease. Designed for students in health and life sciences, it lays the groundwork for advanced studies in physiology, pathology, and medical sciences.					
Course Objective	The Biochemistry course is designed to provide students with a comprehensive understanding of the chemical principles underlying biological systems and processes. This course aims to explore the structure and function of biomolecules such as carbohydrates, lipids, proteins, nucleic acids, and enzymes, and how they contribute to cellular function and metabolism. Emphasis is placed on metabolic					

	pathways, bioenergetics, and the biochemical basis of disease, with a focus on clinical relevance to human health. Students will develop foundational knowledge essential for understanding advanced topics in physiology, pathology, and pharmacology, and will gain skills in interpreting biochemical data, understanding molecular interactions, and linking biochemical mechanisms to organ system functions and clinical conditions.			
Basic skill sets required for the laboratory:	The students shall be able to develop: 1. Accurately measure liquids and solids using lab equipment. 2. Prepare solutions and buffers with correct concentrations. 3. Follow safety rules and handle chemicals properly. 4. Operate instruments like spectrophotometers and pH meters. 5. Observe experiments carefully and record data precisely. 6. Perform basic biochemical tests and enzyme assays. 7. Analyze experimental data to draw conclusions. 8. Write clear and concise lab reports.			
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:** Accurately measure liquids and solids using standard laboratory equipment. **CO2:** Prepare solutions and buffers at specified concentrations following proper protocols. **CO3:** Demonstrate adherence to laboratory safety rules and proper chemical handling techniques. **CO4:** Operate common laboratory instruments such as spectrophotometers and pH meters efficiently. **CO5:** Observe experimental procedures meticulously and record data with precision. **CO6:** Perform basic biochemical tests and enzyme assays competently. **CO7:** Analyze experimental data critically to draw valid scientific conclusions.			
Course Content:				
Module 1	**Introduction to Biochemistry and Carbohydrates**	Assignment		**Sessions**
Topics: Introduction to Biochemistry:				

Definition and Scope: Career opportunities, Branches of Biochemistry.

Importance of Biochemistry: Bioelements and Biomolecules.

Carbohydrates: Classification, Properties and Functions; Derivatives of monosaccharides- Sugar, Amino sugars, and Acids; Chemical Structures- Amylose, Amlopectin, Glycogen, Inulin, Dextrin, Cellulose, Chitin, Hyaluronic acid; and Importance of Carbohydrates.

Module 2	**Lipids, Proteins, and Nucleic Acids**	Assignment		**Sessions**

Topics: Lipids: Introduction, Classification and functions of lipids Classification and functions of fatty acids and Clinical aspects of lipids.

Protein: Introduction, classification, and structures.

Nucleic Acids: Introduction, structures and Clinical aspects

Module 3	**Enzymes and Hormones**	Assignment		**Sessions**

- **Topics: Enzymes:** Chemical nature, Classification and Properties, Factors affecting enzyme action and Enzyme inhibition.
- **Hormones:** Classification, chemical nature and Properties of enzymes, factors affecting enzyme action enzyme inhibition, Diagnostic enzymes, General functions and classification of hormones, Mechanism of action of various, Hormones, clinical importance of hormones

Module 4	**Vitamins & Minerals**	Assignment		**Sessions**

- **Topics: Vitamins**: Characteristics, Classification, and functions , Dietary sources , and Clinical aspects
- **Minerals:** Key minerals and their importance

Module 5	**Metabolic Profile**	Assignment		**Sessions**

Carbohydrate metabolism(glycolysis),Krebs cycle, Glycogenesis, lipid metabolism, amino acid metabolism, urea cycle

Topics:

List of Laboratory Tasks:

- **Experiment 1.Laboratory essential practices**
- Essentials of Laboratory Operations: Introduction to biochemistry laboratory, Common glassware, equipment, chemicals and reagents.

- **Experiment 2. Laboratory safety:** Introduction to safety guidelines and laboratory discipline, Bioethical considerations in the laboratory, Laboratory waste management
- **Experiment 3. SOPs of Laboratory instruments:** Adherence to safety protocols, handling of hazardous chemicals and equipment, emergency procedures and knowledge of safety equipment and techniques.
- **Experiment 4. Sterilization techniques:** Adherence to safety protocols while using various sterilization techniques in biochemistry, Heat, chemical and pressure-based sterilization techniques.
- **Experiment 5 Preparing Reagents and Chemicals:** Dilution and mixing techniques, error minimizing, and measurement of chemicals.
- **Experiment 6 Test for macronutrients**
- Test for Carbohydrates: Identification of known and unknown carbohydrates using various reagents and identification methods. Investigative analysis of unknown carbohydrates.
- **Experiment 7 Test for Proteins:** Identification of known and unknown proteins using various reagents and identification methods. Investigative analysis of unknown proteins.
- **Experiment 8 Investigative Analysis of Unknown nutrients**
- Unknown Sample Investigation: Comprehensive practical investigation to determine the nature of unknown sample

Targeted Application & Tools that can be used:

1. **Clinical Diagnostics** – Use of biochemical kits and spectrophotometers to analyze blood and urine markers.
2. **Metabolic and Nutritional Analysis** – Application of metabolic pathway knowledge with tools like pH meters and buffer systems.
3. **Disease Mechanism Study** – Understanding molecular basis of diseases using virtual labs and case-based tools.
4. **Pharmacological Applications** – Exploration of drug interactions with enzymes and receptors through molecular modeling software.
5. **Genetic and Molecular Biology Integration** – Visualization of DNA/RNA structures and protein synthesis using tools like PyMOL and simulations.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. **Article review:** Recent Advances in Enzyme Therapy or Metabolic Disorders
2. **Presentation:** Make a simple PowerPoint or chart about any one biomolecule (like protein, fat, or carbohydrate).
3. **3. Case Study**: Biochemical Changes in a Common Metabolic Disorder (e.g., Diabetes Mellitus)

Text Book

Textbook of Medical Biochemistry – MN Chatterjea & Rana Shinde

References

Biochemistry –by U Sathyanarayana & U Chakrapani
2. Textbook of Medical Biochemistry by D.M Vasudeva & Shrrekumari.
3. Textbook of Medical Biochemistry- by MN Chatterjea & Rana Shinde
4.Textbook of Medical Laboratory technology by Godkar and Godkar.
5. Biochemistry- by Pankaja Naik

Online learning resources:

- *Harper's Illustrated Biochemistry* – Some editions available on Google Books
- *Biochemistry* by U. Satyanarayana – Often found on institutional e-libraries or PDF sites

Notes and PPTs:

- **NPTEL Biochemistry Notes and Slides** – https://nptel.ac.in
- **SlideShare** – Search for "Biochemistry PPT" on www.slideshare.net for user-shared presentations
- **LibreTexts Biochemistry** – https://bio.libretexts.org – Free, textbook-style learning

ideo Lectures:

- **Khan Academy Biochemistry** – Free, easy-to-follow videos: https://www.khanacademy.org

NPTEL Video Lectures – Comprehensive lectures by Indian professors: https://nptel.ac.in/courses/102/103/102103044/

Topics relevant to "SKILL DEVELOPMENT":

- **Basic Biochemical Laboratory Techniques -** Hands-on skills like pipetting, buffer preparation, and solution making.
- **Qualitative and Quantitative Biochemical Tests -** Performing and interpreting tests for carbohydrates, proteins, lipids, and enzymes.
- **Interpretation of Clinical Biochemistry Reports -** Understanding lab results such as blood glucose, liver function, and lipid profiles.
- **Enzyme Kinetics and Activity Analysis -** Studying how factors affect enzyme function using spectrophotometry.
- **Data Recording and Lab Report Writing -** Developing clear and accurate documentation of experimental work.

Course Code: BPAHQP103T	**Course Title: Introduction to Quality and patient safety** **Type of Course:** Multi-Disciplinary	**L-T-P-C**	2	0	0	2
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides comprehensive knowledge and practical skills essential for quality healthcare delivery, emergency care, infection control, biomedical waste management, antibiotic resistance, and disaster management. It equips students with an understanding of quality assurance standards, life-saving techniques, safe handling of biomedical waste, infection prevention protocols, and strategies to combat antibiotic resistance, alongside preparedness for disaster situations. Emphasis is placed on applying current guidelines such as NABH and JCI to ensure patient safety and healthcare excellence.					

Course Objective	To develop students' understanding of quality management in healthcare settings, equip them with practical emergency and life support skills, promote safe biomedical waste and infection control practices, enhance awareness of antibiotic resistance challenges, and prepare them for effective disaster response and management.			
Course Outcomes	**List the course outcomes** **On successful completion of this course the students shall be able to:** **CO1.** Explain concepts of quality assurance and apply quality improvement tools in healthcare. **CO2.** Demonstrate basic emergency care and life support techniques including CPR and AED use. **CO3.** Manage biomedical waste according to standards, ensuring environmental safety. **CO4.** Implement infection prevention strategies and use PPE effectively. **CO5.** Understand antibiotic resistance mechanisms and apply antimicrobial stewardship principles. **CO6.** Develop disaster management plans focusing on preparedness, response, and psychological support.			
Course Content:				
Module 1	**Quality assurance and Management**	Assignment/ Quiz	Numerical solving Task	**Sessions**
Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Quality Improvement Tools & Introduction to current NABH guidelines				
Module 2	**Basics of emergency care and Life support**	Assignment/ Quiz	Numerical solving Task	**Sessions**
Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR, Using an AED (Automated external defibrillator) & Managing an emergency including moving a patient.				
Module 3	**Bio medical waste management and environment safety**	Assignment/ Quiz	Numerical solving Task	**Sessions**
Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals/ Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices)				

Module 4	**Infection prevention**	Assignment/ Quiz	Numerical solving Task	**Sessions**
Use of Personal protective equipment (PPE) & Monitoring & controlling of cross infection (Protective devices) Prevention & control of common healthcare associated infections, Components of an effective infection control program, and Latest Guidelines (NABH and JCI) for Hospital Infection Control.				
Module 5	**Antibiotic Resistance**	Assignment/ Quiz	Numerical solving Task	**Sessions**
History of antibiotics How resistance happens and spreads, Types of resistance- intrinsic, acquired, passive, Trends in drug resistance & Actions to fight resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance & Antimicrobial Stewardship – Barriers and opportunities, tools and models in hospitals				

Module 5	**Disaster Management**	Assignment/ Quiz	Numerical solving Task	
Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction & Key response functions (including public health, logistics and governance, recovery.				

Targeted Application & Tools that can be used:

1. Quality improvement software and checklists (e.g., Fishbone diagrams, PDCA cycle tools)
2. CPR mannequins and AED simulators for life support practice
3. Color-coded bins and guidelines for biomedical waste segregation and disposal
4. Personal Protective Equipment (PPE) kits and infection control monitoring tools
5. Antibiotic sensitivity testing kits and stewardship tracking systems
6. Disaster management simulation software and emergency response plans

Project Work/ Assignment:

1. Article review: Select and review a recent article on quality improvement in healthcare or antibiotic resistance, summarizing key points and implications for practice.
2. Presentation: Prepare a presentation on one of the following topics: Emergency Life Support techniques, Biomedical Waste Management protocols, or Infection Control measures based on latest NABH guidelines.
3. Case Study: Analyze a real or hypothetical case involving hospital infection outbreak, biomedical waste mishandling, or a disaster scenario, describing the management steps and lessons learned.

Text Book(s):
1. Introduction to Healthcare Quality Management" by Patrice L. Spath.

Reference Book (s):
1. Fundamentals of Patient Safety in Medicine and Surgery" by Venkat Manickam

2. "Patient Safety: Achieving a New Standard for Care" by Philip Aspden, Julie A. Wolcott, Lyle Bootman, and Linda R. Cronenwett

Online Resources (e-books, notes, ppts, video lectures etc.):

1. https://epgp.inflibnet.ac.in/
2. https://nptel.ac.in/
3. https://www.cdc.gov/infectioncontrol/
4. https://openwho.org/

Topics relevant to "SKILL DEVELOPMENT":

1. Perform CPR, first aid, and emergency response techniques.
2. Use personal protective equipment (PPE) correctly.
3. Segregate and dispose of biomedical waste as per protocols.
4. Apply quality improvement tools and interpret NABH guidelines.
5. Respond effectively to disaster scenarios with clear communication.

Course Code: BPAHIC104	**Course Title:** Introduction to Computing **Type of Course: Ability Enhancement**	**L-T- P- C**	2	0	2	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course introduces learners to the fundamentals of computer systems and their applications in everyday life. It covers the history, types, and core components of computers, providing a foundational understanding of how modern computing devices operate. Learners will gain hands-on experience with operating systems, file management, and essential productivity tools such as Microsoft Word and Excel.					
Course Objective	By the end of this course, learners will be able to: • Understand the basic concepts, history, and types of computers. • Identify and describe the major components and functions of a computer system. • Operate common computer operating systems with basic file and application management. • Use essential computer applications like Microsoft Word and Excel for document creation, data entry, and analysis. • Develop practical computing skills for personal, academic, and professional use.					

<table>
<tr><td>Basic skill sets required for the laboratory:</td><td colspan="5">Fundamental computer literacy (booting, navigation, file handling)
Familiarity with keyboard and mouse usage
Basic understanding of MS Office interface
Internet browsing and search engine use</td></tr>
<tr><td>Course Out Comes</td><td colspan="5">On successful completion of the course the students shall be able to:
CO1. Execute basic and external DOS commands for file and directory management.
CO2. Create and manage an email account and use web browsers for information retrieval.

CO3.
Develop, format, and enhance documents using MS Word’s advanced tools.
CO4.
Perform data entry, analysis, and visualization using MS Excel formulas and charts.

CO5. Design visually effective presentations using multimedia and animations in MS PowerPoint.
CO6. Construct and manage simple databases and tables using MS Access.</td></tr>
<tr><td>Course Content:</td><td colspan="5"></td></tr>
<tr><td>Module 1</td><td>Overview of Computers</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="6">Topics: Definition and history of computers
Types of computers (desktop, laptop, tablet, smartphone)
Basic computer hardware components (CPU, RAM, storage, input/output devices)
Computer software (system software, application software)</td></tr>
<tr><td>Module 2</td><td>Components of a Computer</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="6">Topics: Central Processing Unit (CPU)
Types of CPUs (Intel, AMD)
CPU clock speed and performance
Input Devices:</td></tr>
</table>

- Keyboard, mouse, scanner, webcam, microphone
- **Output Devices:**
  - Monitor, printer, speakers, projector
- **Storage Devices:**
  - Hard disk drive (HDD), solid-state drive (SSD), optical drives, USB drives
- Motherboard and its components

Module 3	**Computer Operating Systems**	Assignment		**Sessions**

Topics: Definition and functions of operating systems
- Types of operating systems (Windows, macOS, Linux)
- Basic operations and features of common operating systems
- File management and organization

Module 4	**Computer Programs and Applications**	Assignment		**Sessions**

Topics: Definition and types of computer programs
- Common software applications (word processing, spreadsheets, presentation software, web browsers)
- Installing and uninstalling software
- Software licensing and copyright

Module	**Microsoft Word**	Assignment		**Sessions**

Topics: Creating and editing documents
- Formatting text, paragraphs, and styles
- Inserting images, tables, and charts
- Using templates and styles
- Collaborating on documents

Microsoft Excel

- Creating and editing spreadsheets
- Working with cells, rows, and columns
- Entering data and formulas
- Using functions and formulas
- Creating charts and graphs

List of Laboratory Tasks:

1. Identification of Computer Components
2. Basic Operating System Operations
3. Using Microsoft Word

4. Using Microsoft Excel
5. Introduction to Internet and Web Browsing
6. Introduction to Email
7. Creating and Managing Presentations (Optional)

Targeted Application & Tools that can be used:

- **Operating Systems**: Windows 10/11, Ubuntu (optional)
- **Word Processing**: Microsoft Word
- **Spreadsheet Software**: Microsoft Excel
- **Browsers**: Google Chrome / Mozilla Firefox
- **Other Tools**: Snipping Tool, Paint, Notepad, Calculator

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Digital Transformation in Indian Healthcare: Opportunities and Challenges

2. Presentation: Prepare a PowerPoint presentation on "Types of Operating Systems" or "Evolution of Computers."

3. Case Study: *IT System Failure in Hospital Due to Poor OS Maintenance*

Text Book

. "Computer Science: An Overview" by J. Glenn Brookshear and Dennis Brylow

References

1. "Introduction to Computing Systems: From Bits and Gates to C and Beyond" by Yale N. Patt and Sanjay J. Patel
2. "Computer Networking: A Top-Down Approach" by James Kurose and Keith Ross
3. Starting Out with C++: From Control Structures through Objects" by Tony Gaddis

Online learning resources:

Microsoft Learn – Word, Excel, PPT - https://learn.microsoft.com/en-us/training/office/
GCFLearnFree.org (Office Tutorials) - https://edu.gcfglobal.org/en/
W3Schools MS Access Guide - https://www.w3schools.com/access/

Topics relevant to "SKILL DEVELOPMENT":

1. **Digital Literacy** – Understanding computer basics, hardware, software, and file management.
2. **Text Processing** – Using Microsoft Word for typing, formatting, editing, and templates.
3. **Data Management** – Applying Excel for data entry, formulas, functions, and charts.
4. **Problem Solving** – Using software tools to complete tasks like calculations and formatting.
5. **Ethical & Collaborative Use** – Practicing responsible software use and working with others through digital tools.

Course Code: BPAHAF105	**Course Title:** Accounting and Finance **Type of Course: Core Course**	**L-T- P- C**	2	1	0	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides an in-depth understanding of financial accounting principles, systems, and reporting standards. It explores concepts from basic accounting to the analysis of financial statements and valuation of financial assets, aiming to prepare students to effectively interpret, analyze, and apply financial information in business and healthcare environments.					
Course Objective	1. To introduce the fundamental principles and procedures of financial accounting. 2. To develop proficiency in preparing and analyzing financial statements. 3. To understand the adjustments, income measurement, and cash flow analysis. 4. To apply valuation techniques for financial assets like stocks and bonds. 5. To analyze financial reports for decision-making and strategic planning.					
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:** Understand and apply basic financial accounting principles and systems. **CO2:** Understand and apply basic financial accounting principles and systems**.** **CO3:** Prepare and interpret key financial statements including income statements, balance sheets, and cash flow statements. **CO4:** Analyze financial statements using financial ratios and evaluate organizational performance. **CO5:** Understand inventory, depreciation, liabilities, and equity in the context of financial reporting. **CO6:** Apply asset valuation methods and assess the performance of financial assets such as stocks and bonds.					
Course Content:						

Module 1	**Basics of financial Accounting**	Assignment		**Sessions**
Topics: Introduction, significance of financial accounting, scope and prospects, evaluation scheme of the course, understanding business, Why we invest, financial statement users, analyzing financial statements, double-entry accounting system, debits and credits, Accounting rules and procedures, Assumptions in financial reporting, GAAP, Indian accounting system, IFRS, In AS, and Indian GAAP, Accounting methods, types of accounts, analyzing transactions, accounting process				
Module 2	**Accounting: The Language of Business and recording transactions**	Assignment		**Sessions**
Topics: Accounting system: traditional versus modern, Analyzing and journalizing transactions, posting transactions to ledger, accounting rules, Preparing the trail balance, effects of errors; accounting system, some basic accounting concepts, Revenue and expense transactions, depreciation, and prepaid transactions, accumulated depreciation, adjusted vs unadjusted trail balance, financial statements from trial balance, Closing the accounts, capital vs revenue, types of errors, ethics				
Module 3	**Measuring Income to Assess Performanc e**	Assignment		**Sessions**
Topics: Basics of income measurement, operating cycle, concepts related to income, recognition of revenue, the income statement, understanding income statement, cash dividends and retained earnings, Four popular financial ratios with real-world cases. critical thinking problems and real-world cases Class notes,				
Module 4	**Adjustment s to the accounts and Financial Statements**	Assignment		**Sessions**
Topics: Adjustments to the accounts. four types of four types of adjustments (cont), classified balance sheet , Income statement and profitability evaluation ratios Critical thinking problems using financial statements				
Module 5	**Statement of cash flows**	Assignment		**Sessions**

Overview the cash flow statement, preparing the clash flow statement, types of cash flow activities, inflows and outflows of cash flows Preparation of cash flow statements using direct and indirect methods and its 4importance Cash flow statement and balance sheet, examples of cash flow s4tatements Methods of preparing cash flow statements, accounting rules, th4e importance of cash flow statements

Module 6	**Accounting for Sales**	Assignment		**20 Sessions**

Topics: recognition of sales revenue, measuring sales revenue, cash sales and account receivables Recording the sales using contra account and internal controls Measuring of uncollectible accounts Assessing the level of account receivable, Internal control

Targeted Application & Tools that can be used:

1. Tally / QuickBooks (Intro level for demo)
2. MS Excel (for financial statement modeling, ratio analysis)
3. MS Word / PowerPoint (report and presentation tasks)
4. Simple accounting software or templates
5. NSE Paathshala / Investopedia Simulations (for valuation modules)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review Adoption of IFRS in Indian Healthcare Institutions: Challenges & Benefits
2. Presentation: *Cash Flow vs. Profit: Why Healthcare Organizations Must Track Both*
3. Case Study: *Inventory Mismanagement in a Hospital Pharmacy: Financial Impacts*

Text Book

1. "Principles of Accounting" by Jerry J. Weygandt, Paul D. Kimmel, and Donald E. Kieso

References

- Financial Accounting" by Robert Libby, Patricia A. Libby, and Frank Hodge
- "Principles of Corporate Finance" by Richard A. Brealey, Stewart C. Myers, and Franklin Allen
- Fundamentals of Financial Management" by James C. Van Horne and John M. Wachowicz Jr.

Topics relevant to "SKILL DEVELOPMENT":

1. **Financial Literacy** – Basics of accounting, understanding statements, income, and expenses.
2. **Analytical Thinking** – Ratio analysis, trend interpretation, identifying errors in trial balance.
3. **Tech-Enabled Decision Making** – Using Excel for financial analysis and valuation modeling.
4. **Business Communication** – Preparing formal reports and financial presentations.
5. **Ethical Reasoning** – Understanding financial ethics, internal control, and transparency.

Course Code: BPAHCS 106	**Course Title: Communication Skills for Healthcare Professionals** **Type of Course: Ability Enhancement**	**L-T- P- C**	2	1	0	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course is designed to equip participants with essential professional and interpersonal skills needed in healthcare and related fields. Emphasis is placed on the impact of first impressions, body language, and effective communication—including verbal, nonverbal, written, and active listening skills. Learners will explore strategies for handling difficult conversations and delivering bad news with empathy and professionalism. The course also highlights the importance of etiquette, manners, and self-management in clinical and professional environments, fostering critical thinking and personal growth for long-term success.					
Course Objective	1. To enhance participants' understanding of the importance of first impressions and body language. 2. To develop effective communication skills, including verbal, nonverbal, written, and active listening. 3. To learn how to deliver bad news and handle difficult conversations professionally. 4. To understand the significance of etiquette and manners in healthcare settings. 5. To develop critical thinking and self-management skills for professional success.					
Course Out Comes	**On successful completion of the course the students shall be able to:** ● **CO1**: Demonstrate effective verbal, nonverbal, and written communication in professional and healthcare settings. ● **CO2**: Apply principles of phonetics and pronunciation to improve articulation and clarity. ● **CO3**: Develop active listening and questioning skills to foster better interpersonal and patient interactions. ● **CO4**: Exhibit professional etiquette, cultural sensitivity, and empathetic behavior in clinical environments. ● **CO5**: Apply critical thinking and self-management techniques in handling teamwork, conflict, and stress effectively. ● **CO6**: Communicate confidently in delivering complex or difficult messages within healthcare teams and to patients.					
Course Content:						

Module 1	**First Impressions and Body Language** **The Importance of Communication**	Assignment		**Sessions**
Topics: First Impressions and Body Language ● The power of first impressions ● Nonverbal communication cues (body language, facial expressions, gestures) ● The impact of body language on perceived credibility and professionalism **The Importance of Communication** ● Effective communication as a key to success ● Types of communication (verbal, nonverbal, written) 2. Barriers to effective communication and how to overcome them				
Module 2	**Phonetics and Pronunciation**	Assignment		**Sessions**
Topics: Phonetics and Pronunciation ● Consonant sounds and pronunciation ● Vowel sounds and pronunciation ● Syllables and syllable stress ● Improving pronunciation and articulation **Active Listening** ● The importance of active listening ● Techniques for effective listening ● Providing feedback and clarifying understanding **Communication Skills: Reading** ● Effective reading techniques ● Comprehension strategies ● Critical reading and analysis				
Module 3	**Questioning Skills** **Written Communication** **Delivering Bad News or Handling Difficult Conversations**	Assignment		**Sessions**

Topics: Questioning Skills ● Types of questions (open-ended, closed-ended, probing) ● Effective questioning techniques ● Active listening and questioning **Written Communication** ● Effective writing styles and formats ● Business writing principles ● Email etiquette and professionalism **Delivering Bad News or Handling Difficult Conversations** ● Strategies for delivering difficult news ● Handling objections and resistance ● Resolving conflicts and finding common ground				
Module 4	**Healthcare Success: Mastering Etiquette and Manners** **Bedside Manners**	Assignment		**Sessions**
Topics: Healthcare Success: Mastering Etiquette and Manners ● Importance of etiquette and manners in healthcare settings ● Professional demeanour and behaviour ● Cultural sensitivity and awareness **Bedside Manners** ● Communicating effectively with patients and their families ● Empathetic listening and understanding ● Building rapport and trust				
Module 5	**Understanding Team Dynamics and Developing Critical Thinking**	Assignment		**Sessions**
Topics: **Understanding Team Dynamics and Developing Critical Thinking** ● Team roles and dynamics ● Effective teamwork and collaboration ● Critical thinking skills for problem-solving and decision-making **Self-Management: Building Inner Strength** ● Time management and prioritization ● Stress management techniques ● Building resilience and emotional intelligence				

Targeted Application & Tools that can be used:

- Audio/video recording tools (e.g., mobile phone camera, Audacity) for evaluating speaking skills
- MS Word or Google Docs for business writing and email exercises
- MS PowerPoint or Canva for creating visual presentations
- Role-play and simulation platforms for doctor–patient interaction
- Online phonetic trainers (e.g., Sounds of English)
- Mind-mapping apps (like MindMeister) for critical thinking development

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: The Role of Nonverbal Communication in Patient Care
2. Presentation: Effective Communication Strategies in Multicultural Healthcare Environments
3. Case Study: Handling a Difficult Patient Conversation

Text Book

Communicating in Groups: Applications and Skills - Katherine Adams, Gloria Galanes

References

1. **The Art of Communication: A Book of Skills** by Stephen Covey
2. **Crucial Conversations: Tools for Talking When Stakes Are High** by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler
3. **How to Win Friends and Influence People** by Dale Carnegie
4. **"Communicating in Groups: Applications and Skills"** by Katherine Adams, Gloria Galanes
5. **"Technical Communication"** by Mike Markel
6. **"Interpersonal Communication: Everyday Encounters"** by Julia T. Wood

Online learning resources:

Topics relevant to "SKILL DEVELOPMENT":

1. **Verbal and Nonverbal Communication** – Building confidence, clarity, and appropriate professional expression.
2. **Listening & Comprehension** – Enhancing active listening for better teamwork and patient care.
3. **Writing & Documentation** – Formal email writing, reporting, and written communication skills.
4. **Interpersonal and Social Etiquette** – Polished behavior, empathy, and rapport-building in healthcare settings.
5. **Critical Thinking and Emotional Intelligence** – Decision-making under pressure, resilience, and team problem-solving.

Course Code: BPAHAP 201	**Course Title Type of Course: Human Anatomy and Physiology II**	**L-T- P- C**	2	1	0	3

	Core Course			
Version No.	1.0			
Course Pre-requisites	None			
Anti-requisites	None			
Course Description	This course introduces students to the structural organization and functional mechanisms of the human body. It covers the anatomy (structure) and physiology (function) of major body systems including the musculoskeletal, cardiovascular, respiratory, digestive, urinary, reproductive, nervous, endocrine, and integumentary systems. Emphasis is placed on understanding how body systems work individually and together to maintain homeostasis. The course includes hands-on practical sessions involving anatomical models, charts, and physiological measurements to enhance applied learning.			
Course Objective	1. **Identify and describe** the anatomical structures of the human body. 2. **Explain the physiological functions** of major organ systems. 3. **Demonstrate understanding** of the interrelationship between structure and function of body systems. 4. **Understand the basic concepts** of cell biology and tissue organization. 5. **Analyze how various systems** contribute to homeostasis and overall health. 6. **Perform basic laboratory skills** such as measuring blood pressure, recording pulse, and identifying anatomical features on models and charts. 7. **Relate anatomical knowledge** to common clinical procedures and medical conditions relevant to healthcare settings.			
Course Out Comes	**On successful completion of the course the students shall be able to:** • **CO 1: To explore the specialized sensory systems and their functions.** • • **CO 2: To understand the structure and function of the endocrine system and its hormones** • **CO 3: To delve into the intricacies of the cardiovascular system, including blood, heart, and blood vessels.** • • **CO 4: To study the lymphatic system and its role in immunity**			
Course Content:				
Module 1	**Special Senses &**	Assignment		**Sessions**

	Endocrine System			

Topics:

The Special Senses:

- Eye and vision, ear and hearing, taste
- Smell, touch and proprioception.

The Endocrine System:

- Glands and hormones, hormone action
- Regulation, endocrine disorders.

Module 2	**Cardiovascular System**	Assignment		**Sessions**

Topics:

Blood: Components, functions, and disorders Heart:

- Anatomy, cardiac cycle, electrical activity,
- cardiac output, disorders

Blood Vessels and Hemodynamics:

- Types, blood flow, pressure regulation,
- vascular disorders

Module 3	**Lymphatic, Respiratory & Digestive Systems**	Assignment		**Sessions**

Topics:

Lymphatic System and Immunity:

- Vessels, nodes, immune components,
- Responses, disorders

Respiratory System:

- Anatomy, gas exchange, pulmonary function, respiratory disorders

Digestive System:

- Anatomy, digestion, enzymes, digestive disorders

Module 4	**Metabolism, Nutrition & Urinary System**	Assignment		**Sessions**

Topics:

Metabolism and Nutrition:

- Metabolic processes, energy metabolism.
- Nutrients, metabolic disorders

Urinary System:

- Kidney structure/function, urine formation,
- fluid balance, urinary disorders

Module 5	**Reproductive Systems & Development**	Assignment		**Sessions**

Topics:

Reproductive Systems:

- Male/female anatomy,
- Hormones, processes, disorders

Development and Inheritance:

- Human development stages,
- Genetics, and developmental disorders

List of Laboratory Tasks:

1. Demonstration of Major organs through models and permanent slides.
2. Demonstration of parts of circulatory system from models.

3. Demonstration of parts of respiratory system from models.
4. Demonstration of digestive system from models.
5. Demonstration of excretory system from models.
6. Structure of eye and ear
7. Demonstration of various parts of male & female reproductive system from models.
8. Demonstration of the Nervous System from Models and Charts
9. Observation of Skin, Hair, and Nails Structure Using Models and Slides
10. Demonstration of Endocrine Glands Using Models

Targeted Application & Tools that can be used:

- Audio/video recording tools (e.g., mobile phone camera, Audacity) for evaluating speaking skills
- MS Word or Google Docs for business writing and email exercises
- MS PowerPoint or Canva for creating visual presentations
- Role-play and simulation platforms for doctor–patient interaction
- Online phonetic trainers (e.g. YouGlish)
- Mind-mapping apps (like MindMeister) for critical thinking development

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Enhancing Anatomy and Physiology Learning Through Digital Tools: Phonetic Trainers and Mind-Mapping Applications

2. Presentation: Enhancing A&P Learning with Digital Tools

3. Case Study: Understanding Anatomy and Physiology of Human

Text Book

William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill

References

Chaursia- A Text Book of Anatomy

Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism Publishers

Online learning resources:

Topics relevant to "SKILL DEVELOPMENT":

6. **Verbal and Nonverbal Communication** – Building confidence, clarity, and appropriate professional expression.

7. **Listening & Comprehension** – Enhancing active listening for better teamwork and patient care.
8. **Writing & Documentation** – Formal email writing, reporting, and written communication skills.
9. **Interpersonal and Social Etiquette** – Polished behavior, empathy, and rapport-building in healthcare settings.
10. **Critical Thinking and Emotional Intelligence** – Decision-making under pressure,

resilience, and team problem-solving.

Course Code: BPCTBE202	**Course Title** **Basic Electrocardiography** **Core Course**	**L-T- P- C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides foundational knowledge and practical skills in **Electrocardiography (ECG/EKG)** for allied health professionals. Students will learn the basic principles of cardiac electrophysiology, ECG lead placement, waveform analysis, and the identification of common cardiac arrhythmias. Emphasis is placed on the interpretation of normal and abnormal ECG patterns, the correlation with clinical signs, and the safe use of ECG machines in a healthcare setting. The course integrates both theoretical instruction and hands-on training to prepare students for clinical application in hospital and emergency care environments.					
Course Objective	☐ **Understand the basic anatomy and physiology of the heart**, including electrical conduction pathways. ☐ **Explain the principles of electrocardiography** and the function of the ECG machine. ☐ **Identify and apply the correct placement of ECG leads** for standard 12-lead ECG recordings. ☐ **Recognize and interpret normal ECG waveforms**, intervals, and segments (e.g., P wave, QRS complex, T wave, PR interval). ☐ **Detect common cardiac abnormalities** such as arrhythmias, myocardial infarction, ischemia, and electrolyte imbalances through ECG patterns. ☐ **Demonstrate competence in operating ECG equipment** and recording accurate ECGs in a clinical environment. ☐ **Follow infection control, patient privacy, and safety protocols** during ECG procedures. ☐ **Communicate findings effectively** and collaborate with clinical teams for patient care decisions.					
Course Out Comes	**On successful completion of the course the students shall be able to:**					

	• **CO 1: To explore the specialized sensory systems and their functions.** • • **CO 2: To understand the structure and function of the endocrine system and its hormones** • **CO 3: To delve into the intricacies of the cardiovascular system, including blood, heart, and blood vessels.** • • **CO 4: To study the lymphatic system and its role in immunity**			
Course Content:				
Module 1	**Introduction to Echocardiography**	Assignment		**Sessions**

Topics:

Definition and principles of echocardiography

- Types of echocardiography,
- Transthoracic Echocardiography
- (TTE), Transesophageal Echocardiography (TEE),
- Stress Echocardiography,
- Contrast Echocardiography

Applications:

- Diagnosis of heart diseases,
- Evaluating cardiac function

Module 2	**:Echocardiography Techniques**	Assignment		**Sessions**

Topics:

Transducer positioning:

- Parasternal, Apical, Suprasternal notch,

Echocardiography views:

- Parasternal long axis, Parasternal
- short axis, Apical views, Image acquisition techniques,

Measurement of cardiac dimensions:

- Left ventricular ejection fraction,

- End-diastolic-volume
- End-systolic-Volume

Module 3	**Clinical Applications of Echocardiography**	Assignment		**Sessions**

Topics:

Lymphatic System and Immunity:

- Vessels, nodes, immune components,
- Responses, disorders

Respiratory System:

- Anatomy, gas exchange, pulmonary function, respiratory disorders

Digestive System:

- Anatomy, digestion, enzymes, digestive disorders

Module 4		Assignment		**Sessions**

Topics:

Metabolism and Nutrition:

- Metabolic processes, energy metabolism.
- Nutrients, metabolic disorders

Urinary System:

- Kidney structure/function, urine formation,
- fluid balance, urinary disorders

Module 5	**The Role of Cardiac**	Assignment		**Sessions**

	Care Technicians			

Topics:

Assisting cardiologists:

Preparation of patients

Setting up and maintaining equipment,

Monitoring

Monitoring-vital signs
Assisting in invasive procedures,

Data management

,Emergency response,

Independent performance of echocardiography examinations,

Ethical considerations in echocardiography,

Professional-develop in echocardiography

List of Laboratory Tasks:

1.Introduction to ECG Machine, Identification and Function of ECG Machine Parts.
2. Electrode Placement and Lead System
3. Standard Electrode Placement: Limb Leads (RA, LA, RL, LL), Chest Leads (V1 to V6)
4. Understanding Lead Configurations: ECG Recording and Techniques.
5. Procedure for 12-Lead ECG Recording
6. ECG Paper Reading: Speed, voltage, calibration,Grid interpretation (small and large boxes)
7. Standard Calibration and Troubleshooting Artifacts,Motion artifact, muscle tremor, electrical interference,Normal ECG Interpretation.
8. Normal ECG Waveform:P wave, PR interval, QRS complex, ST segment, T wave, QT interval
9. Heart Rate Calculation Using ECG: RR interval, 300 rule, 1500 rule,Abnormal ECG Patterns (Demonstrations/Simulations)
10. Sinus Arrhythmia, Bradycardia, Tachycardia
11. Atrial Fibrillation and Atrial Flutter
12. Ventricular Tachycardia and Fibrillation
13. Myocardial Infarction Patterns (ST Elevation, Q wave)
14. Bundle Branch Blocks and Axis Deviations
15. Heart Blocks: First, Second, Third Degree.

Targeted Application & Tools that can be used:

- Audio/video recording tools (e.g., mobile phone camera, Audacity) for evaluating speaking skills
- MS Word or Google Docs for business writing and email exercises
- MS PowerPoint or Canva for creating visual presentations
- Role-play and simulation platforms for doctor–patient interaction
- Online phonetic trainers (e.g. Forvo)
- Mind-mapping apps (like MindMeister, XMind, Coggle) for critical thinking development

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Improving ECG Learning Outcomes Using Online Phonetic Trainers and Mind-Mapping Apps

2. Presentation: *Digital Tools in ECG Education: Phonetic Trainers & Mind Mapping in Action*

3. Case Study: *Enhancing ECG Interpretation Skills Using YouGlish and XMind: A Student-Centered Case Study*

Background:

Text Book

EKG Interpretation: 24 Hours or Less to EASILY PASS the ECG Portion of the NCLEX!Chase Hassen

References

1. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test IGNOU 8th Wiley India Pvt Ltd
2.An Introduction to Electrocardiography: Dr. Leo Schamroth 10th Elsevier
Goldberger's Clinical Electrocardiography: A Simplified Approach Ary L. Goldberger, MD, FACC; Zachary D. Goldberger, MD, FACC, FHRS; Alexei Shvilkin, MD, PhD.

Online learning resources:

Topics relevant to "Basic Electrocardiography"

OpenStax – https://openstax.org/books/anatomy-and-physiology/pages/1-introductio

ECG Learning Center – https://ecg.utah.edu/ (University of Utah)

MedEdPORTAL (AAMC) – ECG Teaching Modules- https://www.mededportal.org

Course Code: BPAHGM203	**Course Title: General Microbiology** **Type of Course: Minor**	**L-T- P- C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides a foundational understanding of microbiology and immunology relevant to healthcare. It introduces students to microbial classification, laboratory techniques, sterilization protocols, infection control measures, biomedical waste management, and essential virology. Special focus is given to hospital-acquired infections and the body's immune response mechanisms					
Course Objective	1. This course covers microbiology fundamentals, microscopy techniques, and sterilization methods, emphasizing essential skills for healthcare settings. 2. Additionally, it provides knowledge in immunology, infection control, and biomedical waste management, ensuring comprehensive understanding and practical application.					
Basic skill sets required for the laboratory:	1. Identify and demonstrate the correct use of basic microbiology laboratory equipment and glassware. 2. Perform standard sterilization techniques using autoclaves and hot air ovens. 3. Conduct differential staining methods including Gram, acid-fast, and Indian ink staining. 4. Demonstrate bacterial motility using the hanging drop method. Apply laboratory safety protocols while handling microbial specimens. 5. Interpret staining results for preliminary identification of microorganisms..					
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1.** Describe the historical evolution, classification, and taxonomy of microorganisms. **CO2.** Operate and interpret results using various types of microscopes and culture techniques. **CO3.** Apply knowledge of sterilization, disinfection, and biomedical waste management in clinical and laboratory settings. **CO4.** Understand the principles of innate and adaptive immunity and explain antigen-antibody interactions.					

	CO5. Explain common healthcare-associated infections and strategies for infection prevention and control. **CO6.** Describe the general properties, disease profiles, and preventive strategies for important human viruses (e.g., HIV, hepatitis, rabies).			
Course Content:				
Module 1	**General Microbiology**	Assignment		**Sessions**
Topics: **Introduction and History of Microbiology** – History, Classification, Nomenclature and Taxonomy **Microscopy** – Different types of Microscopes used in the Laboratory. **Sterilization and Disinfection** – Sterilizing Agents (Physical and Chemical agents), Testing of Disinfectants, Sterilization and Disinfection in a Healthcare Setting • **Culture Media** – Types of Media and Special Media employed in the laboratory • **Culture Methods** – Aerobic and anaerobic culture methods, Methods of Isolating pure cultures of bacteria.				
Module 2	**Immunology**	Assignment		**Sessions**
Topics: **Immunity** – Innate or native immunity, Acquired or adaptive immunity, types, Measurement of immunity **Antigen and antibody** – Definitions, types, biological classes of antigens and antibodies. **Hypersensitivity** – Classification and types **Auto immunity** – Definition and Mechanisms, Classification of autoimmune diseases				
Module 3	**Infection Control**	Assignment		**10 Sessions**
Topics: **Healthcare associated infections** – Types, sources, modes of transmission, methods to control infection **Infection** – Classification, Sources, Methods of transmission, predisposing factors, types of infectious diseases				
Module 4	**BMW**	Assignment		**6 Sessions**
Topics: Biomedical waste management – Types and General principles, use of equipment's for sterilization, chemicals used in disinfection				
Module 5	**Virology**	Assignment		**20 Sessions**

General properties of viruses, diseases caused and prevention of following viruses, Hepatitis, HIV, Rabies and Poliomyelitis.

List of Laboratory Tasks:

1. Demonstration of Microscope and its parts
2. Demonstration of glassware used in microbiology.
3. Demonstration of autoclave and sterilization of glass wares.
4. Demonstration of Hot air oven and sterilization of glass wares.
5. To perform Gram staining
6. To perform Acid fast staining (Zeihl Neelsen staining)
7. To perform Indian ink staining
8. To perform Hanging drop method
9. To demonstrate agglutination reaction.
10. To perform RA test 11. To perform WIDAL test
11. To perform RPR test.
12. To perform CRP test.

Targeted Application & Tools that can be used:

Tools: Microscope, autoclave, laminar flow cabinet, incubator, anaerobic jar

☐ **Applications:**

- Microbiological diagnostics in clinical labs
- Infection control in hospitals
- Vaccine and immunity awareness programs
- Biomedical waste handling in healthcare settings

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Review of current practices and emerging trends in sterilization techniques in hospitals.

2. Presentation: Presentation on the immunopathology and control of hospital-acquired infections.

3. Case Study: Case analysis of a hospital outbreak caused by an antibiotic-resistant microorganism and steps taken to contain it.

Text Book

1. **Textbook of Microbiology and Immunology** by Parija S.C.

References

1. Microbiology and Immunology by Ananthanarayan R., Paniker C.K.J.
2. Prescott's Microbiology by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Gareth M. Garrity, David H. Brock
3. Microbiology: An Introduction by Gerard J. Tortora, Berdell R. Funke, Christine L.

Online learning resources:

- **CDC Laboratory Safety Guidelines:** https://www.cdc.gov/labsafety

- **Microbiology Virtual Lab (Amrita V-Labs):** https://vlab.amrita.edu
- **Microbiology Society Resources:** https://microbiologysociety.org
- **YouTube channels:** Osmosis, Khan Academy, Microbiology with Sumi

Topics relevant to "General Microbiology:

- Aseptic techniques in healthcare
- Operation of laboratory equipment (microscopes, sterilizers)
- Infection control protocols and PPE usage
- Biomedical waste segregation and disposal
- Antigen-antibody reaction simulations
- Identification of microorganisms through culture and staining

Course Code: BPCTBE204	**Course Title: Basic Intensive Care** **Type of Course: Skill Enhanced Course**	**L-T- P- C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides a detailed understanding of multidisciplinary care provided in the Intensive Care Unit (ICU). It covers general ICU care, patient monitoring, infection control practices, nutrition management, and specialized care for systemic failures and trauma.					
Course Objective	• To familiarize students with the principles and protocols of ICU care and patient monitoring. • To impart knowledge about infection control, nutrition, and fluid balance in critically ill patients. • To explain ICU management for systemic failures including cardiac, respiratory, renal, and hepatic dysfunctions. • To understand trauma management, transfusion practices, and neonatal ventilation in ICU. • To introduce interpretation of ICU diagnostics such as X-rays and ultrasounds. • To develop awareness of physiotherapy and rehabilitation in the ICU context.					

Basic skill sets required for the laboratory:	1. Understanding of vital signs and physiological parameters 2. Familiarity with ICU terminologies and drug names 3. Ability to operate and interpret basic biomedical devices 4. Competence in aseptic technique and safety practices 5. Communication and teamwork in simulated ICU environment
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1.** Describe the essential components of general ICU care and patient transport protocols. **CO2.** Perform and interpret various ICU monitoring methods including invasive monitoring. **CO3.** Implement effective infection control and nutritional strategies for ICU patients. **CO4.** Identify and manage ICU care for common systemic diseases and organ failure. **CO5.** Apply knowledge in head injury, trauma care, and transfusion practices in ICU. **CO6.** Interpret acid-base imbalances, manage neonatal ventilation, and utilize ICU imaging and physiotherapy techniques.
Course Content:	

Module 1	**General ICU Care and Monitoring**	Assignment		**Sessions**

1. Topics: General Care and Transport of ICU Patients

- Eye, skin, bladder care, position, airways, drains, catheters.
- Transport of critically ill patients to and out of ICU, transport of patients with drains, airway, inotropes, mechanical ventilator.

2. Monitoring in Critical Care

- Vital signs, drains, ECG, fluid intake & output, invasive hemodynamic and central venous pressure monitoring.

Module 2	**Infection Control and Nutrition in ICU**	Assignment		**10 Sessions**

1. Topics: Infection Control in ICU

- Prevention of cross infection, personal protection, antibiotics, and policy.

2. Nutrition and Fluid Balance

- Total parenteral nutrition, nasogastric tube, gastric tube, jejunostomy tube care and feeding.

Module 3	**Systemic Diseases and Care in ICU**	Assignment		**Sessions**

Topics: 1. Cardiac Care in ICU

- Hypertension, hypotension, arrhythmias, cardiac arrest, ACLS.

2. Respiratory Care in ICU

- Airway care, tracheostomy care, endotracheal intubation, mechanical ventilation, care of ventilated patient, complications and weaning.

3. Renal Failure

- Types, etiology, complications, corrective measures.

4. Hepatic Failure

- Types, etiology, complications, corrective measures.

Module 4	**Head Injury and Trauma care in ICU**	Assignment		**Sessions**

Topics: .

1. Head Injury and Trauma Care

- Glasgow Coma Scale, care of head injury patient, polytrauma patient**.**

2. Blood and Blood Products Transfusion

- Transfusion reactions & complications, massive transfusion.

Module 5	**Acid base disorders, neonatal ventilation, imaging in ICU**	Assignment		**Sessions**

Topics: 1. Acid-Base & Electrolyte Balance

- Acid-base & electrolyte balance and their correction, fluid, electrolyte, nutrition balance and management.

2. Neonatal Mechanical Ventilation

- Intubation and problems inherent to the neonate, basic principles of neonatal ventilation, modes, initiation and maintenance.

3. Miscellaneous

- X-rays, ultrasound, chest and limb physical therapy in ICU.

List of Laboratory Tasks:

1. Monitoring of Patients

2. Operating devices, ventilator and monitor settings for different clinical conditions

3. Drugs used in Intensive Care

4. Trouble shooting and maintenance of monitors, equipment and ventilators

Targeted Application & Tools that can be used:

- Multiparameter monitors
- Mechanical/NIV ventilators
- Central line manikins
- ECG/ABG simulators
- Ultrasound for ICU imaging
- Chest physiotherapy tools
- Transport stretchers with ventilator support

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review Latest ICU care guidelines (e.g., sepsis, ARDS, COVID protocols)
2. Presentation: Presentation on care protocols (e.g., tracheostomy care, fluid resuscitation)
3. Case Study: **Case Study** analysis involving multiple organ support in ICU

Text Book

. "Basic Intensive Care Medicine" by Paul L. Marino

References

1. "Intensive Care Medicine: A Comprehensive Review" by Andrew Webb and Duncan Young
2. "Fundamentals of Critical Care Medicine" by Michael E. O'Connor and Joseph E. Parrillo
3. "Principles of Critical Care" by Frederick A. M. P. 8th Edition

Online learning resources:

1. https://www.utas.edu.au/study/short-courses/basic-assessment-and-support-in-intensive-care?utm_source=chatgpt.com

2. https://www.westernhealth.org.au/EducationandResearch/Education/Pages/CourseOutlines/BASIC-Course-%28Basic-Assessment-and-Support-in-Intensive-Care%29.aspx?utm_source=chatgpt.com
3. https://asterhealthacademy.com/courses/certificate-level-program-in-critical-care-medicine/?utm_source=chatgpt.com

Topics relevant to "SKILL DEVELOPMENT":

- ICU device handling and monitoring
- Patient transport and triage in critical settings
- Decision-making under pressure
- Antibiotic stewardship
- Nutritional and electrolyte therapy
- Trauma triage and protocol-based care
- Interpretation of critical diagnostics
- Respiratory and cardiac resuscitation skills

Course Code: BPAHGM205	**Course Title: Applied Anatomy, Physiology , Pharmacology in Cardiac Care** **Type of Course: Skill Enhanced Course**	**L-T- P- C**	2	1	0	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides an integrated understanding of human anatomy, physiology, and pharmacology as applied to **cardiovascular health and disease management**. It focuses on the **structure and function of the heart**, vascular system, and regulatory mechanisms, alongside the **pharmacological agents** used in the diagnosis and treatment of cardiac conditions. The course aims to equip allied health students with foundational knowledge required for **interpreting ECGs**, **administering cardiovascular drugs**, and understanding **pathophysiological changes** in common cardiac disorders. It combines theoretical knowledge with clinical relevance for hospital-based cardiac care.					
Course Objective	**Anatomy:** 1. Describe the anatomical structure of the **heart**, **major blood vessels**, and **conduction system**. 2. Identify the **coronary circulation** and its clinical importance. 3. Understand the anatomical relationship of the **heart with lungs and mediastinum**. ◈ **Physiology:**					

<table>
<tr><td></td><td colspan="5">4. Explain the cardiac cycle, electrical conduction, and hemodynamics.
5. Understand the neural and hormonal regulation of heart rate and blood pressure.
6. Describe normal and abnormal ECG patterns based on physiological principles.
◈ Pharmacology:
7. Classify and explain the mechanism of action of common cardiovascular drugs (e.g., beta-blockers, nitrates, calcium channel blockers).
8. Understand drug indications, contraindications, dosages, and side effects relevant to cardiac patients.
9. Apply knowledge of pharmacodynamics and pharmacokinetics in emergency cardiac care (e.g., during myocardial infarction, arrhythmia, cardiac arrest).</td></tr>
<tr><td>Course Out Comes</td><td colspan="5">On successful completion of the course the students shall be able to:</td></tr>
<tr><td>Course Content:</td><td colspan="5"></td></tr>
<tr><td>Module 1</td><td>Morphology and Function of the Cardiac System</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="6">Topics:
Cardiac Anatomy:
● Chambers, valves
● major vessels,
Electrical Activity:
● Conduction system and the electrocardiogram (ECG),
Cardiac Rhythms:
● Normal (sinus rhythm) and abnormal (arrhythmias),
Cardiac Cycle:
● Phases of systole and diastole,
Mechanical Function:
● Concepts of contractility, preload, and afterload</td></tr>
<tr><td>Module 2</td><td>Cardiac Muscle Physiology and Vascular Circulation</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="6">Topics:</td></tr>
</table>

Cardiac Myocyte Physiology:

- Structure and function of specialized cardiac muscle cells

Contraction Mechanism:

- Role of calcium and cross-bridge cycling in cardiac contraction

Peripheral Circulation:

- Structure and function of arteries, veins, and capillaries

Coronary Circulation:

- Anatomy and regulation of coronary blood flow Physiological Response
- Effects of physical activity on circulation and oxygen delivery

Module 3	**Coronary Artery Anatomy and Blood Supply**	Assignment		**10 Sessions**

Topics:

Coronary Artery Structure:

- Left and right coronary arteries and their branches

Blood Supply to Heart:

- Regional distribution of coronary circulation

Coronary Artery Disease:

- Atherosclerosis, angina pectoris, and myocardial infarction

Module 4	**Determinants of Cardiac Output**	Assignment		**6 Sessions**

Topics:
Cardiac Output Parameters:

- Heart rate, stroke volume, preload, and afterload,

Frank-Starling Law:

- Mechanism of stroke volume adjustment,

Exercise and Environment:

- Influence of physical activity
- Environmental conditions on cardiac output

Module 5	**Pharmacology of Cardiovascular Drugs**	Assignment		**20 Sessions**

Antianginal Drugs:

- Nitrates, beta-blockers, calcium channel blockers,

Antiarrhythmic Drugs:

- Sodium channel blockers, beta-blockers, potassium channel blockers

Diuretics:

- Loop, thiazide, and potassium-sparing diuretics,Beta-blockers: Non-selective and cardioselective agents

Calcium Channel Blockers:

- Dihydropyridine and non-dihydropyridine types,Digitalis Glycosides,

Antihypertensives:

- ACE inhibitors, angiotensin II receptor blockers, alpha-blockers,

Anticoagulants:

- Warfarin, heparin,

Antiplatelet Agents:

- Aspirin, clopidogrel,Drug Safety: Common interactions and side effects

List of Laboratory Tasks:

1. Demonstration of Microscope and its parts
13. Demonstration of glassware used in microbiology.
14. Demonstration of autoclave and sterilization of glass wares.
15. Demonstration of Hot air oven and sterilization of glass wares.

16. To perform Gram staining
17. To perform Acid fast staining (Zeihl Neelsen staining)
18. To perform Indian ink staining
19. To perform Hanging drop method
20. To demonstrate agglutination reaction.
21. To perform RA test 11. To perform WIDAL test
22. To perform RPR test.
23. To perform CRP test.

Targeted Application & Tools that can be used:

Tools: Biomedical waste handling in healthcare settings

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Review of current practices and emerging trends in sterilization techniques in hospitals.

2. Presentation: Presentation on the immunopathology and control of hospital-acquired infections.

3. Case Study: Case analysis of a hospital outbreak caused by an antibiotic-resistant microorganism and steps taken to contain it.

Text Book

Anatomy & Physiology for Health Professionals" by **Jahangir Moini, 3rd Edition,** Published by **Jones & Bartlett Learning.**

References

- **"Cardiovascular Physiology"** by Achille G. Grassi, 11th Edition, McGraw-Hill Education.
- **"Pharmacology for the Health Care Professions"** by W. Renée Acosta, 5th Edition, CRC Press.

"Clinically Oriented Anatomy" by Keith L. Moore, Arthur F. Dalley, and Anne M. R. Agur, 8th Edition, Wolters Kluwer.

Online learning resources:

LibreTexts – Cardiovascular System-https://med.libretexts.org

SkillsCommons – Allied Health Pharmacology Modules

- https://www.skillscommons.org

ECG Learning Center – University of Utah

- https://ecg.utah.edu/

Osmosis (free videos section) – Cardiac Drugs & ECG

- https://www.osmosis.org

Topics relevant to "SKILL DEVELOPMENT":

- Aseptic techniques in healthcare
- Operation of laboratory equipment (microscopes, sterilizers)

- Infection control protocols and PPE usage
- Biomedical waste segregation and disposal
- Antigen-antibody reaction simulations
- Identification of microorganisms through culture and staining

Course Code: BPAHHI206	**Course Title:** Healthcare Informatics and Data Analytics **Type of Course: Value Added**	**L-T- P- C**	2	1	0	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course introduces fundamental concepts and methodologies of **biostatistics** essential for healthcare and clinical research. It covers descriptive and inferential statistical techniques, probability theory, comparative tests, and regression methods. Emphasis is placed on interpreting statistical outputs and applying these tools in real-world biomedical and epidemiological settings.					
Course Objective	• Understand the role of informatics in healthcare delivery. • Gain proficiency in healthcare information systems and technologies. • Learn data collection, storage, and retrieval methods in healthcare settings. • Develop skills in data analysis and interpretation for improving healthcare outcomes. • Understand healthcare data standards and interoperability principles. • Explore the use of data analytics for clinical decision support and population health management. • Learn about healthcare data privacy, security, and regulatory compliance. • Develop competency in using healthcare analytics tools and software. • Apply data analytics techniques to identify trends, patterns, and insights in healthcare data.					

<table>
<tr><td></td><td colspan="4">• Enhance communication and collaboration skills for interdisciplinary healthcare teams.</td></tr>
<tr><td>Course Out Comes</td><td colspan="4">On successful completion of the course the students shall be able to:

• CO1: Classify and organize data using appropriate types and scales of measurement.
• CO2: Summarize and visualize data using measures of central tendency and dispersion.
• CO3: Apply basic probability concepts and distributions in real-world health data.
• CO4: Conduct hypothesis testing and interpret p-values and confidence intervals.
• CO5: Perform comparative statistical tests (t-test, Mann Whitney U, Kruskal-Wallis).</td></tr>
<tr><td>Course Content:</td><td colspan="4"></td></tr>
<tr><td>Module 1</td><td>Introduction to Biostatistics</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="5">Topics: Fundamentals of biostatistics, including basic concepts like variables, data types, and measurement scales, as well as learning about measures of central tendency, dispersion, and graphical representation of data.</td></tr>
<tr><td>Module 2</td><td>Probability and Probability Distributions</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="5">Fundamentals of probability theory, exploring probability distributions (both discrete and continuous, such as binomial and normal distributions), and understanding their applications in healthcare research and epidemiology</td></tr>
<tr><td>Module 3</td><td>Statistical Inference</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="5">Topics:
Sampling distributions, hypothesis testing concepts (null and alternative hypotheses, significance level, and values), and recognizing the types of errors in statistical analysis.</td></tr>
<tr><td>Module 4</td><td>Comparative Analysisc</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="5">Topics:</td></tr>
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Conducting ttests and nonparametric tests such as Mann Whitney U test and KruskalWallis test, and ability to interpret statistical results accurately for informed decisionmaking

Module 5	**Regression Analysis and Multivariate Methods**	Assignment		**Sessions**

Topics: Simple linear regression and its coefficient interpretation, mastering multiple regression techniques, and understanding the applications of logistic regression and survival analysis in statistical modelling and data analysis.

Targeted Application & Tools that can be used:

☐ **Software**: MS Excel, SPSS, R, GraphPad Prism, Python (for advanced learners)

☐ **Statistical calculators and online tools**: OpenEpi, MedCalc, VassarStats

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review Critical statistical analysis of a published medical research paper.

2. Presentation: Explaining statistical significance in a real clinical study.

3. Case Study: Using regression analysis on hospital data (e.g., predicting length of stay based on vitals

Text Book

1. **Health Informatics: A Practical Approach** by Dr. Anupama Reddy

References

- **Medical Informatics: An Indian Perspective** by Dr. Rajesh Bhatia
- **Health Data Analytics and Informatics** by Mbuso Mabuza
- **Big Data Analytics and Machine Intelligence in Biomedical and Health Informatics by** Dr. Sunil Dhal, Dr. Subhendu Kumar Pani, Dr. Srinivas Prasad, Dr. Sudhir Kumar Mohapatra

Online learning resources:

1. https://www.futurelearn.com/courses/eit-health-data-analytics
2. https://medicine.nus.edu.sg/continuing-education/course-catalogue/health-informatics-and-data-visualisation/?utm_source=chatgpt.com
3. https://medicine.nus.edu.sg/continuing-education/course-catalogue/health-informatics-and-data-visualisation/?utm_source=chatgpt.com

Topics relevant to "SKILL DEVELOPMENT":

- Data collection and tabulation techniques
- Use of statistical software (Excel/SPSS/R)
- Interpretation and communication of statistical results
- Evidence-based reasoning for clinical decisions
- Real-world case handling using biostatistical analysis

Course Code: BPAHES207	**Course Title:** Environmental Sciences **Type of Course: Multi-Disciplinary**			**L-T- P- C**	2	1	0	3
Version No.	1.0							
Course Pre-requisites	None							
Anti-requisites	None							
Course Description	This course provides an in-depth understanding of the environment and its components, ecosystems, and the impact of human activities on environmental health and sustainability. It also discusses pressing global environmental issues, pollution, environmental laws, waste management strategies, and ethical approaches to conservation.							
Course Objective	1. To understand and define terminology commonly used in environmental science 2. To teach students to list common and adverse human impacts on biotic communities, soil, water, and air Quality. 3. To understand the processes that govern the interactions of organisms with the biotic and abiotic. 4. Understand the relationship between people and the environment; Differentiate between key ecological terms and concepts							
Course Out Comes	**On successful completion of the course the students shall be able to:** • **CO1**: Identify and describe components of the environment and explain human-environment interactions. • **CO2**: Understand ecological principles, including ecosystem structure, food chains, energy flow, and ecological balance. • **CO3**: Analyze global environmental problems and their implications for biodiversity, climate, and health. • **CO4**: Evaluate different types of pollution, their causes, effects, and control measures, including urban, industrial, and rural contexts. • **CO5**: Apply environmental management strategies to control environmental diseases and understand sanitation practices. • **CO6**: Discuss environmental laws, ethics, and international initiatives for environmental protection and sustainable development.							
Course Content:								
Module 1	**Component of Environment**	Assignment		**Sessions**				

Topics: Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment				
Module 2	**Ecosystem**	Assignment		**Sessions**
Topics: Basic concepts, components of ecosystem, Tropic levels, food chains and food webs, Ecological pyramids, ecosystem functions, Energy flow in ecological systems, Characteristics of terrestrial fresh water and marine ecosystems				
Module 3	**Global Environmental Problems**	Assignment		**Sessions**
Topics: Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards				
Module 4	**Environmental Pollution and Degradation**	Assignment		**Sessions**
Topics: Pollution of air, water and land with reference to their causes, nature of pollutions, impact and control strategies; perspectives of pollution in urban, industrial and rural areas. Habitat Pollution by Chlorinated Hydrocarbons (DDT, PCBs, Dioxin etc, Endocrine disrupting chemicals, Nutrient pollution				
Module 5	**Environmental Management**	Assignment		**Sessions**
Topics: Concept of health and sanitation, environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases, health hazards due to pesticide and metal pollution, waste treatment, solid waste management, environmental standards and quality monitoring				
Module 6	**Environmental**	Assignment		**Sessions**

	Protection Act			

Topics: Environmental Laws, national movements, environmental ethics – holistic approach of environmental protection and conservation, IUCN – role in environmental protection. Concept with reference to UN – declaration, aim and objectives of human right policies with reference to India, recent northsouth debate on the priorities of implementation, Environmental Protection Agency (EPA)
Oil spills, Wastewater treatment, chemical degradation, heavy Metals.

Targeted Application & Tools that can be used:

- **Tools/Software**: Environmental impact analysis tools, GIS (Geographic Information Systems), air and water quality testing kits, waste auditing tools.
- **Platforms**: CPCB (Central Pollution Control Board) portals, WHO environmental databases, UNEP and EPA resources.
- **Multimedia Tools**: Documentaries (e.g., *Our Planet*, *Before the Flood*), online simulations of ecosystem dynamics.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Analyze a published research article on pollution control or climate change mitigation.

2. Presentation: Prepare a PowerPoint presentation on a global environmental issue (e.g., oil spills, ozone depletion, plastic pollution).

3. Case Study: Develop a case study on waste management practices in a rural vs. urban setting in India.

Text Book

1. **Environmental Science: Earth as a Living Planet** by G. Tyler Miller and Scott **Spoolman**

References

1. Environmental Science: Earth as a Living Planet by G. Tyler Miller and Scott **Spoolman**

1. **Fundamentals of Environmental Science** by William P. Cunningham and Mary Ann Cunningham
2. **Environmental Science:** A Global Perspective by Richard T. Wright and David W. Lea:

Online learning resources:

☐ **Amazon:** Environmental Science: Earth as a Living Planet

☐ **Google Books Preview:** Environmental Science

☐ **Perlego (Subscription Required):** Environmental Science PDF

☐ **Internet Archive (Free Access):** Environmental Science by G. Tyler Millercengage.com+3amazon.com+3faculty.cengage.com+3books.google.comperlego.comarchive.org

Topics relevant to "SKILL DEVELOPMENT":

- Environmental monitoring and data collection techniques

- Conducting local environmental impact assessments
- Report writing on pollution surveys
- Designing eco-friendly solutions for waste and water management
- Critical analysis of environmental laws and policies
- Developing awareness campaigns on sanitation and sustainability

Course Code: BPCTCD301	**Course Title:** Cardiovascular diseases pertinent to Cardiac care Technology **Type of Course: Core Course**	**L-T- P- C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course focuses on the **pathophysiology, diagnosis, treatment, and monitoring** of common **cardiovascular diseases (CVDs)** encountered in Cardiac Care Technology. Emphasis is placed on understanding **clinical presentations**, **diagnostic ECG patterns**, **pharmacological and interventional strategies**, and the use of **cardiac care equipment** (e.g., ECG machines, defibrillators, monitors). The course integrates theory with case-based discussions and simulation-based learning to prepare students for **real-world clinical settings** such as ICUs, cath labs, and emergency care units.					
Course Objective	1. Explain the **etiology, pathophysiology, and clinical features** of common CVDs such as: o Coronary Artery Disease (CAD) o Myocardial Infarction (MI) o Heart Failure o Arrhythmias o Valvular Disorders 2. Interpret ECG changes associated with various cardiac diseases (e.g., STEMI, AF, VT). 3. Understand **pharmacological management** of CVDs including antiplatelets, beta-blockers, ACE inhibitors, and emergency drugs. 4. Demonstrate the **use of diagnostic and therapeutic tools** such as ECG, Holter monitor, stress test, defibrillator, and pacemakers. 5. Identify **red flag signs and critical interventions** in acute cardiac emergencies. 6. Communicate effectively in a multidisciplinary cardiac care team.					
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO 1:** To **Remember** the anatomical structures and physiological functions of the cardiovascular system. **CO 2:** TO **Understand and Describe** the diagnostic procedures and tools used in the assessment of cardiovascular conditions. **CO 3:** TO **Apply** foundational pharmacological knowledge to understand drug actions used in cardiovascular treatments.					

	CO 4: TO **Understand** the pathophysiology of major cardiovascular diseases such as hypertension, myocardial infarction, and heart failure.			
Course Content:				
Module 1	**Valvular Heart Disorders and Coronary Artery Disease – A Clinical Approach**	Assignment		**Sessions**

Topics:

Valvular Heart Diseases:

- Rheumatic fever and rheumatic heart disease, Aortic
- mitral valve disorders,
- Combined and tricuspid valve disease,
- Infective endocarditis
  Acquired valvular heart
  Disease,Coronary Artery Disease
- Introduction to CAD
  Angina pectoris,Myocardial infarction, Medical
- surgical management

Module 2	**Integrated Approach to Hypertension, Heart Failure, and Myocardial Disorders**	Assignment		**Sessions**

Topics:

Hypertension:

- Essential and secondary hypertension, Lifestyle management, medications
- DASH diet, Pulmonary hypertension, Pulmonary thromboembolism

Heart Failure:

- Left, right, and biventricular failure,Pathophysiology, causes, symptoms,Medical

- Surgical treatment,Myocardial Disorders**:**

Cardiomyopathies:

Dilated, hypertrophic, restrictive, Myocarditis

Module 3	**Comprehensive Approach to Cyanotic and Acyanotic Congenital Heart Diseases and Pericardial Diseases**	Assignment		**10 Sessions**

Topics:

Acyanotic Congenital Heart Diseases:

- Atrial Septal Defect (ASD),Ventricular Septal Defect (VSD)
- Patent Ductus Arteriosus (PDA),Coarctation of the Aorta,Cyanotic

Congenital Heart Diseases:

- Tetralogy of Fallot (TOF),Double Outlet Right Ventricle (DORV)
- Pulmonary atresia,Transposition of Great Arteries (TGA)
- Total Anomalous Pulmonary Venous Connection (TAPVC)

Pericardial Diseases:

- Pericardial effusion
  Constrictive pericarditis,Cardiac tamponade,Pericardiocentesis procedure

Module 4	**Emergency and Vascular Care – Peripheral Vascular Disease and Cardiac Arrest**	Assignment		**6 Sessions**

Peripheral Vascular Conditions:

Atherosclerotic peripheral vascular disease,

Aortic aneurysms,Aortic dissection,Takayasu's arteritis,

Cardiac Arrest:

Classification,6 H's and 6 T's of cardiac arrest,Signs, symptoms, diagnosis, and treatment,

COPD:

Causes and stages,Clinical features,Diagnosis and management

Targeted Application & Tools that can be used:
Tools: ☐ **ECG Learning Center (University of Utah):** Free ECG waveform interpretation practice

☐ **Visible Body:** 3D heart anatomy, pathophysiology visualizations

☐ **SimMon / Body Interact:** Simulation tools for cardiac emergencies

☐ **Kenhub + YouGlish:** Pronunciation of clinical terms & heart anatomy

☐ **MindMeister/XMind:** Mapping disease pathways and drug mechanisms

☐ **Applications:**

- **Clinical Areas:** ICU, Cath Lab, Emergency Department, Telemetry Units
- **Patient Scenarios:** Acute MI, unstable angina, post-angioplasty care, arrhythmia detection and response
- **Roles:** ECG technician, cardiac monitor technician, cath lab assistant, emergency cardiac support team
-

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:
1. Article review:. Simulation and Digital Resources Improve Cardiovascular Disease Education in Cardiac Technology Students
2. Presentation: STEMI in a 55-Year-Old Male with Sudden Chest Pain
3. Case Study: Recurrent Ventricular Tachycardia in a Young Adult with Hypertrophic Cardiomyopathy

Text Book
Clinical Cardiology Made Ridiculously Simple by **Michael A. Chizner, 6th Edition**
Published by **MedMaster, 2014**

References

- Cardiovascular Physiology Concepts by Richard E. Klabunde, 2nd Edition, 2015 — Lippincott Williams & Wilkins

• Essentials of Cardiovascular Disease, by Michael H. Crawford, Bruce F. Lindsay, ,4th Edition (2019) — Elsevier • Heart Disease: Clinical Cases and Pearls, by Iqbal Malik, 1st Edition —Wolters Kluwer **Online learning resources:** LibreTexts - Cardiovascular Physiology: https://med.libretexts.org Khan Academy – Cardiac Medicine: https://www.khanacademy.org
Topics relevant to "SKILL DEVELOPMENT": • Aseptic techniques in healthcare • Operation of laboratory equipment (microscopes, sterilizers) • Infection control protocols and PPE usage • Biomedical waste segregation and disposal • Antigen-antibody reaction simulations • Identification of microorganisms through culture and staining

	Course Code: BPCTMI302	**Course Title: Medical Instrumentation relevant to Cardiac care** **Type of Course: Core Course**	**L-T- P- C**	2	1	2	4
	Version No.	1.0					
	Course Pre-requisites	None					
	Anti-requisites	None					
	Course Description	This course introduces students to the principles, components, and applications of **medical instrumentation used in cardiac care settings**. It covers the design, function, operation, and safety considerations of devices such as ECG machines, defibrillators, pacemakers, patient monitors, stress test systems, and catheterization lab equipment. The course emphasizes the **interface between biology and electronics**, ensuring that students can operate, troubleshoot, and understand instrumentation in **ICU, emergency, and cath lab environments**.					
	Course Objective	☐ Understand the **basic concepts of biomedical signals**, biosensors, and transducers used in cardiac diagnostics. ☐ Explain the working principles of instruments like **ECG machines, Holter monitors, defibrillators, pacemakers**, and **BP monitors**. ☐ Identify **safety standards**, calibration procedures, and maintenance protocols for cardiac equipment.					

		☐ Analyze **cardiac waveforms and outputs** obtained from various instruments. ☐ Assist in the **setup, monitoring, and troubleshooting** of cardiac instrumentation during clinical procedures. ☐ Demonstrate understanding of **signal acquisition**, **amplification**, **filtering**, and **display systems** in biomedical instruments.				
	Course Out Comes	**On successful completion of the course the students shall be able to:** **CO 1:** TO **Remember and Recall** the anatomy and physiology of the cardiovascular system and define key terminologies related to cardiovascular diseases. **CO 2:** TO **Understand and Explain** the pathophysiology, causes, signs, and symptoms of common cardiovascular disorders such as hypertension, heart failure, and myocardial infarction.. **CO 3:** TO **Apply and Demonstrate** the ability to interpret basic diagnostic findings such as ECG changes, and apply knowledge to identify cardiovascular conditions in clinical scenarios.. **CO 4:** TO **Evaluate** the treatment options including lifestyle modifications, pharmacological interventions, and surgical procedures for cardiovascular conditions.				
	Course Content:					
	Module 1	**Medical Physics – Concepts and Applications**	Assignment		**Sessions**	
	Topics: **Definition and scope**: ● Medical physics,Applications in healthcare and diagnostics, ● **Basic principles:** Biomechanics,Bioelectricity,Biomagnetism, **Overview** ● Medical physics equipment and techniques					
	Module 2	**Electro-Physiological Measurements –**	Assignment		**Sessions**	

		Concepts and Tools			
	Topics: **Types of electrodes:** ● Limb,Floating,Pregelled,Microneedle,Surface, ● ECG lead systems and recording techniques,ECG waveforms and interpretation **Electrical safety in medical settings:** ● Shock hazards,Leakage current,Safety checks for biomedical equipment, ● Transducer selection criteria ● Sensitivity,Accuracy,Biocompatibility				
	Module 3	**Principles of Non-Electrical Parameter Monitoring**	Assignment		**Sessions**
	Topics **Blood pressure measurement:** ● Manual and automatic methods, ● Cardiac output measurement: **Fick's method,Echocardiography** ● Use of stethoscope for:Heart rate,Heart sounds,Activated Clotting Time (ACT) ● Pulmonary function testing:Spirometry, **Body plethysmography,Blood gas analysis:** ● pH,pCO_2,pO_2 Other measurements:Finger-tip oximetry,ESR (erythrocyte sedimentation rate) ● GSR (galvanic skin response)				
	Module 4	**Fundamentals of Assisting and Therapeutic Equipment**	Assignment		**Sessions**
	Topics: **Pacemakers:** ● Fixed-rate,Demand,Biventricular, **Defibrillators:** ● Internal,External,**Ventilators:**Mechanical Non-invasive **Imaging and diagnostic tools:**				

	• C-arm fluoroscopy,Coronary CT and MRI,Radiographic and fluoroscopic techniques, **Dosimetry and Monitoring:** • Thermoluminescent dosimetry (TLD),**Cardiac imaging:**Echocardiography: TTE, TEE, Stress echo,Coronary angiography and PTCA
	Targeted Application & Tools that can be used: • **Clinical Areas:** Cardiac ICU, Cath Lab, Operation Theatre, Cardiac Wards • **Technician Roles:** ECG technician, Biomedical support staff, Cath lab assistant • **Use Cases:** Monitoring vitals during MI, assisting in angioplasty with imaging systems, pacing setup, telemetry support •
	Project work/Assignment: Mention the Type of Project /Assignment proposed for this course: **1. Article review** : Enhancing Cardiac Instrumentation Training Using Online Simulators and Open Resources **2. Presentation**: *Medical Instrumentation in Cardiac Care: Bridging Engineering with Patient Monitoring* **3. Case Study**: *Using Multi-Parameter Monitoring and Defibrillation in a Cardiac ICU Emergency*
	Text Book : **Medical Instrumentation: Application and Design,**John G. Webster**,** 4th Edition**,** Wiley
	References Principles of Biomedical Instrumentation, Andrew Webb, Cambridge University Press **Biomedical Instrumentation and Measurements,** Leslie Cromwell, Fred J. Weibell**,** Pearson **Online learning resources:** LibreTexts – Biomedical Instrumentation- https://eng.libretexts.org SkillsCommons- https://skillscom mons.org •
	Topics relevant to "SKILL DEVELOPMENT": • Community needs assessment • Program planning and evaluation

	• Health communication and education • Epidemiological analysis and interpretation • Ethical decision-making in public health • Data-driven policy advocacy • Leadership in public health promotion

Course Code: BPAHPS303	**Course Title: Preventive and Social Medicine** **Type of Course: Minor**	**L-T- P- C**	2	0	0	2
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides an in-depth understanding of the principles and applications of preventive medicine, public health, and social medicine. It emphasizes the importance of health promotion, disease prevention, and the impact of public health initiatives on population health					
Course Objective	1. The course aims to provide students with a comprehensive understanding of the principles and practices of preventive medicine, public health, and social medicine. 2. By the end of the course, students should be able to identify and assess health risks and determinants, plan and implement preventive interventions, and advocate for policies and programs that promote health and well-being at the individual, community, and population levels.					
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:** Explain the principles of preventive medicine and differentiate between levels of prevention. **CO2:** Identify major public health issues and assess community needs and determinants of health. **CO3:** Design and evaluate public health programs using health indicators and evidence-based practices. **CO4:** Demonstrate ethical and professional behavior in dealing with individuals and communities. **CO5:** Apply critical thinking to develop innovative solutions to population health challenges. **CO6:** Advocate for preventive policies and programs that address health disparities and promote wellness.					
Course Content:						

Module 1	**Principles of Preventive medicine**	Assignment		**Sessions**
Topics: Primary, secondary, and tertiary prevention, Importance of preventive measures in reducing the burden of disease and promoting overall health and well-being				
Module 2	**Public Health Issues**	Assignment		**Sessions**
Topics: What are Public Health Issues, Community needs assessments, Social, economic, environmental, and behavioral determinants, Population health outcomes				
Module 3	**Public Health Programs**	Assignment		**Sessions**
Topics: Public health interventions and programs, Monitoring and evaluation plans, Health indicators, Evidence-based decision-making in public health practice				
Module 4	**Ethical and Professional Conduct**	Assignment		**Sessions**
Topics: Ethical principles and professional standards, Professionalism, integrity, and cultural competence in interactions with individuals, communities, and diverse populations				
Module 5	**Critical Thinking and Problem-Solving Skills**	Assignment		**Sessions**
Topics: Challenges and opportunities for improving population health, Innovative solutions and strategies to improve public health problems.				
Targeted Application & Tools that can be used: ● Public health data collection software (e.g., Epi Info, Google Forms) ● Health surveillance systems ● WHO and CDC datasets ● GIS tools for mapping health indicators ● SPSS/Excel for data analysis				

- Role-play and simulation for ethical scenario training

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review Critical review of a current preventive health intervention or global health report.

2. Presentation: On a public health program (national or international), its impact, and evaluation metrics.

3. Case Study: Analysis of a community health problem with preventive and policy solutions

Text Book

1. Park's Textbook of Preventive and Social Medicine

References

1. Maxcy-Rosenau-Last Public Health and Preventive Medicine
2. Textbook of Community Medicine: Preventive and Social Medicine by Sunder Lal

Online learning resources:

- https://www.ruralhealthinfo.org/toolkits/rural-toolkit/1/needs-assessment?utm_source=chatgpt.com
- https://www.letstalkpublichealth.com/health-communication-toolbox.html?utm_source=chatgpt.com

Course Code: BPCTEC304T	**Course Title: Basic Echocardiography** **Type of Course: Core Course**	**L-T- P- C**	3	1	0	
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course introduces students to the **principles, techniques, an clinical applications of echocardiography**. It covers the physics o ultrasound, basic transducer handling, standard imaging planes, an interpretation of normal and abnormal echocardiographic findings Emphasis is placed on 2D echo, M-mode, Doppler imaging, and basi cardiac measurements essential for diagnosis and monitoring in cardia care settings. The course prepares students to assist in echo labs, ICUs and cath labs.					
Course Objective	☐ Understand the **physical principles of ultrasound and sound wave propagation** in cardiac imaging. ☐ Describe the **standard echocardiographic windows and views** (e.g., parasternal long axis, apical 4-chamber). ☐ Identify **normal and abnormal structures** of the heart using 2D and M-mode imaging. ☐ Understand **Doppler imaging** and how to assess blood flow across valves. ☐ Assist in **basic cardiac measurements** (ejection fraction, chamber size, valve gradient). ☐ Recognize key pathologies such as **valvular disease, pericardial effusion, and LV dysfunction**					

Course Out Comes	**On successful completion of the course the students shall be able to:**			
Course Content:				
Module 1	**Fundamentals of Echocardiography – An Introductory Guide**	Assignment		**Sessions**
Topics Definition and basic principles of echocardiography,**Types of Echocardiography:**Transthoracic Echocardiography (TTE),Transesophageal Echocardiography (TEE),Stress Echocardiography,Contrast Echocardiography **Applications:**Diagnosis of heart diseases,Evaluation of cardiac function				
Module 2	**Imaging Techniques in Echocardiography – A Clinical Approach**	Assignment		**Sessions**
Topics: **Transducer Positioning:**Parasternal,Apical,Suprasternal notch,**Echocardiographic Views:**Parasternal long axis,Parasternal short axis,Apical views,Image acquisition techniques,**Measurement of Cardiac Dimensions:** Left ventricular ejection fraction (LVEF),End-diastolic volume (EDV),End-systolic volume (ESV)				
Module 3	**Echocardiography in Clinical Practice – Applications and Implications**	Assignment		**Sessions**
Topics: **Coronary Artery Disease:**Identification of stenoses,Assessment of myocardial perfusion **Valvular Heart Disease:**Evaluation of valve function,Detection of regurgitation and stenosis **Cardiomyopathies:**Dilated, hypertrophic, and restrictive forms				

Arrhythmias: Evaluation of atrial fibrillation,Assessment of ventricular function **Guided Interventions:**Ablation procedures,Valve repair and replacement				
Module 4	**Modern Echocardiography – Innovations Enhancing Cardiac Care**	Assignment		**Sessions**
Topics: Three-dimensional echocardiography,Strain imaging,Speckle tracking imaging,Contrast echocardiography Echocardiography integrated with artificial intelligence				
Module 5	**Cardiac Care Technicians – Frontline Support in Cardiovascular Health**	Assignment		**Sessions**
Topics: Roles and responsibilities in assisting cardiologists,Independent performance of echocardiographic examinations,Ethical considerations in clinical echocardiography,Continuous professional development and training				
Targeted Application & Tools that can be used: ● Cardiology OPD/Echo Lab- Assisting cardiologist during TTE (Transthoracic Echo) ● Cardiac ICU- Quick bedside echo for pericardial effusion or LV function ● Cath Lab- Pre/post-procedure LV assessment ● Cardiac Emergency- Point-of-care echo in cardiac arrest, tamponade, etc				
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course: **1. Article review** : The Impact of Simulation and Digital Tools on Learning Basic Echocardiography for Non-Physician Learners 2. Presentation: *Basic Echocardiography: Foundation of Non-Invasive Cardiac Imaging* **3. Case Study**: Use of Basic Echo to Diagnose Pericardial Effusion in ICU				
Text Book **Textbook of Clinical Echocardiography:**Catherine M. Otto**,** 6th Edition**,**Elsevie				
References **The Echo Manual:** Jae K. Oh, James B. Seward, A. Jamil Tajik, Lippincott Williams & Wilkins				

Feigenbaum's Echocardiography: William F. Armstrong, Thomas Ryan**,**Lippincott Williams & Wilkins**,** 8th Edition

Online learning resources:

ASE Learning Hub- https://www.asecho.org

E-Echocardiography- http://www.e-echocardiography.com

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Course Code: BPAHCD305	**Course Title: Cultural Diversity in the Indian Society** **Type of Course:** Multi-Disciplinary		**L-T- P- C**	2	1	0	3
Version No.	1.0						
Course Pre-requisites	None						
Anti-requisites	None						
Course Description	This course provides a comprehensive overview of the principles of preventive medicine and public health. It covers the spectrum of disease prevention (primary, secondary, and tertiary), explores contemporary public health issues, and examines public health programs and policies. It emphasizes ethical conduct, cultural competence, and critical thinking in addressing population health challenges.						
Course Objective	1. Appreciate the richness and complexity of Indian culture. 2. Analyze the historical and contemporary dimensions of cultural diversity. 3. Evaluate the impact of cultural diversity on social, political, and economic life. 4. Develop a critical understanding of the challenges and opportunities associated with cultural diversity. 5. Contribute to fostering a harmonious and inclusive Indian society.						
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1.** Describe the principles and levels of disease prevention. **CO2.** Identify determinants of health and conduct community needs assessments. **CO3.** Evaluate and design public health interventions and programs. **CO4.** Apply ethical and professional standards in public health practice. **CO5.** Analyze population-level health data for planning and decision-making. **CO6.** Demonstrate critical thinking in proposing solutions to public health challenges.						
Course Content:							
Module 1	**Foundations of Indian Diversity**	Assignment		**Sessions**			

- **Topics:** Define culture and its components (language, religion, customs, traditions, art, etc.)
- Explain the historical factors contributing to India's cultural diversity (geographic, linguistic, religious, and social).
- Analyze the concept of unity in diversity and its relevance to Indian society.

Module 2	**Religious Diversity**	Assignment		**Sessions**

- **Topics:** Describe the major religions of India (Hinduism, Islam, Christianity, Sikhism, Buddhism, Jainism) and their core beliefs.
- Examine the historical coexistence and conflicts among different religious groups.
- Analyze the role of religion in shaping Indian society and culture.

Module 3	**Linguistic Diversity**	Assignment		**Sessions**

- **Topics:** Explain the linguistic landscape of India, including Indo-Aryan, Dravidian, and other language families.
- Analyze the impact of language diversity on identity, communication, and social cohesion.
- Discuss the role of language in nation-building and cultural integration.

Module 4	**Ethnic and Tribal Diversity**	Assignment		**Sessions**

- **Topics:** Define ethnicity and tribe, and differentiate between them.
- Explore the diversity of ethnic and tribal groups in India, their geographical distribution, and cultural practices.
- Analyze the challenges faced by ethnic and tribal communities in contemporary India.

Module 5	**Cultural Dynamics and Challenges**	Assignment		**Sessions**

- **Topics:** Examine the processes of acculturation, assimilation, and pluralism in Indian society.
- Analyze the impact of globalization and modernization on Indian culture.
- Discuss the challenges posed by cultural diversity, such as communalism, casteism, and regionalism.
- Explore strategies for promoting cultural harmony and national integration.

Targeted Application & Tools that can be used:

1. **Cultural Mapping Software** (e.g., ArcGIS, Tableau Public) for visualizing linguistic, tribal, or religious distribution.
2. **Government Databases**: Census of India, Ministry of Tribal Affairs, NCERT archives.

3. **Digital Archives and Repositories**: IGNCA, Sahapedia, National Digital Library of India (NDLI).
4. **Multimedia Tools**: Canva, PowerPoint, Google Slides for presentations; Kahoot or Quizizz for interactive learning.
5. **Survey Tools**: Google Forms or Microsoft Forms for conducting community or campus-based diversity assessments.
6. **LMS Platforms**: Use of Moodle or Google Classroom for structured content delivery and evaluation.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: "Challenges in Protecting Tribal Rights in India" – analyze and summarize key takeaways.

2. Presentation: "Unity in Diversity: Case Studies from Indian States" or "Language and Identity in Modern India."

3. Case Study: Select a specific culturally diverse region (e.g., North-East India, Jammu & Kashmir, or Kerala).Discuss how religious, ethnic, or linguistic diversity shapes public life and governance in the region.

Text Book

Indian Society: Structure, Change and Continuity by Andre Beteille

References

1. Culture, Diversity and Society by B.L. Maheshwari
2. Indian Social Structure by M.N. Srinivas
3. The Indian Mind by D.P. Chattopadhyaya
4. Religion and Society in India by M.N. Srinivas

Online learning resources:

1. https://www.npi.org/seminars/technology/arcgis-cultural-resources-introduction?utm_source=chatgpt.com
2. https://www.ncertbooks.guru/old-ncert-books/?utm_source=chatgpt.com

Topics relevant to "SKILL DEVELOPMENT":

- **Intercultural Communication Skills** – essential for working in diverse teams and communities.
- **Community profiling and Engagement** – useful for NGO, public health, and policy work.
- **Critical Thinking & Comparative Analysis** – analyzing cultural similarities and differences.
- **Conflict Resolution & Peacebuilding** – addressing communal or caste-based tensions.
- **Ethnographic Research Methods** – observing and documenting cultural practices.
- **Policy Literacy** – understanding the role of law and governance in cultural integration (e.g., minority rights, language policy, and tribal welfare programs).
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Course Code: BPAHMD306	**Course Title: Medical Documentation and Record Keeping** **Type of Course: Ability Enhancement**			**L-T- P- C**	2	1	0	3
Version No.	1.0							
Course Pre-requisites	None							
Anti-requisites	None							
Course Description	This course provides foundational knowledge in medical documentation and health records management, including formats, processes, roles, responsibilities, and compliance with healthcare information management standards.							
Course Objective	1. To familiarize students with the principles and practices of medical documentation and health record management. 2. To develop competency in handling, reviewing, preserving, and disposing of patient records. 3. To introduce basic concepts of medical coding, electronic health record (EHR) systems, and regulatory standards. 4. To equip students with the necessary skills for accurate documentation, data entry, confidentiality, and software usage.							
Course Out Comes	**On successful completion of the course the students shall be able to:** 1. **CO1:** Define medical documentation and explain the types and formats of medical records. 2. **CO2:** Demonstrate the role and responsibilities of a medical record assistant including confidentiality and data handling. 3. **CO3:** Outline the documentation process from patient admission to discharge. 4. **CO4:** Review and verify medical documents using standard checklists. 5. **CO5:** Use appropriate software tools for medical record management and demonstrate basic data entry. 6. **CO6:** Describe and apply basic concepts of medical coding (ICD, ICF), record retention, and destruction protocols							
Course Content:								
Module 1	**Introduction to Medical**	Assignment		**Sessions**				

	Documentation & Record			

Topics:

Definitions: Medical documentation, health record, medical record, and medical chart.

- **Types & Formats**: Paper and electronic records, HIMS documentation per organizational policy.

3. **Medical Record Assistant**: Roles, responsibilities, confidentiality, accuracy, record retrieval, and handling incomplete/conflicting data.

Module 2	**Medical Record Receiving & Reviewing**	Assignment		**Sessions**

Topics: **Documentation Process**: Collecting and verifying discharge files and patient information.
Checklist & Review: Sample checklist, reviewing admission sheets, progress notes, discharge summaries, and other documents.

Module 3	**Software for Medical Records Management**	Assignment		**Sessions**

Topics: **Usage & Selection**: Overview of tools, selecting suitable software per organizational needs.
Tool Management: License verification, data backup, and proper tool usage as per developer guidelines

Module 4	**Retention, Preservation & Destruction of Records**	Assignment		**Sessions**

Topics: **Retention**: Storing records per protocol (normal, death, medico-legal, transplant).

Preservation: Organizing and storing old records securely.
Destruction: Approved destruction process as per statutory guidelines, with proper documentation.

Module 5	**Medical Coding –**	Assignment		**Sessions**

	ICD & ICF			

- **Basics**: Definition and importance of medical coding.
  ICD & ICF: Purpose, differences, and applications.
- **Terminology**: Common diseases, terms, and abbreviations.

Targeted Application & Tools that can be used:

1. **Electronic Health Record (EHR) Software** – e.g., Medixcel, Practo, OpenMRS
2. **Document Management Systems** – Zoho Docs, Google Drive
3. **ICD/ICF Browser Tools** – WHO online coding tools
4. **Medical Record Checklists** – Customized admission/discharge templates
5. **Data Backup Tools** – Cloud storage solutions or local hospital systems
6. **Audit Software** – For record auditing and retention verification

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review "The Role of Digital Records in Healthcare Efficiency."
2. Presentation: "ICD vs ICF – Applications in Real-World Healthcare Settings"
3. Case Study: Present recommendations for improving data safety and compliance.

Text Book

1. **Health Information Management Technology** by Richard W. Gartee

References

1. **Documentation for Medical Records** by Barbara Odom Wesley

Online learning resources:

1. https://aaagh.delhi.gov.in/aaagh/medical-record-depatment?utm_source=chatgpt.com
2. https://pbieducation.com/courses/mr-17/?utm_source=chatgpt.com
3. https://www.cpepdoc.org/cpep-courses/medical-records-keeping-seminar-2/?utm_source=chatgpt.com

Topics relevant to "SKILL DEVELOPMENT":

1. Record Review and Checklist Preparation
2. Basic ICD/ICF Coding Skills
3. Confidentiality and Data Protection Practices
4. EHR Software Handling
5. Retention & Legal Disposal Procedures
6. Communication Skills for Record Management Professionals

Course Code: BPAHMH307	**Course Title: Mental Health & Emotional Intelligence** **Type of Course: Value Added**		**L-T- P- C**	2	0	0	2
Version No.	1.0						
Course Pre-requisites	None						
Anti-requisites	None						
Course Description	This course provides a foundational understanding of mental health and its essential components. It emphasizes the significance of emotional intelligence, stress management, and mental health promotion. Students will explore mental health challenges, treatment options, and the importance of building support systems.						
Course Objective	1. Understand the concept of mental health and its importance. 2. Develop emotional intelligence and apply it to personal and interpersonal relationships. 3. Identify and manage stress effectively. 4. Promote mental well-being in themselves and others. 5. Seek appropriate help for mental health challenges.						
Course Out Comes	**On successful completion of the course the students shall be able to:** • **CO1:** Define mental health and identify common mental health conditions. • **CO2:** Analyze the impact of stigma on mental health and develop strategies to reduce it. • **CO3:** Understand and apply emotional intelligence in personal and professional settings. • **CO4:** Identify stressors and develop effective coping strategies. • **CO5:** Promote mental health and well-being within their communities. • **CO6:** Recognize treatment modalities and support systems for mental health recovery.						
Course Content:							
Module 1	**Understanding Mental Health**	Assignment		**Sessions**			
• **Topics:** Define mental health and its components (emotional, psychological, and social well-being). • Identify common mental health challenges (anxiety, depression, bipolar disorder, schizophrenia, etc.).							

- Explain the impact of stigma and discrimination on mental health.

Module 2	**Emotional Intelligence**	Assignment		**Sessions**

- **Topics:** Define emotional intelligence and its components (self-awareness, self-regulation, social awareness, relationship management).
- Discuss the role of emotional intelligence in personal and professional success.

Develop strategies for enhancing emotional intelligence

Module 3	**Stress Management and Coping**	Assignment		**Sessions**

- **Topics:** Define stress and its types (acute, chronic).
- Identify common stress management techniques (relaxation, meditation, time management).
- Develop coping strategies for handling stress and adversity.

Module 4	**Mental Health Promotion and Prevention**	Assignment		**Sessions**

- **Topics:** Discuss the importance of mental health promotion and prevention.
- Identify risk and protective factors for mental health.
- Develop strategies for promoting mental well-being in individuals and communities.

Module 5	**Mental Health Treatment and Support**	Assignment		**Sessions**

- Explain different mental health treatment approaches (psychotherapy, medication, etc.).
- Discuss the role of support systems in mental health recovery.
- Identify resources for mental health support and crisis intervention

Targeted Application & Tools that can be used:

- **Self-assessment tools** – mental health checklists, emotional intelligence tests
- **Stress management apps** – Headspace, Calm, Breathe2Relax
- **E-counseling platforms** – iCall, Talkspace (demo or simulation)
- **Collaborative tools** – Google Slides/Docs for presentations, Canva for infographics
- **Online survey tools** – Google Forms or Microsoft Forms (for community assessments)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Review a scientific or journalistic article on mental health stigma or recent advances in therapy. **2. Presentation:** "The Role of Emotional Intelligence in Workplace Mental Health" or "Youth Mental Health Trends in India" **3. Case Study**: Analyze a fictional or real-life case dealing with stress, emotional management, or a mental health recovery journey, and propose solutions or interventions.
Text Book 1. Psychology and Life by Richard J. Gerrig and Philip G. Zimbardo
References 1. Abnormal Psychology by Ronald J. Comer 2. Emotional Intelligence: Why It Can Matter More Than IQ by Daniel Goleman 3. Emotional Intelligence 2.0 by Travis Bradberry and Jean Greaves **Online learning resources:** https://www.cdc.gov/mental-health/about/index.html?utm_source=chatgpt.com https://www.verywellhealth.com/mental-illness-5113353?utm_source=chatgpt.com
Topics relevant to "SKILL DEVELOPMENT": • Emotional intelligence training • Stress management and mindfulness practices • Community mental health advocacy • Communication and empathy skills • Crisis response and help-seeking behavior

Course Code: BPCTPI401T	**Course Title: Pediatric Intervention** **Type of Course: Core Course**	**L-T- P- C**	2	1	2	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description						
Course Objective	6. 7.					
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1: Describe the anatomical and physiological differences in the pediatric cardiovascular system compared to adults** **CO2:Identify and classify common congenital and acquired pediatric cardiovascular disorders**					

	CO3:Explain clinical manifestations and formulate basic management plans for common pediatric cardiac conditions			
Course Content:				
Module 1	**Tools for Diagnosing Cardiac Conditions in Children**	Assignment		**Sessions**
Topics: Cardiovascular History Taking: Chief complaint and presenting signs Principles of obtaining a comprehensive history in pediatric cardiology,Vital Signs Physical Examination: Full assessment including cardiac-focused examination,Cardiac Examination Techniques Laboratory Examinations: Blood tests, echocardiography,Integration of Diagnostic Tools:Use of history, physical exam, ECG, and chest X-ray for diagnosis				
Module 2	**Emotional Intelligence**	Assignment		**Sessions**
● **Topics:** Define emotional intelligence and its components (self-awareness, self-regulation, social awareness, relationship management). ● Discuss the role of emotional intelligence in personal and professional success. Develop strategies for enhancing emotional intelligence				
Module 3	**Stress Management and Coping**	Assignment		**Sessions**
● **Topics:** Define stress and its types (acute, chronic). ● Identify common stress management techniques (relaxation, meditation, time management). ● Develop coping strategies for handling stress and adversity.				
Module 4	**Mental Health Promotion and Prevention**	Assignment		**Sessions**
● **Topics:** Discuss the importance of mental health promotion and prevention. ● Identify risk and protective factors for mental health. ● Develop strategies for promoting mental well-being in individuals and communities.				
Module 5	**Mental Health**	Assignment		**Sessions**

	Treatment and Support			

- Explain different mental health treatment approaches (psychotherapy, medication, etc.).
- Discuss the role of support systems in mental health recovery.
- Identify resources for mental health support and crisis intervention

Targeted Application & Tools that can be used:

- **Self-assessment tools** – mental health checklists, emotional intelligence tests
- **Stress management apps** – Headspace, Calm, Breathe2Relax
- **E-counseling platforms** – iCall, Talkspace (demo or simulation)
- **Collaborative tools** – Google Slides/Docs for presentations, Canva for infographics
- **Online survey tools** – Google Forms or Microsoft Forms (for community assessments)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Review a scientific or journalistic article on mental health stigma or recent advances in therapy.

2. Presentation: "The Role of Emotional Intelligence in Workplace Mental Health" or "Youth Mental Health Trends in India"

3. Case Study: Analyze a fictional or real-life case dealing with stress, emotional management, or a mental health recovery journey, and propose solutions or interventions.

Text Book

2. Psychology and Life by Richard J. Gerrig and Philip G. Zimbardo

References

4. Abnormal Psychology by Ronald J. Comer
5. Emotional Intelligence: Why It Can Matter More Than IQ by Daniel Goleman
6. Emotional Intelligence 2.0 by Travis Bradberry and Jean Greaves

Online learning resources:

https://www.cdc.gov/mental-health/about/index.html?utm_source=chatgpt.com

https://www.verywellhealth.com/mental-illness-5113353?utm_source=chatgpt.com

Topics relevant to "SKILL DEVELOPMENT":

- Emotional intelligence training
- Stress management and mindfulness practices
- Community mental health advocacy
- Communication and empathy skills
- Crisis response and help-seeking behavior

Course Code: BPCTEIC402T	**Course Title: Advance Electrocardiography** **Type of Course: Core Course**	**L-T- P- C**	2	1	2	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course dives deep into sophisticated ECG interpretation, covering complex arrhythmias, ischemia/infarction patterns, non-standard lead views (e.g., right-sided, posterior), and acute cardiac emergencies. Training aligns with the latest ILCOR and AHA/ACLS guidelines to ensure clinically relevant competencies					
Course Objective	1. **Master a systematic approach** to 12-lead ECG interpretation — analyzing rate, rhythm, axis, intervals, and waveform morphology 2. **Recognize and interpret advanced ECG pathologies**, including arrhythmias (SVT, VT, VF), conduction blocks (bundle branch, fascicular, AV blocks), hypertrophy, axis deviations, and electrolyte/drug-induced changes 3. **Accurately identify ischemia and infarction patterns**, including STEMI and NSTEMI, across all anatomical territories and understand their pathophysiologic basis 4. **Apply non-standard ECG lead techniques**, such as right-sided and posterior leads, for enhanced diagnostic accuracy in uncovering subtle or hidden cardiac events. 5. **Detect specialty ECG patterns**, such as pacemaker rhythms, channelopathies (e.g., Brugada, long QT), electrolyte imbalances, pericarditis, pulmonary embolism, and low-voltage QRS 6. **Correlate ECG findings with clinical scenarios**, integrating electrocardiographic data into decision-making for ACS management, arrhythmia treatment, and patient care pathways 7. **Demonstrate proficiency under pressure** by identifying red-flag ECGs and initiating appropriate acute interventions (e.g., adenosine administration, STEMI protocol) 8. **Evaluate digital and signal-averaged ECG technology**, including automated interpretation, late-potential detection, and their roles in enhancing diagnostic precision.					

Course Out Comes	**On successful completion of the course the students shall be able to:** 1. **Arrhythmia Understanding:** Students will gain a comprehensive understanding of various arrhythmias, including their mechanisms, clinical manifestations, and management. 2. **Electrophysiology:** Students will learn about the anatomy of the conduction system and the basics of electrophysiology. 3. **ECG Interpretation:** Students will be able to interpret ECGs in the context of ischemic heart disease and arrhythmias. 4. **Arrhythmia Management:** Students will understand the use of antiarrhythmic agents, implantable electrical devices, and ablation therapy for arrhythmia management.			
Course Content:				
Module 1	**Anatomy of the Conduction System and Electrophysiology**	Assignment		**Sessions**
Topics: Anatomy of the conduction system,Electrophysiology basics (depolarization, repolarization), ECG resting interval measurements,EP study techniques and management of arrhythmias				
Module 2	**Genesis of Cardiac Arrhythmias and Management**	Assignment		**Sessions**
• **Topics:** Arrhythmogenesis mechanisms,ECG artifacts and interference,Antiarrhythmic agents (class I, II, III, IV),Implantable electrical devices (pacemakers, defibrillators), Ablation therapy for arrhythmias,ECG changes in ischemic heart disease and myocardial infarction,Stress tests (indications, contraindications, protocols, interpretation)				
Module 3	**Disorders of Impulse Conduction**	Assignment		**Sessions**
• **Topics:** Reentry mechanism, Tachycardia caused by reentry, Electrical remodeling of atria, Sinus reentry, atrial reentry, AV node reentry, Pre-excitation syndromes ,Cardiac pacing (indications, temporary/permanent pacing, NBG codes, types of pacing),Radiofrequency ablation therapy (indications, common ablation sites), Management of atrial flutter, ventricular tachycardia, atrial fibrillation, AVNRT.				
Module 4	**Cardiac Pacing and**	Assignment		**Sessions**

	Radiofrequency Ablation Therapy			

- **Topics:**
- Indications for pacing and ablation therapy, Pacing techniques (temporary, permanent), Radiofrequency ablation techniques,Complications of pacing and ablation,Effectiveness of pacing and ablation in managing arrhythmias

1. 12-lead ECG Review with Axis and Waveform Analysis
2. Additional Lead Placement Techniques:leads (V7–V9), Right precordial leads (V3R–V6R)
3. Signal-Averaged ECG – Theory and Demonstration
4. Vectorcardiography (VCG) – Introduction and Interpretation Basics
5. Detailed Interpretation of Arrhythmias:Atrial fibrillation/flutter, AV blocks, VT/VF, SVT, WPW
6. Bundle Branch Blocks and Fascicular Blocks:RBBB, LBBB, Left anterior/posterior hemiblock
7. ECG in Acute Coronary Syndromes:STEMI localization, reciprocal changes, posterior infarct
8. Pacemaker ECG Interpretation:Atrial vs. ventricular pacing, fusion/capture beats, failure patterns
9. ECG Patterns in Systemic Conditions:Hyperkalemia, hypokalemia, hypocalcemia, pericarditis, PE
10. QT Prolongation – Congenital and Drug-Induced
11. Brugada Syndrome, HCM, ARVD – ECG Clues
12. Case Studies and ECG-based Clinical Decision-Making
13. Advanced ECG Machine Handling:Digital ECG systems, interpretation software
14. Holter Monitor Setup, Data Retrieval & Rhythm Strip Analysis
15. Telemetry Monitoring in ICUs – Alarms, Artifacts, Rhythm Capture
16. Troubleshooting ECG Artifacts – Muscle tremor, Lead reversal, Interference
17. Code Blue ECG Interpretation in Real-Time Scenarios
18. Recognizing Pulseless Rhythms: Asystole, PEA, VF, VT
19. Pre- and Post-Defibrillation ECG Changes
20. ECG in ACLS Decision-Making and Algorithm Practice

Targeted Application & Tools that can be used:

- **Collaborative tools** – Google Slides/Docs for presentations, Canva for infographics
- **Online survey tools** – Google Forms or Microsoft Forms (for community assessments)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: "Artificial Intelligence-Enhanced Electrocardiography for Accurate Diagnosis"
2. Presentation: "*Advanced ECG: From Patterns to Practice"* (30–45 minutes)
3. Case Study: 54-year-old male, chest pain & diaphoresis

Text Book

- ECG Made Easy –Atul Luthra

References

- Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
- Hampton J. 2003, The ECG made Easy (6th ed.) Churchill Livingstone, Edinburgh
- An Introduction to Electrocardiography: Schamroth Colin
- Clinical Electrocardiography: Goldberger. A

Online learning resources:
Medmastery – ECG Mastery Program-Medmastery ECG Mastery Program
Medmastery – ECG Blue Belt-Medmastery ECG Blue Belt

Topics relevant to "SKILL DEVELOPMENT":

- Emotional intelligence training
- Stress management and mindfulness practices
- Community mental health advocacy
- Communication and empathy skills
- Crisis response and help-seeking behavior

Course Code: BPCTEC403T	**Course Title: Advance Echocardiography** **Type of Course: Core Course**	**L-T- P- C**	2	1	0	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides an in-depth exploration of advanced echocardiographic techniques, including three-dimensional echocardiography, speckle-tracking imaging, contrast studies, and strain imaging. It emphasizes image acquisition, interpretation, and the clinical relevance of each modality in complex cardiovascular conditions. The course is designed for students and healthcare professionals aiming to enhance diagnostic proficiency in echocardiography.					
Course Objective	To develop expertise in advanced echocardiographic techniques and image optimization. To analyze myocardial function using 2D, 3D, and strain imaging modalities. To understand the clinical utility of contrast echocardiography and stress echocardiography. To interpret echocardiographic findings in congenital, valvular, ischemic, and cardiomyopathic heart diseases. To integrate artificial intelligence and software tools in echocardiographic analysis.					
Course Out Comes	**On successful completion of the course the students shall be able to:**					

	CO1: To **recall** advanced echocardiographic modalities and their principles. **CO2:** To **explain** the use and interpretation of Doppler and 3D echocardiography. **CO3:** To perform and **interpret** advanced echocardiographic studies in various cardiac conditions. **CO4:** To **analyze** echocardiographic data for assessing cardiac function and pathology.			
Course Content:				
Module 1	**Heart Failure, Myocardium, and Pericardium**	Assignment		**Sessions**
Topics: Heart failure (types, causes, symptoms), Left ventricular systolic function (ejection fraction, wall motion), Coronary artery disease (stenosis, myocardial infarction), Cardiomyopathies (dilated, hypertrophic, restrictive) Myocarditis,Diastolic function,Right ventricular function, Pericardial diseases (effusion, tamponade) Cardiac resynchronization therapy				
Module 2	**Transesophageal Echocardiography**	Assignment		**Sessions**
• **Topics:** TEE principles and applications,TEE transducer positioning,TEE views (transgastric, bicaval, esophageal, suprasternal notch), TEE image acquisition and interpretation,Advantages and disadvantages of TEE. Patient preparation and post-procedure care				
Module 3	**Special Situations and Conditions**	Assignment		**Sessions**
• **Topics:** Echocardiography in pregnancy, Echocardiography in rhythm disturbances (e.g., atrial fibrillation, ventricular tachycardia), Echocardiography in syncope and palpitations,Echocardiography in left ventricular hypertrophy,Echocardiography in stroke, TIA, and thromboembolism,Echocardiography in patients with HIV, Chagas disease, Lyme disease, and rheumatic heart disease				
Module 4	**Recent Advances in**	Assignment		**Sessions**

	Echocardiography			

- **Topics:**
  3D echocardiography, 4D echocardiography, Tissue Doppler imaging, Contrast echocardiography

1. Review of Echo Machine Controls and Knobology:Gain, depth, focus, time gain compensation (TGC)

2. Transducer Types and Frequencies:Phased array, TEE, pediatric probes

3. Image Optimization Techniques:Sector width, frame rate, zoom, harmonics

4. Acquisition of Standard 2D Views:Parasternal Long Axis (PLAX),Parasternal Short Axis (PSAX),Apical (4-chamber, 2-chamber, 3-chamber),Subcostal and Suprasternal Views

5. M-Mode Imaging for Chamber Dimensions

6. Assessment of Left and Right Ventricular Function:EF calculation (Teichholz, Simpson's method)

7. Pulsed Wave, Continuous Wave, and Color Doppler Techniques

8. Assessment of Diastolic Function using Doppler (E/A ratio, E/e')

9. Spectral Doppler for Valvular Flow Assessment:Aortic stenosis, mitral regurgitation, tricuspid regurgitation

10. Measurement of Pressures and Gradients:Peak and mean pressure gradients,Pulmonary artery pressure estimation.

11. Valvular Heart Diseases (Detailed Doppler Evaluation):Mitral, aortic, tricuspid, and pulmonary valve diseases

12. Cardiomyopathies – Dilated, Hypertrophic, Restrictive

13. Pericardial Effusion and Tamponade Signs

14. Regional Wall Motion Abnormalities in Ischemic Heart Disease

15. Stress Echocardiography (Exercise & Pharmacological) – Demonstration

16. Transesophageal Echocardiography (TEE) – Protocol and Video Observation

17. Contrast Echocardiography – Indications and Technique (Demo)

18. 3D Echocardiography – Introduction and Interpretation (Demo/Video)

19. Basic Pediatric Echo Views and Adjustments

20. Common Congenital Defects on Echo (ASD, VSD, TOF – Observation)

21. Measurement of Shunt Flow and RVSP in Congenital Cases

22. Reporting of Echo Findings – Standard Format

23. Measurement Techniques and Report Entry

24. Case Review and Interpretation of Stored Echo Cases

25. Quality Control, Ethics, and Patient Privacy in Echo Labs

Targeted Application & Tools that can be used:
Early diagnosis of heart failure and cardiomyopathies

3D Echocardiography machines (e.g., Philips EPIQ, GE Vivid E95)

Strain analysis software (e.g., EchoPAC, TomTec Imaging Systems)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:
1. Article review: Critical analysis of imaging techniques used **"**"
2. Presentation: "*Speckle Tracking in Myocardial Strain*
3. Case Study: Patient history and indication for echo

Text Book
Echo Made Easy Sam Kaddoura 3rd Edition.

References
- Echocardiography Technician - The Comprehensive Guide: Mastering Cardiac Imaging in Modern Healthcare Linda D.Gillam, Catherine M.Otto 1st Edition
- Feigenbaum's Echocardiography William F. Armstrong, Thomas Ryan 8th edition
- The Echo Manual Jae K. Oh, James B. Seward, A. Jamil Tajik

Online learning resources:
https://www.asecho.org/education/

Imaging, Interpretation, and Diagnostics

ASE Learning Hub
https://learn.asecho.org

➤ CME-accredited resources, webinars, case libraries

EdX – Echocardiography Courses (by Philips Healthcare)
https://www.edx.org
➤ Interactive modules, imaging demos

Radiopaedia: Echocardiography https://radiopaedia.org ➤ Open-access image bank and cases
Topics relevant to "SKILL DEVELOPMENT": • Emotional intelligence training • Stress management and mindfulness practices • Community mental health advocacy • Communication and empathy skills • Crisis response and help-seeking behavior

Course Code: BPCTDC404T	**Course Title: Development of Cardiovascular system: Fetal & Neonatal Type of Course: Core Course**	**L-T- P- C**	2	1	0	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course focuses on the embryological and physiological development of the cardiovascular system during the fetal and neonatal stages. It provides comprehensive knowledge of normal cardiovascular formation, fetal circulation, transitional circulation at birth, and common congenital heart diseases. Emphasis is placed on diagnostic tools and early intervention strategies in neonatal cardiology.					
Course Objective	1.To understand the embryological stages of cardiac development. 2.To describe the structure and function of fetal circulation and its transition postnatally. 3.To recognize common congenital heart anomalies and their embryological basis.					

	4.To explore diagnostic approaches including fetal echocardiography and neonatal cardiac assessment. 5.To evaluate the impact of perinatal factors on cardiovascular development and adaptation.			
Course Out Comes	**On successful completion of the course the students shall be able to:** .**CO1:** To **recall** the anatomy and physiology of the fetal and neonatal cardiovascular system. **CO2**: To **explain** the physiological changes occurring during the transition from fetal to neonatal circulation. **CO3**: To **apply** diagnostic methods for assessing cardiovascular function in fetuses and neonates. **CO4**: To **analyze** common congenital and acquired cardiovascular disorders in neonates.			
Course Content:				
Module 1	**Early Development of the Cardiovascular System**	Assignment		**Sessions**
Topics: Early embryonic development,Blood vessel formation (intra-embryonic, extra-embryonic),Heart tube formation and positioning,Heart looping mechanism,Formation of embryonic ventriclesDevelopment of the sinus venosus,Cardiac septation (atrial, ventricular, truncus arteriosus)				
Module 2	**Formation of Cardiac Valves and Great Systemic Veins**	Assignment		**Sessions**
• **Topics:** Formation of cardiac valves (atrioventricular, semilunar),Development of cardiac veins,Development of vitelline veins, Development of umbilical veins.Formation of the vena cava				

Module 3	**Fetal and Neonatal Circulation**	Assignment		**Sessions**
• **Topics:** Blood flow pattern in fetal circulation,Oxygenation and venous return,Cardiac output and its distribution,Intra-cardiac vascular pressures, Myocardial function and energy metabolism Characteristics of fetal circulation, Changes at birth, Postnatal circulation				
Module 4	**Etiology of Cardiovascular Malformations and Adult Circulation**	Assignment		**Sessions**
• **Topics:** Etiology of cardiovascular malformations (genetic, environmental factors),Congenital anomalies (e.g., atrial septal defect, ventricular septal defect, patent ductus arteriosus),Systemic circulation (anatomy, blood flow),Pulmonary circulation (anatomy, blood flow)				
1				
Targeted Application & Tools that can be used: Early detection of congenital heart disease (CHD) Assessment of fetal cardiac function and rhythm abnormalities Neonatal echocardiography (2D, M-mode, color Doppler) Pulse oximetry screening in neonates				
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course: **1. Article review:"**" **2. Presentation: "***Developmental stages of the heart tube* **3. Case Study**: Diagrams and fetal cardiac imaging				
Text Book • Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waughand Allison Grant				
References • Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora & Bryan Derrickson • Human Embryology; Inderbir Singh **Online learning resources:**				

ISUOG – International Society of Ultrasound in Obstetrics and Gynecology
https://www.isuog.org
➤ Courses and videos on fetal cardiac screening

Children's Heart Foundation – Educational Library
https://www.childrensheartfoundation.org
➤ Family-friendly summaries, research funding updates

NeoReviews (American Academy of Pediatrics)
https://neoreviews.aappublications.org
➤ Articles and review papers on neonatal cardiology

Open Pediatrics (Boston Children's Hospital)
https://www.openpediatrics.org

Topics relevant to "SKILL DEVELOPMENT":

- Emotional intelligence training
- Stress management and mindfulness practices
- Community mental health advocacy
- Communication and empathy skills
- Crisis response and help-seeking behavior

Course Code: BPAHDM405	**Course Title: Disaster Management** **Type of Course: Minor**	**L-T- P- C**	2	1	0	3
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides a foundational understanding of disaster management with a focus on preparedness, mitigation, response, and recovery. Students will learn to distinguish between emergency and disaster scenarios, assess risks and vulnerabilities, understand disaster impact on development, and apply strategic frameworks for disaster preparedness and response.					
Course Objective	1. Understand types and phases of disasters. 2. Learn risk assessment and mitigation strategies. 3. Master emergency response protocols. 4. Develop coordination and leadership skills. 5. Enhance communication and teamwork abilities. 6. Implement disaster preparedness plans. 7. Evaluate and improve disaster response effectiveness. 8. Provide immediate medical and humanitarian aid.					

Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:** Explain the types, causes, and consequences of various disasters. **CO2:** Understand and apply the phases of the disaster management cycle. **CO3:** Analyze the interrelationship between disasters and development. **CO4:** Evaluate strategies for disaster mitigation and preparedness. **CO5:** Develop disaster response and recovery plans using modern methodologies. **CO6:** Integrate child protection and gender considerations in disaster **planning.**			
Course Content:				
Module 1	**Introduction to Disaster Management**	Assignment		**34 Sessions**
Topics: Introduction, Distinguishing between an emergency and a disaster situation, Types of natural and non-natural disasters, Implications of disasters on your region and environment.				
Module 2	**Disaster Management Cycle – Phase I: Mitigation**	Assignment		**10 Sessions**
Topics: Disaster Management Cycle. Disaster Mitigation, Mitigation strategies5 Hazard identification and vulnerability analysis, Mitigation strategies or measures Disaster Mitigation and Infrastructure Considerations, Disaster and Development The impact of disasters on development programs Vulnerabilities caused by development, Development programs can decrease vulnerability, Developing a draft country-level disaster and development policy.				
Module 3	**Disaster Management Cycle – Phase II:Preparedness**	Assignment		**10 Sessions**
Topics: Introduction Disaster Preparedness, Disaster Risk Reduction (DRR), The Emergency Operation Plan (EOP), Developing and Writing the EOP, Mainstreaming Child Protection and Gender in Emergency Planning				
Module 4	**Disaster Management Cycle – Phases III and IV: Response**	Assignment		**6 Sessions**

	and Recovery			

Topics: Disaster Response, Aims of disaster response, Disaster Response Activities, Modern and traditional responses to disasters, Modern methods of disaster response, Disaster Recovery, The Recovery Plan, Disasters as opportunities for development initiatives

Targeted Application & Tools that can be used:

- GIS & remote sensing tools for hazard mapping
- Online disaster simulation platforms (e.g., UNDRR tools)
- E-learning modules from NDMA, UNISDR, Sphere Handbook
- Risk assessment templates and software
- Community engagement frameworks

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review : Review recent case studies on disaster response in India.

2. Presentation: Create a community-based disaster preparedness plan.

3. Case Study: Analyze a real disaster event (e.g., Kerala floods, 2004 Tsunami) covering all phases of the disaster cycle.

Text Book

Disaster Management by R.B. Singh

References

1. **Natural Hazards and Disaster Management: Vulnerability and Mitigation** by R.B. Singh
2. **Disaster Management: A Comprehensive Approach** by S. Lakshmi:

Online learning resources:

1. https://nidm.gov.in/online.asp
2. https://get.disasterready.org/disaster-management/
3. https://onlinecourses.swayam2.ac.in/ntr25_ed61/preview

Topics relevant to "SKILL DEVELOPMENT":

- Disaster risk and vulnerability mapping
- Community-based disaster management (CBDM)
- Development of Emergency Operation Plans (EOP)
- Rapid needs assessment and resource coordination
- Inclusion of vulnerable groups in disaster strategies

Course Code: BPAHME406	**Course Title:** Medical Ethics & Legal Aspects **Type of Course: Minor**			**L-T- P- C**	2	1	0	3
Version No.	1.0							
Course Pre-requisites	None							
Anti-requisites	None							
Course Description	This course provides a comprehensive overview of the ethical and legal frameworks guiding healthcare professionals. It aims to instill a strong foundation in medical ethics, patient rights, legal obligations, and the principles that govern medical decision-making.							
Course Objective	1. Understand ethical principles guiding medical practice. 2. Comprehend legal frameworks governing healthcare. 3. Analyse ethical dilemmas in medical decision-making. 4. Navigate legal responsibilities in patient care. 5. Apply ethical reasoning in clinical and research contexts. 6. Interpret healthcare laws and regulations. 7. Foster ethical behaviour and professionalism in healthcare. 8. Address conflicts between medical ethics and legal requirements. 9. Advocate for patient rights and autonomy.							
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1.** Define medical ethics and describe its scope and goals in healthcare practice. **CO2.** Interpret the legal and ethical aspects of malpractice, negligence, and patient rights. **CO3.** Explain the medico-legal significance of documentation and patient confidentiality. **CO4.** Apply ethical principles to case-based situations in medical laboratory practice. **CO5.** Critically evaluate dilemmas involving end-of-life care, reproductive rights, and healthcare disparities. **CO6.** Demonstrate professional conduct in accordance with ethical and legal standards.							
Course Content:								
Module 1	**Introduction to Medical Ethics and**	Assignment		**Sessions**				

	Code of Conduct			
Topics: Medical ethics – Definition – Goal – Scope, Introduction to Code of conduct, Basic principles of medical ethics – Confidentiality				
Module 2	**Malpractice, Negligence, and Patient Rights**	Assignment		**Sessions**
Topics: Malpractice and negligence – Rational and irrational drug therapy, Autonomy and informed consent – Right of patients, Care of the terminally ill- Euthanasia. Development of standardized protocol to avoid near miss or sentinel events				
Module 3	**Medico-Legal Aspects and Ethics in Laboratory Practice**	Assignment		**10 Sessions**
Topics: Organ transplantation, Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC – ownership of medical records – Confidentiality Privilege communication – Release of medical information – Unauthorized disclosure – retention of medical records – other various aspects. Ethics in the profession of Medical Laboratory Science.				
Module 4	**Ethical Principles and Contemporary Issues in Healthcare**	Assignment		**6 Sessions**
Topics: Autonomy, Beneficence, Non-malfeasance, Justice and confidentiality, Informed consent, medical privacy, end-of-life care, reproductive rights, and healthcare disparities				
Targeted Application & Tools that can be used: 1. Case law analysis tools 2. Ethical dilemma simulation activities 3. Clinical documentation audit frameworks 4. Policy guidelines from MCI, WHO, ICMR				

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review : Analyze a peer-reviewed article on informed consent or euthanasia.

2. Presentation: Present a case on medical negligence or ethical decision-making in ICU.

3. Case Study: Develop a report on an MLC (Medico-Legal Case) with recommendations for ethical improvement.

Text Book

1. Medical Law and Ethics by B. Sandeepa Bhat

References

1. Perverse Medical Negligence Judgments: The Bane of Modern Medicine by Dr. Shri Gopal Kabra

Online learning resources:

1. ScienceDirect Topics: Medical Ethics
2. https://nextgenu.org/courses/medical-ethics-online/?utm_source=chatgpt.com
3. https://learningpath.org/articles/Free_Online_Medical_Ethics_and_Bioethics_Courses_from_Top_Universities.html?utm_source=chatgpt.com

Topics relevant to "SKILL DEVELOPMENT":

- Ethical reasoning and decision-making
- Handling patient data and documentation
- Professional communication and conflict resolution
- Medico-legal writing and case analysis

Course Code: BPAHCC407T	**Course Title:** Campus to Corporate (Bedside Manners & PoSH) **Type of Course: Ability Enhancement**	**L-T- P- C**	2	0	0	2
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course is designed to develop essential soft skills for success in professional, academic, and clinical settings. It emphasizes professional etiquette, effective communication, teamwork, interpersonal relationships, time management, bedside manners, and legal awareness through the POSH Act.					
Course Objective	1. Develop professional etiquette and communication skills for corporate environments. 2. Cultivate empathy and effective bedside manners in patient interactions.					

	3. Understand and comply with Prevention of Sexual Harassment (PoSH) policies and procedures. 4. Practice respectful and inclusive behaviour in workplace interactions. 5. Enhance conflict resolution and problem-solving skills. 6. Learn to navigate workplace dynamics and organizational culture. 7. Develop self-awareness and emotional intelligence. 8. Foster teamwork and collaboration in professional settings. 9. Acquire strategies for managing workplace stress and maintaining well-being. 10. Apply ethical principles and values in corporate and healthcare contexts.			
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:** Demonstrate appropriate professional etiquette, attire, and workplace behavior. **CO2:** Communicate effectively using verbal, non-verbal, listening, and written skills in diverse situations. **CO3:** Exhibit teamwork, resolve conflicts constructively, and contribute to collaborative efforts. **CO4:** Build strong interpersonal relationships through respect, empathy, and effective conversation. **CO5:** Apply time management and emotional self-regulation techniques for personal and professional balance. **CO6:** Understand and apply the POSH Act to foster a safe, inclusive work/study environment.			
Course Content:				
Module 1	**Professional Etiquette**	Assignment		**Sessions**
● **Topics:** Making a strong first impression ● Dress code and professional attire ● Displaying courtesy and respect in the workplace ● Workplace etiquette and protocol				
Module 2	**Communication Skills**	Assignment		**Sessions**
● **Topics:** Effective verbal and non-verbal communication ● Active listening techniques ● Developing questioning skills ● Written communication and professional writing				
Module 3	**Teamwork and Collaboration**	Assignment		**Sessions**
● **Topics:** Understanding corporate values and culture ● Building trust and effective teams ● Conflict resolution and management ● Team synergy and collaboration				
Module 4	**Interpersonal Skills**	Assignment		**Sessions**

- **Topics:** Developing strong interpersonal relationships
- Acknowledging and respecting differences
- Conversation etiquette and building rapport
- Professional boundaries and social media etiquette

Module 5	**Time Management and Self-Management**	Assignment		**Sessions**

- Prioritization and time management techniques
- Dealing with distractions and procrastination
- Work-life balance strategies
- Self-care practices and emotional intelligence

Module	**Bedside Manners**	Assignment		**Sessions**

- **Topics:** The concept of bedside manners
- Developing empathy, compassion, and ownership
- Effective patient communication and interaction
- Building trust with patients and their families

Module	**POSH (Prevention of Sexual Harassment)**	Assignment	**Session**

Topics:

- Understanding the changing work environment
- The POSH Act: key provisions and implications
- Prevention and reporting of sexual harassment
- Creating a safe and inclusive workplace

Targeted Application & Tools that can be used:

- Case-based discussion platforms
- Self-assessment and personality tools (MBTI, Johari Window)
- Mock interviews, group activities, empathy exercises
- POSH policy templates and real-life workplace simulations

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: Explore a real-life case of professional misconduct or exemplary bedside manner.

2. Presentation: Create and deliver a role-play on conflict resolution or patient interaction.

3. Case Study: Analyze a scenario of workplace harassment under the POSH Act and suggest a redressal plan.

Text Book

1. The Power of Etiquette by Peggy Post

References

1. Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler
2. The Five Dysfunctions of a Team by Patrick Lencioni
3. The Art of Empathy by Karla McLaren

Online learning resources:

1. https://10minuteschool.com/en/product/corporate-ettiquette/?utm_source=chatgpt.com
2. https://training.safetyculture.com/course-collection/empathy-training-courses/?utm_source=chatgpt.com
3. https://www.skillindiadigital.gov.in/courses/detail/35d1b0e0-7dfb-4d07-a3d8-d6632ece72c8?utm_source=chatgpt.com

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPAHAI501T	**Course Title: Advanced Intensive Care (ACLS, PALS & NALS) Type of Course: Skill Enhancement Course3**	**L-T- P-C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course equips healthcare students and professionals with advanced knowledge and hands-on skills in critical life-saving interventions, focusing on Advanced Cardiovascular Life Support (ACLS), Pediatric Advanced Life Support (PALS), and Neonatal Advanced Life Support (NALS). Emphasis is placed on the recognition and management of life-threatening emergencies across age groups, team-based resuscitation, airway management, pharmacological					

	interventions, and post-resuscitation care following evidence-based protocols.			
Course Objective	1.To understand the pathophysiology of cardiac arrest, respiratory failure, and shock across neonatal, pediatric, and adult populations. 2.To apply evidence-based algorithms from AHA (American Heart Association) for ACLS, PALS, and NALS. 3.To demonstrate effective skills in airway management, defibrillation, vascular access, and drug delivery. 4.To perform team-based code management and simulation scenarios. 5.To analyze post-resuscitation care including stabilization and transfer protocols.			
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:** To **recall** protocols and algorithms for BLS, ACLS, PALS, and NALS. **CO2:** To **explain** the pathophysiological basis of life-threatening conditions and their emergency management. **CO3**: To **perform** advanced resuscitation techniques and emergency interventions in simulated and clinical scenarios. **CO4**: To **assess** patient conditions and identify priorities for intensive and emergency care.			
Course Content:				
Module 1	**1: Advanced Cardiac Life Support Algorithms**	Assignment		**Sessions**
• **Topics:** ACLS algorithm,Cardiac rhythm recognition,Advanced airway management (intubation, cricothyrotomy),ACLS medications (e.g., epinephrine, amiodarone, vasopressin),Post-arrest care (temperature management, sedation), Neurologic assessment				
Module 2	**Pharmacology in ACLS**	Assignment		**Sessions**
• **Topics:** ACLS medications (e.g., epinephrine, amiodarone, vasopressin, atropine),Indications, dosages, and administration routes,Mechanisms of action and side effects, Drug calculations. Adverse drug reaction management				
Module 3	**Advanced Airway Management**	Assignment		**Sessions**

- **Topics:**
- Endotracheal intubation techniques,Difficult airway management, Cricothyrotomy,Airway complications (e.g., aspiration, tube dislodgement)

Module 4	**Defibrillation and Pacing**	Assignment		**Sessions**

- **Topics: **
- **Defibrillation principles (biphasic, monophasic), Defibrillation technique, Pacemaker modes (e.g., fixed-rate, demand), Pacing indications and complications**

Module 5	**Post-Arrest Care and Neurologic Assessment**	Assignment		**Sessions**

Post-arrest care (temperature management, sedation),Neurologic assessment (GCS, pupil response)
Targeted temperature management

Targeted Application & Tools that can be used:

- Emergency room resuscitation of adults, children, and neonates
- ICU and pre-hospital critical care interventions
- Airway kits (BVM, ETT, LMA, video laryngoscopes)
- Defibrillators (manual and AED)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review:

2. Presentation: High-quality CPR techniques and innovations

3. Case Study: Background and patient history

Clinical presentation and arrest scenario

Text Book

The Interventional Cardiac Catheterization Handbook Morton J. Kern, MD (3rd Edition**)**

References

Textbook of Neonatal Resuscitation (NRP), by **Gary M. Weiner, Jeanette Zaichkin,** edition **8th Edition, 2021** published by **American Academy of Pediatrics**

2. **Critical Care Medicine: Principles of Diagnosis and Management in the Adult,** by **Joseph E. Parrillo, R. Phillip Dellinger**, edition **5th Edition, 2019** published by **Elsevier**

3.**Manual of Emergency Airway Management**, by **Ron M. Walls, Michael F. Murphy**, edition **5th Edition, 2018**, published by **Wolters Kluwer**

Online learning resources:

4. Save a Life by NHCPS (Disque Foundation) – Free certified courses & resources https://nhcps.com/free-resources/
5. 🔗 ACLS, PALS, BLS Algorithms & Tools (from ACLS-PALS-BLS.com) https://www.acls-pals-bls.com/algorithms/pals/
6. 🔗 American Heart Association – ACLS/BLS/PALS Course Info https://cpr.heart.org
7. 🔗 ACLSNow – Study tools, practice tests, algorithm downloads https://aclsnow.com/

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPCTCC502	**Course Title: Cardiac Catheterization Type of Course: Core Course**	**L-T- P-C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides comprehensive knowledge and practical insights into the principles and procedures of cardiac catheterization. It covers both diagnostic and interventional techniques, indications, contraindications, hemodynamic measurements, coronary angiography, and structural interventions. The course prepares learners for assisting in or performing cardiac cath lab procedures with					

	a strong emphasis on patient safety, imaging modalities, and catheter-based therapies.			
Course Objective	1.To understand the anatomy, indications, and procedural steps of cardiac catheterization. 2.To interpret hemodynamic data obtained during right and left heart catheterization. 3.To assist in coronary angiography, balloon angioplasty, and device closures. 4.To recognize and manage catheterization-related complications. 5.To apply radiation safety and sterile techniques in the cath lab environment.			
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:** To **recall** the anatomy, instrumentation, and procedural steps involved in cardiac catheterization. **CO2**: To **describe** the indications, contraindications, and physiological basis of cardiac catheter procedures. **CO3:** To **assist** in patient preparation, equipment handling, and intra-procedural support in the catheterization lab. **CO4**: To **interpret** hemodynamic data and angiographic findings from cardiac catheterization			
Course Content:				
Module 1	**Asepsis in the Cardiovascular Catheterization Laboratory**	Assignment		**Sessions**
• **Topics:** Aseptic technique principles,Sources of contamination (e.g., personnel, equipment, environment),Sterile field setup and maintenance,Infection control protocols				
Module 2	**Atherectomy and Thrombectomy**	Assignment		**Sessions**
• **Topics:** Atherectomy devices (directional coronary atherectomy, rotational atherectomy),Atherectomy procedure,Atherectomy complications,Thrombectomy devices (angiojet, manual aspiration devices),Thrombectomy procedure				
Module 3	**Foreign Body Retrieval**	Assignment		**Sessions**
• **Topics:** Foreign body retrieval instruments (Amplatz goose neck snare, Curry				

intravascular retriever, Dotter intravascular retriever, vascular retrieval forceps, Welter retrieval loop, biopsy forceps) , Foreign body retrieval techniques, Challenges and complications

Module 4	**Emergencies in the Cardiac Catheterization Laboratory**	Assignment		**Sessions**

- **Topics:**

Common complications in the catheterization laboratory (e.g., bleeding, arrhythmias, contrast reactions), ACLS and BLS algorithms, Emergency management strategies, Response to cardiac arrest, anaphylaxis, and bleeding

Targeted Application & Tools that can be used:

- Diagnosis of coronary artery disease, valvular disease, and congenital heart anomalies
- Pre-operative assessment and planning
- Catheters (Judkins, Amplatz, Swan-Ganz)
- Guide wires and sheaths

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: *Catheterization and Cardiovascular Interventions* or *JACC: Cardiovascular Interventions*.

2. Presentation: Right heart catheterization and PA pressure analysis

3. Case Study: Steps performed and imaging results

Text Book

Grossman & Baim's Cardiac Catheterization, Angiography, and Intervention (9th Edition) Mauro Moscucci, MD, MBA Lippincott Williams & Wilkins (LWW)

References

Textbook of Interventional Cardiology (8th Edition) Eric J. Topol, MD; Paul S. Teirstein, MD Elsevier

Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine (12th Edition)Douglas P. Zipes, MD; Peter Libby, MD; Robert O. Bonow, MD; Douglas L. Mann, MD; Gordon F. Tomaselli, MD 12th : Elsevier

ACC/AHA Guidelines for Cardiac Catheterization Laboratories American College of Cardiology/American Heart Association Task Force on Practice Guidelines Circulation,

Online learning resources:

1.Boston University – Cath Lab Fellow Manual
🔗https://www.bumc.bu.edu/cardiovascular-medicine/files/2013/06/BMC-Cath-Lab-Fellow-Manual-2013.doc

2.UNC Medical Center – Infection Control in Cath Labs
🔗https://spice.unc.edu/wp-content/uploads/2022/06/Cardiac-Catheterization-Laboratories.pdf

3.Cleveland Clinic – Procedure Overview
🔗https://my.clevelandclinic.org/health/diagnostics/16832-cardiac-catheterization

4.Johns Hopkins Medicine – Cath Explanation

🔗https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/cardiac-catheterization

5.Mayo Clinic – About Cardiac Catheterization

🔗https://www.mayoclinic.org/tests-procedures/cardiac-catheterization/about/pac-20384695

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPCTICF503	**Course Title: Invasive Cardiology** **Type of Course: Core Course**	**L-T-P-C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course introduces the principles and practices of invasive cardiology, focusing on the diagnostic and therapeutic procedures performed within a cardiac catheterization laboratory. It covers coronary angiography, electrophysiology studies, hemodynamic					

	assessments, and interventional techniques for managing structural and coronary artery diseases. Emphasis is placed on patient selection, procedural planning, equipment handling, and post-procedural care.			
Course Objective	1. To understand the indications, contraindications, and procedural steps in invasive cardiac procedures. 2. To acquire knowledge of diagnostic angiography, percutaneous coronary interventions (PCI), and electrophysiological testing. 3. To interpret hemodynamic data and angiographic images. 4. To develop skills in assisting interventional cardiology procedures with proper aseptic and radiation safety protocols. 5. To evaluate complications and emergency management during invasive procedures.			
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:**To **identify** the tools, techniques, and procedural protocols used in invasive cardiology. **CO2**: To **explain** the physiological and clinical rationale behind invasive cardiac procedures. **CO3:** To **assist** in preparation, execution, and monitoring of patients during invasive cardiovascular procedures. **CO4**: To **differentiate** between various invasive techniques and **interpret** clinical data obtained during intervention			
Course Content:				
Module 1	**Contrast Media and Hemodynamics**	Assignment		**Sessions**
• **Topics:** Contrast media (types, properties, applications),Contrast media reactions (mild, moderate, severe, allergies),Contrast-induced nephropathy,Hemodynamics (pressure measurement, sources of error, artifacts),Hemodynamic waveforms,Gradient and valve area calculations,Cardiac output formulas				
Module 2	**Intravascular Ultrasound (IVUS) and Functional**	Assignment		**Sessions**

	Assessment			
• **Topics:** Angiography vs. IVUS, IVUS systems and applications, IVUS complications, Intravascular pressure measurement, Coronary pressures and fractional flow reserve				
Module 3	**Percutaneous Coronary Intervention (PCI)**	Assignment		**Sessions**
• **Topics:** PCI history and indications, Angioplasty balloons (OTW, SOE, fixed-wire),Stent implantation,Interventional cardiology hardware (stents, guidewires, catheters),IABP (principles, indications, contraindications, timing, complications), Percutaneous ventricular assist devices (e.g., tandem heart, Impella)				
Module 4	**Peripheral Carotid Angiography and Cardiac Pharmacology**	Assignment		**Sessions**
• **Topics:** **P**eripheral carotid angiography (indications, procedure, post-procedure care),Cerebrovascular anatomy and pathology,Local anesthetics, analgesics, and sedatives,Vasodilators (nitroglycerine, sodium nitroprusside),Beta-blockers (metoprolol, propranolol, esmolol, labetalol),Calcium channel blockers (diltiazem, verapamil, nicardipine).Anticoagulation agents (platelet aggregation inhibitors, aspirin, clopidogrel,glycoprotein IIb/IIIa inhibitors, tirofiban, heparin, warfarin, thrombolytics)				
Targeted Application & Tools that can be used: Coronary artery disease evaluation and treatment Acute myocardial infarction intervention (Primary PCI)				
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course: **1. Article review:** *Catheterization and Cardiovascular Interventions* or *JACC: Cardiovascular Interventions*. **2. Presentation:** STEMI management through primary PCI **3. Case Study**: Clinical indication and history				
Text Book The Interventional Cardiac Catheterization Handbook (3rd Edition) Morton J. Kern, MD Saunders (Elsevier)				
References Invasive Cardiology: A Manual for Cath Lab Personnel (3rd Edition) Sandy Watson, Kenneth A. Gorski: Jones & Bartlett Learning **Online learning resources:**				

1.ESC (European Society of Cardiology) – Interventional Cardiology Curriculum 🔗https://www.escardio.org/Sub-specialty-communities/European-Association-of-Percutaneous-Cardiovascular-Interventions-(EAPCI)/Education/Core-curriculum 2.OpenStax (Basic Cardiovascular Physiology) 🔗https://openstax.org/books/anatomy-and-physiology/pages/19-introduction 3.NBE (India) – FNB Interventional Cardiology Curriculum 🔗https://natboard.edu.in/viewNBEprogram?NBE=Interventional%20Cardiology 4.UC Davis Interventional Cardiology Fellowship Curriculum (Sample OER) 🔗https://health.ucdavis.edu/internalmedicine/fellowships/interventional-cardiology/
Topics relevant to "SKILL DEVELOPMENT": • Workplace etiquette & grooming • Verbal & written communication • Team coordination and leadership • Empathy and patient communication • Time and stress management • Legal literacy through POSH

Course Code: BPCTTE504	**Course Title: Treadmill exercise stress testing and 24 hour recording** **Type of Course: Core Course**	**L-T- P-C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description						
Course Objective	6.					
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1:**To **recall** the indications, protocols, and safety measures related to TMT and Holter Monitoring. **CO2**: To **describe** the physiological basis and diagnostic value of ambulatory ECG and exercise stress testing. **CO3**: To **operate** equipment, prepare patients, and conduct TMT and Holter tests in clinical settings.					

	CO4: To **interpret** recorded ECG data to identify arrhythmias, ischemic changes, and abnormal responses.			
Course Content:				
Module 1	**Treadmill Exercise Stress Testing**	Assignment		**Sessions**
• **Topics:** Treadmill components and functions,Exercise stress testing principles,Indications and contraindications for exercise stress testing,Patient preparation for exercise stress tests,Exercise stress test protocols,Interpretation of exercise stress test results (ECG changes, ST segment analysis)				
Module 2	**ST Segment ChangesST Segment Changes**	Assignment		**Sessions**
• **Topics:** ST segment anatomy, Normal ST segment changes during exercise,Abnormal ST segment elevations and depression, Interpretation of ST segment changes in myocardial ischemia and infarction				
Module 3	**Cardiac Arrhythmias and Conduction Disturbances**	Assignment		**Sessions**
• **Topics:** Common arrhythmias during stress testing (e.g., atrial fibrillation, ventricular tachycardia), Conduction disturbances (e.g., heart blocks),Relationship between arrhythmias and coronary artery disease,Risk factors for arrhythmias and conduction disturbances				
Module 4	**Holter Monitoring**	Assignment		**Sessions**
• **Topics:** Holter recording principles,Holter recording procedure (electrode placement, recording duration),Holter recording analysis (rhythm identification, arrhythmia detection)Holter recording report interpretation				
Module 5	**Advanced Techniques in Stress Testing**	Assignment		**Sessions**

- **Topics:**

Stress echocardiography (principles, indications, interpretation),Nuclear stress testing (principles, indications, interpretation),Comparison of different stress testing modalities Advanced stress testing techniques (e.g., dobutamine stress echo, pharmacological stress testing)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: *Catheterization and Cardiovascular Interventions* or *JACC: Cardiovascular Interventions*.

2. Presentation: STEMI management through primary PCI

3. Case Study: Clinical indication and history

Text Book

Advanced Cardiovascular Life Support (ACLS) Provider ManualAmerican Heart Association (AHA) American Heart Association

References

Online learning resources:

1.ESC Working Group 10: Curriculum & Syllabus for Interventional Cardiology Training PDF: ESC WG 10 Curriculum (2006) acc.org+15escardio.org+15escardio.org+15

2.ESC/EAPCI: Core Curriculum for Percutaneous Cardiovascular Interventions PDF: Updated Core Curriculum (2020) escardio.org+

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPAHIP555	Course Title: Internship Evaluation Type of Course: Summer Internship	L-T- P- C	0	0	8	4

Course Code: BPCTPT601T	Course Title: Perfusion Technology Type of Course: Core Course	L-T- P- C	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					

<table>
<tr><td>Course Description</td><td colspan="4">This course introduces the science and clinical application of extracorporeal circulation and cardiopulmonary bypass (CPB) techniques used during cardiac surgeries. Students will learn about perfusion systems, blood conservation strategies, physiological monitoring, and the role of perfusionists in open-heart procedures, organ support, and extracorporeal life support (ECLS/ECMO). The course prepares learners to function safely and effectively as part of a cardiac surgical team.</td></tr>
<tr><td>Course Objective</td><td colspan="4">To understand the principles of cardiopulmonary bypass and extracorporeal circulation.

To identify components and functions of the heart-lung machine.

To evaluate physiological parameters and manage perfusion variables.

To assist in clinical decision-making during cardiac surgeries and ECMO.

To ensure patient safety by applying blood conservation, anticoagulation, and equipment sterilization protocols.</td></tr>
<tr><td>Course Out Comes</td><td colspan="4">On successful completion of the course the students shall be able to:
CO1: To identify key perfusion equipment, components of the heart-lung machine, and circuit layouts.
CO2: To explain the physiological effects of extracorporeal circulation and the principles of oxygenation and perfusion.
CO3: To perform standard perfusion techniques under supervision and manage bypass procedures according to protocols.
CO4: To monitor and interpret perfusion parameters and respond to intraoperative changes in patient status.</td></tr>
<tr><td>Course Content:</td><td colspan="4"></td></tr>
<tr><td>Module 1</td><td>Development of Cardiopulmonary Bypass</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="5">• Topics:
History of CPB, Key researchers in CPB,Development of pumps, oxygenators, and heat exchangers, Blood pump theory (pulsatile vs. centrifugal pumps)</td></tr>
<tr><td>Module 2</td><td>Blood Pumps, Circuitry, and Cannulation Techniques</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="5">• Topics:</td></tr>
</table>

Types of blood pumps (centrifugal, roller, peristaltic), CPB circuit components (reservoir, oxygenator, heat exchanger, pump), Cannulation techniques (arterial, venous),Blood handling (heparinization, priming, temperature control)

Module 3	**Principles of Oxygenator Function**	Assignment		**Sessions**

- **Topics:**

Gas exchange in oxygenators (diffusion, convection),Heat transfer in oxygenators.Membrane vs. bubble oxygenators, Chemistry and physics of heat exchange, Miniaturization of oxygenators

Module 4	**Myocardial Protection**	Assignment		**Sessions**

- **Topics:**

Myocardial protection strategies, Blood vs. crystalloid cardioplegia,Types of cardioplegia solutions (cold, warm, buffered),Routes of cardioplegia administration (coronary ostia, aortic root),Ischemic preconditioning,Reperfusion injury

Module 5	**Pediatric Cardiopulmonary Bypass**	Assignment		**Sessions**

- **Topics:**

Pediatric CPB considerations (smaller size, different anatomy),Cannulation techniques in children,DHCA (indications, techniques),Anticoagulation in pediatric CPB
Recent Advances in Cardiopulmonary Bypass,
Recent advancements in CPB (e.g., miniaturized circuits, hybrid CPB),Mechanical circulatory support devices (IABP, ECMO, VADs),Applications of mechanical circulatory support,Advantages and limitations of new CPB techniques.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review: *Perfusion*, *ASAIO Journal*, or *The Annals of Thoracic Surgery*.

2. Presentation: Step-by-step overview of CPB initiation and termination

3. Case Study: Patient background and indication for bypass/ECMO

Text Book

Cardiopulmonary Bypass: Principles and Practice (4th Edition) Glenn P. Gravlee, Richard F. Davis, John Hammon, Barry Kussman Lippincott Williams & Wilkins

References

Cardiopulmonary Bypass: Principles and Techniques of Extracorporeal Circulation Christina T. Mora Springer-Verlag

Cardiopulmonary Bypass (2nd Edition) Sunit Ghosh Cambridge University Press

Online learning resources:

1.MSOE Library – Perfusion Resources Guide

https://libguides.msoe.edu/perfusion-resources

2.Lipscomb University Perfusion Sciences Textbook Guide

https://libguides.lipscomb.edu/perfusion

3.American Society of ExtraCorporeal Technology (AmSECT)

https://amsect.org

4.PerfusFind – Perfusion Education & Calculations

https://perfusfind.com

5.University of Utah – Cardiovascular Perfusion Handbook

https://medicine.utah.edu/physical-therapy-athletic-training/cardiovascular-perfusion

6.Jefferson University – Perfusion Program Info

https://www.jefferson.edu/academics/colleges-schools-institutes/health-professions/departments/cardiovascular-perfusion.html

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPCTPU602T	**Course Title: Principal of Ultrasonography** **Type of Course: Core Course**	**L-T- P-C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides a comprehensive introduction to the fundamental principles and applications of ultrasonography in medical diagnostics. It covers the physics of ultrasound, instrumentation, image formation, scanning techniques, and safety considerations. Students will gain theoretical knowledge and practical insights into the use of ultrasound in various clinical settings, including abdominal, obstetric, vascular, and musculoskeletal imaging.					

Course Objective	1.To understand the basic physics and instrumentation of ultrasound. 2.To develop foundational skills in ultrasound image acquisition and interpretation. 3.To familiarize students with standard scanning protocols and anatomical landmarks. 4.To promote safe and effective use of ultrasonography in patient care. 5.To prepare students for advanced clinical applications and hands-on ultrasound practice.			
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO:** To **identify** basic concepts of ultrasound physics, components of ultrasound machines, and terminology. **CO2::** To **explain** the principles of sound wave generation, propagation, and interaction with human tissues. **CO3:**To **operate** ultrasound equipment for basic scanning techniques and image optimization. **CO4:** To **distinguish** between normal and artifact images and assess quality based on technical parameters.			
Course Content:				
Module 1	**Principles of Ultrasonography**	Assignment		**Sessions**
• **Topics:** Definition and applications of ultrasound,Physical principles (sound waves, propagation, reflection, attenuation),Technical principles (transducers, image formation), Ultrasound terminology (e.g., echogenicity, anechoic, hypoechoic, hyperechoic)				
Module 2	**2: Examination Techniques and Sonographic Phenomena**	Assignment		**Sessions**
• **Topics:**				

Ultrasound examination techniques (scanning planes, transducer manipulation),Sonographic phenomena (aliasing, reverberation, shadowing, enhancement),Artifact reduction techniques, Image optimization (gain, time-gain compensation, depth)

Module 3	**Ultrasound of the Thoracic Cavity and Heart**	Assignment		**Sessions**

- **Topics:**

Ultrasound of the diaphragm and pleura,Echocardiography (2D, M-mode, Doppler),Normal heart anatomy and function,Cardiac diseases (e.g., coronary artery disease, valvular heart disease,
cardiomyopathies),Echocardiographic findings in cardiac diseases

Module 4	**Ultrasound of the Vascular System**	Assignment		**Sessions**

- **Topics:**

Ultrasound of carotid vessels (carotid intima-media thickness, plaque assessment),Ultrasound of vertebral artery,Ultrasound of the aorta (aneurysms, dissections),Ultrasound of blood vessels of the lower limb (deep vein thrombosis, arterial occlusive diseases),Doppler ultrasound (velocity measurements, flow direction)

Module 5	**Special Diagnostic Procedures**	Assignment		**Sessions**

- **Topics:**

Ultrasound-guided biopsy (fine-needle aspiration, core biopsy),Ultrasound-guided interventions (drainage, cyst puncture),Monitoring bone healing with ultrasound,3D and 4D ultrasound,Interventional ultrasound (e.g., ablation procedures, vascular interventions)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review:.

2. Presentation: Physics of Ultrasound: Understanding the Basics"

3. Case Study: A patient with suspected gallbladder disease evaluated by abdominal ultrasound.

Text Book

Diagnostic Imaging: Ultrasound Anil T. Ahuja, James F. Griffith, K. T. Wong, Gregory E. Antonio Elsevier

References

Manual of Ultrasound (3rd Edition) G. S. Garkal

Textbook of Diagnostic Sonography: 2-Volume Set (9th Edition) Sandra L. Hagen-Ansert, MS, RDMS, RDCS, FASE, FSDMS Elsevier

Online learning resources:
1.OpenWHO (World Health Organization)

https://openwho.org

2.Global Library of Women's Medicine (GLOWM)

https://www.glowm.com

3.Vanderbilt University Global Surgical Atlas

https://www.vumc.org/global-surgical-atlas

4.NCBI Bookshelf – US National Library of Medicine

https://www.ncbi.nlm.nih.gov/books/

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPCTCC603T	**Course Title:Cardiac Catheterization Laboratory advanced Type of Course: Core Course**	**L-T- P-C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course provides an in-depth understanding of advanced principles, techniques, and procedures used in cardiac catheterization laboratories. It focuses on diagnostic and interventional procedures, including coronary angiography, percutaneous coronary interventions (PCI), transcatheter valve therapies, and intravascular imaging modalities. Emphasis is placed on patient preparation, hemodynamic monitoring, sterile technique, radiation safety, and the management of procedural complications. The course integrates theoretical					

<table>
<tr><td></td><td colspan="4">knowledge with clinical case discussions and simulation-based learning to prepare students for real-world cath lab practice.</td></tr>
<tr><td>Course Objective</td><td colspan="4">1.To develop comprehensive knowledge of advanced diagnostic and interventional cardiac catheterization techniques.

2.To understand the indications, contraindications, and clinical decision-making pathways for cardiac invasive procedures.

3.To gain proficiency in interpreting angiographic and hemodynamic data.

4.To familiarize students with advanced tools and technologies including FFR, IVUS, OCT, and closure devices.

5.To promote adherence to safety, infection control, and radiation protection protocols in the cath lab.

6.To prepare students for clinical roles in cardiac catheterization teams through case-based and hands-on learning.</td></tr>
<tr><td>Course Out Comes</td><td colspan="4">On successful completion of the course the students shall be able to:
CO1: To recall specialized instruments, contrast agents, and procedural protocols in advanced catheterization.

CO2: To explain the physiological principles behind complex diagnostic and interventional catheter-based procedures.
CO3:To assist in complex coronary and peripheral interventions, pressure measurements, and contrast imaging techniques.
CO4: To interpret real-time hemodynamic data, angiographic findings, and recognize procedural complications</td></tr>
<tr><td>Course Content:</td><td colspan="4"></td></tr>
<tr><td>Module 1</td><td>Advanced Concepts in Cath Lab Operation</td><td>Assignment</td><td></td><td>Sessions</td></tr>
<tr><td colspan="5">• Topics:

Cath lab workflow and zoning, Sterile techniques and infection control in invasive procedures, Roles of cath lab personnel in advanced procedures, Emergency preparedness and crash cart management.</td></tr>
</table>

Module 2	**Hemodynamics and Cardiac Physiology**	Assignment		**Sessions**

- **Topics:**

Pressure waveforms and interpretation: RA, RV, PA, PCWP, LV, Aorta, Fick principle and thermodilution technique for cardiac output, Oxygen saturation runs and shunt calculations, Hemodynamic changes in congenital and acquired heart diseases.

Module 3	**Advanced Coronary Interventions**	Assignment		**Sessions**

- **Topics:**

Percutaneous Coronary Intervention (PCI): indications, types, steps, Chronic Total Occlusion (CTO) management, Rotational Atherectomy and plaque modification techniques, Drug-eluting balloons and stents: types and deployment, Complications of PCI: no-reflow, perforation, restenosis.

Module 4	**Structural Heart Interventions**	Assignment		**Sessions**

- **Topics:**

Balloon valvuloplasty (mitral, aortic, pulmonary), Percutaneous closure of ASD, VSD, and PDA, Basics of TAVI (Transcatheter Aortic Valve Implantation), Left atrial appendage closure and septal ablation.
Pacemakers and Electrophysiology Integration: Temporary and permanent pacemaker indications and insertion, ICD and CRT: overview and implantation basics, Overview of Electrophysiology Study (EPS) and ablation, Cath lab preparation for device therapy procedures.

Module 5	**Imaging Modalities in Interventions**	Assignment		**Sessions**

- **Topics:**
  Fluoroscopy principles and safety, Intravascular Ultrasound (IVUS), Optical Coherence Tomography (OCT), Use of contrast agents: types, reactions, precautions, 3D reconstruction and road-mapping in interventions.
  Radiation Safety & Legal Considerations: ALARA principle and dose management, PPE and shielding protocols, Recording fluoroscopy time and cumulative dose, Legal

documentation and consent in interventional cardiology, Ethical issues and patient communication.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review:.

2. Presentation: "Role of Fractional Flow Reserve (FFR) in Decision-Making for PCI"

3. Case Study: ST-Elevation Myocardial Infarction (STEMI) managed with primary PCI

- **List of Experiments/Practical's:**

Cath Lab Zoning, Workflow & Sterility Maintenance
Radiation Protection: Fluoroscopy Time Management, Lead Usage
Emergency Protocols: Anaphylaxis, Cardiac Arrest, Tamponade
Patient Preparation for High-Risk Procedures
IV Line Setup, Sedation Monitoring, and Crash Cart Familiarization
Chronic Total Occlusion (CTO) Procedures
Rotational Atherectomy & Other Plaque Modification Devices
Percutaneous Device Closure of ASD, VSD, PDA (Observation)
Transcatheter Aortic Valve Implantation (TAVI) – Overview
Temporary & Permanent Pacemaker Insertion Assistance
Cath Lab Console Operation and Troubleshooting
Inventory Management: Catheters, Sheaths, Guidewires, Stents
Sterilization & Maintenance of Instruments
Documentation and Digital Storage of Angiographic Data
Logbook Maintenance and Procedure Reporting
Coronary Angiography with Hemodynamic Monitoring
Left & Right Heart Catheterization – Stepwise Assistance
Pressure Recording and Waveform Interpretation (RA, RV, PA, PCWP)
Fick Method and Thermodilution for Cardiac Output Measurement
Contrast Administration and Reaction Management
Percutaneous Coronary Intervention (PCI) – Stepwise Assistance
Intravascular Ultrasound (IVUS) & Optical Coherence Tomography (OCT)
Balloon Valvuloplasty (Mitral, Aortic, Pulmonary Valves)

Text Book

- Grossman & Baim's Cardiac Catheterization, Angiography, and Intervention

Reference Book

- Manual of Interventional Cardiology – Eric Topol
- Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine
- ACC/AHA Guidelines for Cardiac Catheterizations

Online learning resources:

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPAHHA604	**Course Title: Hospital Administration Type of Course: Minor**	**L-T- P-C**	2	1	2	4
Version No.	1.0					
Course Pre-requisites	None					
Anti-requisites	None					
Course Description	This course introduces students to the principles and practices of hospital administration and healthcare management. It covers organizational structure, hospital planning, human resource management, legal and ethical aspects, quality control, budgeting, and the role of technology in hospital operations. The course equips students with managerial and administrative skills necessary to ensure effective delivery of healthcare services in a hospital environment.					
Course Objective	To understand the organizational structure and functioning of hospitals. To gain knowledge of planning, staffing, and financial management in hospital settings. To develop skills in hospital operations, including quality assurance and patient safety. To understand legal, regulatory, and ethical issues in healthcare administration. To prepare students for administrative roles in hospitals and healthcare institutions.					
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1**: To **identify** administrative structures, hospital departments, and relevant healthcare regulations. **CO2:** To **explain** the principles of healthcare management, hospital organization, and interdepartmental coordination.					

	CO3: To **perform** basic administrative functions such as resource allocation, scheduling, and documentation. **CO4:** To **evaluate** workflow systems, identify inefficiencies, and propose process improvements.			
Course Content:				
Module 1	**Introduction to Hospital Management**	Assignment		**Sessions**
• **Topics:** Definition, departments, types of hospital, hierarchy, roles and responsibilities of hospital administrators. Importance: hospital administration in healthcare delivery**.**				
Module 2	**Healthcare Policies and Regulations**	Assignment		**Sessions**
• **Topics:** Introduction, compliance requirements (e.g., accreditation, licensing). Ethical considerations in healthcare management. Financial Management in Healthcare Principles: financial management in healthcare organizations, Budgeting, revenue cycle management, and financial reporting. Cost containment strategies in healthcare				
Module 3	**Human Resource Management-in Healthcare**	Assignment		**Sessions**
• **Topics:** HR Policy: Recruitment, training, and retention of healthcare personnel, Employee relations and performance management: Legal and ethical issues in human, resource management in healthcare.				
Module 4	**Quality Improvement and Patient Safety**	Assignment		**Sessions**
• **Topics:** • Concepts: methodologies of quality improvement in healthcare. Patient safety: Initiatives and adverse event reporting systems. Implementing quality improvement projects in hospitals. NABH: Introduction, definition, 5 Patient Topic, 5 hospital Staff Topics.				

Module 5	**Information Technology in Healthcare**	Assignment		**Sessions**

- **Topics:**
  Introduction: Role of information technology in healthcare administration. Electronic health records (EHRs): implementation and interoperability, Data security and privacy in healthcare IT systems.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course:

1. Article review:.

2. Presentation: Accreditation and Quality Assurance in Hospitals (e.g., NABH/JCI)"

3. Case Study: A hospital managing a mass casualty incident.

- **List of Experiments/Practical's:**

1. Orientation to Hospital Departments & Layout:Medical, Surgical, ICU, OPD, Casualty, Radiology, Pharmacy, CSSD
2. Organizational Structure & Role of Hospital Administration
3. Visit to Administrative Wing: Medical Records, HR, Finance, Purchase
4. Registration and Admission Protocols
5. IPD/OPD Documentation and Patient File Handling
6. Billing Systems and Insurance Claims Processing (TPA)
7. Discharge Process and Medical Summary Documentation
8. CSSD (Central Sterile Services Department): Workflow and Safety
9. Housekeeping & Waste Disposal (Bio-Medical Waste Handling)
10. Dietary Services & Nutritional Planning in Hospitals
11. Laundry and Transport Services Observation
12. HR Practices in Hospitals: Recruitment, Roster, Leave Management
13. Staff Appraisal, Grievance Redressal and Training Modules
14. Payroll Basics and Shift Allocation
15. Hospital Store and Inventory Handling
16. Procurement of Medical Supplies – Tendering and Purchase
17. Stock Maintenance and Reorder Level Tracking
18. NABH/NABL/JCI Accreditation Protocols Overview
19. Patient Safety Indicators and Audit Reports
20. Clinical Governance, Infection Control Policies, Fire Drills
21. Legal Aspects: Consent Forms, Medico-Legal Cases (MLC)
22. Effective Communication with Patients and Staff (Verbal/Written)
23. Medical Records Department: Electronic Health Records (EHR)
24. Handling Patient Complaints and Feedback System
25. Disaster Management Plan of the Hospital
26. Emergency Code System (Code Blue, Red, Pink, etc.)
27. Simulation/Mock Drill for Emergency Response

Text Book

Hospital Administration and Management" by D.C. Joshi and Mamta Joshi

References

Principles of Hospital Administration and Planning" by B.M. Sakharkar
Textbook of Hospital Administration" by C.M. Francis and Mario C. de Souza

Online learning resources:

WHO – Hospital Management Training Manual

https://www.who.int/management

NPTEL: Healthcare Management (IIT Kharagpur)

https://nptel.ac.in/courses/110105146

OpenWHO – Hospital Readiness & Emergency Preparedness

https://openwho.org/channels/hospital-readiness

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH

Course Code: BPAHRM605	**Course Title:Research Methodology & Biostatics Type of Course: Minor**	**L - T - P - C**	3	1	0	4
Version No.	1.0					
Course Pre-requisites	None					

Anti-requisites	None			
Course Description	This course provides foundational knowledge in research design, data collection, analysis, and interpretation of results using statistical methods. It equips students with the skills to plan and conduct scientific research, apply appropriate statistical tests, critically appraise literature, and effectively present research findings. It is essential for evidence-based practice, academic writing, and professional development in health sciences.			
Course Objective	To understand the fundamentals of research design, hypothesis formulation, and sampling techniques. To learn methods of data collection, management, and ethical research practices. To apply descriptive and inferential statistical techniques in biomedical research. To interpret data using software tools and present findings accurately. To develop skills in literature review, referencing, and scientific report writing.			
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO1**:To **define** key terms and basic concepts in research methodology and biostatistics. **CO2:**To **explain** different types of research designs, sampling techniques, and data collection methods. **CO3:** To **design** simple research proposals and apply appropriate statistical tools for data analysis. **CO4:** To **interpret** research findings and assess the validity, reliability, and significance of results.			
Course Content:				
Module 1	**Sampling Methods**	Assignment		**Sessions**
• **Topics:** Sampling methods, Probability rules & Probability distributions (Normal & Binomial) Collection of relevant data: sampling methods Construction of study: population, sample, normality and its beyond (not design of study, perhaps),				

Summarizing data on the pretext of underlined study,Understanding of statistical analysis (not methods)				
Module 2	**Counselling in Diverse Settings**	Assignment		**Sessions**
• **Topics:** Developing a research proposal-Models by engaging patients' information and data-base of the diagnostic approaches				
Module 3	**Use of Advanced Search Tools**	Assignment		**Sessions**
• **Topics:** Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism				
Module 4	**Study Designs**	Assignment		**Sessions**
• **Topics:** Interventional vs. observational studies,Cross-sectional, cohort, case-control, and longitudinal designs,Randomized Controlled Trials (RCTs),Quasi-experimental designs,Systematic reviews & meta-analysis: overview and process				
Textbook Introduction to Biostatistics and Research Methods (5th Edition) P.S.S. Sundar Rao, J. Richard PHI Learning Pvt. Ltd. **References** Biostatistics & Research Methodology (Semester 3) : Dr. Ashok A. Hajare Nirali Prakashan Biostatistics & Research Methodology (BP801T – Final Year BPharm, Semester 8) Prof. Chandrakant R. Kokare 4th Nirali Prakashan Research Methodology: Methods, Techniques, Practices Rabi Narayan Subudhi, Sumita Mishra, Malabika Sahoo Taxmann Publications Pvt. Ltd. **Online learning resources:** 1.OpenIntro Statistics https://www.openintro.org/book/os/				

2.An Intuitive and Interactive Introduction to Biostatistics (Univ. of Iowa) https://open.umn.edu/opentextbooks/textbooks/an-intuitive-interactive-introduction-to-biostatistics

3.MERLOT Biostatistics Module

https://www.merlot.org/merlot/viewMaterial.htm?id=773418205

4.cxv Fundamentals of Biostatistics (Bernard Rosner)

https://www.unilus.ac.zm/lms/e-books/books/Basic_Sciences/Behavioural%20sciences%20and%20public%20health/Fundamentals%20of%20Biostatistics%20%287th%20Edition%29.pdf

5.Foundations of Biostatistics – KSU Faculty https://faculty.ksu.edu.sa/sites/default/files/Textbook%20Foundations%20of%20Biostatistics.pdf

Topics relevant to "SKILL DEVELOPMENT":

- Workplace etiquette & grooming
- Verbal & written communication
- Team coordination and leadership
- Empathy and patient communication
- Time and stress management
- Legal literacy through POSH