Programme Handbook
B.Sc. Cardiovascular Technology (B.Sc. CVT)
School of Health Science
Sushant University

(Applicable to students admitted in academic year 2024- 2025)

School Of Health Sciences
Department of CVT
Sushant University, Gurugram

- **List of Events to be conducted in the session 2024-25.**

S. No.	Name of Event	Department	Tentative Date	Coordinator
1.	Independence Day Celebration.	CVT	14th august,2024	Ms. Kanika/ Mr. Lalit
2.	Workshop on Invasive & Non- Invasive Cardiology.	CVT	30th august,2024	Ms. Kanika/ Mr. Lalit
3.	World Heart Day Celebration.	CVT	27th September,2024	Ms. Kanika/ Mr. Lalit
4.	Diwali Celebration.	CVT	24th October,2024	Ms. Kanika/ Mr. Lalit
5.	Fresher's Party.	CVT	27th September,2024	Ms. Kanika/ Mr. Lalit
6.	BLS Workshop.	CVT	18th October,2024	Ms. Kanika/ Mr. Lalit
7.	Cardiovascular disease Awareness Week celebration.	CVT	10th- 15th February 2025	Ms. Kanika/ Mr. Lalit
8.	Guest Lecture.	CVT	3rd week of February, 2025.	Ms. Kanika/ Mr. Lalit
9.	Workshop on recent advances in Cardiovascular technology.	CVT	20th March,2025	Ms. Kanika/ Mr. Lalit
10.	Health Camp.	CVT	21st April,2025	Ms. Kanika/ Mr. Lalit

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PRELIMINARY DEFINITIONS AND NOMENCLATURE

In this document, unless the context otherwise requires:

1. "**Programme**" means Degree Programme that is B.Sc. Cardiovascular Technology (B.Sc. CVT) Degree Programme.
2. "**Discipline**"means B.Sc. CVT Degree Programme
3. "**Course**" means a theory or practical subject that is normally studied in a semester, like Cardio vascular disease, ECG, General Pharmacology, etc.
4. **"Director Academic Affairs"** means the authority of the University who is responsible for all academic activities of the Academic Programmes for implementation of relevant rules of this Regulations pertaining to the Academic Programmes.
5. **"Dean/Director"** means head of the School concerned.
6. **"PD"** means Programme Director of the respective programme of the School concerned.
7. **"Controller of Examinations (COE)"** means the authority of the University who is responsible for all activities of the University Examinations.
8. **"SU/ University"**meansSushant University (Erstwhile Ansal University)
9. **"MSE"**- Mid-Semester Evaluation, "**ESE"**- End Semester Examination**, "SGPA"**-Semester Grade Point Average, "**CGPA"**- Cumulative Grade Point Average, "**TDCC"-** Trans Disciplinary Certificate

Index

1. ADMISSION

1.1. Candidates seeking admission to the first semester of the eight semester B.Sc. CVT Degree Programme: Should have passed (with 50% marks) the Higher Secondary Examinations of (10+2) (Medical Science) prescribed by the State/Central Examination Boards or any examination of any other recognized body.

1.2. Lateral entry admission

Minimum two years diploma in CVT from recognized institute.

The candidates who possess the Diploma in CVT awarded by the State Board of Technical Education, or its equivalent are eligible to apply for Lateral entry admission to the third semester of BCVT.

1.3. Migration/Transfer of candidates from another University approved by UGC shall be granted as per the approval of the School level lateral admissions and Migration Committee (LAMC)

1.4. All Migration/ Transfers are subject to the approval of the Vice Chancellor of SU.

2. STRUCTURE OF PROGRAMME

2.1. Credits requirement

Minimum credit requirement is 196 credits for a student to be eligible to get Under Graduate Degree with Honours in CVT Department.

2.2. Categorization of Courses

Programme will have a curriculum with syllabi consisting of theory and practical courses that shall be categorized as follows-

S. No.	Category	Suggested breakup of Credits (Total 196)
1	Core Courses	97
2	Discipline Specific Electives (DSE)	06
3	Generic Elective I (GE I)	08
4	Generic Elective II (GE II)	02
5	Dissertation/Project/Internship	71
6	Skill Enhancement Courses (SEC)	05
7	Ability Enhancement courses (AEC)	05
8	Service Learning/Community Service Based Course	2
	TOTAL	**196**

2.3 Induction Programme

2.3.1. An induction programme with two weeks duration will be conducted before the commencement of I semester class as per the school curriculum or preference. The following physical activities shall be completed during the induction programme.

I. Physical fitness and Health

- Physical fitness Activities
- Sports/Games Related

II. Culture

- Learning an art form
- Heritage
- Intangible Cultural Heritage

III. Literature & Media

- Literature, Cinema and Media
- Group reading of classics

IV. Social Service

- Social Awareness
- Social Service

V. Self-Development

- Spiritual, Mindfulness & Meditation
- Religion and Inter-faith
- HumanValues
- Behavioural and Interpersonal skills
- Lectures

VI. Nature

- Nature Club
- Environment Protection (non-credit course)

VII. Innovation

2.3.2. Other Courses (Coursera, Medvarsity, Udemy)

- Introduction to Myocardial Infarction.
- Introduction to ECG.
- Basics of 2D Echocardiography.
- Medical Ethics and Legal Aspects.

2.4. Bridge Courses

Bridge Courses Lecture based Modules for Bridge Course – The bridge courses are offered before the commencement of Semester I. The main objective of the course is to bridge the gap between subjects studied at Pre-university level and subjects they would be studying in Graduation. Students from diverse educational background will be acquainted with fundamental concepts of the discipline of Cardiovascular Technology.

The Capstone Bridge Course is a dynamic, three-week program designed to provide an enriching transition for 12th-grade students by introducing them to innovative and interdisciplinary subjects. It serves as a foundation for exploring advanced concepts that bridge high school learning with higher education aspirations.

The curriculum emphasizes hands-on, integrative approaches across courses such as "From Cell to Systems," "Investigating the World of Pathogenic Organisms," and "Information Practices in Health Sciences." Through interactive lectures, students gain critical insights into human biology, microbiology, and data management in health sciences, fostering curiosity and preparedness for future academic and professional challenges.

1. From Cell to Systems: Decoding Human Structure and Function, this course explores the intricate architecture of the human body, beginning with cellular structures and progressing to organ systems. Students gain a comprehensive understanding of human anatomy and physiology, emphasizing the interconnections between cellular functions and systemic operations.

2. Investigating the World of Pathogenic Organisms- Focusing on microbiology and infectious diseases, this course delves into the characteristics, mechanisms, and impacts of pathogenic organisms. Students study bacteria, viruses, fungi, and parasites, along with their role in causing diseases. Emphasis is placed on diagnostic techniques, antimicrobial resistance, and infection control strategies, equipping learners to tackle real-world challenges in clinical and research

settings.

3. Information Practices in Health Sciences- This course introduces students to the critical role of information management in healthcare. It covers data collection, analysis, and interpretation methods used in health sciences. Topics include electronic health records, medical databases, and the ethical use of patient information. Students develop skills to manage and utilize health data effectively, supporting informed decision-making in clinical and administrative environments.

2.5. Number of courses per Semester

Each semester curriculum shall normally have a blend of lecture courses not exceeding 27 credits including Internship courses.

2.6. Credit Assignment

Each course is assigned certain number of credits based on the following:

Contact period per week	Credits
1 Lecture period	1
1 tutorial Periods	1
2 Laboratory Periods (also for EE Courses like Seminar/ project work/ case study/ etc.)	1

2.7 Hospital Training/ Internship

2.7.1. The students may undergo Hospital training for a period (6-8 Weeks) as specified in the Curriculum during summer/ winter vacation. In this case the training has to be undergone continuously for the entire period. During this period student has to maintain a log book and need to submit during ESE.

2.7.2. The students may undergo Internship at Research organization / University/Industry (after due approval from the Dean/Director). The students shall be permitted to carry out their internship between 7th and 8th Semester.The report of which under the industry as well as faculty mentor to be submitted and presented in 8th Semester.

2.8. Industrial Visit

Every student is required to go for at least one Industrial Visit every semester starting from the third semester of the Programme.

The Deans/Director shall ensure that necessary arrangements are made in this regard.

2.9. Massive Open Online Courses

Students may be permitted to credit one online course under Massive Open Online Course (which are provided with certificate) subject to a maximum of two credits. The approved list of online courses will be provided by the concerned department from portals like Swayam, NPTEL, Coursera, edX, Udemy before the commencement of every semester. The credit attained through MOOC course has to be transferred to the marksheet of their respective semester and will be a compulsory course to meet the programme requirements. In a scenario, where the complete assessment is not done by the MOOC platform the School may conduct its own exam for evaluation of the respective course. The details regarding online courses taken up by students should be sent to the Controller of Examinations one month before the commencement of End Semester Examination.

2.10. Medium of Instruction

The medium of instruction is English for all courses, examinations, seminar presentations and project / thesis / dissertation reports.

3. ATTENDANCE REQUIREMENTS FOR COMPLETION OF THE SEMESTER

3.1. A student who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester.

Every student is expected to attend all classes of all the courses and secure 100%attendance. However, in order to give provision for certain unavoidable reasons such as Medical/ participation in sports, the student is expected to attend at least75% of the classes.

Therefore, **he/ she shall secure not less than 75%** (after rounding off to the nearest integer) of overall attendance.

3.2. However, a student who secures attendance between 65% and 74% in the current semester due to medical reasons (prolonged hospitalization / accident / specific illness) /participation in sports events may be permitted to appear for the current semester examinations subject to the condition that the student shall submit the medical certificate/ sports participation certificate attested by the Dean/Director. The same, after approval of the VC shall be forwarded to the Controller of Examinations for record purposes.

3.3. Except special circumstances as mentioned in clause 3.2, students who secure less than 75% attendance in all the courses of the semester and students who do not satisfy the other requirements as specified by their respective

programme shall not be permitted to write the University examination at the end of the semester. They are required to repeat the incomplete semester in the summer exams, as per the norms prescribed and duly notified by the Controller of Examinations.

4. FACULTYMENTOR

To help the students in planning their courses of study and for general advice on the academic programme, the Dean/Director of the Department will attach a certain number of students to a teacher of the Department who shall function as Faculty mentor for those students throughout their period of study. The Faculty Mentor shall advise the students in registering and reappearance registering of courses, authorizes the process, monitor their attendance and progress and counsel them periodically. If necessary, the Faculty Mentor may also discuss with or in form the parents about the progress/ performance of the students concerned.

List of Mentor's-

S.NO	SEMESTER	FACULTY MENTOR
1.	1st Semester	Mr. Lalit Yadav
2.	3rd Semester	Mr. Lalit Yadav
3.	5th Semester	Mr. Lalit Yadav
4.	7th Semester	Mrs. Kanika Bhardwaj

The responsibilities for the faculty mentor shall be:

- To act as the channel of communication between the Dean/Director and the students of the respective group.
- To collect and maintain various statistical details of students.
- To inform the students about the various facilities and activities available to enhance the student's curricular and co-curricular activities.
- To guide student enrolment and registration of the courses.
- To authorize the final registration of the courses at the beginning of each semester.
- To monitor the academic and general performance of the students including attendance and to counsel them accordingly.

5. PROGRAMME COMMITTEE

5.1. Every Programme shall have a Programme Committee consisting of teachers of the programme concerned, student representatives and chaired by the Dean/Director. It is like a 'Quality Circle' (more commonly used in industries) with the overall goal of improving the teaching-learning process.

Grievance Committee	Member	Designation
President	Dr. Elina Dewanji Sen	Head of Department, School of Health Sciences.
Secretary	Mr. Lalit Yadav	Tutor, CVT
	Mr. Adnan Bhat	Assistant Professor, CVT
Members	Ms. Avanie	BCVT 5th Semester
	Ms. Shrutika	BCVT 5TH Semester
	Ms. Janhvi	BCVT 3RD Semester
Examination Committee	Ms. Neha Singh, Mr. Ayush Wilson, Mr. Ashish	Assistant Professor, MRIT &Optometry, Lab Instructor CVT
Attendance Committee	Mr. Adnan Bhat and Ms. Neelu	Assistant Professor, CVT
Discipline Committee	Mr. Lalit, Ms. Neelu	Tutor, Assistant Professor, CVT
Extra-Curricular Activities Committee	Mr. Adnan Bhat and Ms. Neelu, Mr. Ashish	Assistant Professor, CVT, Lab Instructor CVT

The functions of the Programme committee include-

- Solving problems experienced by students in the class room and in the laboratories.
- Informing the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for

each assessment.

- Informing the student representatives, the details of regulations regarding weightage used for each assessment. In the case of practical courses (laboratory/ project work / seminar etc.) the breakup of marks for each exercise / module of work, should be clearly discussed in the Programme committee meeting and informed to the students.
- Analysing the performance of the students of the respective Programme after each test and finding the ways and means of solving problems, if any.
- Identifying the weak students, if any, and requesting the teachers concerned to provide some additional help or guidance or coaching to such weak students.

5.2. The Programme committee shall be constituted within the first week of each semester by the Dean/Director.

5.3. At least 4 student representatives (usually 2 boys and 2 girls) shall be included in the Programme committee depending upon the strength of the programme.

5.4. The Chairperson of the programme committee may invite the Faculty mentor(s) if required to the programme committee meeting.

5.5. The Programme Director is required to prepare the minutes of every meeting, submit the same to the Dean/Director within two days of the meeting and arrange to circulate it among the students and faculty members concerned.

5.6. The first meeting of the Programme committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments within the framework of the regulations. Two or three subsequent meetings shall be held in a semester at suitable intervals. The Programme Committee shall put on the Notice Board the cumulative attendance particulars of each student at the end of every such meeting to enable the students to know their attendance details. During these meetings the student members representing the respective class, shall meaningfully interact and express the opinions and suggestions of the other students of the class in order to improve the effectiveness of the teaching-learning process.

6. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or group, shall

have a “Course Committee” comprising all the teachers teaching the common course with one of them nominated as Course Coordinator. The nomination of the Course Coordinator shall be made by the Dean/ Director depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The ‘Course committee’ shall meet in order to arrive at a common scheme of evaluation for the test and shall ensure a uniform evaluation of the tests. Wherever feasible, the course committee may also prepare a common question paper for the internal assessment test(s).

6.1 Curriculum Development Committee

A **Curriculum Development Committee (CDC)** plays a pivotal role in designing, reviewing, and enhancing educational programs to ensure they meet the evolving needs of students and align with institutional goals and societal demands. Comprising subject matter experts, faculty members, industry professionals, and sometimes student representatives, the committee evaluates existing curricula, incorporates emerging trends, and ensures compliance with educational standards and regulatory guidelines. The CDC focuses on identifying learning objectives, developing course content, and integrating innovative teaching methodologies to foster holistic development. By regularly assessing the relevance and effectiveness of the curriculum, the committee ensures that students are equipped with the knowledge and skills needed for academic, professional, and personal success.

6.2 CDC COMMITTEE MEMBERS

Member	Designation	Affiliation
Dr. Sanjeev Sharma	Chairperson	Dean, School of Health Sciences.
Prof. Jyoti Sinha	Vice-Chairperson	Associate Dean & Principal of Pharmacy School of Health Sciences.
Dr. Elina Dewanji Sen	Secretary	Head of Department, School of Health Sciences.
Ms. Laxmi Singh	Joint- Secretary	Assistant Professor, MRIT, Sushant University.
Mr. Anil Yadav	Director, Academic & Quality Assurance	COE, Sushant University.

Dr. Dhananjay Kumar Jhamb	Industry Expert Member	HOD & Director, Sanar International Hospitals.
Mr. Najmus Saquib	External Academic Expert Member	**Assistant Professor, CVT, Sharda University.**

7. EXAMINATION SYSTEM

7.1. The academic performance of students is adjudged by the aggregate of continuous mid Semester Evaluation (MSE) and the End Semester Examination (ESE).

7.2. Each course, both theory and practical (including project work & viva-voce Examinations) shall be evaluated for a maximum of 100 marks.The weightage of End Semester Examination (ESE) to Mid Semester Evaluation (MSE) TDL/TDC and Soft-Skills courses is 60% to 40%.

7.3. Industrial training and seminar shall be part of the course concerned.

7.4. The University examination (theory and practical) of 2 hours duration shall ordinarily be conducted twice in December and May for Odd and Even semester respectively.

End Semester Examination question paper pattern is given below:

A question paper for theory examinations of a course unit of any programme will be of 2 hours' duration with maximum marks 60/50 (weightage 60%) and will have three parts; Part A, Part-B and Part-C. (The duration of practical examinations will be as required and the value addition courses will have different format).

Part-A: 28 Marks (students are advised to devote approximately 50 minutes to 60 minutes out of total 2 hours on this part)

In this section, a student is required to answer 4 out of 5 given questions. Each question will be of 7 marks. These questions may include short numerical problems or theory questions to assess students' understanding of concepts and frameworks.

If needed in this part, a question might be designed to have maximum two sub-parts (a) and (b) with weightage of 3 and 4 or 4 and 3 marks respectively to enable testing on more concepts and frameworks.

Part-B: 20 Marks (students are advised to devote approximately 30 minutes to 40 minutes out of total 2 hours on this part)

In this part, a student is required to answer any 2 out of 3 given questions. Each question will have a weightage of 10 marks and may include long theory questions or numerical problems requiring students to apply the concepts to a given situation or in a given context and analyse a situation.

If a faculty feels that a question in this section needs to have sub-parts, there may be maximum two sub- parts provided that sub-part (a) involves understanding of a concept through a numerical or a theory question and sub-part (b) is application/ analysis of the concept used in sub-part (a).

Part-C: 12 Marks (students are advised to devote approximately 20 to 30 minutes out of total 2 hours on this part)

This part will be compulsory without any choice and will have a weightage of 12 marks. This may be a case study, a hypothetical problem or a situation seeking a possible solution(s), students' response to a situation based on general awareness of the broad discipline of study etc. The objective is not only to judge the skills of students to apply the concept to a particular situation or context but also to assess his/her analytical ability and how a student make realistic assumptions and can ascribe meaning to data (given in the question paper or to be assumed). The students will also be tested on integrative and evaluative skills by making them apply more than one concept together in a given situation or the context.

7.5. The University examination for project work/dissertation shall consist of evaluation of the final report submitted by the student or students of the project group (of not exceeding X students) by an external examiner and an internal examiner, followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner, the supervisor of the project group and an internal examiner.

7.6. For the University examination in both theory and practical courses including project work/Dissertation the internal and external examiners shall be appointed by the Dean/Director in consultation with the Controller of Examinations.

8. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

8.1. Internal Assessment

For all theory and practical courses, the distribution of marks for various **components for the Internal Assessment** is shown below in the table:

8.1.1. For a course of 100 marks containing both theory and Lab Component:

MID SEMESTER EVALUATION (40) – Theory (40 Marks)

Theory (40)				
Class tests & Teacher student Interaction	Assignment	Mid term Practical (Presentation, Quiz, Role play, Panel Discussion)	Midterm theory	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)	
Theory (35)	Lab(25)

8.1.2. For a course of 100 marks containing only theory Component:

MID SEMESTER EVALUATION (40) – Theory (40 Marks)

Theory (40)				
Class tests & Teacher student Interaction	Assignment	Mid term Practical (Presentation, Quiz, Role play, Panel Discussion)	Midterm theory	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

8.1.3. For a course of 100 marks containing only practical Component:

END SEMESTER EXAMINATION (100) Practical (100)						
Internal	Viva	Continuous Assessment	Lab Work	Presentation	Log Book/Practical File	**Total**
20	20	10	10	30	10	**100**

8.2. TDCC

For Inter disciplinary/ trans disciplinary certificate courses the External Assessment Marks will be 40 and Internal Assessment will be 60.

8.3. Internship/Project Work

8.3.1. The courses included under this category are- hospital training/ Internship in Invasive and Non- Invasive Cardiology and Research Project etc.

8.3.2. Here the continuous assessment is based on project prepared, logbook submitted will be 30 marks and the External Assessment based on Viva-voce/presentation will be 50 marks.

8.3.3. If a student fails to submit the project report on or before the specified deadline, he/ she is deemed to have failed in the Project Work and shall re-register for the same in a subsequent semester.

8.4. Seminar Papers

The students are encouraged to research and present Seminar paper.

8.5. Attendance and Assessment Record

Every teacher is required to upload on ERP the attendance and assessment record which consists of attendance marked in each lecture or practical or project work class, the test marks and the record of class work (topic covered), separately for each course. The teacher is also expected to safely keep excel of the attendance and the assessments. The University or any inspection team appointed by the University may verify the records of attendance and assessment of both current and previous semesters.

9. EXAM REGULATIONS

9.1.Requirements for appearing for End Semester Examinations- A student shall normally be permitted to appear for the End Semester Examinations for all the courses registered in the current semester (vide clause 9.10) if he/she has satisfied the semester completion requirements.

9.2. The students will be graded under absolute 10-point **Grading Scheme** as given below:

Grade	Range	Grade Point Attached
O	>=95	10
A+	>=85	9
A	>=75	8
B+	>=70	7
B	>=60	6
C	>=50	5
D	>=40	4
F	<40	0
AB	——	0

9.3. Passing Criterion

A student has to fulfil the following conditions to pass academic programme of the University:

- A student should earn minimum "D" grade in all courses separately. However, he/she can improve his/her grade ("D" grade onwards) by re-appearing.
- To pass a course, student must obtain 40% marks in the aggregate of Mid Semester Evaluation (MSE) & End Semester Examination (ESE). In order to pass a particular course, student must appear in the Final examination irrespective of the marks obtained in the Mid Semester Evaluation.
- For successful completion of a programme, the student should secure a minimum Cumulative Grade Point Average (CGPA) of 4.0 at the end of final year of the Programme.

9.4. Promotion to Next Year

The promotion rules are applicable only for under-graduate programs across the university.

The promotion rules for programme will be as under:

1. The students will not be debarred from going to the 2nd year, irrespective of their result of the 1st year.
2. They will be promoted to 3rd year only if at least 60% of the courses prescribed in the 1st year (excluding TDL/TDCC & Soft Skills) are clear.

3. Similarly, the condition for promotion to 4th year and 5th year will be clearing of minimum of 60% courses in 2nd year and 3rd year respectively.
4. Finally, the students will become eligible to earn the degree only if they fulfil the passing criterion.

9.5. Exam Duration

All End Semester Examinations (ESE) would be of two hours duration unless specified otherwise.

9.6. Re-Appearing

There is a provision for re-appearing in the examination (without attending the course-work again) for a course. Re-appearing in examination will be in following cases:

1. A student who fails to meet passing criteria in a course shall be eligible to re-appear in the examination of such course as and when scheduled, with a view to improve the performance.
2. A student who fails to appear in the examination shall be eligible to subsequently re-appear in the examination when scheduled for next batch of students.
3. The latest result obtained by the student in re-appear courses is considered as final and same will be considered for calculating his/her SGPA and CGPA.
4. There is no provision of re-appear in the Mid Semester Evaluation (MSE). **Students who have not passed a course need to take the re-appear of the End Semester Examination (ESE). The previous internal marks shall be carried forward.**
5. A student who has to re-appear in ESE in terms of provisions made above shall be examined as per the syllabus in the scheme of teaching applicable at the time of his/her joining the concerned programme. However, in cases where only some minor modifications have been made in the syllabus of the course(s) and the Dean/Director of the concerned Department certifies the same, the examination may be held in accordance with the revised syllabus.

9.7. Improvement of Score

- If a student has poor performance in number of courses in a particular term, he may at his option, take only one academic break for one year, and re-register for both the semesters of that academic year in the next academic year on payment of prescribed fee. Such a student may have the option of repeating any or all the courses in the semester(s) and retain the credits already earned by him in other course(s).
- A student shall be allowed to improve his SGPA and CGPA by re-appearing in the Examination(s) in the Courses of his choice when these examinations are held in normal schedule in which case his Mid Semester Evaluation (MSE) shall be carried forward. However, permission will not be granted to improve internal assessment. The best of the marks obtained in that subject(s) shall be taken into consideration for calculating the SGPA and CGPA and eligibility for award of a degree.
- A student, who has failed to meet the passing criteria (required CGPA), have the option to re-appear in the Final Examination (End Semester Examination) of those courses in which he/she desires to improve his/her performance in order to secure the minimum CGPA, when these examinations are scheduled for next batch of students. Improvement in the score of courses completed by a student prior to his lateral entry in the University shall not be allowed.

9.8. Methods for Redressal of Grievances in Evaluation

Rechecking/Re-Evaluation of Answer Books of ESE:

1. Students are entitled to ask for re-checking or re-evaluation of any of his/her paper(s) on the payment of prescribed fee within the stipulated time as notified by the Controller of Examinations.
2. If the re-evaluated/ re-checked marks are less than the earlier obtained marks, the same less marks will be treated as final.

9.9. Disciplinary Control of Students in Examinations

1. The student shall maintain proper discipline and orderly conduct during the examinations. They shall not make use of any unfair or dishonest means or indulge in disorderly conduct in the examinations.
2. No student will be allowed to appear in the Examination unless he/she is carrying his/her **ID Card and Admit Card during End**

Semester Examination. All the students reappearing in End Term Examination will be allowed with the valid admit card.

3. If a student is found in possession of written/printed matter related to the subject of examination on anything (such as mobile phone, piece of paper or cloth, scribbling pad etc.), other than the answer book, any other response sheet specifically provided by the University to the students, it will be treated as act of unfair means and such cases will be forwarded to Unfair Means Committee.

9.10. Duration of the Programme

The minimum period required for completion of a programme shall be as specified in the Scheme of Teaching and Examination and Syllabi for concerned programme approved by the Academic Council on the recommendations of the Board of Studies.

The maximum number of years within which a student must pass the credit requirements for award of a degree is as follows:

- For B.Sc. CVT 3 years and above total duration of the programme will be n+2 years.

The maximum permissible period includes academic break, if availed by the student.

9.11. Grade sheet

After results are declared, Grade Sheets will be issued to each student which will contain the following details:

- The list of courses registered during the semester and the grade scored.
- The Grade Point Average (GPA) for the semester.
  The Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards would be shown on the final semester grade sheet.

The Semester performance of a student is indicated as “Semester Grade Point Average (SGPA)”. The SGPA is weighted average of Grade Points of all letter grades awarded to a student for all the Courses in the semester. The formula for Computing SGPA is given below:

Grade points secured in the Semester

SGPA= ______________________________

Associated Credits in the Semester

The overall performance of a student in all the previous Semester(s) including the current Semester is indicated as “Cumulative Grade Point Average (CGPA)". The Cumulative Grade Point Average (CGPA) is the weighted average of grade points of all letter grades awarded to a student for all the courses in the previous Semester(s) including the current Semester. The formula for computing CGPA is given below:

Cumulative Grade points secured in all the previous Semester(s) including the Current Semester

CGPA= ______________________________

Associated Credits in the previous Semester(s) including the current Semester

CGPA to Percentage Conversion Formula is given below:

Percentage (%) = CGPA (X) 10

9.12. Eligibility for the Award of the Degree

A student shall be declared to be eligible for the award of the B.Sc CVT Degree provided to the student has

1. Successfully gained the required number of total credits as specified in the curriculum corresponding to the student’s programme within the stipulated time.
2. Successfully passed all the Courses as per curriculum.
3. Successfully completed the Programme requirements, appeared for the End-Semester examinations and passed all the subjects prescribed.
4. The award of Degree must be approved by the Academic Council of SU.

9.13. Declaration of Result

The university shall strive to declare the results of every examination conducted by it within a period of thirty days from the last date of the examination for that particular programme/course and shall in any case declare the results latest within a period of forty-five days from such date

9.14. Convocation

Convocation of the university shall be held every academic year for conferring degrees, diplomas, certificates and shall be conducted as specified in the Act/Statues. The dates for the convocation (normally within six months) shall be notified well in advance to all the students.

10. PROVISION FOR AUTHORISED BREAK OF STUDY

10.1. Students who apply for Academic Break and the case is recommended by the Deans/Directors for justifiable reasons to be recorded, can be granted academic break of one year to the students, if approved by the Vice Chancellor, under the following circumstances:

a. The student has been continuously ill.
b. Career advancement
c. Justified personal reasons.

10.2. The student who is granted academic break shall not be required to pay the academic fee for that year. However, on rejoining, he/she will pay the fee applicable to the batch he/she joins.

11. DISCIPLINE

Every student is required to observe discipline and decorous behaviour both inside and outside the University and not to indulge in any activity which will tend to bring down the prestige of SU. The disciplinary committee of the University enquires into acts of gross indiscipline and notify the University about the disciplinary action taken against the student.

12. REVISION OF REGULATIONS, CURRICULUM AND SYLLABI

SU may from time-to-time revise, amend or change the Regulations, Curriculum, Syllabus and scheme of examinations as proposed by the BOS and approved by the Academic Council.

13. EXTRA/ CO-CURRICULAR ACTIVITIES OF THE SCHOOL

The Schools may have activities like Physical Activities (Sports), Cultural, literature and Media, Social Service Scheme (NSS), Self-Development such as Yoga and Human Values, Nature Club, Yoga, etc. focusing on the holistic development of its students. A brief profile of School's respective Committees to be added.

*Not applicable for this course

14. PROGRAMME STRUCTURE

Name of the Program – B.Sc. CVT
Duration of the Program – 04 Years
Total Semesters – 08 Semesters
Total Credits of the Program – 196 Credits

Color Code	Nature of Courses	Actual Percentage	Proposed Percentage
	Core Courses	49.5%	60-70%
	Discipline Specific Electives (DSE)	3%	10-15 %
	Generic Elective I (GE I)	4 Courses (TDCC)	4 Courses in UG as Required
	Generic Elective II (GE II)	2 Courses	2 Courses in UG as required
	Dissertation/Project/Internship	71 Credits	30 Credits
	Skill Enhancement Course (SEC)	2 Courses	2 Courses
	Ability Enhancement Course (AEC)	3 Courses	2 courses
	Service Learning/Community Service Based Course	1 Courses	1 Course

FIRST SEMESTER

Course Code	Course Title	Lectures(L)/ Tutorial(T)	Practical(P)	Total Credits
BCVT101	General Anatomy	2	2	3
BCVT102	General Physiology	2	2	3
BCVT103	Biochemistry	2	2	3
BCVT104	Basic in Computer & Information Science	2	2	3
BCVT105	Introduction to Quality and patient Safety	3	-	3
BCVT106	Introduction to national health care delivery System in India (Workshop)	1	-	1
BCVT107	Hematology	2	-	2
EVS2111	Environmental science	2	-	2
SS151	Soft Skills-I	1	-	1
	TOTAL			**21**

SECOND SEMESTER

Course Code	Course Title	Lectures (L)/ Tutorial (T)	Practical (P)	Total Credits
BCVT201	Basic Pharmacology	4	2	5
BCVT202	Pathophysiology of Cardiovascular Disease	4	2	5
BCVT203	Microbiology	2	-	2
BCVT204	Medical Ethics and legal aspects	2	-	2
BCVT205	Workshop	1	-	1
BCVT206	Anatomy and Physiology of Cardiovascular System	3	-	3
CS251	English & Communication Skill	2	-	2
	TDCC	1	2	2
	Total			**22**

THIRD SEMESTER

Course Code	Course Title	Lectures (L)/ Tutorial (T)	Practical (P)	Total Credits
BCVT301	General Medicine related to cardiovascular system	4	-	4
BCVT302	Cardiac Diseases- I	4	8	8
BCVT303	Basics of cardiac technology	4	4	6
BCVT304	Workshop	1	-	1
BCVT335	Summer training with evaluation-I	-	-	6
	TDCC	1	2	2
	Total			**27**

FOURTH SEMESTER

Course Code	Course Title	Lectures (L)/ Tutorial(T)	Practical(P)	Total Credits
BCVT401	Cardiac Diseases- II	6	4	8
BCVT402	Electrocardiography- I	6	4	8
BCVT403	Echocardiography- I	6	4	8
BCVT404	Workshop	1	-	1
	TDCC	1	2	2
	TOTAL			**27**

FIFTH SEMESTER

Course Code	Course Title	Lectures (L)/ Tutorial (T)	Practical(P)	Total Credits
BCVT501	Echocardiography- II	2	4	4
BCVT502	Electrocardiography- II	2	4	4
BCVT503	Cardiac catheterization-I	2	4	4
BCVT504	Research methodology and Biostatistics-I	2	-	2
BCVT505	Workshop	1	-	1
BCVT535	Summer training and evaluation-II	-	-	9
BCVT 506	Certificate Course	1		1
	TDCC	1	2	2
	Total			**27**

SIXTH SEMESTER

Course Code	Course Title	Lectures (L)/ Tutorial (T)	Practical (P)	Total Credits
BCVT601	Cardiac catheterization-II	4	8	8
BCVT602	Research methodology and Biostatistics –II	2	-	2
BCVT603	Workshop	1	-	1
BCVT604	Research (project)	-	-	6
BCVT605	Hospital Management	3	-	3
BCVT 606	Certificate Course	1		1
BCVT 607	Community Service		4	2
	TDCC	1	2	2
	TOTAL			**25**

SEVENTH SEMESTER (INTERNSHIP)

Course Code	Course Title	Lectures (L)/Tutorial (T)	Practical (P)	Total Credits
BCVT701	Research (project evaluation)	-	-	10
BCVT835	Internship	-	-	15
	TOTAL			**25**

EIGTH SEMESTER (INTERNSHIP)

Course Code	Course Title	Lectures (L)/Tutorial (T)	Practical (P)	Total Credits
BCVT801	Research (project evaluation)	-	-	10
BCVT835	Internship	-	-	15
	TOTAL			**25**

15. Appendix A. COURSE DESCRIPTION (Separate document)

APPENDIX A
COURSE DESCRIPTION
Programme Handbook

B. Sc. Cardiovascular Technology [BCVT]
School of Health Sciences
Sushant University

To prepare and train the students for working as a Cardiovascular Technologist in Healthcare Institutions where they will manage the machines and care for patients who are suffering from cardiovascular problems.

15.1 ABOUT THE COURSE

As the population ages, and due to life style changes, disorders increasing and more people are developing the complications of the heart and other systems. These heart disorders and other problems becoming the leading cause of death.

Thankfully, due to advances in medical technology, coupled with greater awareness of the signs and symptoms of cardiovascular disease, heart conditions can now be detected much earlier than ever before. Current management of various cardiac disorders includes the application of complex diagnostic and therapeutic procedures, which involve the use of various equipment, computer hardware, tools, machines, and pharmacological agents.

Optimal delivery of cardiovascular health care is based on the safe use of the equipment and devices, due to this increase in usage of cardiovascular technologies, there is a greater demand for technologists and technicians trained in a cardiovascular technology programs to perform these procedures.

This program educates and prepares the students to become either an Invasive or a Non-Invasive Cardiovascular Specialist known as a Cardiovascular Technologist (CVT).

The Invasive Cardiovascular Specialist is a health care professional who is an integral member of the cardiac catheterization and electrophysiology laboratory teams. The CVT's primary role is to perform, at the direction of a qualified physician, technical procedures for the diagnosis and treatment of cardiovascular injury and disease.

The Non-Invasive Cardiovascular Specialist is a health care professional who practices at the Cardio OPD and performs diagnostic tests such as Electrocardiography, Echocardiography and Treadmill Test among others, and on patients who are admitted for various cardiovascular diseases related symptoms or problems.

15.2 Program Educational Objectives (PEO)

The **B.Sc. Cardiovascular Technology (CVT) program** aims to equip students with the knowledge, skills, and competencies required to excel in the field of cardiovascular technology. Graduates become trained and qualified cardiovascular technicians capable of working independently or in collaboration with advanced healthcare setups. The program ensures that candidates master techniques such as Electrocardiography, Echocardiography, Treadmill/Stress testing, Doppler ultrasonography, and Contrast Echo. By integrating knowledge and practical skills, graduates are prepared to provide healthcare solutions that benefit society. They are well-trained to assist cardiac and cardiothoracic surgeons, as well as cardiologists, in tertiary care hospitals and other medical institutions. Furthermore, graduates actively promote cardiac health within the community, offering support and information while continuously enhancing their expertise. With strong leadership qualities and entrepreneurial skills, they effectively work and communicate in interdisciplinary environments, whether independently or as part of a team.

PEO1 :B.Sc CVT program enables students to become a trained, qualified cardiovascular technician capable of working independently or in association with a higher setup.
PEO2 : After the completion of program, candidates become well known in techniques such as Electrocardiography, Echocardiography, Treadmill test/Stress test, Doppler ultrasonography and contrast Echo.

PEO3 : Graduate will integrate knowledge and skills of cardiovascular technology to provide healthcare solutions for the benefit of the society.
PEO4 : After the completion of program, graduate become well-prepared for work associated with assisting cardiac surgeons, cardio -thoracic surgeons and cardiologists in tertiary care hospitals and others.

PEO5 : Graduate will be supportive, informative and providing in necessary information regarding good cardiac health for society and community and continuously improving his/ her knowledge and abilities.

PEO6 : Graduates will have a good leadership qualities and entrepreneur skills by working and communicating effectively in interdisciplinary environment, either independently or with a team.

15.3 Program Specific Outcomes (PSO's)

The **B.Sc. Cardiovascular Technology (CVT) program** is designed to provide students with a comprehensive understanding of cardiac diseases, equipping them with the skills required for accurate diagnosis and effective management. Graduates are trained to perform diagnostic maneuvers and tests under the guidance of a qualified physician, contributing to the diagnosis and treatment of cardiovascular injuries and diseases. Upon completion of the program, students are prepared to apply specialized theoretical knowledge and practical skills to work independently as qualified cardiovascular technologists. They become integral members of cardiac catheterization and electrophysiology lab teams, playing a vital role in advanced cardiac care.

PSO1:B.Sc. CVT program enables students to understand disease, acquire skills regarding diagnosis and its management of various cardiac diseases.
PSO2 : The CVT's primary role is to perform maneuvers, diagnostic test according to direction of a qualified physician and helping him/ her in the diagnosis and treatment of cardiovascular injury and disease.
PSO3: After completion of the program students will be able to apply specialized occupational theory, skills and concepts to work independently as qualified cardiovascular technologist and becomes an integral member of the cardiac cath. lab and electrophysiology lab teams.

15.4 Program outcomes (Graduate Attributes) - (PO's)

The **B.Sc. Cardiovascular Technology (CVT) program** prepares graduates with a thorough understanding of the human cardiovascular system and its related functions, enabling them to define, describe, and classify various cardiovascular disorders. Students are equipped to apply this knowledge in diagnosing and managing cardiovascular and related disorders while addressing societal and legal issues in patient care. The program emphasizes the utilization of modern tools and techniques to enhance patient compliance and the efficient management of cardiovascular diseases. It fosters a commitment to lifelong learning and continuous training to tackle future challenges in cardiac health. Graduates are encouraged to

evolve ethical practices and moral values, ensuring integrity in their personal and professional endeavors. Regular learning and adaptation of advanced tools and methodologies ensure that students remain proficient in managing cardiovascular conditions effectively.

PO1: Define and describe human cardiovascular and its related system in relation to various diseases.**(human cardiovascular system)**
PO2: Distinguish and classify various cardiovascular disorder **(cardiovascular disorder)**
PO3: Apply knowledge of human cardiovascular and its related system in the diagnosis, cardiovascular disorder, related disorder its management& apply the knowledge and skills to assess and solve societal and legal issues related to cardiovascular care of the patients**(society and legal issues)**

PO4: Utilize modern tools and techniques in the field of cardiovascular technology for patient compliance. **(modern tools and techniques)**

PO5: Tackle future challenges through lifelong learning and training process related to cardiac health.**(lifelong learning and training)**

PO6: Evolve ethical practices and moral values in personal and professional endeavors.**(moral values)**

PO7: Regular learning the use of modern tools and techniques for the efficient management of cardiovascular diseases and related disorder **(management of cardiovascular diseases)**

Mapping Sheet

UNIVERSITY MISSION WITH PEOs

M1	Transform lives and communities through education and research
M2	Achieve excellence through participatory governance and focus on quality research and innovation
M3	Attract talent through international partnerships and collaborations to achieve highest standards
M4	Facilitate learning through student centric and empathetic approach
M5	Develop thought leadership with industry integration

PEO1	B.ScCVT program enables students to become a trained, qualified cardiovascular technician capable of working independently or in association with a higher setup.
PEO2	After the completion of program, candidates become well known in techniques such as Electrocardiography, Echocardiography, Treadmill test/Stress test, Doppler ultrasonography and contrast Echo.
PEO3	Graduate will integrate knowledge and skills of cardiovascular technology to provide healthcare solutions for the benefit of the society.
PEO4	After the completion of program, graduate become well-prepared for work associated with assisting cardiac surgeons, cardio -thoracic surgeons and cardiologists in tertiary care hospitals and others.

PE05	Graduate will be supportive, informative and providing in necessary information regarding good cardiac health for society and community and continuously improving his/ her knowledge and abilities.
PEO6	Graduates will have a good leadership qualities and entrepreneur skills by working and communicating effectively in interdisciplinary environment, either independently or with a team.

L= Low M= MEDIUM H= HIGH

PEOs WITH PSOs

PEO1	B.ScCVT program enables students to become a trained, qualified cardiovascular technician capable of working independently or in association with a higher setup.
PEO2	After the completion of program, candidates become well known in techniques such as Electrocardiography, Echocardiography, Treadmill test/Stress test, Doppler ultrasonography and contrast Echo.
PEO3	Graduate will integrate knowledge and skills of cardiovascular technology to provide healthcare solutions for the benefit of the society.
PEO	After the completion of program, graduate become well-prepared for work associated with assisting cardiac surgeons, cardio -thoracic surgeons and cardiologists in tertiary care hospitals and others.
PEO5	Graduate will be supportive, informative and providing in necessary information regarding good cardiac health for society and community and continuously improving his/ her knowledge and abilities.
PEO6	Graduates will have a good leadership qualities and entrepreneur skills by working and communicating effectively in interdisciplinary environment, either independently or with a team.

PSO1	B.Sc. CVT program enables students to understand disease, acquire skills regarding diagnosis and its management of various cardiac diseases.
PSO2	The CVT's primary role is to perform maneuvers, diagnostic test according to direction of a qualified physician and helping him/ her in the diagnosis and treatment of cardiovascular injury and disease.

PSO 3	After completion of the program students will be able to apply specialized occupational theory, skills and concepts to work independently as qualified cardiovascular technologist and becomes an integral member of the cardiac cath. lab and electrophysiology lab teams.

PSO / PEO	PSO1	PSO2	PSO3
PEO1	L	M	H
PEO2	M	H	M
PEO3	H	H	H
PEO4	M	H	H
PEO5	M	H	H
PEO6	H	H	L

L= Low M= MEDIUM H= HIGH

PSOs WITH POs

PSO1	B.Sc. CVT program enables students to understand disease, acquire skills regarding diagnosis and its management of various cardiac diseases.
PSO2	The CVT's primary role is to perform maneuvers, diagnostic test according to direction of a qualified physician and helping him/ her in the diagnosis and treatment of cardiovascular injury and disease.
PSO 3	After completion of the program students will be able to apply specialized occupational theory, skills and concepts to work independently as qualified cardiovascular technologist and becomes an integral member of the cardiac cath. lab and electrophysiology lab teams.

PO1	Define and describe human cardiovascular and its related system in relation to various diseases. **(human cardiovascular system)**
PO2	Distinguish and classify various cardiovascular disorder **(cardiovascular disorder)**
PO3	Apply knowledge of human cardiovascular and its related system in the diagnosis, cardiovascular disorder, related disorder its management& apply the knowledge and skills to assess and solve societal and legal issues related to cardiovascular care of the patients **(society and legal issues)**
PO4	Utilize modern tools and techniques in the field of cardiovascular technology for patient compliance.**(modern tools and techniques)**
PO5	Tackle future challenges through lifelong learning and training process related to cardiac health.**(lifelong learning and training)**
PO6	Evolve ethical practices and moral values in personal and professional endeavors.**(moral values)**
PO7	Regular learning the use of modern tools and techniques for the efficient management of cardiovascular diseases and related disorder **(management of cardiovascular diseases)**

PROGRAMME STRUCTURE

Name of the Program – B.Sc CVT
Duration of the Program – 04 Years
Total Semesters – 08 Semesters
Total Credits of the Program – 196 Credits

Nature of Courses	Actual Percentage	Proposed Percentage
Core Courses	49.5%	60-70%
Discipline Specific Electives (DSE)	3%	10-15 %
Generic Elective I (GE I)	4 Courses (TDCC)	4 Courses in UG as Required
Generic Elective II (GE II)	2 Courses	2 Courses in UG as required
Dissertation/Project/Internship	71 Credits	30 Credits
Skill Enhancement Course (SEC)	2 Courses	2 Courses
Ability Enhancement Course (AEC)	3 Courses	2 courses
Service Learning/Community Service Based Course	1 Courses	1 Course

FIRST SEMESTER

Course Code	Course Title	Lectures(L)	Tutorial(T)	Practical(P)	Total Credits
BCVT101	General Anatomy	2	-	2	3
BCVT102	General Physiology	2	-	2	3
BCVT103	Biochemistry	2	-	2	3
BCVT104	Basic in Computer & Information Science	2	-	2	3
BCVT105	Introduction to Quality and patient Safety	2	1	-	3
BCVT106	Introduction to national health care delivery System in India (Workshop)	-	1	-	1
BCVT107	Hematology	2		-	2
EVS2111	Environmental science	2		-	2
SS151	Soft Skills	1		-	1
	TOTAL				**21**

SECOND SEMESTER

Course Code	Course Title	Lectures (L)	Tutorial(T)	Practical (P)	Total Credits
BCVT201	Basic Pharmacology	4	-	2	5
BCVT202	Pathophysiology of Cardiovascular Disease	4	-	2	5
BCVT203	Microbiology	2	-	-	2
BCVT204	Medical Ethics and legal aspects	2	-	-	2
BCVT205	Workshop (ECG)	-	1		1
BCVT206	Anatomy and Physiology of Cardiovascular System	2	1	-	3
CS251	English & Communication Skill	2		-	2
	TDCC	1		2	2
	Total				**22**

THIRD SEMESTER

Course Code	Course Title	Lectures (L)	Tutorial (T)	Practical (P)	Total Credits
BCVT301	General Medicine related to cardiovascular system	3	1	-	4
BCVT302	Cardiac Diseases- I	5	1	4	8
BCVT303	Basics of cardiac technology	4	1	2	6
BCVT304	Workshop (TYPES OF STENT)	-	1		1
BCVT335	Summer training with evaluation-I	**-**	**1**	**10**	6
	TDCC	1		2	2
	Total				**27**

FOURTH SEMESTER

Course Code	Course Title	Lectures (L)	Tutorial(T)	Practical(P)	Total Credits
BCVT401	Cardiac Diseases-II	5	1	4	8
BCVT402	Electrocardiography- I	5	1	4	8
BCVT403	Echocardiography-I	5	1	4	8
BCVT404	Workshop(ECHO)	-	1		1
	TDCC	1		2	2
	TOTAL				**27**

FIFTH SEMESTER

Course Code	Course Title	Lectures (L)	Tutorial (T)	Practical(P)	Total Credits
BCVT501	Echocardiography- II	3	-	2	4
BCVT502	Electrocardiography- II	3	-	2	4
BCVT503	Cardiac catheterization-I	3	-	2	4
BCVT504	Research methodology and Biostatistics- I	2	-	-	2
BCVT505	Workshop (invasive procedure)		1	-	1
BCVT535	Summer training and evaluation-II	**-**	**1**	**16**	9
BCVT 506	Certificate Course(BLS)			2	1
	TDCC	1		2	2
	Total				**27**

SIXTH SEMESTER

Course Code	Course Title	Lectures (L)	Tutorial (T)	Practical (P)	Total Credits
BCVT601	Cardiac catheterization-II	6	1	2	8
BCVT602	Research methodology and Biostatistics –II	2	-	-	2
BCVT603	Workshop (CATH LAB)		1	-	1
BCVT604	Research (project)	3	3	-	6
BCVT605	Hospital Management	5	-	-	5
BCVT608	Certificate Course(ACLS)	-	-	2	1
BCVT607	Community Service	-	-	4	2
	TOTAL				**25**

SEVENTH SEMESTER (INTERNSHIP)

Course Code	Course Title	Lectures (L)	Tutorial (T)	Practical (P)	Total Credits
BCVT701	Research (project evaluation)	-		**20**	10
BCVT735	Internship	-		30	15
	TOTAL				**25**

EIGTH SEMESTER (INTERNSHIP)

Course Code	Course Title	Lectures (L)/Tutorial (T)	Tutorial (T)	Practical (P)	Total Credits
BCVT801	Research (project evaluation)	-	-	**20**	10
BCVT835	Internship	-	-	30	15
	TOTAL				**25**

Examination Scheme

For a course of 100 marks containing both theory and Lab Component:

MID SEMESTER EVALUATION (40) – Theory (40 Marks)

Theory (40)				
Class tests & Teacher student Interaction	Assignment	Mid term Practical (Presentation, Quiz, Role play, Panel Discussion)	Midterm theory	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)	
Theory (35)	Lab(25)

For a course of 100 marks containing only theory Component:

MID SEMESTER EVALUATION (40) – Theory (40 Marks)

Theory (40)				
Class tests & Teacher student Interaction	Assignment	Mid term Practical (Presentation, Quiz, Role play, Panel Discussion)	Midterm theory	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

For a course of 100 marks containing only practical Component:

END SEMESTER EXAMINATION (100) Practical (100)						
Internal	Viva	Continuous Assessment	Lab Work	Presentation	Log Book/Practical File	**Total**
20	20	10	10	30	10	**100**

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title: General Anatomy			
Semester: I	**Course code: BCVT101**	**Credits: 3**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/week		**No. of practical hours: 2/week**	
Course Pre-requisites: None			

Course Introduction

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person ‘s physical, mental, social, emotional, environmental health and holistic well-being. The study of anatomy helps them in putting into perspective the knowledge that they gain for better good of humanity.

Course Objectives

This course is designed to provide the students the basic knowledge in anatomy. At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
2. Identify the microscopic structures of various tissues, and organs in the human body & correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.

Course Outcomes

Upon successful completion of the course, the students should be able to:

CO1: Understand the various organ structures with a backdrop of general anatomy (Remember & Understand)

CO2: Compare the differences between the similar structures in the body and their relevance (Analyze)

CO3: Learn to apply the knowledge of various structures to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	L	H	M	M	H	L	M
CO2	H	H	H	H	H	M	H
CO3	L	H	M	M	H	L	H
CO4	H	H	L	L	H	L	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general structures and the specialized organs in a manner aimed at being student friendly. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, chart and poster making and model making are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. They are taught on simulators for a live feeling. The practical includes the study of structures through mannequins which helps in holding the interest of the students.

Course Contents

Module 1

1. **Introduction to Anatomical terms of the human body** - Basic anatomical terminology, anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, cavities of the body.
2. **Organization of the human body at the cellular level** - Structure of the cell comprising of cell membrane, cytoplasm, cell organelles, nucleus, cell extensions etc.
3. **Organization of the human body at the tissue level** - Epithelial, Connective, Muscular& Nervous tissue.

Module 2

1. **Blood** - Composition of blood, Features of red blood cells, white blood cells, platelets.
2. **Lymphatic system** - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
3. **Nervous system** - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.
4. **Muscular system** - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.

5. **Skeletal system** - Features of bones, axial skeleton, appendicular skeleton.

6. **Musculoskeletal system** - Joints of upper & lower limb.

Module 3

1. **Respiratory system** - Nose & paranasal sinuses, pharynx, larynx, trachea, lungs.

2. **Cardiovascular system** - Heart & blood vessels.

3. **Digestive system -** Oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.

4. **Urinary system** - Kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra.

Module 4

1. **Introduction to genetics** - Features of chromosomes, DNA.

2. **Reproductive system in females** - External & internal genital organs, breast.

3. **Reproductive system in males** - Penis, scrotum, testes, prostate gland.

4. **Endocrine system** - Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.

5. **Special senses** - Olfactory system, taste apparatus, external middle & internal ear, eye.

6. **Skin** - Features of skin, hair, sebaceous glands, sweat glands, nails.

The classes will be two theories and two practical including the tutorials in a week

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, make charts and posters, make models, and conduct quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Text Books:

1. P.R Ashalatha& G Deepa ‘s Textbook of anatomy & physiology by
2. B.D. Chaurasia’s human anatomy

Reference books:

1. SampathMadhyastha’sManipal manual of anatomy for allied health sciences

2. Krishna Garg &Madhu Joshi's Practical anatomy workbook
3. Dixit's Atlas of Histology for Medical Students
4. Basic Histology: A Color Atlas & Text
5. Jana's Exam Oriented Practical Anatomy
6. Krishan's Anatomy Mnemonics

Online references:
Coursera subscription for physiology topic

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: General Physiology			
Semester: I	**Course code: BCVT102**	**Credits: 3**	**Core / Elective: Core**
No. of lectures/ tutorials: 2 / Week		**No. of practical hours: 2 / Week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. An enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care. The teaching of physiology aims to integrate their learning in sync with the understanding of the basic functions of the various organs in the body and their clinical aspect so that the knowledge gained can give them an edge in their field.

Course Objectives:

This course is designed to provide the students the basic knowledge in physiology. At the end of the course, the student should be able to:

1. Explain the normal functioning of various organ systems of the body and their interactions.
2. Elucidate the physiological aspects of normal growth and development.
3. Describe the physiological response and adaptations to environmental stresses.
4. Know the physiological principles underlying pathogenesis of disease.

Course Outcomes

Upon successful completion of the course, the students should be able to:

CO1: Understand the various organ functions with a backdrop of general physiology (Remember & Understand)

CO2: Compare the differences between the similar functions in the body and their relevance (Analyze)

CO3: Learn to apply the knowledge of various physiological process to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

PO KEYWORDS	**Human cardiovascular system**	**Moral values**	**Cardiovascular disorder**	**Societal and legal issues**	**Modern tools and techniques**	**Lifelong learning and training**	**Management of CVD**
CO1	H	M	L	M	H	H	H

CO2	M	H	M	H	M	M	H
CO3	H	H	M	H	H	M	H
CO4	H	L	M	M	H	L	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general structures and the specialized organs in a manner aimed at being student friendly. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, chart and poster making and model making are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. They are taught on simulators for a live feeling. The practical includes the study of structures through mannequins which helps in holding the interest of the students.

Course Contents and Duration

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1

1. **Introduction to physiology of the human body** –Composition of body, Homeostasis, Introduction to chemistry of life.
2. **Organization of the human body at the cellular level** – Function of lipids, carbohydrates, proteins & cell organelles.
3. **Organization of the human body at the tissue level** – Function of Epithelial, Connective, Muscular & Nervous tissues.

Module 2

1. **Blood** – Haemopoesis, haemostasis, coagulation of blood, blood transfusion.
2. **Lymphatic system** – Function of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
3. **Resistance & immunity** – Innate immunity, acquired immunity, humoral & cell mediated immunity.

Module 3

1. **Nervous system** – Properties of nerve fibres, function of neuroglia, synapse, CNS, CSF, brain, cranial nerves, demonstration of reflexes.
2. **Muscular system** – Properties of skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.

3. **Skeletal system** – Functions of bones, axial skeleton, appendicular skeleton.
4. **Musculoskeletal system** – Movement in the joints of upper & lower limb**.**

Module 4

1. **Respiratory system** – Physiology of respiration, pulmonary function tests, gas exchange in lungs, transport of gases between lungs & tissues, regulation of respiration.
2. **Cardiovascular system** - Heart & blood vessels: Systemic circulation, pulmonary circulation, ECG, cardiac output, blood pressure.
3. **Digestive system** – Process of digestion, function of oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.
4. **Urinary system** – Function of kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra, physiology of urine formation, glomerular filtration, tubular reabsorption, water balance, micturition.
5. **Introduction to genetics** - Features of chromosomes, DNA, protein synthesis, dominant inheritance, recessive inheritance, sex linked inheritance.
6. **Reproductive system– female**: Physiology of female reproductive system.
7. **Reproductive system – male**: Physiology of male reproductive system.
8. **Endocrine system** - Mechanism of action of hormones, function of pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.
9. **Special senses** - Physiology of olfaction, taste, hearing, balance & vision.
10. **Skin –** Function of skin, hair, sebaceous glands, sweat glands, nails, temperature regulation.

Practical: demonstration / observation

Blood test:

1. Microscope
2.Haemocytometer
3. Blood
4. RBC count
5.Hb
6.WBC count
7. Differential Count
8. Hematocrit demonstration
9. ESR
10. Blood group & Rh. Type
11.Bleeding time and clotting time.

Digestion

Test salivary digestions

Excretion

1.Examination of Urine
2.Specific gravity

3. Albumin
4.Sugar
5.Microscopic examination for cells and cysts

Respiratory System:
1.Clinical examination of respiratory system
2.Spirometry
3.Breath holding test

Cardio Vascular System:
1.Measurement of blood pressure and pulse rate
2.Effect of exercise on blood pressure and pulse rate

Course References

1. PR Ashalatha& G Deepa's Textbook of anatomy & physiology
2. N Geetha 's Textbook of physiology

Reference Books:

1. C C Chatterjee's Human Physiology
2. C C Chatterjee's Practical Physiology for Paramedical Courses
3. CN Chandra Shekhar'sManipal Manual of Medical Physiology
4. RK Maurya's Medical Physiology

Online references:

Coursera subscription for online anatomy topics

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Biochemistry			
Semester: I	**Course code: BCVT103**	**Credits: 3**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/week		**No. of practical hours: 2/week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. An enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care. Biochemistry is the branch of the life sciences devoted to understanding the mechanisms by which living organisms carry out their many functions in complete, molecular detail. It is inherently interdisciplinary in nature and fundamental to every other branch of the life and biomedical sciences. It has clinical aspect so the knowledge gained can support the students in correlating the various clinical implications.

Course Objectives:

At the end of the course, the student should be able to:

1. Demonstrate a critical understanding of the chemical and physical properties of small molecules found in living systems and will have a working knowledge of the phenomena that govern the behavior of biomolecules in aqueous and non-aqueous environments.

2. Extend and apply their understanding of molecular structure and function to polymeric macromolecules and macromolecular complexes and consequences of deviation from normal.

3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

Course Outcomes

At the completion of the course, students should be able to:

CO1: Comprehend the role biochemistry in the practice of medicine and medical research;

CO2: Appreciate the central and essential importance of water as polar solvent in biological chemistry;

CO3: Possess a general understanding of the major types of biochemical molecules, including small, large and super molecular components found in cells;

CO4: Be able to immediately recognize the different types of biochemical molecules and know their essential chemical characteristics that make them indispensable for life;

CO5: Understand basic energy metabolism of cells;

CO6: Identify some of common reaction mechanisms in biochemical processes.

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	M	L	M	H	M	L
CO2	H	H	M	H	H	M	H
CO3	M	M	M	H	H	L	H
CO4	H	M	L	L	H	M	H
CO5	M	L	H	M	H	M	L
CO6	H	H	L	M	H	L	M

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy incudes a comprehensive study including the study of basic concepts, structures and biological and clinical implications in a manner aimed at being student friendly. Various clinical aspects will be discussed in relevance to the topic taught so as to relieve the monotony of the subject. Apart from regular lecture based teaching, presentations, discussions, videos etc. will be used for better understanding of concepts. Regular doubt clearing sessions, written assignments, quiz, chart and poster making are some of the measures for learning evaluation along with periodic and surprise tests.

Course Contents and Duration

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module I: Carbohydrates:

Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)

Module II: Proteins:

Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin, collagen)

Module III: Lipids:

Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane

Module IV: Vitamins:

General with emphasis on A, B2, C, E and inositol (requirements, assimilation and properties)

Module V: Minerals:

Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties)

Practical:

Preparation of Solutions, Sterilization techniques, Estimation of blood and urine sugar, Reactions of monosaccharides, disaccharides and starch: Glucose, Fructose, Galactose, Maltose, lactose, Sucrose, Starch, Bio fluid of choice – blood, plasma, serum, Glucose, Protein, Urea, Creatinine, Bilirubin

References

1. MN Chatterjea, Rana ShindeTextbook of Medical Biochemistry, Eighth Edition, JayPee Publications, New Delhi.
2. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical. Biochemistry, Orient Longman, Madras, 1990
3. Nelson & Cox Lehninger Principles of Biochemistry, 6th Edition, Mc Milan Publication,2015

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Basics In Computer & Information Science			
Semester: I	**Course code: BCVT104**	**Credits: 3**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction:

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. An enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care. The teaching of computer and information science aims to integrate their learning in sync with the understanding of the basic functions of the various setups of the computers and its software; this knowledge will help them gained confidence and give them an edge in their field.

Course Objectives:

1. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.
2. The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various hardware and software of the computer system,

CO2: Compare the differences between the various functions of the same (Analyze)

CO3: Learn to apply the knowledge of various fields of the course (Apply &Analyze)

CO4: Augment their learning by making various presentations and graphics (Synthesize, evaluate & create

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	M	H	L	M	H	H	H
CO2	M	H	L	M	H	M	H
CO3	H	H	H	H	H	L	M
CO4	H	H	L	L	H	M	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the various software and hardware of the computer system in order to make the students more competent and skilled in its use and storage. Various aspects about the use for same in health care setups are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students.

Module 1

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, opti cal disk, mass storage devices.

Module 2

1. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
2. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving th e document, spell checking, printing the document file, creating and editing of table, mail merge.
3. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

Module 3

1. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
2. Introduction of Operating System: introduction, operating system concepts, types of operating system.

3. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
4. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
5. Application of Computers in clinical settings.

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Introduction to Quality and Patient Safety			
Semester: I	**Course code: BCVT105**	**Credits: 3**	**Core / Elective: Core**
No. of lectures/ tutorials: 3/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction:

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. An enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care. The teaching of computer and information science aims to integrate their learning in sync with the understanding of the basic functions of the various setups of the computers and its software; this knowledge will help them gained confidence and give them an edge in their field.

Course Objectives

Students are made to learn basic concepts of quality in health care and develop skills to implement sustainable quality assurance program. Introducing students to basic emergency care, infection prevention & control with knowledge of biomedical waste management and antibiotic resistance.

Course Learning Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various hardware and software of the computer system,

CO2: Compare the differences between the various functions of the same (Analyze)

CO3: Learn to apply the knowledge of various fields of the course (Apply &Analyze)

CO4: Augment their learning by making various presentations and graphics (Synthesize, evaluate & create

PO KEYWORDS	Human cardiovascular	Moral values	Cardiovascular disorder	Societal and legal	Modern tools and	Lifelong learning and	Management of CVD
CO1	H	H	L	H	H	L	H
CO2	H	H	M	H	H	M	H
CO3	M	H	M	H	H	L	H
CO4	H	H	M	M	H	H	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the various rules of quality management and patient safety. Various aspects about the use for same in health care setups are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular

doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students.

Course Contents

Module 1: Quality assurance and Management

Introduction, Quality improvement approaches, standards and norms, quality improvement tools, introduction to NABH guidelines.

Module 2: Basic of Emergency care and Life support skills

Basic life support(BLS) following cardiac arrest, recognition of sudden cardiac arrest and activation of emergency response system, early cardiopulmonary resuscitation(CPR) and rapid defibrillation with an automated external defibrillator(AED)

Module 3: Basic emergency care

First aid, choking, rescue breathing methods, ventilation including use of bag valve master (BVMs)

Module 4: Biomedical Waste Management

Definition, waste minimization, BMW-segregation, collection, transportation, treatment and disposal (Including color coding), Liquid BMW, Radioactive waste, metals/chemicals/drug waste, BMW management and methods of disinfection, use of Personal protective equipment(PPE)

Module 5: Infection Prevention and Control

Sterilization, Disinfection, Effective hand hygiene, use of PPE, Prevention and control of common health care associated infections, Guidelines(NABH) and JCI for hospital infection control.

Module 6: Disaster preparedness and management

Fundamentals of emergency management

Practical (demonstration only)

1. Vital signs and primary assessment
2. Basic emergency care- first aid

Course References

1. The Essentials of Patient Safety by Charles Vincent
2. Laboratory Quality Control and Patient Safety by De Gruyter
3. Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458

Required Readings:

1. Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458

Recommended Readings:

1. Medical Dictionary

Others

1. Disaster management set up in india - opcw.org
2. Www.opcw.org/sites/default/files/documents/event_photos/2010/tabletop_exercise_poland_nov201..
3. Natural disasters: hospital management | 2015-10-22 | ahc ...
4. Www.reliasmedia.com/articles/136571-natural-disasters-hospital-management
5. Biomedical waste management in India: Critical appraisal - NCBI - NIH
6. Www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295
7. Vital signs: Understanding what the body is telling us
8. Https://www.coursera.org/learn/vital-signs/
9. Patient Safety and Quality Improvement
10. Https://www.coursera.org/learn/patient-safety

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Introduction to National Health Care Delivery System in India (Workshop)			
Semester: I	**Course code: BCVT106**	**Credits: 1**	**Core / Elective: Core**
No. of lectures/ tutorials: 1/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction

The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

Course Contents

1. Introduction to healthcare delivery system
   - Healthcare delivery system in India at primary, secondary and tertiary care
   - Community participation in healthcare delivery system Health system in developed countries.
   - Private Sector
   - National Health Mission
   - National Health Policy
   - Issues in Health Care Delivery System in India
   - National Health Programme
   - Background, objectives
   - Action plan, targets, operations, achievements and constraints in various National Health Programme.
2. Introduction to AYUSH system of medicine
   - Introduction to Ayurveda.
   - Yoga and Naturopathy
   - Unani
   - Siddha
   - Homeopathy
   - Need for integration of various system of medicine
3. Health scenario of India
   - Past, present and future, Public health – India (epidemiology and demography)
4. Demography & Vital Statistics-
   - Demography – its concept
   - Vital events of life & its impact on demography
   - Significance and recording of vital statistics
   - Census & its impact on health policy
5. Epidemiology
   - Principles of Epidemiology
   - Natural History of disease
   - Methods of Epidemiological studies

- Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Hematology			
Semester: I	**Course code: BCVT107**	**Credits: 2**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/ Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction

Hematology is the branch of medicine that is generally concerned with blood, blood forming organs and blood related diseases. This course will introduce students to hematology lab equipment, procedures of blood collection and preservative methodologies. This course will brief students about basic techniques followed in blood cell count. This course will form a foundation to advanced hematology levels.

Course Objectives

1. The main objective of the subject is to impart the knowledge of apparatus, units, equipment, and volumetric analysis in the laboratory of hematology.
2. The students should learn the technique of collection of clinical samples and their processing along with recording of data.
3. The students will also be given the basic knowledge of blood, blood cells, which are routinely estimated in different diseases so that a clear understanding of the different tests is obtained, in addition to basic training in safety measures, quality control and automation.
4. Students will learn the basic concepts of Hematology and routine clinical investigations of Hematology laboratory.

Course Outcomes

Upon successful completion of the course, the students should be able to:

C01: Understood the role of medical lab technologist, role of medical personnel in Hematology lab, hazards and safety measures. (Understanding Based)

C02: Understood the handling of glassware, storage of chemicals and its MSDS (Material Safety Data Sheet. (Remembering Based)

C03: Understood the anticoagulants mode of action. (Applying based)

C04: Understood the blood, its role and process of formation of different blood cells. (Understanding Based)

CO5: understood the techniques for blood cell count by different staining methodologies and Hemoglobin estimation techniques.

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	M	M	H	L	H
CO2	H	H	L	M	H	M	H
CO3	M	H	M	H	H	L	H
CO4	H	H	L	L	H	M	H
CO5	M	L	M	H	H	L	M

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

This course will use mixed technique of interactive lectures, digital learning methodologies, regular assignments and power point presentations. Students will be made to prepare project reports by interacting directly with laboratory personnel and visits to hospital to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day to day real world applications. This course will focus mainly on applying based methodologies, students will not be made limited to theory only, but hands on practices and analyzing every aspect of the module by themselves.

Course Contents

Module 1: **Introduction to Hematology**

Definition, Role of personnel, Importance, safety measures, Equipment used in Hematology lab.

Module 2: Blood

Introduction, Composition of blood, Functions and normal cellular components, Anemia, Leukemia

Module 3:Hematopoiesis

Introduction, Erythropoiesis, Leucopoiesis, Thrombopoiesis

Module 4: **Anticoagulants**

Introduction, Types and mode of action and preference of anticoagulants for different hematological studies.

Module 5:Phlebotomy

Definition, different methods of Blood collection, Safety measures, Complications related to phlebotomy and preventive measures, ABG and VBG.

Module 6:Hemoglobin

Introduction, its composition and functions, types of hemoglobin, methods to measure with

merits and demerits, Absolute Values

Module 7:Hemocytometry

Introduction, Principle, Reagent preparation, RBC count, WBC count, Platelet count Errors and Remedies

Module 8: Coagulation Profile;

Method and principles; Advantages and disadvantages, Clot Retraction time; Bleeding Time, clotting time**,**

Module 9: Transfusion reactions and complications of blood transfusion

Blood Components; Packed red cells; Platelet Concentrate-Appropriate uses; Granulocyte concentrate; appropriate uses; Fresh Frozen Plasma (FFP); appropriate uses; Factor VIII and Factor IX concentrate and appropriate uses; Cryoprecipitate and appropriate uses;

Module 10: Quality Assurance in Hematology

Introduction, Quality assurance at basic level.

Course References

Text Books

1. Godkar.B. Praful, (2016) Textbook of MLT,3rd edition,Bhalani Publications
2. Singh Tejinder, (2014), Atlas & Textbook of Haematology,3rd edition,Avichal Publications
3. Ochei J &KolhatkarA(2000),Medical Laboratory Science: Theory & Practice, 3 rdedition,Mcgraw Hill Education
4. Mukherjee .L.K (2017), Medical Laboratory Technology,Vol.1-3,3rd edition, Tata Mcgraw Hill
5. SoodRamnik, (2015), Text book of Medical Laboratory Technology,2nd edition, Jaypee Publications

Reference Books

1. Hematology - definition of hematology by The Free Dictionary
2. www.thefreedictionary.com/hematology

3. Hematology Articles (Diagnosis, Pathophysiology, Staging ...
4. emedicine.medscape.com/hematology
5. 8.American Society of Hematology - Official Site
6. www.hematology.org
7. 9. Medical Dictionary

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Environmental Science			
Semester: I	**Course code: EVS2111**	**Credits: 2**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction

Environmental Studies is a multidisciplinary subject and hence requires a comprehensive knowledge on various subjects, which primarily include general science, social science, law and management practices. The prime objective of this course is to make the undergraduate students acquainted with the fundamental concepts of environmental science and to adopt eco-friendly technologies to facilitate conservation and regeneration of natural resources.

Course Objectives

The broad objectives of this course are:

1. To gain an understanding of the concepts fundamental to environmental science
2. To understand the complexity of ecosystems and possibly how to sustain them
3. To understand the relationships between humans and the environment.
4. To understand major environmental problems including their causes and consequences.
5. To understand current and controversial environmental issues and possible solutions to environmental problems and their pros and cons.
6. To understand the hospital environment in general

Course Outcomes

Upon successful completion of the course, the students should be able to:

CO1: To gain knowledge on the importance of environmental education and ecosystem.

CO2: To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution.

CO3: To understand the treatment of wastewater and solid waste management.

CO4: To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.

CO5: To be aware of the national and international concern for environment for protecting the environment.

CO6: To understand the environmental issues arising from different labs of the hospital

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	L	M	H	L	H
CO2	H	H	M	H	H	M	H
CO3	H	H	M	H	H	L	H
CO4	H	H	L	L	H	M	H
CO5	H	M	H	L	M	M	M
CO6	H	M	H	M	H	L	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course follows the pedagogy of "learning by doing". Instructional design is based on creating situations in which the students have opportunities "to do things". The course would be delivered primarily through presentations and discussions led by students for active learning. The course facilitator would execute the same either by organizing in-class activities or out-of-class projects. A topic would be introduced to the class by the facilitator. Next the students would break off into groups. Group discussions would be conducted to bring in various perspectives on the topic followed by presentations by the students and activities carefully designed around the given theme to achieve the course learning outcomes (CLOs). Performance of and learning demonstrated through the same activities/ presentations would be used for assessment.

Course Contents

The class would meet twice in a week for a period of 10 weeks approx.

Module 1. Introduction
Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness.

Module 2. Natural Resources
Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

Module 3. Ecosystems

Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hotspots of biodiversity

Module 4. Environmental Pollution
Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution,

Marine pollution, Noise pollution, Thermal pollution, nuclear hazards, Solid waste management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies, Disaster management: Floods, earthquake, cyclone and landslides.

Module 5. Social blemishes and the Environment

From Unsustainable to Sustainable development, urban problems related to energy, Water conservation, rain water harvesting, water shed management Resettlement and rehabilitation of people; its pros and concerns. Case studies, Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies, Wasteland reclamation, Consumerism and waste products. Environment Protection Act, Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation Public awareness.

Human Population and the Environment, Population growth, variation among nations. Population explosion–Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies.

Module 5. Understanding the Hospital Environment

Module.6 Understanding the environment in the following clinical laboratories:

Microbiology, Biochemistry, Histopathology, Hematology

Module 7. Clinical laboratory hazards to the environment from the following and means to prevent:

Infectious material, Toxic Chemicals, Radioactive Material, Other miscellaneous wastes

Assessment Scheme

Students would be assessed continuously at four assessment points during the course through the activities and deliverables mentioned in the table in point 4 above. Course assessment is based on a student's activity/ assignments/quizzes (records/ evidence of his/her performing and learning). They could be in the form of PowerPoint Presentations, Videos watched etc. The details of the components of assessment are detailed next.

Course References

Text Book:

1. Chawla S., 2012. A Textbook of Environmental Studies, Tata Mc Graw Hill, New Delhi.

Reference Books

1. Jadhav, H &Bhosale, V.M., 1995. Environmental Protection and Laws. Himalaya Pub. House, New Delhi.

2. Gadi R., Rattan, S., 2006. Environmental Studies, KATSON Books, New Delhi.
3. Mckinney, M.L. & School, R.M., 1996. Environmental Science Systems & Solutions, Web enhanced edition.
4. Wanger K.D., 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA

Papers

1. Beckerman, W. (1992). Economic growth and the environment: Whose growth? Whose environment? *World Development, 20(4),* 481-496.
2. Lorente, D.B., Shahbaz, M., Roubaud, D., Farhani, S. (2018) How economic growth, renewable electricity and natural resources contribute to CO2 emissions? *Energy Policy, 113(C), 356–367.*
3. Kumar Reddy D.H., Lee S.M. (2012) Water Pollution and Treatment Technologies, *J Environ Anal Toxicol, 2(5)* e103.
4. Dwivedi, A. K. (2017) Researches In Water Pollution: A Review. *International Research Journal of Natural and Applied Sciences, 4(1)* 118-142.

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Soft Skills			
Semester: I	**Course code: SS151**	**Credits: 1**	**Core / Elective: Core**
No. of lectures/ tutorials: 1/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Objectives:

1. To introduce the topic.
2. To make the students confident in written communication skills.
3. To make the students learn about good manners and behavior.
4. To make the students develop good IPR amongst each other and develop professionalism, etiquettes and ethics.

Course Outcomes

Upon successful completion of the course, the students should be able to:

CO1: Understood the role of cardiovascular lab technologist, role of medical personnel in patient communication and interpersonal relationship.

C02: Understood the importance of empathy and greetings to the patient and their relatives.

C03: Understood the importance of mannerism.

C04: Understood the importance of various gestures, body language and moods in greeting the patient.

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	M	H	H	M	H	L	H
CO2	H	H	M	H	H	H	H
CO3	L	H	L	H	H	L	H
CO4	H	H	L	L	H	H	M

HIGH – H MEDIUM- M LOW – L

Module 1: Introduction to soft skills

Introduction, definition of soft skills, importance of soft skills, types of soft skills: communication skills, written communication skills, body language, interpersonal skills, presentation skills, stress management, time management, and leadership skills.

Module 2: Letter writing skills

Introduction to letters: informal and formal letters, format of letter writing.

Module 3: Telephone etiquettes

Introduction to telephone etiquettes, need of phone calls, phases of professional calls, basic skills of making calls, basic skills of answering a calls; smile, greetings, verbal handshakes, focus, taking messages, closing the calls, general phone etiquettes.

Course References

1. www.slideshare.net
2. www.wikipedia.co.in
3. www.information.net

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Basic Pharmacology			
Semester: II	**Course code: BCVT201**	**Credits: 5**	**Core / Elective: Core**
No. of lectures/ tutorials: 4/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction:

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

Course Objectives:

This course is designed to provide the students the basic knowledge in pharmacology. At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied knowledge of various mechanism of actions of drugs.
2. Identify the indications and contraindications of various categories of the drugs with their structure.
3. Comprehend the basic idea of medication considerations of prescription and its prerequisites also its impacts on human body.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various structures of drugs and their mechanism of actions.

CO2: Understand the various indications and contraindications of various categories of the drugs.

CO3: Learn to apply the knowledge of various drugs to clinical aspect of diseases (Apply &Analyze)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	L	M	H	H	H
CO2	M	H	M	H	H	M	L
CO3	M	H	M	M	H	L	M

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general actions of the drugs. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz,

presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students.

Course Contents

Module 1: Basic Pharmacology:

Terminology, pharmacokinetics, pharmacodynamics.

Module 2: Salient features of Drugs:

Drug allergy and toxicity, Classification of drugs, Principles of drug administration and routes of administration.

Module 3: Drugs acting on nervous system:

Mechanism of action, indications, and contraindications, adverse reactions of the drugs acting on autonomic and central nervous system.

Module 4: Drugs acting on various medical conditions:

Anti - infective agents, Analgesics & anti allergic, Antidiabetic drugs, Steroids & hormones, Chemotherapy, Immune modulators, Antioxidants, Diuretics

Module 5: Cardiovascular Drugs:

Mechanism of action, indications, and contraindications, adverse reactions of the following in brief:

- Drugs used in the treatment of shock
- Drugs used in the treatment of myocardial infarction
- Antihypertensive drugs: beta adrenergic antagonists, alpha adrenergic antagonists etc.
- Antiarrhythmic drugs
- Cardiac glycosides
- Sympathetic and parasympathetic inotropic agents
- Coronary vasodilators
- Anti-anginal drugs
- Drugs used in Hemostasis – anticoagulants, Thrombolytic and anti-thrombolytic

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books Recommended

1. Essentials of Medical Pharmacology, K D Tripathi (6th ed.) Jaypee publishers
2. Principles of Pharmacology, K Ksharma, M K Sharma, Paras Publications
3. Pharmacology for Nurses and Allied Professions, Chaudhury1/e,Jaypee Publishers
4. Pharmacology for Dental and Allied Health Sciences, Udaykumar,4/e,Jaypee Publishers
5. Principles of Pharmacology, K Ksharma, M K Sharma, Paras Publications

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Pathophysiology of Cardiovascular Disease			
Semester: II	**Course code: BCVT202**	**Credits: 5**	**Core / Elective: Core**
No. of lectures/ tutorials: 4/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction:

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person ‘s physical, mental, social, emotional, environmental health and holistic well-being. The study of pathophysiology of cardiovascular diseases helps them in putting into perspective the knowledge that they gain for better good of humanity.

Course Objectives:

This course is designed to provide the students the basic knowledge in disease pathophysiology. At the end of the course, the student should be able to:

- Comprehend the normal disposition, inter-relationships, gross, functional and applied knowledge of various pathophysiological changes in the cardiac disease.
- Identify the disease condition and their pathophysiology
- Comprehend the basic idea of disease process and its occurrence.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various structures of drugs and their mechanism of actions.

CO2: Understand the various indications and contraindications of various categories of the drugs.

CO3: Learn to apply the knowledge of various drugs to clinical aspect of diseases (Apply &Analyze)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	M	M	H	H	L	H
CO2	H	H	L	H	M	M	L
CO3	M	H	M	H	L	L	M

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general actions of the drugs. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. The practical includes the study of drugs via presentations and viva voce.

Course Contents

Module 1: Assessment and history taking

History taking, physical assessment: heart rate measurement, auscultation.

Module 2: Cardiac Diseases

Coronary artery disease and myocardial infarction, Cardiac myopathy, Pathophysiology and clinical manifestation, Rheumatic Fever

Module 3: Valvular Heart Disease

Tricuspid valve disease, Combined valve diseases, Mitral stenosis, Mitral regurgitation, Aortic stenosis, Aortic Regurgitation,

Module 4: Circulatory Diseases:

Left to right Shunts, right to Left Shunts (Eisenmenger Syndrome), Circulatory failure, Hypertension,

Module 5: Congenital Heart Disease

Acyanotic heart disease, Cyanotic heart disease, Congestive Heart Disease

Module 6: Invasive Monitoring: CVP, Intra Arterial BP, PA Wedge Pressure, Cardiac Output

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books Recommended

1. Text Book of Pathology by Dr. Harsh Mohan Robbin's Pathologic Basis of Disease
2. Practical Pathology by Tejender Singh Medical Lab Techniques by Prof V H Talib

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title: Microbiology			
Semester: II	**Course code: BCVT203**	**Credits: 2**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction:

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person 's physical, mental, social, emotional, environmental health and holistic well-being. The study of microbiology helps them in putting into perspective the knowledge that they gain for better good of humanity.

Course Objectives:

This course is designed to provide the students the basic knowledge in disease pathophysiology.

After completion of the course the students will be able to:

- Define Morphology and its classification.
- Discuss about Parasitology, mycology and virology.
- Apply the knowledge of hospital infection while working.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various structures of microbes.

CO2: Understand the various disease caused by microbes

CO3: Understand the variousFundamentals of Immunology structure and functions

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	L	M	H	L	H
CO2	M	H	M	H	H	M	H
CO3	H	H	M	H	H	L	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general actions of

the drugs. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. The practical includes the study of drugs via presentations and viva voce.

Course Contents

Module 1: Introduction to microbes
Source of infection, modes of spread, bacterial Cell structure, growth requirements of bacteria, bacteria Cycle and different medias for bacterial growth
Module II: Sterilization and Disinfection
Definition; Methods of sterilization, procedures, techniques and Clinical Importance,
Module III: Viral Infections
HIV & AIDS, Hepatitis Virus; Hepatitis A; B; & C,
Module IV: Basic Fundamentals of Immunology structure and functions
Introduction, T-Cells; B-Cell Lymphocytes, Antigen, Antibody, Antigen and Antibody Reactions Immunoglobulins; Classes of immunoglobulins; IgG; IgA; IgM; IgD; IgE; Immune Responses; Immunity; Hyper Sensitivity
Module IV: Parasitic diseases and its vectors
Classification of Human Parasites Vector and arthropods of medical importance (Mosquitoes, Fleas, Tick, Flies, Sand fly, Scabies.)

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books Recommended

1. RamanikSood, Laboratory Technology (Methods and Interpretations) J.P. Bros, New Delhi.
2. Sachdev K N, Clinical Pathology & Bacteriology J.P. Bros, New Delhi.
3. Basic Laboratory Methods in Parasitology, J.P. Bros, New Delhi.
4. Ananthnarayan&Panikar, Text book of Medical Microbiology.
5. Robert Cruckshank, Medical Microbiology – The practice of Medical Microbiology.
6. D.R. Arora Text book of Microbiology, CBS Publications, New Delhi.
7. Prof. C.P. Baveja, Practical Microbiology, Arya Publications.

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title: Medical Ethics and Legal Aspects			
Semester: II	**Course code: BCVT204**	**Credits: 2**	**Core / Elective: Core**
No. of lectures/ tutorials: 02/ Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Objectives

Medical ethics has developed into a well-based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Physicians are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

Course Outcomes

Upon successful completion of the course, the students should be able to:

CO1: Classify, recognize, and further categories the ethical and legal principles applicable to health sciences and applied medicine.

CO2: Interpret the ethical-legislative intent and comparative best practices in India and across the world concerning health sciences.

CO3: Examine and further test the present Indian health law regime with the ethical and legal principles prevailing in the global context.

CO4: Develop and formulate a proposed bill integrating 1) ethics, 2) legal principles, 3) evolving best practices in health sciences.

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	M	M	M	H	L	M
CO2	H	L	M	H	H	M	M
CO3	H	H	M	H	H	L	M
CO4	H	H	L	L	H	M	H

HIGH – H MEDIUM- M LOW – L

Course Contents

1. Medical ethics - Definition - Goal - Scope

2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. 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.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent.
12. Ethics in the profession of Medical Laboratory Science

Course References

1. Medical Law and Ethics by Bonnie F Fremgen
2. Medical Law and Ethics by Jonathan Herring
3. Medical Law and Ethics, Fifth edition, Bonnie F. Fremgen, Pearson, Copyright 2016
4. Student Handbook, The Pathfinder: http://www.panola.edu/student-success/documents/pathfinder.pdf
5. S. V. Jogarao - Current Issues in Criminal Justice and Medical Law

6. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title: Workshop(ECG)			
Semester: III	**Course code: BCVT205**	**Credits: 1**	**Core / Elective: Core**
No. of lectures/ tutorials: 1/Week		**No. of practical hours: NA**	
Course Pre-requisites: None			

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title: Anatomy &Physiology of Cardiovascular System			
Semester: II	**Course code: BCVT206**	**Credits: 3**	**Core / Elective: Core**
No. of lectures/ tutorials: 3/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person‘s physical, mental, social, emotional, environmental health and holistic well-being. The study of anatomy helps them in putting into perspective the knowledge that they gain for better good of humanity.

Course Objectives

This course is designed to provide the students the advanced knowledge in anatomy. At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human cardiovascular system.
2. Identify the microscopic structures of various tissues, and organs in the cardiovascular system & correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the cardiovascular system so as to analyse the integrative and regulative functions on the organs and systems.

Course Outcomes

Upon successful completion of the course, the students should be able to:

CO1: Understand the various organ structures with a backdrop of cardiovascular system. (Remember & Understand)

CO2: Compare the differences between the similar structures in the cardiovascular system and their relevance (Analyze)

CO3: Learn to apply the knowledge of various structures in the cardiovascular system to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	M	H	L	M	H	L	H
CO2	M	M	M	H	L	M	H
CO3	M	H	M	H	H	L	H
CO4	H	H	L	L	H	L	M

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the cardiovascular system in a manner aimed at being student friendly. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, chart and poster making and model making are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. They are taught on simulators for a live feeling.

Course Contents and Schedule

Module 1

1. Introduction to clinical anatomy of the heart - Basic anatomical terminologies of heart, anatomical position, external features, pericardium etc.
2. Course of blood through the heart – Systemic circulation, pulmonary circulation, right & left heart etc.
3. Functional anatomy of the cardiovascular system – Functional features of heart, Excitatory & conducting system of the heart, Properties of cardiac muscle.

Module 2

1. Chambers of the Heart-External & internal features of the right atrium, interatrial septum, right ventricle, interventricular septum, left atrium, left ventricle.
2. Valves of the Heart-Atrioventricular valves, semilunar valves.

3. Blood supply of the heart- Arterial supply, Venous supply, coronary sinus.
4. Nerve supply of heart- ANS, PNS etc.
5. Blood vessels- Histology of blood vessels, veins, structure of large artery, structure of medium artery, structure of large vein etc.
6. The Aorta- Ascending aorta, Arch of aorta, Descending aorta.

Module 3

1. Electrocardiography- Electrocardiograph, Electrocardiogram, Normal pattern of ECG, Clinical aspects of ECG etc.
2. Cardiac cycle- Pressure changes, Jugular venous pulse tracing etc.
3. Heart sounds- S1, S2, S3, S4, Areas of auscultation, Abnormalities of heart sounds, Murmurs etc.

Module 4

1. Arterial pulse & blood pressure- Normal pulse & blood pressure, Variations in pulse & B.P, Regulation of B.P, Circulatory shock, Cardiac failure etc.
2. Coronary circulation- Normal & variations in coronary circulation.

The classes will be three theory including the tutorials in a week

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, make charts and posters, make models, and conduct quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Course References

Text Books:

1. P R Ashalatha& G Deepa ‘s Textbook of Anatomy & Physiology by
2. B.D.Chaurasia’s Human Anatomy

Reference books:

1. SampathMadhyastha’sManipal manual of anatomy for allied health sciences
2. Krishna Garg &Madhu Joshi’s Practical anatomy workbook
3. Dixit’s Atlas of Histology for Medical Students
4. Basic Histology: A Color Atlas & Text
5. Jana’s Exam Oriented Practical Anatomy
6. Krishan’s Anatomy Mnemonics

Online references:

1. Coursera subscription for physiology topics

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title: English and Communication Skills			
Semester: II	**Course code: CS251**	**Credits: 2**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction:

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. An enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care. The teaching of English and communication skills aims to integrate their learning in sync with the understanding of the basics of spoken English and communication techniques.

Course Objectives:

1. This course trains the students in oral presentations, expository writing, logical organizati on and structural support.
2. By acquiring skills in the use of communication techniques the students will be able to express better, grow personally and professionally, develop poise and confidence and

Course Outcomes

Upon successful completion of the course, the students should be able to:

CO1: Understood the role of cardiovascular lab technologist in soft skills, mannerism, verbal and written communication skills.

C02: Learn to apply the knowledge of English language in various fields of the health care in understanding the difficult words, diagnosis and disease processes.

C03: Understood the important of good communication with patients and their families as a health care professional.

CO4: Learn to grow professionally and personally by making good interpersonal relationships with other health care professionals.

CO5: Learn to raise the confidence in personality development and spoken English as a health care professional.

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	M	H	L	M	H	H	H
CO2	H	M	M	H	H	L	H
CO3	H	H	M	H	H	M	H
CO4	H	H	L	H	H	M	H
CO5	H	L	M	M	H	L	M

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the various communication skills in order to make the students more competent and skilled in its use and storage. Various aspects about the use for same in health care setups are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students.

Module 1: Basics of Grammar- Part I

Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words.

Module 2: Basics of Grammar – Part II

Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms

Module 3: Writing Skills

Letter writing, E mail, and Essay, Articles, and Memos, one word substitutes, note making and Comprehension

Module 4: Writing and Reading

Summary writing, Creative writing, newspaper reading

Module 5: Practical Exercise

Formal speech, Phonetics, semantics and pronunciation

Communication:

Module 6: Introduction: Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals.

Module 7: Speaking: Importance of speaking efficiently; Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling, Presentation skills, Individual feedback for each student, Conference/Interview technique.

Module 8; Listening: Importance of listening, Self-assessment, Action plan execution, Barriers in listening, Good and persuasive listening.

Module 9: Reading: What is efficient and fast reading, Awareness of existing reading habits, tested techniques for improving speed, Improving concentration and comprehension through systematic study.

Module 10; Non Verbal Communication: Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP).

Course References

1. www.wikipedia.co.in
2. www.information.net

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title:	**General Medicine Related to Cardiovascular System**		
Semester: III	**Course code: BCVT301**	**Credits: 4**	**Core / Elective: Core**
No. of lectures/ tutorials: 4/Week		**No. of practical hours: NIL**	
Course Pre-requisites: None			

Course Introduction:

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person ‘s physical, mental, social, emotional, environmental health and holistic well-being. The study of general medicine related to cardiovascular diseases helps them in putting into perspective the knowledge that they gain for better good of humanity.

Course Objectives:

This course is designed to provide the students the basic knowledge in pharmacology. At the end of the course, the student should be able to:

4. Comprehend the normal disposition, inter-relationships, gross, functional and applied knowledge of various mechanism of actions of drugs.
5. Identify the indications and contraindications of various categories of the drugs with their structure.
6. Comprehend the basic idea of medication considerations of prescription and its prerequisites also its impacts on human body.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various physiological and pathophysiological processes of the various cardiovascular diseases.

CO2: Understand the various disease processes and their signs and symptoms

CO3: Learn to apply the various knowledge in the clinical field

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	M	H	M	M	H	L	H
CO2	M	H	H	H	M	M	M
CO3	H	H	L	L	M	M	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general actions of the drugs. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. The practical includes the study of drugs via presentations and viva voce.

Course Contents

Module 1: Preventive Cardiology

Epidemiology of CVD in India, Burden of tobacco in India, Harmful effects of tobacco on health and environment, Methods of tobacco cessation, Legislative and preventive program for tobacco control.

Module 2: Systemic diseases related to Cardiovascular system

Bleeding disorders and Laboratory tests used to diagnose bleeding disorders (in brief)
Respiratory System
-Chronic obstructive pulmonary diseases (COPD)
- Concept of obstructive versus restrictive pulmonary disease
-PFT and its interpretation
Renal System
-ARF & CRF
-Role of dialysis and renal transplantation in its management

Module 3: Cardiac epidemiology

Alternate system of medicine, complimentary medicines, Risk factors, hereditary, psychosocial factors of Diabetes Mellitus, Obesity, smoking.

Module 4: Cardiac programmers

National health programme related to cardiovascular and thoracic conditions.

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Cardiac Disease – I			
Semester: III	**Course code: BCVT302**	**Credits: 8**	**Core / Elective: Core**
No. of lectures/ tutorials: 6/Week		**No. of practical hours: 4/Week**	
Course Pre-requisites: None			

Course Introduction:

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person 's physical, mental, social, emotional, environmental health and holistic well-being. The study of general medicine related to cardiovascular diseases helps them in putting into perspective the knowledge that they gain for better good of humanity.

Course Objectives:

This course is designed to provide the students the basic knowledge in pharmacology. At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied knowledge of various mechanism of actions of drugs.
2. Identify the indications and contraindications of various categories of the drugs with their structure.
3. Comprehend the basic idea of medication considerations of prescription and its prerequisites also its impacts on human body.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various physiological and pathophysiological processes of the various cardiovascular diseases.

CO2: Understand the various disease processes and their signs and symptoms

CO3: Learn to apply the various knowledge in the clinical field

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	L	M	M	H	H
CO2	M	H	M	H	H	M	H
CO3	H	H	H	M	H	L	M

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general actions of the drugs. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. The practical includes the study of drugs via presentations and viva voce.

Course Contents

Module 1: Prevalence, causes and prevention of cardiovascular diseases

Inflammatory heart Diseases: RHD
Heart failure- Causes, Types, symptoms and signs, diagnosis, management, prevention.
Arrhythmias- Brady and Tachyarrhythmia's, causes, diagnosis and management,
Heart blocks- and its types

Module 2

Atherosclerosis- Definition, risk factors, pathogenesis, Clinical significance and prevention.
Hypertension- Definition, causes, signs and symptoms, diagnosis, evaluation, management.
Angina- its types, infective endocarditis, myocarditis and pericarditis.
Pulmonary Hypertension -Definition, Causes, diagnosis and treatment.

Module 3

Core pulmonale, pulmonary TB, Pulmonary embolism,

Module 4

ACLS, BLS, Use of defibrillator

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books recommended

- Braunwalds
- Harrisons
- Davidsons

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title: Basic in Cardiac Technology			
Semester: III	**Course code: BCVT303**	**Credits: 6**	**Core / Elective: Core**
No. of lectures/ tutorials: 4/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction:

Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person 's physical, mental, social, emotional, environmental health and holistic well-being. The study of general medicine related to cardiovascular diseases helps them in putting into perspective the knowledge that they gain for better good of humanity.

Course Objectives:

This course is designed to provide the students the basic knowledge in pharmacology. At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied knowledge of various mechanism of actions of drugs.
2. Identify the indications and contraindications of various categories of the drugs with their structure.
3. Comprehend the basic idea of medication considerations of prescription and its prerequisites also its impacts on human body.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

CO1: Understand the various physiological and pathophysiological processes of the various cardiovascular diseases.

CO2: Understand the various disease processes and their signs and symptoms

CO3: Learn to apply the various knowledge in the clinical field

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	H	M	H	L	M
CO2	M	H	L	H	H	M	H
CO3	H	H	M	M	H	M	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general actions of the drugs. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. The practical includes the study of drugs via presentations and viva voce.

Course Contents

Module 1

Electricity & electro medical equipment & their safe guards -Basics of electricity & functioning of electro medical equipment, earthing& care of apparatus, Static electricity.
Intensive coronary unit & recovery room concepts.

Module 2

Cardiopulmonary resuscitation –Basic cardiac life support – Advanced cardiac life support
Management of Cardiac arrest- definition, causes, external cardiac message, artificial respiration & other drugs and procedures used in the management of cardiac arrest.
Cardiac monitoring –definition, purpose of cardiac monitoring, how to recognize various arrhythmias

Module 3

Use of Defibrillator-Indications, how to use the defibrillator, complications during the procedure & its management.
Radiation Hazard & safety
Personal protective equipment

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books recommended

Braunwalds
Harrisons
Davidso

Workshop (BCVT304)

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Workshop(TYPES OF STENT)**		
Semester: III	**Course code: BCVT304**	**Credits: 1**	**Core / Elective: Core**
No. of lectures/ tutorials: 1/Week		**No. of practical hours: NA**	
Course Pre-requisites: None			

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Summer training**		
Semester: III	**Course code: BCVT305**	**Credits: 6**	**Core / Elective: Core**
No. of lectures/ tutorials: 6/Week		**No. of practical hours: NA**	
Course Pre-requisites: None			

Summer Training Evaluation – I (BCVT305)

Assessment criteria

End Term (100)		**Total**
Class Performance	**Theory/ Practical/VIVA**	**100**
10	**90**	

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title: Cardiac Diseases- II			
Semester: IV	**Course code: BCVT401**	**Credits: 7**	**Core / Elective: Core**
No. of lectures/ tutorials: 6/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of electrocardiography will help them in their chosen profession and will be of immense use to the people.

Course Objectives:

This course is designed to provide the students the basic knowledge in electrocardiography. At the conclusion of the course, the students will have the knowledge of nomenclature of electrocardiogram terminologies. They will be able to appreciate different leads, normal electrocardiogram values and normal and abnormal waves.

Course Outcomes:

Upon successful completion of the course, the students should be able to (knowledge based):

Upon successful completion of the course, the students should be able to:

CO1: Understand the various heart structures with a backdrop of electrophysiology (Remember & Understand)

CO2: Compare the differences between the similar tracings on ECG and their relevance (Analyze)

CO3: Learn to apply the knowledge of various types of readings of ECG to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators and visiting hospitals for practical training (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	M	M	H	L	H
CO2	H	H	M	H	H	M	H
CO3	M	H	L	M	L	H	H
CO4	H	H	M	H	H	M	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course Contents and Duration

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1

Cardiomyopathies- Dilated Cardiomyopathy, Hypertrophic Cardiomyopathy, Restrictive Cardiomyopathy

Pericardial diseases- Acute Pericarditis, Pericardial effusion, Pericardial tamponade.

Module 2

Peripheral vascular diseases, deep vein thrombosis, Varicose vein, Raynaud's Disease, Disorders of aorta.

Module 3

Oxygen therapy, Nebulization, Stress management and ICU psychosis, post resuscitation care.

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books recommended

- Braunwalds
- Harrisons
- Davidsons

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title:	**Electrocardiography – I**		
Semester: IV	**Course code: BCVT402**	**Credits: 6**	**Core / Elective: Core**
No. of lectures/ tutorials: 6/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of electrocardiography will help them in their chosen profession and will be of immense use to the people.

Course Objectives:

This course is designed to provide the students the basic knowledge in electrocardiography. At the conclusion of the course, the students will have the knowledge of nomenclature of electrocardiogram terminologies. They will be able to appreciate different leads, normal electrocardiogram values and normal and abnormal waves.

Course Outcomes:

Upon successful completion of the course, the students should be able to (knowledge based):

Upon successful completion of the course, the students should be able to:

CO1: Understand the various heart structures with a backdrop of electrophysiology (Remember & Understand)

CO2: Compare the differences between the similar tracings on ECG and their relevance (Analyze)

CO3: Learn to apply the knowledge of various types of readings of ECG to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators and visiting hospitals for practical training (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD

CO1	H	M	M	M	H	L	H
CO2	M	H	M	H	M	M	H
CO3	L	H	M	H	H	L	H
CO4	H	H	M	H	H	M	L

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course Contents and Duration

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1

1. Nomenclature of ECG deflections – Electrocardiogram, Electrophysiology, Deflections, Intervals, Segments.
2. Electrocardiographic leads – Limb leads, Chest leads, Lead orientation, Einthoven triangle.
3. Electrocardiography grid – Electrocardiograph paper, Electrical field of the heart, Understanding normal ECG values, P wave, QRS complex, T wave, U wave, PR interval, QT interval, PR segment, ST segment.
4. Determination of electrical axis – Electrical axis, Hex axial system, QRS Axis.
5. Determination of heart rate – Focus of origin, Pattern of regularity, Atrio ventricul**ar** relationship**.**

Module 2

1. Abnormalities of the P wave – Normal P wave, Absent P wave, Inverted P wave, Changing P wave morphology, Tall P wave, Broad P wave.
2. Abnormalities of QRS complex – Normal QRS complex, Low voltage QRS complex, Alternating QRS voltage, Abnormal QRS axis, Fascicular block, Abnormal Q waves, Abnormally tall R waves, Abnormally deep S waves, Abnormally wide QRS complexes.
3. Abnormalities of the T wave – Normal T wave, Inverted T wave, Tall T wave.
4. Abnormalities of the U wave – Normal U wave, Prominent U wave, Inverted U wave.

Course References

- AtulLuthra,s ECG Made Easy

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title:	**Echocardiography – I**		
Semester: IV	**Course code: BCVT403**	**Credits: 6**	**Core / Elective: Core**
No. of lectures/ tutorials: 6/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of echocardiography will help them in their chosen profession and will be of immense use to the people.

Course Objectives:

This course is designed to provide the students the basic knowledge in electrocardiography. At the conclusion of the course, the students will have the knowledge of nomenclature of electrocardiogram terminologies. They will be able to appreciate different leads, normal electrocardiogram values and normal and abnormal waves.

Course Outcomes:

Upon successful completion of the course, the students should be able to (knowledge based):

Upon successful completion of the course, the students should be able to:

CO1: Understand the various heart structures with a backdrop of electrophysiology (Remember & Understand)

CO2: Compare the differences between the normal and abnormal Echocardiography and their relevance (Analyze)

CO3: Learn to apply the knowledge of various types of readings echocardiography and relate it to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making assignments visiting hospitals for practical training (Synthesize, evaluate & create).

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD

CO1	H	H	H	M	H	L	H
CO2	M	H	M	H	H	M	L
CO3	H	H	M	H	H	M	H
CO4	L	H	M	H	H	M	L

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course Contents and Duration

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1

Echocardiography- Basic principles of ultrasound, M-Mode Echocardiography, Two dimensional Echocardiography, Doppler Echocardiography, colour flow.
Echocardiography Instrumentation: Basic pulse Echo system, Transducer, Pulse generation, Echo detection, Echo displays, A mode, B mode, M-mode, Display & recording.
Echo-cardiographic Examination: Selecting transducers, Position of the patient, Placement of the transducer, setting control, M-Mode labeling, 2 D Echo, Normal variants, Terminology, Identification of segments, Doppler Echocardiography

Module 2

Echo in rheumatic heart Disease-Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, pulmonary hypertension, post MVR, Post AVR. Prosthetic valve Malfunction, LA clot.
Echo in congenital heart disease- Echo in ASD, VSD, PDA, pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF, Dextrocardia.
Echo in ischemic heart disease- Echo in acute myocardial infarction, old myocardial infarction & other ischemic heart disease related conditions, LV aneurysm.

Module 3

Echo in other cardiovascular disease- Echo in various types of Cardiomyopathy, infective endocarditis, diseases of aorta, mitral valve prolapse, myxoma& other cardiovascular diseases.

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end

term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books recommended

- Braunwalds
- Harrisons
- Davidsons
- ECHO made easy by AtulLuthra.

Workshop (BCVT)

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title: Workshop(ECHO)			
Semester: IV	**Course code: BCVT 404**	**Credits: 1**	**Core / Elective: Core**
No. of lectures/ tutorials: 1/Week		**No. of practical hours: NA**	
Course Pre-requisites: None			

Trans Disciplinary Learning

Assessment criteria

Mid Term (60)		**End Term (40)**	**Total**
Class Performance	**Theory**	**Theory**	**100**
10	**50**	**40**	

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Echocardiography – II**		
Semester: V	**Course code: BCVT501**	**Credits: 4**	**Core / Elective: Core**
No. of lectures/ tutorials: 3/ Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None		**No. of sessions: 60**	

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of echocardiography will help them in their chosen profession and will be of immense use to the people.

Course Objectives:

This course is designed to provide the students the basic knowledge in electrocardiography. At the conclusion of the course, the students will have the knowledge of nomenclature of electrocardiogram terminologies. They will be able to appreciate different leads, normal electrocardiogram values and normal and abnormal waves.

Course Outcomes:

Upon successful completion of the course, the students should be able to (knowledge based):

Upon successful completion of the course, the students should be able to:

CO1: Understand the various heart structures with a backdrop of electrophysiology (Remember & Understand)

CO2: Compare the differences between the normal and abnormal Echocardiography and their relevance (Analyze)

CO3: Learn to apply the knowledge of various types of readings echocardiography and relate it to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making assignments visiting hospitals for practical training (Synthesize, evaluate & create).

PO KEYWORDS	**Human cardiovascular system**	**Moral values**	**Cardiovascular disorder**	**Societal and legal issues**	**Modern tools and techniques**	**Lifelong learning and training**	**Management of CVD**

CO1	M	H	L	L	H	M	H
CO2	H	H	M	H	H	L	H
CO3	M	H	M	M	H	H	H
CO4	M	H	L	L	H	M	L

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1

- Trans esophageal echocardiogram- indications, procedures, usefulness & complications, one
- may encounter and its management.
- Stress Echo- procedure & indications.
- Fetal echocardiogram- procedure, basic interpretation

Module 2

- Peripheral Doppler- procedure & usefulness of peripheral Doppler
- Assessment of cardiac function- measurements of all cardiac chambers and assessment of
- cardiac function

Module 3

- Contrast Echo Cardiogram-Procedure & usefulness of Contrast Echo cardiogram.
- Myocardial Contrast Echo- Basic knowledge

Module 4

- Echo in pericardial disease-pericardial effusion, cardiac tamponade, constrictive pericarditis.
- 3D Echo
- Other latest developments in the field of Echocardiogram

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous

evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books recommended

- Braunwalds
- Harrisons
- Davidsons
- ECHO made easy by AtulLuthra.

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title:	**Electrocardiography – II**		
Semester: V	**Course code: BCVT502**	**Credits: 4**	**Core / Elective: Core**
No. of lectures/ tutorials: 3/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of Cardiac catheterization will help them in their chosen profession and will be of immense use to the people.

Course Objectives

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinCardiac catheterization. At the conclusion of the course, the students will have the knowledge of nomenclature of electrocardiogram terminologies. They will be able to appreciate different leads, normal electrocardiogram values and normal and abnormal waves.

Course Outcomes

Upon successful completion of the course, the students should be able to (knowledge based):

CO1: Understand the various heart structures with a backdrop of electrophysiology (Remember & Understand)

CO2: Compare the differences between the similar tracings on ECG and their relevance (Analyze)

CO3: Learn to apply the knowledge of various types of readings of ECG to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators and visiting hospitals for practical training (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular	Moral values	Cardiovascular disorder	Societal and legal	Modern tools and	Lifelong learning and training	Management of CVD
CO1	H	H	L	M	H	M	H

CO2	M	H	H	H	H	M	H
CO3	H	H	M	H	H	L	L
CO4	H	H	L	L	L	M	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1

1. Abnormalities of the PR segment – PR segment depression.
2. Abnormalities of the ST segment – ST segment depression, ST segment elevation.
3. Abnormalities of PR interval – Abnormalities of PR interval, Prolonged PR interval, Shortened PR interval, Variable PR interval.
4. Abnormalities of QT interval – Normal QT interval, Shortened QT interval, Prolonged QT interval.
5. Abnormalities in the rhythm of the heart – Premature beats, Pauses in regular rhythm, Fast regular and irregular rhythm, Slow regular and irregular rhythm.

Module 2

1. Miscellaneous cases diagnosed by ECG – LVH, LBBB, Hypokalaemia, Hyperkalaemia, Sick sinus syndrome, WPW syndrome, SVT, Atrial fibrillation, Ventricular tachycardia.
2. Reporting of ECG
3. ECG findings in specific situations – Absence of heart disease, Congenital heart disease, Valvular heart disease, Coronary artery disease, Myocardial disease, Pericardial disease, Pulmonary disease.

References

- AtulLuthra,s ECG Made Easy

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title:	**Cardiac catheterization – I**		
Semester: V	**Course code: BCVT503**	**Credits: 4**	**Core / Elective: Core**
No. of lectures/ tutorials: 3/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of Cardiac catheterization will help them in their chosen profession and will be of immense use to the people.

Course Objectives:

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinCardiac catheterization. At the conclusion of the course, the students will have the knowledge of nomenclature of electrocardiogram terminologies. They will be able to appreciate different leads, normal electrocardiogram values and normal and abnormal waves.

Course Outcomes

Upon successful completion of the course, the students should be able to (knowledge based):

CO1: Understand the various heart structures with a backdrop of electrophysiology (Remember & Understand)

CO2: Compare the differences between the abnormalities in the heart

CO3: Learn to apply the knowledge of various types of Cath studies in clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators and visiting hospitals for practical training (Synthesize, evaluate & create)

PO KEYWORDS	**Human cardiovascular system**	**Moral values**	**Cardiovascular disorder**	**Societal and legal issues**	**Modern tools and techniques**	**Lifelong learning and training**	**Management of CVD**
CO1	H	M	L	L	H	L	L
CO2	H	M	M	H	H	M	H

CO3	H	M	M	H	H	L	H
CO4	H	M	L	H	H	M	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week

Course contents

Module 1

Preparation for Cath procedure and post procedure care

Cardiac Catheterization laboratory- General details of Cardiac Catheterization equipment, how to handle the machine, common problems, one may come across and how to overcome it.

Module 2

Radiation hazards

Materials used in the Cath Lab- All catheters, balloons, guidewires, pacemakers, contrast materials &other materials used in the Cardiac Catheterization Laboratory and Sterilization of all these materials.

Module 3

Right heart Catheterization- procedure, Cath position, Oximetry at various levels, angiographies done & its interpretation

Left heart catheterization- procedure, Cath position, Oximetry at various levels, angiographies done & its interpretation.

Course Assessment

Course References

- Braunwalds

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Research Methodology and Biostatistics- I**		
Semester: V	**Course code: BCVT504**	**Credits: 2**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of research methodology will help them in their chosen profession and will be of immense use in the same.

Course Objectives:

This course is designed to provide the students the basic knowledge in research process and Bio-statistics. At the conclusion of the course, the students will have the knowledge of data collection, statistical application and finally, presentation of the statistical data. The first part shall be conducted in second semester and second part shall be covered in third semester

Course Outcomes:

Upon successful completion of the course, the students should be able to (knowledge based):

Upon successful completion of the course, the students should be able to:

CO1: Understand the needs of research in clinical field of cardiology

CO2: Understand the difference between the various types of research methodologies.

CO3: Understand the various types of data collecting methods.

CO4: Understand and learn about the knowledge of research to be used in clinical areas.

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	L	M	H	L	M
CO2	M	H	L	M	M	H	H

CO3	H	H	M	H	H	L	M
CO4	H	H	L	L	H	M	L

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1: Need for Research in the field of cardiology. Introduction to research methods, conducting a literature review, Research design, Sampling methods, Data collection and data collection tools, Data analysis: Quantitative and Qualitatively, Public health research, Issues in Research of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module 2: Introduction of epidemiology, Descriptive epidemiology, Experimental and non-experimental research designs, Screening, Sampling methods, Biological variability, normal distribution

Module 3: Bias and Confounding, Association and causation, Odds ratio and relative risk, sensitivity and specificity Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction,

Course References

1. Research Methodology: Kothari
2. Methods in Biostatistics by B.K Mahajan
3. Probability and Statistics by Murray
4. Research Methodology by SM Israni

Workshop (BCVT)

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title: Workshop(INVASIVE PROCEDURE)			
Semester: IV	**Course code: BCVT 505**	**Credits: 1**	**Core / Elective: Core**
No. of lectures/ tutorials: 1/Week		**No. of practical hours: NA**	
Course Pre-requisites: None			

Summer Training Evaluation - II (BCVT506)

Assessment criteria

End Term (100)		Total
Class Performance	**Theory/ Practical/VIVA**	**100**
10	**90**	

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title:	**Cardiac catheterization- II**		
Semester: VI	**Course code: BCVT601**	**Credits: 8**	**Core / Elective: Core**
No. of lectures/ tutorials: 7/Week		**No. of practical hours: 2/Week**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of Cardiac catheterization will help them in their chosen profession and will be of immense use to the people.

Course Objectives:

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinCardiac catheterization. At the conclusion of the course, the students will have the knowledge of nomenclature of electrocardiogram terminologies. They will be able to appreciate different leads, normal electrocardiogram values and normal and abnormal waves.

Course Outcomes

Upon successful completion of the course, the students should be able to (knowledge based):

CO1: Understand the various heart structures with a backdrop of electrophysiology (Remember & Understand)

CO2: Compare the differences between the similar tracings on ECG and their relevance (Analyze)

CO3: Learn to apply the knowledge of various types of readings of ECG to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making models, charts and learning on simulators and visiting hospitals for practical training (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	H	H	L	M	M
CO2	H	H	L	M	H	L	H

CO3	H	H	M	H	H	L	L
CO4	M	M	L	L	H	M	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications..

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1

Coronary Angiogram-procedure, materials used, complications one may encounter and how to manage it, type & amount of dye used, indications & contra indications, various pictures recorded in various angles and gross interpretation.
Peripheral Angiogram- procedure, indication & contra indication

Module 2

Angioplasty of coarctation of aorta
Valvuloplasties- procedure, indications, complications and preparation of balloons, mitral Valvuloplasties, balloon aortic Valvuloplasties, Balloon pulmonary Valvuloplasties& Balloon tricuspid Valvuloplasties,

Module 3

Coil closure & device closure of PDA- procedure, indications & materials used for coil & device closure of PDA
Device Closure of ASD- procedure, indications & materials used for device closure of ASD
Device Closure of VSD procedure, indications & materials used for & device closure of VSD
Electrophysiological studies-basic knowledge of electrophysiological studies

Module 4

Electrophysiological studies, pacemaker insertion.

Course References:

- Braunwalds

Sushant University soaring high	**School of Health Sciences** **B. Sc. Cardiovascular Technology**

Course Title:	**Research Methodology and Biostatistics-II**		
Semester: VI	**Course code: BCVT602**	**Credits: 2**	**Core / Elective: Core**
No. of lectures/ tutorials: 2/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of research methodology will help them in their chosen profession and will be of immense use in the same.

Course Objectives:

This course is designed to provide the students the basic knowledge in research process and Bio-statistics. At the conclusion of the course, the students will have the knowledge of data collection, statistical application and finally, presentation of the statistical data. The first part shall be conducted in second semester and second part shall be covered in third semester

Course Outcomes

Upon successful completion of the course, the students should be able to (knowledge based):

CO1: Understand the various research methodology (Remember & Understand)

CO2: Compare the differences between the central tendency and measures of dispersion.

CO3: Learn to apply the knowledge of various types of research to clinical aspect of diseases (Apply &Analyze)

CO4: Augment their learning by making abstracts, charts, diagrams, graphs and learning on visiting hospitals for practical skills in research methods (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	H	L	M	H	L	H
CO2	M	H	M	L	H	M	M
CO3	H	H	M	M	H	L	H
CO4	H	H	L	L	H	L	H

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module 1: Critical analysis of research papers, conducting a literature review, Writing Research proposals, Development of conceptual framework in research

Module 2: Introduction to Biostatistics

Introduction to Statistics, Classification of data, Source of data, Method of scaling - nominal, ordinal, ratio and interval scale, measuring reliability and validity of scales, Measures of Central tendency, Measures of Dispersion, Skewness and kurtosis, Sampling, Sample size determination, Introduction and method of collecting and presenting of statistical data. Calculation and interpretation of various measures like mean, median, standard deviations, Skewness and Kurtosis, Probability distribution, Correlation and regression Significance tests and confidence intervals

Course References

- Research Methodology: Kothari
- Methods in Biostatistics by B.K Mahajan
- Probability and Statistics by Murray
- Research Methodology by SM Israni

Workshop (BCVT)

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Workshop(NON INVASIVE)**		
Semester: IV	**Course code: BCVT603**	**Credits: 1**	**Core / Elective: Core**
No. of lectures/ tutorials: 1/Week		**No. of practical hours: NA**	
Course Pre-requisites: None			

School of Health Sciences **B. Sc. Cardiovascular Technology**			
Course Title:	**Hospital Management**		
Semester: VI	**Course code: BCVT605**	**Credits: 5**	**Core / Elective: Core**
No. of lectures/ tutorials: 5/Week		**No. of practical hours: Nil**	
Course Pre-requisites: None			

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of research methodology will help them in their chosen profession and will be of immense use in the same.

Course Objectives:

This course is designed to provide the students the basic knowledge in research process and Bio-statistics. At the conclusion of the course, the students will have the knowledge of data collection, statistical application and finally, presentation of the statistical data. The first part shall be conducted in second semester and second part shall be covered in third semester

Course Outcomes

Upon successful completion of the course, the students should be able to (knowledge based):

CO1: Understand the importance of hospital management (Remember & Understand)

CO2: Compare the differences between the roles and responsibilities of clinical manager.

CO3: Learn to apply the knowledge of management and administration in clinical areas and managing causalities. (Apply &Analyze)

CO4: Augment the learning by making assignments, charts, flow diagrams of various organizational charts by visiting hospitals for practical skills in hospital management. (Synthesize, evaluate & create)

PO KEYWORDS	Human cardiovascular system	Moral values	Cardiovascular disorder	Societal and legal issues	Modern tools and techniques	Lifelong learning and training	Management of CVD
CO1	H	M	L	M	H	L	H
CO2	H	H	M	H	H	L	H
CO3	H	H	M	H	H	M	H

CO4	H	M	L	L	H	M	L

HIGH – H MEDIUM- M LOW – L

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

Course contents

Module I: Concept of Healthcare Management

Concepts of management, scopes of management, nature of management, characteristics of management, need of management, difference between management and administration, levels of management, management skills, managerial roles.

Module II: Functions and factors of management

Elements of management process, classification of management functions, factors affecting management (environmental and financial factors), functions of good manager, common characteristics of successful manager.

Module III: Clinical manager

Qualities of good manager, clinical responsibilities of a manager, roles and responsibilities of manager, essential skill required for clinical cardiac manager, common problems faced by clinical cardiac manager.

Module IV: Hospital, ward, and patient care unit management

Objectives, scopes, functions, steps of hospital planning,

Hospital facility planning, design and development,

Cardiac unit environment, basic components of environment, influence of external environment, furnishing patient care unit.

Organization principal in ward/ recovery room management, factors influencing ward management.

Module V: Emergency department/ services

Concepts of emergency care, function of emergency care, infrastructure and design of casualty, staffing pattern of emergency room, managerial issues of in emergency room, medico legal aspects of emergency department, Triage, roles of clinical manager in emergency department.

Module VI: Effective communication

Communication, concept, modes, barriers, methods, importance, roles and responsibilities of cardiac technician in effective communication.

Course Assessment

Mid Term (40)		End Term (60)	Total
Class Performance	Theory	Theory	
10	30	60	100

Course References

1. Essential of management in nursing, I Clement, Elsevier publication.
2. www. Wikipedia. in
3. www.slideshare.in

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Clinical Training – V / Internship – I**		
Semester: VII	**Course code: BCVT701**	**Credits: 15**	**Core / Elective: Core**

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Research Project**		
Semester: VII	**Course code: BCVT702**	**Credits: 10**	**Core / Elective: Core**

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Clinical Training – VI / Internship – II**		
Semester: VIII	**Course code: BCVT801**	**Credits: 15**	**Core / Elective: Core**

	School of Health Sciences **B. Sc. Cardiovascular Technology**		
Course Title:	**Research Project**		
Semester: VII	**Course code: BCVT802**	**Credits: 10**	**Core / Elective: Core**