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

(Applicable to students admitted in the academic year 2024-25)

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

Programme Handbook - M.Sc. Cardiovascular Technology (M.Sc. CVT)

PRELIMINARY DEFINITIONS AND NOMENCLATURE

In this document, unless the context otherwise requires:

1. "**Programme**" means Degree Programme that is M.Sc. Cardiovascular Technology (M.Sc. CVT) Degree Programme.
2. "**Discipline**" means M.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"** means Sushant 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

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1. ADMISSION

1.1. Candidates seeking admission to the first semester of the fourth semester M.Sc. CVT Degree Programme: Should have passed (with 50% marks in B.Sc. CVT) from any recognized university.

2. STRUCTURE OF PROGRAMME

2.1. Credits requirement

Minimum credit requirement is 100 credits for a student to be eligible to get post 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:

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. Students from diverse educational background will be acquainted with fundamental concepts of the discipline of Cardiovascular Technology.

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 in 4th semester. The report of which under the industry as well as faculty mentor to be submitted.

2.7. 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 least 75% 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, authorize 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	Mrs. Kanika Bhardwaj
2.	3rd 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. Adnan Bhat	Assistant Professor, CVT
	Ms. Neelu	Assistant Professor, CVT
Members	Ms. Akshara	MCVT 1st Semester

	Ms. Vanshika	MCVT 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. Adnan Bhat ,Ms. Neelu	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 2 student representatives (usually 1 boys and 1 girl) 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- Invasive/ Non Invasive cardiology Internship 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. Exam Duration

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

9.5. 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.

9.6. 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.

9.7. Methods for Readressal 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.

9.8. 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.

9.9. 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:

i.)For M.Sc CVT total duration of the programme will be n+1 years.

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

9.10. 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:

$$SGPA = \frac{\text{Grade points secured in the Semester}}{\text{Associated Credits in the Semester}}$$

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:

$$CGPA = \frac{\text{Cumulative Grade points secured in all the previous Semester(s) including the Current Semester}}{\text{Associated Credits in the previous Semester(s) including the current Semester}}$$

CGPA to Percentage Conversion Formula is given below:

Percentage (%) = CGPA (X) 10

9.11. Eligibility for the Award of the Degree

A student shall be declared to be eligible for the award of the M.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.

9.12. 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

9.13. 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 – M.Sc. CVT
Duration of the Program – 02 Years
Total Semesters – 04 Semesters
Total Credits of the Program – 100 Credits

FIRST SEMESTER

Course Code	Course Title	L/T	P	Total Credits
24MCVT101	Infection Control Measures, policies and Procedures	4	2	5
MCVT102	Electrocardiography	4	2	5
MCVT103	Echocardiography	4	2	5
MCVT104	Anatomy, Physiology, Pathology of Lungs and Heart	2	2	3
MCVT105	Basics of Perfusion Technology	3	2	4
MCVT106	Teaching Methodology	2		2
MCVT107	Personality Development – I	1	-	1
MCVT108	Workshop	1(T)	-	1
	Total	**21**	**10**	**26**

L – Lecture
T- Tutorial
P- Practical

SECOND SEMESTER

Course Code	Course Title	L/T	P	Total Credits
24MCVT201	Recent Advances in Interventional Cardiology	4	2	5
24MCVT202	Patient Right, Consent and Medical Ethics	4	-	4
MCVT203	Advanced Perfusion Techniques	3	2	4
MCVT204	Electrophysiology and Cardiac Pacemakers	3	2	4
MCVT205	Preventive Cardiology	3	-	3
MCVT206	Research Methodology – I	2	-	2
24MCVT207	Invasive and Non invasive cardiology	3	2	4
	TDCC	2	-	2
	Total	**24**	**8**	**28**

THIRD SEMESTER

Course Code	Course Title	L/T	P	Total Credits
MCVT301	Research Methodology – II	2	-	2
MCVT302	Cath and Intervention in Ischemic and Valvular Heart Diseases	4	2	5
MCVT303	Cath and Intervention in Congenital Heart Diseases	4	2	5
MCVT304	Cath and Intervention in Myocardial and Pericardial Diseases	4	2	5
MCVT305	Summer Training Evaluation	-	-	4
MCVT306	Workshop	1	-	1
MCVT307	Synopsis Presentation	-	2	1
	TDCC	2	-	2
	Total	**17**	**8**	**25**

FOURTH SEMESTER

Course Code	Course Title	L/T	P	Total Credits
24MCVT401	Clinical Training / Internship	-	30	15
24MCVT402	Project and Dissertation	-	12	6
	Total	**-**	**42**	**21**

Note: During second semester 2 days of institutional training and 3 days of clinical training in the hospital including Saturday.

L – Lecture
T- Tutorial
P- Practical

M.Sc.Cardiovascular Technology [MCVT]
School of Health Sciences
Sushant University

M.Sc. Cardiovascular Technology

Duration- Two Years

Batch (2024-26)
Total Credits: 100

Eligibility for admission:
B. Sc. Cardiovascular Technology or B.sc Cardiac Care Technology or Equivalent with 5 CGPA.

Duration of the course:
Duration of the course: 2 years or 4 semesters.

Medium of instruction:
English shall be the medium of instruction for all the subjects of study and for examination of the course.

Attendance:
A candidate has to secure minimum-

1.75% attendance in theoretical
2.80% in Skills training (practical) for qualifying to appear for the final examination.

Assessment:
Assessment should be completed by the academic staff, based on the compilation of the student's theoretical &clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated.

Credit details:

10 hour lecture per semester	1 credit
10hours of tutorials per semester	1 credit
20 hours of practical per semester	1 credit
30 hours of self-guided clinical training per semester	1 credit

Program Educational Objectives (PEO)

The **M.Sc. Cardiovascular Technology (CVT) program** aims to equip students with the knowledge, skills, and competencies required to excel in the field of cardiovascular technology. Post 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, post 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 : M.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 : Post Graduates 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 : Post Graduates 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 : Post 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 **M.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. Post 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:M.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 **M.Sc. Cardiovascular Technology (CVT) program** prepares Post 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. Post 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)**

FIRST SEMESTER

Course Code	Course Title	L/T	P	Total Credits
24MCVT101	Infection Control Measures, policies and Procedures	4	2	5
MCVT102	Electrocardiography	4	2	5
MCVT103	Echocardiography	4	2	5
MCVT104	Anatomy, Physiology, Pathology of Lungs and Heart	2	2	3
MCVT105	Basics of Perfusion Technology	3	2	4
MCVT106	Teaching Methodology	2		2
MCVT107	Personality Development – I	1	-	1
MCVT108	Workshop	1(T)	-	1
	Total	**21**	**10**	**26**

L – Lecture
T- Tutorial
P- Practical

SECOND SEMESTER

Course Code	Course Title	L/T	P	Total Credits
24MCVT201	Recent Advances in Interventional Cardiology	4	2	5
24MCVT202	Patient Right, Consent and Medical Ethics	4	-	4
MCVT203	Advanced Perfusion Techniques	3	2	4
MCVT204	Electrophysiology and Cardiac Pacemakers	3	2	4
MCVT205	Preventive Cardiology	3	-	3
MCVT206	Research Methodology – I	2	-	2
24MCVT207	Invasive and Non invasive cardiology	3	2	4
	TDCC	2	-	2
	Total	**24**	**8**	**28**

THIRD SEMESTER

Course Code	Course Title	L/T	P	Total Credits
MCVT301	Research Methodology – II	2	-	2
MCVT302	Cath and Intervention in Ischemic and Valvular Heart Diseases	4	2	5
MCVT303	Cath and Intervention in Congenital Heart Diseases	4	2	5
MCVT304	Cath and Intervention in Myocardial and Pericardial Diseases	4	2	5
MCVT305	Summer Training Evaluation	-	-	4
MCVT306	Workshop	1	-	1
MCVT307	Synopsis Presentation	-	2	1
	TDCC	2	-	2
	Total	**17**	**8**	**25**

FOURTH SEMESTER

Course Code	Course Title	L/T	P	Total Credits
24MCVT401	Clinical Training / Internship	-	30	15
24MCVT402	Project and Dissertation	-	12	6
	Total	**-**	**42**	**21**

	Sushant School of Health Sciences M.Sc. CVT

Course Title: Infection Control Measures, policies and Procedures			
Semester: IV	**Course Code: 24MCVT101**	**Credits:05**	**Core/Elective: Core**
No. of Lectures/Tutorial :4	**No. of Practical Hours:2**		
Course Pre-Requisites: NA			

Note: During second semester 2 days of institutional training and 3 days of clinical training in the hospital including Saturday.

L – Lecture
T- Tutorial
P- Practical

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

46. Foundation Core	47. Foundation Skill	48. Professional Core	49. Professional Skill	50. Premier Skill

Course Objectives

The main objective of this course is to teach students quality measures to provide patients with effective methodsoftreatmentwithmorefocusonproperhandlingofinfectedspecimensandpropertreatment with beststerilizedanddisinfectedmeanstoreducethecross-infectionscenarioandnosocomialinfections, which occursduetopoorhandlingofinfectedspecimensandimproperdisposalmeanspollutingenvironmenttoo. 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

Uponsuccessfulcompletionofthecourse,thestudentsshouldbeableto:

CO1: Understoodeffectivehandhygiene,preventionandcontrolofcommonhealthcare associated infections. (Remembering Based)

CO2: Understoodproperdisposalsofbiomedicalwaste,reducingriskofinfectiontowas handling personnelandcross infectionwhichcanoccurdueto improperhandlingofinfected waste polluting surroundings too. (Applying Based)

CO3: Learnaboutthecommoninfectionsinthehealthcare environment

CO4:learnaboutthepersonalprotective techniques

CO5: Augmenttheir learningbymakingmodels,chartsandlearningonsimulators(Synthesize,evaluate & create)

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the circulatory systemandbloodvesselssupplyingtotheheartmuscleinamanneraimedatbeingstudentfriendly.Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotonyof the subject. Regulardoubtclearingsessions,writtenassignments,quiz,chartandpostermakingandmodelmakingare someofthemeasuresforlearning.Periodicandsurprisetestsaretakentoappriseandevaluatethestudents. 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.

Note: For working professionals, this course also provides you with more flexibility than a traditionalon-campusclass through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module1
Introduction:Scope,Purpose

EpidemiologyofHealthcare-Associated Infections:MostCommonHAISites,EpidemiologicalTriad of HAI within a healthcare setting Routes of transmission
Infection Control Programme: Rationale &Aims: OrganizationInfection controlresponsibility ofdifferentstakeholders AntimicrobialManagementProgram,Educationalprograms andstrategies,NotificationRecommendationsandGuidelines

Module2

PreventionofHealthcare-AssociatedInfectionsMeasuresforPreventionofInfectionsofmost common healthcare-associated infections.
Proposed methods of disinfection of commonly used articles / material/surfaces.
Differential nosocomial infection risk by patient and interventions ,Reducing person-to-person transmission

Standard and transmission based precautions ,Standard Precautions Hand washing ,Personal protectiveequipmentPatientCareEquipment,.UrineandFecesEnvironmentControl ,Patient Transport Laboratory Specimens ,Wastes Laundry Visitors, Transmission-Based Precautions Contact precautions ,Droplet precautions Airborne precaution , Environment:. Buildings. Segregation of different areas in the hospitals , Ventilation Operating theatres, Ultra-clean air , Water Waste.

Module3

Influence of Facility design on Healthcare-associated infection ,Filtration System: Ventilation systems and airflow control, Healthcare flooring & furnishing ,Furnishing , Water supplysystem

Healthcare associated infection surveillance: Role of surveillance in reducing HAI ,Aim& Objectives Strategy Methods of Surveillance ,Organization for efficient surveillance ,Implementation of surveillance

Investigation of a Healthcare-Associated Infections outbreak, Objectives Steps in investigation of an outbreak , Health-care facility preparedness planning for acute respiratory infection epidemics

Module4

Sterilizationanddisinfection

BiomedicalWaste Management

Antimicrobialuseandantimicrobialresistance,Measurestocontrolspreadofantibioticresistance,Chemoprophylaxis, Role ofthemicrobiologylaboratory, Controlofspreadofspecific organisms-MRSA, VRE, MDR GNB ,Antibiotic stewardship

AntimicrobialStewardship

Preventing infections amongst Health care workers , Pre-employment screening, Post-exposure prophylaxis
TranslatingInfectionControlGuidelinesintoPractice

CourseAssessmentScheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodictestsandsurprisetestswillbeconducted. Studentswillhaveto submit writtenassignments, make chartsandposters,makemodels,andconductquizforthetopics.Practicalwillbeconductedwithviva.

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Electrocardiography			
Semester: I	**Course Code: MCVT102**	**Credits: 05**	**Core/Elective: Core**
No. of Lectures / Tutorial: 4	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

1. Foundation Core	2. Foundation Skill	3. Professional Core	4. Professional Skill	5. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge and key terms related to electrocardiography.

1. Understand the electrical conduction system of the heart and the purpose of standardization of the ECG
2. Identify the 12 leads of an ECG and describe what area of the heart each lead represents.
3. Understand the genesis of normal and abnormal ECG
4. Understand the various types of ECGs, their capabilities and procedure

Course Learning Outcomes

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

CO1: Identify the basic and abnormal components of ECG

CO2: Understand what the ECG measures and what the traces represent

CO3: Recognize the diverse range of indications for ECG recording

CO4: Have acquired a methodical approach to accurate 12 – Lead ECG recording

CO5: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the circulatory system and blood vessels supplying to the heart muscle 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus classthrough blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Nomenclature of ECG deflections – electrocardiogram, electrophysiology, Deflections, Intervals and Segments
- Electrocardiographic leads and placement – Limb Leads, Chest Leads, Lead Orientation and the Einthoven Triangle, reducing artifact
- ECG grid and normal values, determination of electrical axis and heart rate

Module 2

- ECG abnormalities – Infarction and Ischemia
- Disorders of cardiac rhythm –Basic Principles, Sinus Rhythm, Ectopic Atrial Rhythms, Atrioventricular Nodal Rhythms, Ventricular Rhythms, Sinoatrial block, Atrioventricular block, Reciprocal rhythm, Supraventricular tachycardias
- Common equipment's and medicines used in cardiac catheterization laboratory

Module 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.
- Determination of electrical axis – Electrical axis, Hex axial system, QRS Axis.
- Determination of heart rate – Focus of origin, Pattern of regularity, Atrio ventricul**ar** relationship**.**

Module 4

- Abnormalities of the P wave – Normal P wave, Absent P wave, Inverted P wave, Changing P wave morphology, Tall P wave, Broad P wave.
- 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.
- Abnormalities of the T wave – Normal T wave, Inverted T wave, Tall T wave.
- Abnormalities of the U wave – Normal U wave, Prominent U wave, Inverted U wave.

Practical:

- To determine ECG.
- To study systematic interpretation of ECG.
- To study the standard 12 lead ECG demonstration.
- To study techniques and interpretation of ECG.
- To study types of ECG machines.
- To study abnormalities of P wave.
- To study abnormalities of QRS complex.
- To study abnormalities of T wave.
- Case study.
- Case study.

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. ECG Made Easy by AtulLuthra
2. The ECG in Practice, International Edition by Hampton

Online references:

https://books.google.co.in/books/about/ECG_Made_Easy.html?id=z8TVdRbku70C
https://www.primemedicaltraining.com/12-lead-ecg-placement/

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Echocardiography			
Semester: I	**Course Code: MCVT103**	**Credits: 05**	**Core/Elective: Core**
No. of Lectures / Tutorial: 4	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

1. Foundation Core	2. Foundation Skill	3. Professional Core	4. Professional Skill	5. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge and key terms related to echocardiography.

1. Understand the basic aspects of cardiac ultrasound, physical principles, instrumentation, cardiovascular anatomy, cardiovascular physiology, and cardiovascular pathophysiology.
2. Become familiar with the technical performance, interpretation, strengths, and limitations of 2D echocardiography and Doppler
3. Learn how to correlate the findings from the echocardiographic and Doppler exam with the results of other imaging modalities and physical examination

Course Learning Outcomes

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

CO1: Knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology

CO2: Demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation

CO3: Demonstrate and understanding of clinical echocardiographic diagnostic procedures and testing

CO4: Identify normal and abnormal cardiovascular structure and function, including ventricular function, wall motion abnormalities, and valvular lesions

CO5: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the circulatory system and blood vessels supplying to the heart muscle 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus classthrough blended learning. This means you can do your coursework around your work schedule and family life.

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

- Principles of Ultrasound and Doppler, conventional echo, colour Doppler echo and echo windows
- Normal views and values, ventricular dysfunction, LV segments
- Echo findings in Cardiomyopathies – Dilated cardiomyopathy, Restrictive Cardiomyopathy and Hypertrophic Cardiomyopathy
- Echo findings in Rheumatic Heart Disease

Module 3

- Echo findings in Coronary Artery Diseases, Regional Wall Motion Abnormality
- Echo in systemic and pulmonary hypertension, aortic diseases
- Echo findings in Congenital Heart Diseases –VSD, ASD, PDA,TOF, Eisenmenger reaction
- Echo findings in pericardial diseases, intra-cardiac masses.

Module 4

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

Practical:

1. To Study and understand the principles of Ultrasound and Doppler.
2. To understand the introduction, significance and clinical applications of Conventional ECHO.
3. To Understand the Color Doppler ECHO with principles and applications.
4. To identify the Transthoracic ECHO Windows with types of transducers and patient positions.
5. To understand and study the normal values of cardiac chambers and ECHO views.
6. To identify and study Trans-Esophageal ECHO with views, probe, patient Safety-management and protocols to be followed before and after the procedure.
7. Case Study.
8. Case Study.
9. Case Study.
10. Case Study.

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.

Assessment Criteria

Mid Term (40)			End Term (60)	Total
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Echo Made Easy by AtulLuthra
2. Feigenbaum's Echocardiography

Online references:

https://books.google.co.in/books/about/Echo_Made_Easy.html?id=4rhEDwAAQBAJ&redir_esc

=y
https://epdf.pub/feigenbaum-echocardiography-sixth-edition.html

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Anatomy, Physiology, Pathology of Heart and Lungs			
Semester: I	**Course Code: MCVT104**	**Credits: 02**	**Core/Elective: Core**
No. of Lectures / Tutorial: 2			
Course Pre-Requisites: NA			

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, physiology, pathology of heart and lungs. 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 heart and lungs
2. Comprehend the blood vessels supplying blood to heart, aorta and its branches, cardiac cycle, components of heart beat, pericardium, coronary artery and its branches, pulmonary and systemic circulation
3. Comprehend the heart sounds, organization of the respiratory system, Blood pressure, gross structure and features of trachea and bronchial tree

Course Learning Outcomes

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

CO1: Understand the cardiovascular and respiratory system 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)

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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus classthrough blended learning. This means you can do your coursework around your work schedule and family life.

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. **Respiratory system** - Lungs, Bronchial Tree, Respiratory movements, Definitions and Normal values of Lung volumes and Lung capacities, applied pathology, pleural diseases, examination of Respiratory system to count respiratory rate and measure inspiration and respiration, pleural diseases

Module 2

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

Module 3

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 4

1. **Cardiovascular system** - Surface anatomy of heart, chambers of the heart, valves of the heart, major blood vessels of heart, pericardium, coronary arteries, Physiology of the heart, Heart sounds, Cardiac cycle, Cardiac output, Auscultatory areas, and Hypertension, Measurement of human blood pressure.

2. **Infectious diseases**- General principles of microbial pathogenesis Viral Infections, Bacterial infections- Rheumatic heart disease, Fungal infections, Parasitic infections

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Basics of Perfusion Technology			
Semester: I	**Course Code: MCVT105**	**Credits: 04**	**Core/Elective: Core**
No. of Lectures / Tutorial: 3	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

6. Foundation Core	7. Foundation Skill	8. Professional Core	9. Professional Skill	10. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge and key terms related to perfusion technology

1. Understand themechanism and regulation of respiration, principles of gaseous exchange, physics of ventilation, brief concepts of artificial ventilation
2. Learn the basics of Perfusion Technology, laboratory investigations in relation to perfusion technology, monitoring and instrumentation
3. Comprehend the physiology of extra – corporeal circulation, perfusion equipment, support of cardiac operation theatre techniques, blood transfusion techniques

Course Learning Outcomes

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

CO1: Knowledge and understanding of mechanism and regulation of respiration, principles of gaseous exchange and physics of ventilation.

CO2: Understanding of the concepts of artificial ventilation, various types of oxygenators and pumps

CO3: Knowledge and understanding of basics of heart lung machine, connection of vascular

system and extracorporeal circulation

CO4: Knowledge and understanding of laboratory investigations in relation to perfusion technology

CO5: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the circulatory system and blood vessels supplying to the heart muscle 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus classthrough blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Principles of gaseous exchange, Physics of ventilation
- Various types of oxygenators and pumps
- Brief concepts of artificial ventilation

Module 2

- Basics of heart lung machine, IABP
- Introduction to perfusion technology
- Laboratory investigations in relation to perfusion technology

Module 3

- Monitoring and instrumentation, physiology of extra – corporeal circulation, perfusion equipment
- Support of cardiac operation theatre techniques, blood transfusion techniques

Module 4

- **CannulationTechniquesin CardiopulmonaryBypass-Tounderstandthetypesofcannulaeand its sizes.**
- **Generalsurveyofcircuit-Tounderstandtheheparincoatedcircuitandtypesofcircuits**
- **Aorticandvenouscannulation-Tounderstandthedifferencebetweenaorticandvenouscannulationsites**

Practical:
Machines:pumps,oxygenators
heatexchangers,

blood pumptheory

BloodPumps,

Circuit

CannulationTechniquesinCardiopulmonaryBypass,

Generalsurveyofcircuit,

cannulationtechniques,aorticandvenouscannulation,

Bloodhandling

Pump drugs

Priming solutions

-
-

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Cardiac surgery – by Kirklin and BarratBoyes – 4th edition
2. Cardiac Surgery In Adults – by Lawrence H. Cohn – 4th edition
3. A Practical Approach To Cardiac Anesthesia - by Glenn p. Gravlee
4. Kaplan's Cardiac anaesthesia – by Kaplan Reich Sarino – 6th edition
5. Cardiopulmonary Bypass - by Gravlee – 3rd edition.
6. Cardiopulmonary bypass – by Sunit Ghosh – 1st edition

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Teaching Methodology			
Semester: I	**Course Code: MCVT106**	**Credits: 02**	**Core/Elective: Core**
No. of Lectures / Tutorial: 2			
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

11. Foundation Core	12. Foundation Skill	13. Professional Core	14. Professional Skill	15. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge and key terms related to qualitative teaching, teaching methodology and learning.

1. Develop the presentation skills & teaching ability among students.
2. To help students to discuss concepts
3. To encourage students in detail studies and analysis of the subject taught
4. To make students aware of the recent trend in the subject taught

Course Learning Outcomes

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

CO1: Knowledge and better understanding of the course, various types of teaching methods
CO2: Understanding of the concepts of qualitative teaching, teaching methodology and learning
CO3: Understanding of practical skills related to the specialization
CO4: Develop interest in academics
CO5: Able to conduct lectures in the class, hospitals & in the laboratories.

Course Pedagogy

Teaching is the best way of practicing knowledge skills. This course will help students to understand the courses better & develop teaching skills. It also develops an interest in academics,

deeper understanding and strengthens the ability to convert knowledge and understanding of the course into the application. 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.Lecture demonstrations in the class, hospitals & in the laboratories.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus classthrough blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Teaching strategies classification (teacher controlled, interactive procedure, learning controlled, group controlled, clinical method)
- Lecture methods – planning, delivery, advantages & disadvantages
- Discussion methods – advantages and disadvantages

Module 2

- Seminar – types of seminar, requirements and roles, advantages and limitations
- Workshop – characteristics of workshop, strengths and weaknesses
- Symposiums – characteristics, scope, advantages and disadvantages

Module 3

- Micro teaching – characteristics and skills, phases, advantages and limitations
- Details of various teaching methods
- Lecture method
- Discussion method
- Demonstration methods

Module 4

Off line vs online methods

-

Practical:

-

-

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.

Assessment Criteria

Mid Term (40)			End Term (60)	Total
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference link:

https://epdf.pub/language-teaching-methodology-a-textbook-for-teachers.html
https://www.educatorstechnology.com/2012/06/best-9-free-websites-that-offer-free.html
http://www.publicbookshelf.com/education/

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Personality Development-I			
Semester: I	**Course Code: MCVT107**	**Credits: 01**	**Core/Elective: Core**
No. of Lectures / Tutorial: 1			
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

16. Foundation Core	17. Foundation Skill	18. Professional Core	19. Professional Skill	20. Premier Skill
		✓		

Course Objectives

This course is aimed at the promotion of the strategies for the personality development of the participants. The rationale behind this endeavor is the recognition of the multifaceted influence of the personality of the employees upon organizational effectiveness.

1. Bring about personality development with regard to the different behavioral dimensions that have far reaching significance in the direction of organizational effectiveness
2. Become self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills.
3. Aims at grooming the participants through sensitizing them about proper behavior, socially and professionally, in formal and informal circumstances.

Course Learning Outcomes

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

CO1: Gain insight into their *personality* type and communication preferences, facilitate critical thinking and analysis of activities and attitudes that support company’s success.

CO2: Understanding of the method of *developing* necessary characteristics that make up the overall *personality* of an individual.

CO3: Comprehend conversations and speeches, speak with clarity and confidence, thereby enhancing their employability skills.

CO4: Identify his/her creative self, and express effectively the same in writing
CO5: Explain the advantages of teamwork and how the tasks could be completed effectively when done as a cohesive unit.

Course Pedagogy

The training is conducted in a very informal, interesting, and interactive manner, which gives ample scope for the students to interact with each other and face a wide variety of issues, topics, and situations that they are likely to come across as employees in future.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.Lecture demonstrations in the class, hospitals & in the laboratories.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus classthrough blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Introduction to personality development – definition, importance
- Corporate Grooming – hair, makeup, formal shirts and trousers, jewelry, socks and shoes, nails, etc
- Self – introduction – framework to make effective first impression

Module 2

- SWOT analysis – strengths, weaknesses, opportunities, weaknesses
- Communication Skills – verbal and non- verbal communication
- Time management - time as a resource, identify important time wasters, individual time management styles, techniques for better time management.

Module 3

- Group Dynamics and Team Building – importance of groups in organization, interactions in groups, interaction with a team, and how to build a good team
- Body language– gestures, hand movements, facial expressions, body movements, postures
- Email etiquettes – types of email, importance of formal email, parts of email

Module 4

- Interview etiquettes – commonly asked HR questions, Dress code, resume
- Interpersonal relations - introduction to interpersonal relations, analysis relations of different ego states

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, conduct quiz for the topics. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Assessment Criteria

Mid Term (40)			End Term (60)	Total
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Workshop			
Semester: I	**Course Code: MCVT108**	**Credits: 01**	**Core/Elective: Core**
No. of Lectures / Tutorial: 1			
Course Pre-Requisites: NA			

Sushant University soaring high	**Sushant School of Health Sciences** **M.Sc. CVT**

Course Title: Recent Advances in Interventional Cardiology			
Semester: IV	**Course Code: MCVT201**	**Credits: 05**	**Core/Elective: Core**
No. of Lectures / Tutorial: 04	**No. of Practical Hours: 02**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

1. Foundation Core	2. Foundation Skill	3. Professional Core	4. Professional Skill	5. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge in Invasive and Noninvasive Cardiology.

1. Understand the diagnostic tools that evaluate cardiovascular and coronary artery disease and its importance in providing treatment strategies for patients diagnosed with cardiovascular diseases.
2. Knowledge about advanced diagnostic procedures and tools in the field of cardiology
3. Understand the capabilities of these tools, what their findings mean, how to interpret the results, and how assimilate them into the practice.

Course Learning Outcomes

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

CO1: Understand the common conditions being treated by minimally invasive techniques.

CO2: Differentiate between various advances techniques in cardiac interventions

CO3: Learn about the common equipment, drugs and cocktails used in cardiac labs

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

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the

circulatory system and blood vessels supplying to the heart muscle 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1: Introduction to Percutaneous Mitral Valve Repair

Percutaneous Aortic valvular approach-
Percutaneous heart valve Implantation TAVI Mitral clip

Pulmonary and Tricuspid valve examination implantation

Stem Cell Therapy for IHD

Module 2:

Percutaneous Balloon pericardiotomy for patient examination

Pericardial effusion and tamponade

The LAA intervention-

LAA closure device implantation

PTSMA

Support & Adjunct devices-
Support for High risk percutaneous coronary interventions. –Cutting Balloon, ThrombectomyLaser, Ultrasound &Atherectomy Devices

Module 3:Cardiac Assist devices

Impella ECMO

Intracoronary Pressure & flow measurement examination IVUS & OCT Functional Flow

Reserve (FFR)

Trials Preclinical and clinical trails

Module 4: CRT
Resynchronization therapy for heart failure and combo device

Quantitative CAG
Coronary angiography

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Textbook of Interventional Cardiology - 8th Edition Elsevier
2. Cath Lab Practicals by Sundeep Mishra
3. ECG Made Easy by AtulLuthra

Online references:
https://books.google.co.in/books/about/Cardiac_Catheterization_Handbook_E_Book.html?id=_rHSCQAAQBAJ&redir_esc=y

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Patient Right, Consent and Medical Ethics			
Semester: IV	**Course Code:** MCVT 202	**Credits: 04**	**Core/Elective: Core**
No. of Lectures / Tutorial: 4			
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

6. Foundation Core	7. Foundation Skill	8. Professional Core	9. Professional Skill	10. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge in laws and ethics to followed as health professionals.

After completion of the course the students will be able to: Understand the various definitions

Course Learning Outcomes

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

CO1: Understood the importance of the professional laws and ethics**.**

CO2: Understood the legal aspects and medical ethics in health setups.

CO3: Understood the importance of the Human experimentation and ethics**.**

CO4: Understood the legal aspects Animal and experimental research and medical ethics in health setups.

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the circulatory system and blood vessels supplying to the heart muscle 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1:

Professional Ethics-

Code of conduct
Confidentiality
Fair trade practice
Handling of prescription

Module 2:

Mal practice and Negligence
Professional vigilance

Module 3:

Research Ethics-

Animal and experimental research/ humanness
Human experimentation
Human volunteer research - informed consent
Clinical trials

Module 4:

Gathering all scientific factors
Gathering all value factors
Identifying areas of value – conflict, setting priorities
Working out criteria towards decision
ICMR/ CPCSEA/ INSA Guidelines for human / animal experimentation

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.

Assessment Criteria

Mid Term (40)			End Term (60)	Total
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Francis C.M., Medical Ethics, I Edition, 1993, Jay pee Brothers, New Delhi p189.
2. Good Clinical Practices: GOI Guidelines for clinical trials on Pharmaceutical Products inIndia (www.cdsco.nic.in)
3. INSA Guidelines for care and use of Animals in Research – 2000.
4. CPCSEA Guidelines 2001(www.cpcsea.org).
5. Ethical Guidelines for Biomedical Research on Human Subjects, 2000, ICMR, New Delhi

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Advanced Perfusion Techniques			
Semester: II	**Course Code: MCVT203**	**Credits: 04**	**Core/Elective: Core**
No. of Lectures / Tutorial: 3	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

21. Foundation Core	22. Foundation Skill	23. Professional Core	24. Professional Skill	25. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge of techniques and equipment of cardiopulmonary bypass (CPB) have evolved over the past 60 years, and numerous numbers of cardiac surgical procedures are conducted around the world using CPB. Despite more widespread applications of percutaneous coronary and valvular interventions, the need for cardiac surgery using CPB remains the standard approach for certain cardiac pathologies because some patients are ineligible for percutaneous procedures,

1. Learn about the recent advances and updates in Cardiopulmonary bypass (CPB) and perfusion technology
2. Provide a competent technologist who is well versed with modern technologies and up to date knowledge in patient care

3. Introduction to Extra corporeal membrane oxygenation (ECMO), Counter pulsation and Ventricular Assist Devices (VAD), Minimally Invasive Cardiac Surgery (MICS)
4. Learn about perfusion for non - cardiac procedures: liver transplant, isolated limb perfusion, Recent advances in Perfusion Techniques, basics of pediatric perfusion

Course Learning Outcomes

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

CO1: Knowledge and understanding of the recent advances and updates in Cardiopulmonary bypass (CPB) and perfusion technology

CO2: Understanding of modern technologies and up to date knowledge in patient care

CO3: Knowledge and understanding of the Introduction to Extra corporeal membrane oxygenation (ECMO), Counter pulsation and Ventricular Assist Devices (VAD), Minimally Invasive Cardiac Surgery (MICS)

CO4: Knowledge and understanding of perfusion for non - cardiac procedures: liver transplant, isolated limb perfusion, Recent advances in Perfusion Techniques, basics of pediatric perfusion

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of clinical applications of CPB, recent advances in perfusion technology, and basics of perfusion technology. 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Recent advances and updates in Cardiopulmonary bypass (CPB) and perfusion technology under the sections**:**
- inflammatory mediators,
- heart lung machine, oxygenators,
- heater-cooler equipment, heat exchanger,
- arterial filters,

Module 2

- Hemofiltration &hemofilters,
- pumps in extracorporeal circulation,
- circuit and cannulae for CPB,
- hypothermia, circulatory arrest, normothermia in ECC,
- myocardial protection and cardioplegia,

Module 3

- cell saver,
- IABP,
- ECMO
- Non-cardiac application of ECC, Ventricular assist devices, Artificial heart.

Module 4

- Recent advances in perfusion in special condition:

✓ Aortic aneurysms
✓ Pregnancy
✓ Complex congenital cardiac malformations
✓ Transplantation
✓ Trauma care
✓ Malignancy
✓ Organ transport

- **Practical:**heart lung machine
- oxygenators
- heater-cooler equipment
- heat exchanger
- arterial filters
- hemofiltration
- tubings
- cell saver
- IABP
- ECMO

-

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Cardiac surgery – by Kirklin and BarratBoyes – 4th edition
2. Cardiac Surgery In Adults – by Lawrence H. Cohn – 4th edition
3. A Practical Approach To Cardiac Anesthesia - by Glenn p. Gravlee

4. Kaplan's Cardiac anaesthesia – by Kaplan Reich Sarino – 6th edition
5. Cardiopulmonary Bypass - by Gravlee – 3rd edition.
6. Cardiopulmonary bypass – by Sunit Ghosh – 1st edition

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Electrophysiology and Cardiac Pacemakers			
Semester: II	**Course Code: MCVT204**	**Credits: 04**	**Core/Elective: Core**
No. of Lectures / Tutorial: 3	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

11. Foundation Core	12. Foundation Skill	13. Professional Core	14. Professional Skill	15. Premier Skill
		✓		

Course Objectives

Thiscourseisdesignedtoprovide the studentsthebasicknowledgeof Electrophysiological Study and Cardiac Pacemakers part of cardiac catheterization laboratory. At theconclusion 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.

1. Understand the diagnostic tools that evaluate cardiovascular and coronary artery disease and its importance in providing treatment strategies for patients diagnosed with cardiovascular diseases.
2. Knowledge about advanced diagnostic tools in the field of cardiology
3. Understand the capabilities of these tools, what their findings mean, how to interpret the results, and how assimilate them into the practice.
4. Knowledge about the cardiac pacemakers, types, pacing methods, pacemaker classification
5. Learn about the cardiac pharmacology, commonly used drugs in cardiology

Course Learning Outcomes

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

CO1: Differentiate between normal and abnormal cardiac rhythms on ECG (Tachyarrhythmias, Bradyarrhythmias)

CO2: Understand the genesis of cardiac arrhythmias with electrophysiological study consideration, invasive and therapy management

CO3: Comprehend the guidelines and remember the guidelines for pacemaker, ICD and CRT

CO4: Knowledge and understanding of pacemaker components, modes of pacing and pacemaker classification

Course Pedagogy

The course pedagogy includes a comprehensive study including the study the conduction system of heart, cardiac arrhythmias and management. 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Conduction system of the heart with intrinsic rates of each foci – SA node, Av node, Bundle of His, Purkinje fibers and genesis of cardiac rhythms
- Cardiac pharmacology – anticoagulants (heparin, low molecular weight heparin, warfarin,direct thrombin inhibitors),antiplatelet (aspirin, clopidogrel, glycoprotein IIb/IIIa inhibitor), thrombolytic agents (streptokinase, urokinase,tissue plasminogen activator-TPA, other cardiovascular drugs (atropine, lidocaine, Procanaimide,Diltiazem, Adenosine, Sodium Bicarbonate, Morphine, calcium chloride), adrenergic receptors (Dopamine,Dobutamine, Isoprotrenol, Nor ephinephrine, Digitalis(Digoxin) , NTG, Beta blockers, Diuretics)
-

Module 2

- Cardiovascular Resuscitation – Basic and Advanced Life Support: Approach to emergency cardiac care – VF, Hypotension,VT, Asystole, Pulseless electrical activity
- Chance of survival: Adjuncts of airway control, endotracheal intubation, Clinical profile of suddencardiac arrest, principle and management

Module 3

- Electrophysiological study – genesis of cardiac arrhythmias: diagnosis of cardiac arrhythmias, diagnostic tests (holter monitoring, exercise test, HR variability, QT dispersion, and SAECG, Tilt table Test)
- Invasive EP study: AV blocks, Sinus node dysfunction (intraventricular conduction disturbances) and complications

Module 4

- Therapy for cardiac arrhythmias – pharmacological therapy (antiarrhythmic drug classification), direct current electrical cardioversion, ICD, ablation therapy, surgical therapy for tachyarrhythmia
- The guidelines for pacemaker, ICD and CRT, 3D mapping
- Pacemaker components, modes of pacing and pacemaker classification

Practical:

- Orientation of instruments: Catheters, guide wires, sheaths, stents, valves, ECG machine, TMT machine, Fluoroscopy machine, crash cart, different cabinets, Echo machine, pediatric and adult echo probe, sphygmomanometer and its parts, holter machine, electrodes, ECG and ultrasound gel, commonly used medicines in cardiac lab, tools and devices used in cath lab etc

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1.The EHRA Book of Pacemaker, ICD, and CRT Troubleshooting: Case-based learning with multiple choice questions

2. The EHRA Book of Interventional Electrophysiology: Case-based learning with multiple choice questions

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Preventive Cardiology			
Semester: II	**Course Code: MCVT205**	**Credits: 03**	**Core/Elective: Core**
No. of Lectures / Tutorial: 3			
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

16. Foundation Core	17. Foundation Skill	18. Professional Core	19. Professional Skill	20. Premier Skill
		✓		

Course Objectives

This course is designed to address clinical practice and preventive medicine of cardiology in persons at individual and population levels. The goal of preventive cardiology is to prevent CVD and to reduce the burden of CVD in populations and improve the quality of life and life expectancy in individuals with CVD.

1. Perform a complete evaluation of the patient (personal medical history, medications, social and relevant family medical history, accurate examination with an emphasis on cardiovascular and cardiovascular-related findings, etc.).
2. Write a concise H&P or progress note with emphasis on medical and therapeutic lifestyle strategies, behavior modification, patient education/counseling
3. Ability to counsel patients regarding therapeutic lifestyle changes (exercise, heart-healthy dietary habits, weight management, tobacco cessation, stress management, and behavior modification) according to AHA guidelines, where appropriate.
4. Ability to write an exercise prescription for a patient, and/or to establish a cardiac rehabilitation program.
5. Understand the strategies for diagnosis and treatment of hypertension, anti-hypertensive medication side effects, primary and secondary dyslipidemias, lipid-lowering medication side effects, obesity and the management of smoking cessation and nicotine addiction.

Course Learning Outcomes

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

CO1: Knowledge and understanding of cardiovascular screening and risk assessment strategies for coronary heart disease and peripheral vascular disease.

CO2: Knowledge about optimal management of Dyslipidemia (elevated LDL, low HDL, high triglycerides, high non-HDL, and mixed dyslipidemias). Review mechanism of action and side effects of Lipid-Lowering Agents.

CO3: Able to interpret the results of atherosclerosis screening/diagnostic studies, how to apply the results to improve cardiovascular disease risk assessment, and how study results influence patient care/management.

CO4: Knowledge and understanding of ACC/AHA guidelines on the primary prevention of cardiovascular diseases

CO5: Knowledge and understanding of WHO/ISH risk prediction charts, clinical assessment of cardiovascular risk

Course Pedagogy

The course pedagogy includes a guidance to policy-makers and health care workers on how to target individuals at high risk of developing CVD, at all levels of the health system and in different resource settings, using evidence-based and cost-effective preventive approaches.The objective is to reduce the incidence of heart attacks, strokes, and renal failure associated with hypertension and diabetes, as well as the need for amputation of limbs because of ischemia, by reducing the cardiovascular risk. The focus is prevention of disability and early deaths and improvement of quality of life. 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Introduction to preventive cardiology: background,
- scope and purpose of the guidelines
- The total risk approach to prevention of cardiovascular disease
- rationale for targeting high risk groups, complementary strategies for prevention and control of cardiovascular disease

Module 2

- Risk prediction charts:
- ACC/AHA guidelines on the primary prevention,
- WHO/ISH risk prediction charts

Module 3

- Recommendations for prevention of cardiovascular disease: levels of evidence and

grades of recommendations

- Basics of recommendations: modification of behavior (tobacco, diet, physical activity, body weight, alcohol), psychological factors, blood pressure lowering, lipid lowering, control of glycaemia

Module 4

SpecialDiagnosticProcedures

- **Ultrasound-Guidedbiopsy, MonitoringBoneHealing, Three-dimensionalUltrasonography,InterventionalUltrasonography**

Practical:

-

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

ESC Handbook of preventive cardiology by Catriona Jennings, Ian Graham, and StephanGielen

Online references:

https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.110.981613
https://onlinelibrary.wiley.com/toc/17517141/2010/13/4
http://www.freebookcentre.net/medical_text_books_journals/cardiology_texts_journals_online_download.html

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Research Methodology – I			
Semester: II	**Course Code: MCVT206**	**Credits: 02**	**Core/Elective: Core**
No. of Lectures / Tutorial: 2			
Course Pre-Requisites: NA			

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:

Thiscourseisdesignedtoprovidethestudentsthebasicknowledgein research process and Bio-statistics. At the conclusion of the course, the students will have the knowledge of data collection,statisticalapplicationandfinally,presentationofthestatisticaldata. The first part shall be conducted in second semester and second part shall be covered in third semester

Course Learning Outcomes:

Upon successful completion of the course, the students should be able to (knowledge based):
C01: 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

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

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course contents

Module 1: Need for Research inthe field of cardiology. Introduction to research methods, conducting a literature review, Researchdesign, Samplingmethods,Datacollectionanddatacollectiontools,Dataanalysis:

Module 2: Quantitative andQualitatively,Publichealthresearch,IssuesinResearch of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module 3: Introduction of epidemiology, Descriptive epidemiology, Experimental and non-experimental research designs, Screening, Sampling methods, Biological variability, normal distribution

Module 4: 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 Assessment

Mid Term (40)			End Term (60)	Total
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

References

1. Research Methodology: Kothari
2. Methods in Biostatistics by B.KMahajan
3. Probability and Statistics byMurray
4. Research Methodology by SMIsrani

Sushant University soaring high	**Sushant School of Health Sciences** **M.Sc. CVT**

Course Title: Invasive and Noninvasive Cardiology			
Semester: I	**Course Code: 24MCVT 207**	**Credits: 04**	**Core/Elective: Core**
No. of Lectures / Tutorial: 3	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

21. Foundation Core	22. Foundation Skill	23. Professional Core	24. Professional Skill	25. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students the basic knowledge in Invasive and Noninvasive Cardiology.

4. Understand the diagnostic tools that evaluate cardiovascular and coronary artery disease and its importance in providing treatment strategies for patients diagnosed with cardiovascular diseases.
5. Knowledge about advanced diagnostic tools in the field of cardiology
6. Understand the capabilities of these tools, what their findings mean, how to interpret the results, and how assimilate them into the practice.

Course Learning Outcomes

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

CO1: Understand the common conditions being treated by interventional cardiology

CO2: Differentiate between invasive and non-invasive cardiac testing

CO3: Learn about the common tools and devices, medicines used in cardiac labs

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

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of structures of the circulatory system and blood vessels supplying to the heart muscle 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus classthrough blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- Introduction to clinical & functional anatomy of the heart, and course of blood through the heart
- Anatomy and function of the coronary arteries
- Coronary artery disease – overview, causes, symptoms, risk factors, prevention
- Difference between invasive and noninvasive cardiology

Module 2

- Common conditions treated by interventional cardiology
- Invasive cardiology procedures like coronary angiography and cardiac catheterization,
- emergent angioplasty,
- electrophysiology studies,

Module 3

-permanent pacemaker insertions,

- implantable defibrillator insertions,

- cardiac ablation and cardioversions,

- MPI, MUGA, CCT, Tilt table test

- Patient preparation before, during and after procedure

Module 4

- Common equipment's and medicines used in cardiac catheterization laboratory
- Noninvasive cardiology procedures like echocardiography,
- electrocardiography, stress tests, heart monitors, coronary artery calcium scoring scan, nuclear stress test, cardiac computed tomography, cardiac magnetic resonance tomography

- Patient preparation, interpretation of normal and abnormal findings.

Practical:
- Orientation of instruments: Catheters, guide wires,
- Sheaths, stents, valves,
- ECG machine,
- TMT machine,
- Fluoroscopy machine, crash cart, different cabinets,
- Echo machine,
- pediatric and adult echo probe,
- sphygmomanometer and its parts,

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Research Methodology – II			
Semester: III	**Course Code: MCVT301**	**Credits:02**	**Core/Elective: Core**
No. of Lectures / Tutorial: 2			
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

26. Foundation Core	27. Foundation Skill	28. Professional Core	29. Professional Skill	30. Premier Skill
		✓		

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 Learning Outcomes

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

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)

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.
Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.
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,

Module 3: Measuring reliability and validity of scales.

- Measures of Central tendency.
- Measures of Dispersion.
- Skewness and kurtosis, Sampling, Sample size determination.
- Introductionandmethodofcollectingandpresentingofstatisticaldata.

Module 4: Calculationandinterpretationofvariousmeasureslikemean,median,standarddeviations, Skewness andKurtosis.

- Probabilitydistribution, Correlation andregression Significance tests and confidenceintervals.

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.
Assessment Criteria

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

Reference books:

- Research Methodology: Kothari
- Methods in Biostatistics by B.KMahajan
- Probability and Statistics byMurray
- Research Methodology by SMIsrani

Sushant University soaring high	**Sushant School of Health Sciences** **M.Sc. CVT**

Course Title: Cath and Intervention in Ischemic and Valvular Heart Diseases			
Semester: III	**Course Code: MCVT302**	**Credits:05**	**Core/Elective: Core**
No. of Lectures / Tutorial:4	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

31. Foundation Core	32. Foundation Skill	33. Professional Core	34. Professional Skill	35. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students with the knowledge of Cath and Intervention in Ischemic and Valvular Heart Diseases.

1. Provides the knowledge of pathophysiology of common and major diseases of the cardiovascular diseases.
2. Describes the essential pathological features valvular heart diseases.
3. Understand the diagnostic tools that evaluate cardiovascular and coronary artery disease and its importance in providing treatment strategies for patients diagnosed with cardiovascular diseases.
4. Knowledge about advanced diagnostic tools in the field of cardiology.

Course Learning Outcomes

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

CO1: Understand pathophysiology, treatment of various complications of common and major diseases of the cardiovascular diseases

CO2: Understand pathophysiology, treatment of various complications of valvular heart diseases

CO3: Use and know the importance diagnostic tools and evaluate the diseases

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

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of Cath and

Intervention in Ischemic and Valvular Heart Diseasesin 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- **Understanding coronary circulation;** Pathogenesis of atherosclerotic plaques, Abnormalities of coronary perfusion, Anomalies of the Coronary circulation, Wall motion scoring Global ventricular function, Myocardial infarction, Complication of MI, Surgical aspect of IHD**.**
- **Angiographic technique;** Femoral and radial or brachial approach, Adverse effect of coronary angiography, Views and quantification of stenosis, Coronary collaterals, Coronary vasospasm, Myocardial bridge, Left ventriculography - Technique, Analysis and Complications.
- **Coronary angioplasty;** Common angiographic views for coronary angioplasty, Angiographic TIMI classification of blood flow, Angiographic classification of collaterals flow, Assessment of coronary stenosis, Coronary lesion description for angioplasty, Problem and solution in the interpretation of coronary angiogram**.**

Module 2

- **Complications of PCI;** MI during PCI, Abrupt vessel closure after PCI, Intracoronary thrombus, Dissection, Hypotension, Arrhythmia, Peripheral vascular complication.
- No flow/slow flow/No-Reflow phenomena, Stent thrombosis, Complication related to radiographic contrast media.
- **Non balloon PCI devices;** Rotational ablation catheters, Directional coronary atherectomy, Thrombus aspiration system, Embolic protection devices, Cutting balloons.

Module 3

- **Restenosis, Brachytherapy and drug eluting stents;** In stent restenosis and management, brachytherapy, Drug eluting stents.
- **Difficult situation in PCI And strategies;** Side branch and bifurcation stenosis and approach, Eccentric stenosis, Severe calcific stenosis Ostial lesions, Total coronary occlusion, Multi-vessel PCI, IMA PCI, PCI for bypass graft, PCI for unstable angina and acute MI, PCI for cardiogenic shock.

- **High risk PCI;** Identifying the high risk PCI patient, ACC/AHA lesion classification Patient related and clinical risk factors, Risk reduction and support of the high risk PCI, Management of complication.

Module 4

- **Percutaneous therapy for valvular heart disease;** Hemodynamic information derived from echocardiography (MS,MR,AR,AS,TR,TS), Indications for balloon valvuloplasty (MS,AS),Angiographic assessment of valvular lesions(MR,AR).
- **BVM;**Balloon selection and technique for mitral valvuloplasty, Complications, Post procedural evaluation, Management of complications.
- **Aortic Valvulolasty;** Indications, Technique (Retrograde and ante grade technique), Balloon selection, Procedure Complication.
- **Pulmonary and tricuspid valvuloplasty;** Management, Indications-Selection of balloons, Technique, Results, Complication.

Practical:

- **Coronary angiography:**Insertion and flushing of coronary catheter Coronary anatomy, Injection technique, Pressure damping and ventricularisation Cannulation of coronary ostium Cannulation of coronary grafts, Angiographic views and quantitation of stenosis Lesion quantification, Coronary co-laterals Coronary vasospasm Myocardial bridges, Ventricular injection, catheter selection, injection site, rate and volume Foreign body's removal.
- **Coronary angioplasty;** J tip, straight tip, CTO wires, retrograde technique, Dilatation catheters: Complaint and non-complaint Complications, Stent designs and types Wire coils, Slotted tubes Bifurcating stents, Complications of stenting Coated stents, Drug eluting stents Covered stents radioactive stents.
- **Calculation of stenotic valve orifice area;**Gorlin formula Mitral valve area Aortic valve area, Tricuspid and pulmonary valve area.
- **Percutaneous coronary and valvular interventions;** Balloon percutaneous transluminal coronary angioplasty Coronary atherectomy, Directional coronary athrectomy Rotational atherectomy, Catheter based thrombolysis and mechanical thromboectomy Distal embolic protection device, The spider filter EPI filter wire Angio guard device Accune devices Rubicon filter Interceptor filter, Total occlusion crossing device Instent restenosis, Radiation brachiotherapy for instent restenosis Vascular closure device, Anticoagulation during percutaneous coronary intervention Mitral valvuloplasty, Aortic valvuloplasty Pulmonary valvuloplasty Tricuspid valvuloplasty.
- **Percutaneous coronary intervention in MI and management of complication;** Uses of thrombus aspiration catheters, administration of intra-arterial and intra venous, drug, Intra-aortic balloon pump insertion, etc.

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.

Assessment Criteria

Mid Term (40)			End Term (60)	Total
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Textbook of Interventional Cardiology - 8th Edition Elsevier
2. Cath Lab Practicals by Sundeep Mishra

Online references:

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Cath and Intervention in Congenital Heart Diseases			
Semester: III	**Course Code: MCVT303**	**Credits:05**	**Core/Elective: Core**
No. of Lectures / Tutorial: 4	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

36. Foundation Core	37. Foundation Skill	38. Professional Core	39. Professional Skill	40. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students with the knowledge of Cath and Intervention in Congenital Heart Diseases.

1. Provides the knowledge of pathophysiology of common and major diseases of the cardiovascular diseases
2. Describes the essential pathological features of Congenital Heart Diseases
3. Understand the diagnostic tools that evaluate Congenital Heart Diseases
4. Knowledge about advanced diagnostic tools in the field of cardiology

Course Learning Outcomes

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

CO1: Understand pathophysiology, treatment of various complications of Congenital Heart Diseases

CO2: Use and know the importance diagnostic tools and evaluate the diseases

CO3: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

CO1: Understand pathophysiology, treatment of various complications of Rheumatic Heart

Diseases

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of Cath and Intervention in Congenital Heart Diseasesin 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.

Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.

Course Contents

Module 1

- **Introduction and Basics;**Shunt detection and quantification, Detection of left to right intra-cardiac shunts, Oximetry run-calculation of pulmonary blood flow and resistance(QPand PVR), Calculation of systemic blood flow and resistance(QS and SVR), Flow ratio-calculation ofbidirectional Shunt, Eisenmenger's physiology**.**
- **Indications for CHD;**Diagnostic catheterization indications and angiographic views in CHD**.**

Module 2

- **Approach to the pediatric cath.**
- **Cardiac output measurement;** various methods.
- **Oxygen consumption measurements;** various methods and difficulties.
- **Oxygen saturation;** Oximetry run.

Module 3

- **Blood flow;** Qp, Qs, Qep,Qes calculation.
- **Vascular resistance;** Systemic vascular resistance (SVR), Pulmonary vascular resistance (PVR).
- **Intra cardiacshunt lesions;** Step-up and step-down of O2saturation shunt calculation.
- **Interventions in acyanoticheartdisease;** Cath, angiography and intervention in PFO, ASD, VSD -PDA.

Module 4

- **Interventions in cyanotic heart disease;** TGA, TAPVC, TA, DORV, DOLV,Ebstein, HLHS,.
- **Extra-cardiac shunts;** Fistulas intervention.
- **Venacavalanomalies;**Intervention.

Practical:

- **Cardiac catheterization in infants and children's;** Sedation and anesthesia Equipment used in catheterization, Catheters, contrast media, Control of radiation.
- **Cardiac catheterization in various congenital heart diseases;**Right and left heart catheterization, Instrumentation used in chamber injection and to obtain pressure recordings, Diagnosing shunt/obstructive lesion and flow direction with QP/QS from the hemodynamic data of oxygen saturation and pressure of different chambers, Abnormalities of right and left ventricular inflow, Abnormalities of right and left ventricular outflow, Abnormalities of cardiac septation, Abnormalities vascular connection and structures, Cono-truncal abnormalities.

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.

Assessment Criteria

Mid Term (40)			**End Term (60)**	**Total**
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Textbook of Interventional Cardiology - 8th Edition Elsevier
2. Cath Lab Practicals by Sundeep Mishra

Online references:

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Cath and Intervention in Myocardial and Pericardial Diseases			
Semester: III	**Course Code: MCVT304**	**Credits:05**	**Core/Elective: Core**
No. of Lectures / Tutorial: 4	**No. of Practical Hours: 2**		
Course Pre-Requisites: NA			

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

41. Foundation Core	42. Foundation Skill	43. Professional Core	44. Professional Skill	45. Premier Skill
		✓		

Course Objectives

This course is designed to provide the students with the knowledge of Cath and Intervention in Congenital Heart Diseases.

1. Provides the knowledge of pathophysiology of common and major diseases of the cardiovascular diseases
2. Describes the essential pathological features of Cath and Intervention in Myocardial and Pericardial Diseases
3. Understand the diagnostic tools that evaluate Cath and Intervention in Myocardial and Pericardial Diseases
4. Knowledge about advanced diagnostic tools in the field of cardiology

Course Learning Outcomes

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

CO1: Understand pathophysiology, treatment of various complications of Cath and Intervention in Myocardial and Pericardial Diseases
CO2: Use and know the importance diagnostic tools and evaluate the Myocardial and Pericardial Diseases
CO3: Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate &create)
CO4: Use and know the importance diagnostic tools and evaluate the MI

Course Pedagogy
The course pedagogy includes a comprehensive study including the study of Cath and Intervention in Congenital Heart Diseasesin 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.
Note: For working professionals, this course also provides you with more flexibility than a traditional on-campus class through blended learning. This means you can do your coursework around your work schedule and family life.
Course Contents
Module 1

- **Introduction and Hypertrophic cardiomyopathy;** Morphological variants, diagnosis, hemodynamics,assessing gradients, evaluation of therapy, pre and post procedural evaluation PTSMA methodology and complications**.**
- **Idiopathic dilatedcardiomyopathy;** Diagnosis and differentiation from other disorders myocardial biopsy**.**
- **Restrictive cardiomyopathy;** Diagnosis, hemodynamics.

Module 2

- **Disease of the pericardium;** Pericardial effusion Detection, quantitation of fluid Cardiac tamponade, pericardial aspiration Techniques, Constrictive pericarditis, Differentiation from Restrictive cardiomyopathy.
- **Aortic disease;** Aortic dilation and Aneurysm Aortic dissection diagnosisand classification, false aneurysm, RSOV aneurysm, Intervention in aortic aneurysm,Aorto-LV tunnel Atherosclerosis.

Module 3

- **Vascular Intervention;** Mesenteric, celiac, Iliac artery intervention.
- **Carotid and cerebrovascular intervention;** Aortic arch classification, intervention and complications CoA intervention.

Module 4

- **Upper and lower extremity;** Intervention and complications.

- **Renal artery intervention;**Intervention and complications
- **Venous intervention;**IVC filter, Budd Cheri intervention, CS intervention.

Practical:

- **Hypertrophic Cardiomyopathy;**Morphological variants, diagnosis, hemodynamics, assessing intracavitary and outflow tract gradients, evaluation of therapy, pre and post-procedural evaluation.
- **Idiopathic dilated cardiomyopathy;**Diagnosis and differentiation from other disorders such as IHD, ventricular functions and secondary effects, pre and post-procedural evaluation for cardiac re-synchronization therapy. Overview of cardiac transplantation.
- **Restrictive Cardiomyopathy;**Diagnosis and hemodynamics, infiltrative cardiomyopathies, miscellaneous- myocardial diseases in neuromuscular disorders, infectious agents and toxins.
- **Diseases of the pericardium;**Pericardial effusion: Detection of fluid, diagnosis-pleural versus pericardial fluid, quantitation, loculated effusions, cardiac tamponade-diagnosis, hemodynamicsetiology, pericardiocentesis Constrictive pericarditis: Diagnosis and hemodynamics. Differentiation from restrictive Cardiomyopathy.
- **Diseases of the aorta;**Aortic dilatation and aneurysms, Aortic dissection-diagnosis and classification, false aneurysms, aneurysms of the aortic sinuses- rupture, hemodynamics, pre-and post-surgical evaluation. Miscellaneous-trauma, infections, aorta-left-ventricular tunnel, atherosclerosis**.**
- **Systemic disorders;**Diabetes, hypertension, renal failure, neurological conditions.
- **Cardiac masses;**Normal variants, primary cardiac neoplasms and secondary involving the heart, secondary effects, extra cardiac masses, intra cardiac thrombi.
- **Aorta and peripheral artery Intervention;** Thoracic aorta, Aortic coarctation Aortic aneurysm, Aortic dissection abdominal aorta, Subclavian and vertebral arteries Carotid arteries, Renal arteries, Pelvic and lower extremities.
- **Atrial septostomy;** Balloon atrial septostomy, Blade atrial septostomy**.**
- **Balloon valve dilation;**Pulmonary/aortic/mitral/tricuspid valve dilatation.
- **Percutaneous transluminal septal myocardial ablation;** Indication, Procedural steps, left ventricular outflow gradient assessment, Brocken brough phenomena and complications.
- **Dilatation of peripheral systemic arteries.**
- **Re COA of aortic dilation.**

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.

Assessment Criteria

Mid Term (40)			End Term (60)	Total
Class Performance	**Theory**	**Practical**	**Theory**	
10	**15**	**15**	**60**	**100**

Reference books:

1. Textbook of Interventional Cardiology - 8th Edition Elsevier
2. Cath Lab Practicals by Sundeep Mishra

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Summer Training Evaluation			
Semester: III	**Course Code: MCVT305**	**Credits:04**	**Core/Elective: Core**

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 pride themselves on attention to detail, teamwork and their ability to help patients feel at ease.

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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

1. Foundation Core	2. Foundation Skill	3. Professional Core	4. Professional Skill	5. Premier Skill
			✓	

Assessment criteria

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

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Workshop			
Semester: III	**Course Code: MCVT306**	**Credits:01**	**Core/Elective: Core**

Course Introduction

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Employability-level:

6. Foundation Core	7. Foundation Skill	8. Professional Core	9. Professional Skill	10. Premier Skill
		✓		

Assessment criteria

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

	Sushant School of Health Sciences **M.Sc. CVT**		
Course Title: Synopsis Presentation			
Semester: III	**Course Code: MCVT307**	**Credits:01**	**Core/Elective: Core**

Course Introduction

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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 offers a range of exciting challenges and learning opportunities in both invasive and non-invasive cardiology.

Employability-level:

11. Foundation Core	12. Foundation Skill	13. Professional Core	14. Professional Skill	15. Premier Skill
		✓		

Assessment criteria

End Term (100)		Total
Class Performance	**Synopsis Presentation**	**100**
10	**90**	

	School of Health Sciences **M. Sc. Cardiovascular Technology**		
Course Title:	**Clinical Training / Internship**		
Semester: IV	**Course code: MCVT401**	**Credits: 15**	**Core / Elective: Core**

	School of Health Sciences **M. Sc. Cardiovascular Technology**		
Course Title:	**Project and Dissertation**		
Semester: IV	**Course code: MCVT402**	**Credits: 06**	**Core / Elective: Core**