Programme Handbook
B.Sc. in Medical Radiology & Imaging Technology
School of Health Sciences
Academic Year 2024-25

Programme Handbook B.Sc. MRIT

PRELIMINARY DEFINITIONS AND NOMENCLATURE

In this document, unless the context otherwise requires:

1. "**Programme**" means Degree Programme that is batch (B.Sc.MRIT)
2. "**Discipline**" means specialization in radiography procedures like x-ray, CT, MRI, DEXA, USG, mammography and DSA examinations. Maintenance of the radiological equipment's and its QA & QC, patient care and work flow management,
3. "**Course**" means a theory or practical subject that is normally studied in a semester, like Radio-imaging technology, radiation physics, 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 Course

Index

1. ADMISSION

1.1. Candidates seeking admission to the first semester of the eight semesters B.Sc. MRIT Degree Programme:

1. He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks in Physics, Chemistry, Biology/ Maths

OR

Diploma in Medical Radiology and Imaging Technology after completing 12th class/ 10 +2 of CBSE or equivalent with minimum aggregate of 50% marks in physics chemistry and biology provided the candidate has passed in each subject separately.

2. Candidates who have studied abroad and have passed the equivalent qualification as determined by the Association of Indian Universities will form the guideline to determine the eligibility and must have passed in the subjects: Physics, Chemistry, Biology/Maths and English up to 12th Standard level.

3. Candidates who have passed the Senior Secondary school Examination of National Open School with a minimum of 5 subjects with any of the following group subjects.

a. English, Physics, Chemistry, Botany, Zoology

b. English, Physics, Chemistry, Biology and any other language

4. He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.

6. Admission to B.Sc. Medical Radiology and Imaging Technology course shall be made on the basis of eligibility and an entrance test to be conducted for the purpose. No candidate will be admitted on any ground unless he/she has appeared in the admission test and interview.

a. Entrance test, to be conducted by the university as per the syllabus under 10 +2 scheme of CBSE, subject-wise distribution of questions will be as 30% in Physics, 30% in biology/maths, 30% in Chemistry, 5% in English (Language & Comprehension) and 5% in General Awareness about health-related methods.

b. Successful candidates on the basis of written Test will be called for the interview & shall have face an interview board. The interview board will include the Head of the Department of medical radiology and imaging technology (Chairman of the Board) along with the principal / chief faculty as well as Chief of MRIT apart from other nominees, whose recommendations shall be final for the selection of the students.

c. During subsequent counselling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.

d. Candidate who fails to attend the Medical Examination on the notified date(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.

e. The name of the student(s) who remain(s) absent from classes for more than 15 days at a stretch after joining the said course will be struck off from the college rolls without giving any notice.

1.2 Provision of Lateral Entry:

Lateral entry to second year for allied and healthcare science courses for candidates who have passed diploma program from the Government Boards and recognized by State/Central University, fulfilling the conditions specified and these students are eligible to take admission on lateral entry system only if the same subject have been studied at diploma level.

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

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

2. STRUCTURE OF PROGRAMME

2.1. Credits requirement

Minimum credit requirement is 186 credits for a student to be eligible to get B.Sc. in Medical Radiology & Imaging Technology.

2.2. Categorization of Courses

B.Sc. MRIT Programme will have a curriculum with syllabi consisting of theory and clinical courses that shall be categorized as follows:

S. No.	Nature of Courses	Suggested breakup of Credits
1.	**Core Courses**	74
2.	**Discipline Specific Electives (DSE)**	05
3.	**Generic Elective I (GE I)**	10
4.	**Generic Elective II (GE II)**	04
5.	**Dissertation/Project/Internship**	66
6.	**Skill Enhancement Course (SEC)**	12
7.	**Ability Enhancement Course (AEC)**	13
8.	**Service Learning/Community Service Based Course**	01
	TOTAL	**186**

2.3 Induction Programme

2.3.1. An induction programme with at least 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
- Human Values
- Behavioural and Interpersonal skills
- Lectures

VI. Nature

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

VII. Innovation

2.3.2. Other Courses (MOOC courses)

- AI & Modern Radiology
- Radiation Monitoring & safety measures
- Basic Course in Biomedical Research
-

2.4. Bridge Courses

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

The Capstone Bridge Course is a dynamic, three-week program designed to provide an enriching transition for 12th-grade students by introducing them to innovative and interdisciplinary subjects. It serves as a foundation for exploring advanced concepts that bridge high school learning with higher education aspirations. The curriculum emphasizes hands-on, integrative approaches across courses such as "From Cell to Systems," "Investigating the World of Pathogenic Organisms," and "Information Practices in Health Sciences." Through interactive lectures, students gain critical insights into human biology, microbiology, and data management in health sciences, fostering curiosity and preparedness for future academic and professional challenges.

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

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

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

2.5. Number of courses per Semester

Each semester curriculum shall normally have a blend of lecture courses not exceeding 25-27credits.

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 Practical Periods	1

2.7 Industrial Training / Internship

2.7.1. The students may undergo Industrial training for a period (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. The report and certificate of the internship has to be submitted to the Internship Recruitment Cell of the department and be presented as and when required.

2.7.2. The students may undergo Internship at reputed, multi-speciality hospitals and diagnostic centre (after due approval from the Dean/Director) for the period prescribed in the curriculum. The report and certificate of the internship has to be submitted to the Internship Recruitment Cell of the department and be presented as and when required.

2.8. Industrial Visit

Every student will be required to go for an Industrial Visit as per the requirement of the curriculum. The Deans/Directors shall ensure that necessary arrangements are made in this regard.

2.9. Massive Open Online Courses

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

2.10. Medium of Instruction

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

3. ATTENDANCE REQUIREMENTS FOR COMPLETION OF THE SEMESTER

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

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

4. FACULTY MENTOR

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 inform the parents about the progress / performance

of the students concerned.

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. The functions of the Programme committee include-

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

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

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

5.5. The Programme Director is required to prepare the minutes of every meeting, submit the same to 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.

Grievance Committee	Member	Designation
President	Dr. Elina Dewanji Sen	Head of Department, School of Health Sciences.
Secretary	Ms. Neha Singh	Assistant Professor, MRIT
	Ms. Laxmi Singh	Assistant Professor, MRIT
Members	Ms. Tanshika	MMRIT 1ST Semester
	Ms. Mansi	BMRIT 5TH Semester
	Ms. Nikita	BMRIT 3RD Semester
Examination Committee	Ms. Neha Singh, Mr. Ayush Wilson	Assistant Professor, MRIT & Optometry
Attendance Committee	Mr. Nakul Tyagi, Ms. Laxmi Singh	Assistant Professor, MRIT
Discipline Committee	Ms. Laxmi Singh, Ms. Neha Singh	Assistant Professor, MRIT
Extra-Curricular Activities Committee	Ms. Neha Singh, Ms. Laxmi Singh, Mr. Nakul Tyagi	Assistant Professor, MRIT

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. CURRICULAM DEVELOPMENT COMMITTEE

A Curriculum Development Committee (CDC) is a formal group tasked with designing, revising, and enhancing educational curricula to meet academic standards, align with institutional goals, and cater to the needs of students and industries. The committee operates within educational institutions, training organizations, or professional bodies to ensure high-quality and relevant learning experiences.

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.
Mr. Mohan Lal Bhagwat	External Academic Expert Member	Head of Center of Research and Skill, Jamia Hamdard University
Mr. Rakesh Kaul	Industry Expert Member	Chief Radiotherapy Technologist, Max Hospital, Saket.

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) of all courses except TDL/Soft-Skills/ Internship and MOOC courses is 60% to 40%.
- The weightage of End Semester Examination (ESE) to Mid Semester Evaluation (MSE) of TDL/TDCC and Soft-Skills courses is 40% to 60%.

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

7.4. The University examination theory and practical course will be 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 (weightage 60%) and will have three parts; Part A, Part-B and Part-C. (The duration of examinations for the value addition courses will have a 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 clinical 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 only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

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

Internal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

8.2. TDCC

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

8.3. Internship/Project Work

8.3.1. The courses included under this category are- hospital training and Internship, Summer training I & II, etc.

8.3.2. Here the Internal Assessment based on project prepared and submitted will be 40 marks and the External Assessment based on Viva-voce/presentation will 60.

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

Students are encouraged to research and present seminar papers.

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, 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 B.Sc.MRIT academic programme of the University:

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

9.4. Promotion to Next Year

The promotion rules are applicable only for under-graduate programs across the university.
The promotion rules for your programme will be as under:

1. The students will not be debarred from going to the 2nd year, irrespective of their result of the 1st year.

2. They will be promoted to 3rd year only if at least 60% of the courses prescribed in the 1st year (excluding TDL/TDCC & Soft Skills) are clear.
3. Similarly, the condition for promotion to 4th year and 5th year will be clearing of minimum of 60% courses in 2nd year and 3rd year respectively.
4. Finally, the students will become eligible to earn the degree only if they fulfil the passing criterion.

9.5. Exam Duration

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

9.6. Re-Appearing

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

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

9.7. Improvement of Score

- If a student has poor performance in number of courses in a particular term, he may at his option, take only one academic break for one year, and re-

register for both the semesters of that academic year in the next academic year on payment of prescribed fee. Such a student may have the option of repeating any or all the courses in the semester(s) and retain the credits already earned by him in other course(s).

- A student shall be allowed to improve his SGPA and CGPA by re-appearing in the Examination(s) in the Courses of his choice when these examinations are held in normal schedule in which case his Mid Semester Evaluation (MSE) shall be carried forward. However, permission will not be granted to improve internal assessment. The best of the marks obtained in that subject(s) shall be taken into consideration for calculating the SGPA and CGPA and eligibility for award of a degree.
- A student, who has failed to meet the passing criteria (required CGPA), have the option to re-appear in the Final Examination (End Semester Examination) of those courses in which he/she desires to improve his/her performance in order to secure the minimum CGPA, when these examinations are scheduled for next batch of students. **Improvement is only possible in courses which have a written theory exam component in the ESE (VIVA, Jury and submission-based ESE cannot be taken for improvement).**
- Improvement in the score of courses completed by a student prior to his lateral entry in the University shall not be allowed.

9.8. Methods for Redressal of Grievances in Evaluation

Re-Checking/Re-Evaluation of Answer Books of ESE:

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

9.9. Disciplinary Control of Students in Examinations

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

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

9.10. Duration of the Programme

The minimum period required for completion of a programme shall be as specified in the Scheme of Teaching and Examination and Syllabi for concerned programme approved by the Academic Council on the recommendations of the Board of Studies.
The maximum number of years within which a student must pass the credit requirements for award of a degree is as follows:

For 3 years and above Programs = n+2 years

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

9.11. Grade sheet

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

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

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

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

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

9.12. Eligibility for the Award of the Degree

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

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

9.13. Declaration of Result

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

9.14. Convocation

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

10. PROVISION FOR AUTHORISED BREAK OF STUDY

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

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

10.2. The student who is granted academic break shall not be required to pay the academic fee for that year. However, on re-joining, 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 school aims at holistic development of the students. The students represent our school in various co-curricular and extra-curricular activities not only at the university level but also outside the university by being a part of these committees

14. PROGRAM STRUCTURE

Name of the Program – B.Sc. Medical Radiology and Imaging Technology
Program Code – SHSU004
Duration of the Program – 04 Years
Total Semesters – 08 Semesters
Total Credits of the Program – 186 CREDITS

Color Code	Nature of Courses	Actual Percentage	Proposed Percentage
	Core Courses	44.5%	60-70%
	Discipline Specific Electives (DSE)	2.5%	10-15 %
	Generic Elective I (GE I)	4 Courses (TDCC)	4 Courses in UG as Required
	Generic Elective II (GE II)	2 Courses	2 Courses in UG as required
	Dissertation/Project/Internship	66 Credits	30 Credits
	Skill Enhancement Course (SEC)	3 Courses	2 Courses

	Ability Enhancement Course (AEC)	5 Courses	2 courses
	Service Learning/Community Service Based Course	1 Courses	1 Course

FIRST SEMESTER

Course Code	**Course Titles**	**Lectures(L)**	**Tutorial (T)**	**Practical (P)Hours**	**Total Credits**
23BMRIT1001	General Anatomy-I	2	-	2	3
23BMRIT1002	General Physiology-I	2	-	2	3
BMRIT1003	Basic in Computer & Information Science	2	-	2	3
23BMRIT1004	Introduction to Quality And patient Safety	2	-	-	2
23BMRIT1006	Radiation Physics	2	-	2	3
23BMRIT1007	Image Acquisition, Processing & Archiving	3	1	-	4
23BMRIT1008	Medical Terminology and Record Keeping	2	-	-	2
EVS2111	Environmental Science	2	-	-	2
SS151	Soft Skills	1	-	-	1
	TOTAL				**23**

SECOND SEMESTER

Course Code	Course Titles	Lectures (L)	Tutorial (T)	Practical (P)Hours	Total Credits
BMRIT2001	Human Anatomy and Physiology part -II	3	-	2	4
23BMRIT2002	Basics and Radiological physics	3	-	2	4
BMRIT2003	Conventional radiography and equipment	3	-	2	4
23BMRIT2004	Image Processing Techniques	3	-	2	4
23BMRIT2005	Medical ethics and legal aspects	2	-	-	2
BMRIT2006	Introduction to National Health Care Delivery system in India (Work shop)	-	1	-	1
21ENG11	Communication in English	1	-	2	2
	TDCC	1	-	2	2
TOTAL					**23**

THIRD SEMESTER

Course Code	Course Titles	Lectures (L)	Tutorial (T)	Practical (P)Hours	Total Credits
23BMRIT3001	Clinical Radiography and positioning-I	3	-	2	4
23BMRIT3002	Physics of modern Radiological and Imaging Equipment	2	1	2	4
23BMRIT3003	Contrast media and Radiographic Procedures	3	-	2	4
23BMRIT3004	Workshop (Telemedicine)	-	-	2	1
BMRIT335	Summer training with evaluation-I	-	-	8	4
	TDCC	1	-	2	2
TOTAL					**19**

FOURTH SEMESTER

Course Code	Course Titles	Lectures (L)	Tutorial (T)	Practical (P) Hours	Total Credits
BMRIT4001	Physics of Newer Imaging Modalities	3	-	2	4
BMRIT4002	Clinical Radiography Positioning Part 2	3	2	2	6
23BMRIT4003	Imaging of CT and MRI	3	-	2	4
23BMRIT4004	Quality Control and Patient Safety	3	-	2	4
BMRIT4005	Quality Protocols in Radiology (Workshop)	-	1	-	1
BMRIT4006	Health Research Fundamentals (MOOC)	-	2	-	2
	TDCC	1	-	2	2
TOTAL					**23**

FIFTH SEMESTER

Course Code	Course Titles	Lectures (L)	Tutorial (T)	Practical (P)Hours	Total Credits
BMRIT5001	Cross sectional anatomy and Physiology	3	-	2	4
BMRIT5002	Physics of Advanced Imaging Technology	3	-	2	4
23BMRIT5003	Imaging of USG and Nuclear Medicine	3	1	2	5
23BMRIT5004	Research Methodology & Biostatistics -I	2	-		2
23BMRIT5005	Regulatory Requirements in Radio Imaging	2	1	2	4
23BMRIT0535	Clinical Posting – part III & IV (studentship)	-	-	8	4
	TDCC	1	-	2	2
TOTAL					**25**

SIXTH SEMESTER

Course Code	Course Titles	Lectures(L)	/Tutorial (T)	Practical (P)	Total Credits
BMRIT6001	Quality assurance & radiation safety (AERB guideline) in diagnostic radiology-2	3	2	2	6
BMRIT6002	Research methodology	2			2
BMRIT6003	Hospital Practice & Care of Patients	3	2	2	6
23BMRIT6004	Project	3	3	-	6
BMRIT6005	Quality assurance & radiation safety	-	-	2	1
	TOTAL				**21**

SEVENTH SEMESTER (INTERNSHIP)

Course Code	Course Titles	Lectures (L)	Tutorial(T)	Practical (P)	Total Credits
BMRIT7001	Research Project & Evaluation	-	-	16	8
BMRIT0735	Internship	-	-	36	18
TOTAL					**26**

EIGHT SEMESTERS (INTERNSHIP & DISSERTATION)

Course Code	Course Titles	Lectures(L)	Tutorial(T)	Practical (P)	Total Credits
BMRIT8001	Research Project & Evaluation	-	-	16	8
BMRIT0835	Internship	-	-	36	18
TOTAL					**26**

Vision:

The mission of the School of Health Sciences is to Develop highly qualified clinical technologists in health care through excellence in education and patient care. As a Health Sciences research and education provider, develop strategic partnerships and collaboration initiatives, and innovative approaches to education through industry integration and research excellence.

Mission:

- We empower, engage, and educate health professionals, scientists and researchers who will lead their fields to best serve the health and well-being of people.
- Encourage community participation and create an atmosphere through the provision of services to the underprivileged.
- Continued creativity and innovation in education, patient care and research and create an environment of evidence-based learning.
- Teach ethics and professionalism and demonstrate a deep conviction to the integrity of the institution and all of its people.
- Develop and empower effective leaders that serve our institution, our patients, our communities, our profession and our world.
- To foster life-long learning among our students, faculty and staff.

Syllabus

1. About the Program- B.Sc. MRIT

Bachelor of Science in Medical Radiology and Imaging Technology is an undergraduate 4 years academic program, with 3 years of educational learning and 1year of mandatory Internship. Medical radiology and imaging technology plays a crucial role in diagnosing and monitoring of various medical conditions by taking internal images of the human body. Students will be able to perform procedures on various modalities like X-ray imaging, Mammography, DSA, DEXA, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound, and Nuclear Medicine. These technologies enable the visualization of bones, soft tissues, and organs, aiding in the diagnosis and monitoring of a wide range of medical conditions. Student will be able to interpret radiological images accurately, identifying normal and abnormal findings across different imaging modalities.

1.1. Graduate Attributes

The graduate attributes reflect the particular quality and feature or characteristics of an individual, including the knowledge, skills, attitudes and values that are expected to be acquired by a graduate through studies at the higher education institution (HEI) such as a college or university. The graduate attributes include capabilities that help strengthen one's abilities for widening current knowledge base and skills, gaining new knowledge and skills, undertaking future studies, performing well in a chosen career and playing a constructive role as a responsible citizen in the society. The graduate attributes define the characteristics of a student's university degree program(s), and describe a set of characteristics/competencies that are transferable beyond study of a particular subject area and program contexts in which they have been developed. Graduate attributes are fostered through meaningful learning experiences made available through the curriculum, the total college/university experiences and a process of critical and reflective thinking.

The learning outcomes-based curriculum framework is based on the premise that every student and graduate is unique. Each student or graduate has his/her own characteristics in terms of previous learning levels and experiences, life experiences, learning styles and approaches to future career-related actions. The quality, depth and breadth of the learning experiences made available to the students while at the higher education institutions help develop their characteristic attributes. The graduate attributes reflect disciplinary knowledge and understanding, generic skills, including global competencies that all students in different academic fields of study should acquire/attain and demonstrate. Some of the characteristic attributes that a graduate should demonstrate are as follows:

• Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

- Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

- Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

- Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

- Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and address opposing viewpoints.

- Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

- Cooperation/Teamwork: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

- Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

- Reflective thinking: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

- Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

- Self-directed learning: Ability to work independently, identifies appropriate resources required for a project, and manages a project through to completion.

• Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

• Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulates a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

• Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

• Lifelong learning: Ability to acquire knowledge and skills, including, learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/re-skilling.

1.2. Program Educational Objectives (PEO's)

1. Professional Efficiency: To develop a well skilled radio-technologist, including such skills as research, writing, analysis, patient care, workflow management and radiography.

2. Promote e-learning: Create an environment advancing use of technology and building e-innovations into pedagogy.

3. Enhance employability: Explore and understand specific issues relating to the workplace such as time management, discipline, workplace culture, teamwork, giving and receiving feedback, and achieving balance in one's life in a multidisciplinary environment.

4. Inculcate communication skills: To inculcate all the required skills such as Good oral and written communication skills, Analytical and Reasoning Skills, Initiative, Personal Impact, Resilience, Teamwork, technically updated, Planning and organizing, through its innovative course matrix.

1.3. Program Outcomes (POs)

1. Instilling professionalism: Students are equipped with knowledge, passion and drive to excel as leaders in the medical profession, mankind service, private & governmental organizations/hospitals, entrepreneurships, and corporate entities through academic exposure and professional internships.

2. Effective communication: Graduates are able to communicate effectively to various stakeholders and practice their profession with high regard to societal needs, diversity, constraints in the professional workplace and ethical responsibilities.

3. Understanding the medical system: Students are able to understand the Indian medical system in the global context and various principles and theories addressing both the national and international level issues.

4. Construction and Ability: Students are able to use tools and techniques through training and internship exercises to be able to perform and interpret statutes and other enacted rules to treat, cure and diagnose patients.

5. Active participation in professional training: Students develop the skills to actively participate, as professionals, in discipline-oriented conferences, CME, workshops, hands-on workshops, seminars and internship programs.

6. Dealing with contemporary issues: The students are able to recognize the need for identifying contemporary issues due to changing scenarios by participating in classroom quizzes, special lectures and training exercises on latest updates in the technology.

7. Building up teamwork: Students are adapted to work in a team through participation in various other co-curricular and extra-curricular activities strengthening their organizing skills and leadership qualities.

8. Employability: Demonstrate core values relating to profession or job requirements and meet new challenges maintaining the dignity of the profession.

9. Lifelong Learning: Demonstrate participation and learning process by updating knowledge and practice in order to meet the professional needs and priorities of the system.

EXAMINATION SCHEME:

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

1.3 Program Specific Outcomes (PSO's)

PSO1 – Demonstrate conceptual knowledge in X-rays, medical radio-imaging Technology, CT, MRI, DSA, DEXA, ETC.

PSO2- Comply with safety regulations and universal precautions and also to monitor quality control within predetermined limits while working in Hospitals and radiology department/ radio-technologist.

PSO3- Apply continuing education requirements as a function of growth and maintenance of professional competence for the growth and support to national and international organizations as a technical officer.

PSO4- Demonstrate professional conduct and interpersonal communication skills with patients, personnel, other health care professionals and the public

Program outcomes (Graduate Attributes) - (PO's) – B.Sc. (B.Sc. in Medical Radiology and Imaging Technology)

Upon successful completion of B.Sc. in Medical Radiology and Imaging Technology Program, the student will be able to:

PO1	Develop critical thinking by integrating knowledge of general anatomy and physiology of the human body, CT, MRI, DSA, Mammography, etc. to provide accurate diagnostic information to members of the health care team. (**Knowledge & Expertise of Medical Radiology and Imaging Technology)**
PO2	Plan and implement clinical and scientific activities related to the profession of medical radio-technology. (**Leadership and mentorship)**
PO3	Act efficiently as a leader in various interdisciplinary and multidisciplinary health care communities and solve complex problems arising during assessment of the patients. **(Problem solving)**
PO4	Apply the knowledge and skills to assess societal and legal issues related to the diagnostic approach of the patients. **(Ethics and accountability)**
PO5	Write, interpret, and communicate effectively and scientifically. **(Communication & presentation skills)**
PO6	Use modern tools and techniques for the efficient diagnosis of diseases. **(Commitment to professional excellence)**

PO7	Promote advancement of medical radiology & imaging technology through practice, education, and research. **(Research)**
PO8	Acquire the practical skills needed to work as a competent Medical Radiology and Imaging Technologist delivering Emergency Medical Services. **(Lifelong learning)**
PO9	Apply the skills that have learned during the program to appropriate, safe, effective, and compassionate patient care independently. **(Employability, Entrepreneurship)**
PO10	Exhibit appropriate skills of interpersonal communication with patients and other members of the healthcare team. **(Organizational Behaviour)**
PO11	Practice according to the ethical principles and legal requirements of the profession of Medical Radiology and Imaging Technologists. **(Ethical, Social, and professional understanding)**

PEO1	To develop proficient communication skills to deal with patients/clients, caregivers, other health professionals and community globally as a Medical Radiology and Imaging Technologist.
PEO2	To enable students, understand the ethical principles and legal requirements of the profession and self-assess their knowledge and skills to refine existing skills and acquire new skills as a Medical Radiology and Imaging Technologists
PEO3	To enable students to demonstrate distinctive, meritorious and high-quality practice that leads to excellence and depicts commitment to competence, standards, ethical principles and values.
PEO4	To develop qualities to work independently and to take a leadership role to coordinate, delegate and supervise care safely, manage risks and remain accountable
PEO5	To enable students to establish and promote innovative practices patterns by providing evidence-based care and testing new models which will translate results of research into practice.

Programme Objectives with Programme Specific Outcome

PSO1	To equip students with the knowledge, technical skills, and ethical practices required for excellence in medical imaging, radiological diagnosis, and patient care
PSO2	Comply with safety regulations and universal precautions and also to monitor quality control within predetermined limits while working in Hospitals and radiology departments as a radio-technologist.
PSO3	Apply continuing education requirements as a function of growth and maintenance of professional competence for the growth and support to national and international organizations as a technical officer.
PSO4	Demonstrate professional conduct and interpersonal communication skills with patients, radiology personnel, other health care professionals and the public

PSO **PEO**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
PEO1	**1**	**2**	**3**	**3**
PEO2	**2**	**3**	**2**	**3**
PEO3	**3**	**3**	**3**	**3**
PEO4	**2**	**3**	**3**	**2**
PEO5	**2**	**3**	**3**	**2**

1= Low **2= MEDIUM** **3= HIGH**

Program Specific Outcome with Program Outcomes

PSO1	Demonstrate conceptual knowledge in CT, MRI, DEXA, DSA, X-RAYS, Mammography, etc.
PSO2	Comply with safety regulations and universal precautions and also to monitor quality control within predetermined limits while working in Hospitals and radiology department as a radio-technologist.
PSO3	Apply continuing education requirements as a function of growth and maintenance of professional competence for the growth and support to national and international organizations as a technical officer.
PSO4	Demonstrate professional conduct and interpersonal communication skills with patients, radio-personnel, other health care professionals and the public

PO1	***Knowledge & Expertise of Medical Radio-radio-imaging technology***
PO2	***Leadership and mentorship***
PO3	***Problem solving***
PO4	***Ethics and accountability***
PO5	***Communication & presentation skills***
PO6	***Commitment to professional excellence***
PO7	***Research***
PO8	***Lifelong learning***
PO9	***Employability, Entrepreneurship***
PO10	***Organizational Behaviour***
PO11	***Ethical, Social, and professional understanding***

PO **PSO**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
PSO1	**3**	**1**	**3**	**2**	**1**	**3**	**3**	**3**	**3**	**2**	**2**
PSO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**3**
PSO3	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**1**	**3**	**2**	**1**
PSO4	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**

1= LOW **2= MEDIUM** **3= HIGH**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: GENERAL ANATOMY -I			
Semester: I	**Course code: 23BMRIT1001**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 20		**No of practical hours:** 20	
Course Prerequisites:		**Number of sessions: 40**	

Course Introduction

Allied and healthcare professionals (AHPs) include 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 the better good of humanity.

Course Objectives

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

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

Course Learning Outcomes

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

CLO1: Understand the various organ structures with a backdrop of general anatomy (Remember & Understand)

CLO2: Compare the differences between the similar structures in the body and their relevance (Analyze)

CLO3: Learn to apply the knowledge of various structures to clinical aspect of diseases (Apply Analyze)

CLO4: 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.

Course Contents

Module 1

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

Module 2

1. **Blood** - Composition of blood, Features of red blood cells, white blood cells, platelets.
2. **Lymphatic system** - Features of lymph vessels, lymphatic tissue & organs, lymphatic, spleen, tonsil, thymus.
3. **Muscular system** - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.

Module 3

1. **Respiratory system** - Nose & paranasal sinuses, pharynx, larynx, trachea, lungs.
2. **Cardiovascular system** - Heart & blood vessels.
3. **Digestive system -** Oral cavity, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.
4. **Endocrine system-** Endocrine glands, Pituitary and hypothalamus: Position & structure, Thyroid gland, parathyroid glands, Adrenal (supra renal) glands, Pancreases: Position, types of cells, Hormones: secretion, function and control, pineal gland, Common terms and diseases related to the system

Module 4

1. **Introduction to genetics** - Features of chromosomes, DNA.
2. **Special senses** - Olfactory system, taste apparatus, external middle & internal ear, eye.
3. **Skin** - Features of skin, hair, sebaceous glands, sweat glands, nails.

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

Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to SUBMIT written assignments, make charts and posters, make models, and conduct quizzes 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

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Text Books:

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

Reference books:

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

Online references:

Coursera subscription for physiology topics

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**

CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: GENERAL PHYSIOLOGY-I			
Semester: I	**Course code: 23BMRIT1002**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 20		**No of practical hours:** 20	
Course Prerequisites:		**Number of sessions: 40**	

Course Introduction

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

Course Objectives:

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

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

Course Learning Outcomes

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

CLO1: Understand the various organ functions with a backdrop of general physiology (Remember & Understand)

CLO2: Compare the differences between the similar functions in the body and their relevance (Analyze)

CLO3: Learn to apply the knowledge of various physiological processes to clinical aspect of diseases (Apply & Analyze)

CLO4: 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.

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

Course contents
Module 1

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

Module 2

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

Module 3

1. **Muscular system** – Properties of skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.

Module 4

1. **Respiratory system** – Physiology of respiration, pulmonary function tests, gas exchange in lungs, transport of gasses between lungs & tissues, regulation of respiration.
2. **Cardiovascular system -** Heart & blood vessels: Systemic circulation, pulmonary circulation, ECG, cardiac output, blood pressure.
3. **Digestive system** – Process of digestion, function of oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.
4. **Introduction to genetics -** Features of chromosomes, DNA, protein synthesis, dominant inheritance, recessive inheritance, sex linked inheritance.
5. **Endocrine system -** Mechanism of action of hormones, function of pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.
6. **Special senses -** Physiology of olfaction, taste, hearing, balance & vision.
7. **Skin –** Function of skin, hair, sebaceous glands, sweat glands, nails, temperature regulation.

Practical: demonstration / observation

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

Digestion
Test salivary digestions
Excretion
1. Examination of Urine
2. Specific gravity
3. Albumin
4. Sugar
5. Microscopic examination for cells and cysts

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

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

Course Assessment

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed &	Assignment(s)	Continuous Assessment	**Total**

	Lab report			
15	15	5	5	**40**

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

Course References

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

Reference Books:

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

Online references:

Coursera subscription for online anatomy topic

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Basic in Computer & Information Science			
Semester: I	**Course code: BMRIT1003**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 20		**No of practical hours:** 20	
Course Prerequisites:		**Number of sessions: 40**	

Course Introduction:

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

Course Objectives:

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

Course Learning Outcomes:

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

CLO1: Understand the various hardware and software of the computer system,

CLO2: Compare the differences between the various functions of the same (Analyze)

CLO3: Learn to apply the knowledge of various fields of the course (Apply & Analyze)

CLO4: Augment their learning by making various presentations and graphics (Synthesize, evaluate & create

Course Pedagogy

The course pedagogy includes a comprehensive study including the various software and hardware of the computer system in order to make the students more competent and skilled in its use and

storage. Various aspects about the use for same in health care setups are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students.

Module 1

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

Module 2

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

Module 3

1. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
2. Introduction of Operating System: introduction, operating system concepts, types of operating system.
3. Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
4. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
5. Application of Computers in clinical settings.

Course Assessment

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Introduction to Quality and Patient Safety			
Semester: I	**Course code: 23BMRIT1004**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 30		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 30**	

1. Course Introduction

As antibiotic-resistant strains of bacteria are growing rapidly, making it difficult to cure such patients, the importance of sterilization and proper disposals is only way to prevent it. Well known sayings, prevention is better than cure, the main objective of this course is to focus mainly on the preventive measures and quality assurance to the patients. This course emphasizes more on risk management principles and safe handling of disposals, basic emergency care and basic life support skills which can prove remedy in emergency cases.

2. Course Objectives: The main objective of this course is to teach students quality measures to provide patients with effective methods of treatment with more focus on proper handling of infected specimens and proper treatment with best sterilized and disinfected means to reduce the cross-infection scenario and nosocomial infections, which occurs due to poor handling of infected specimens and improper disposal means polluting environment too. Students are made to learn basic concepts of quality in health care and develop skills to implement sustainable quality assurance programs. Introducing students to basic emergency care, infection prevention& control with knowledge of biomedical waste management and antibiotic resistance.

3. Course Learning Outcomes

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

CL01: Understood quality improvement approaches, NABH, NABL, JCI guidelines which purely focuses on the quality measures and proper handling of disposals providing quality facility to patients. (Understanding Based)

CL02: Understood basic life support skills which can save many lives in urgent cases. (Applying Based)

CL03: Understood proper disposals of biomedical waste, reducing risk of infection to waste handling personnel and cross infection which can occur due to improper handling of infected waste polluting surroundings too. (Applying Based)

CL04: Understood effective hand hygiene, prevention and control of common health care associated infections. (Remembering Based)

CL05: Understood fundamentals of emergency management, disaster preparedness. (Remembering Based)

4. Course Pedagogy

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

Course Contents

Module 1: Quality assurance and Management

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

Module 2: Basic of Emergency care and Life support skills

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

Module 3: Basic emergency care

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

Module 4: Biomedical Waste Management

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

Module 5: Infection Prevention and Control

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

Module 6: Disaster preparedness and management

Fundamentals of emergency management

PRACTICALS (DEMONSTRATION ONLY)

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

Course Assessment

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

7. Course References

Texts, Materials, and Supplies:

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

Required Readings:

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

Recommended Readings:

• Medical Dictionary

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Radiation Physics			
Semester: I	**Course code: 23BMRIT1006**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 30		**No of practical hours: 20**	
Course Prerequisites:		**Number of sessions: 50**	

2. Course Introduction

Radiation Physics is a science and bridge between physics and engineering. It is applied for particular technological or practical use. The course covers the study of the application of the theories and principles of science to practical purposes.

3. Course Objectives: The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications. This course also provides fundamental idea about circuit analysis, working principles of machines. In addition, the course is expected to develop scientific temperament and analytical skill in students, to enable them logically tackle complex engineering problems in their chosen area of application. The main objectives are:

1. To understand the general scientific concepts required for technology
2. Understand the basic concepts of magnetic circuits, AC & DC circuits.
3. To gain knowledge about fundamentals of electronic components and devices.

4. Course Learning Outcomes

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

CLO1: Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in day-to-day life.

CLO2: Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments.

CLO3: Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how an interdisciplinary approach helps in providing better solutions and new ideas for sustainable developments.

4. 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 Radiation Physics but also improve skills and techniques for tackling practical problems.

Course contents

MODULE-1

BASIC PHYSICS: Sound -The nature and propagation of sound wave (the characteristics of sound, wave theory), speed of sound in a material medium, intensity of sound, the decibel, Interference of sound waves, beats, diffraction, Doppler's effect

HEAT: Definition of heat, temperature, Heat capacity, specific heat capacity, Heat transfer-conduction, convection, radiation, thermal conductivity, equation for thermal conductivity (k), the value of k of various materials of interest in radiology, thermal expansion.

MODULE-2

FUNDAMENTALS OF DC CIRCUITS: Introduction to DC and AC circuits, Active and passive two terminal elements, Ohm's law, resistivity, series and parallel combination, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, EMF.

AC CIRCUITS: A.C. and D.C. power supply with examples, single phase and polyphase power supply, Sinusoids, Introduction to three phase systems - types of connections, relationship between line and phase values.

MODULE-3

MAGNETIC CIRCUITS: Introduction to magnetic Circuits-Simple magnetic Circuits-Faraday's laws, induced EMFs and inductances, Galvanometer. Magnets and magnetic field, force on an electric current in a magnetic field, force on electric charge moving in a magnetic field, magnetic field due to straight wire; force between two parallel wires, Ampere's law, electromagnet and solenoids

MODULE-4

RECTIFICATION: Wave form of half wave and full wave current/voltage wave form; Rectifiers: Introduction, energy bands in solids, the semiconductor, p-type and n-type semiconductors, p-n junction, p-n junction diode, p-n junction diode as rectifier (half- wave and full-wave rectifier), rectifiers relative merits and demerits; silicon, germanium diodes.

Course Assessment

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**

CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Image Acquisition, Processing & Archiving			
Semester: I	**Course code: 23BMRIT1007**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 40**	

Course Objectives

- Demonstrate composition of film, screens, cassette, processing solution, the usage and effect of light.
- Perform best storage guidelines for film storage and handling.
  Select cassette size, demonstrate loading & unloading of films.

Course Learning Outcomes

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

CLO1: Understood the basic concepts, fundamental principles, and the scientific theories related to films, screens.

CLO2: Acquired the skills in handling film screens and planning of dark-room and performing in laboratory experiments.

CLO3: Realized how developments in any radio-graphic image quality. How interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.

Course contents

MODULE-1. Composition of single and double coated radiographic films, Screen &non-Screen films, structure of film, characteristic curve. characteristics (speed, base + fog, gamma, latitude), effect of grain size on film response to exposure, interpretation of characteristics curve, latent image formation, process of film developing (composition of developer, Fixer and other processing solution), common errors and faults while processing (densitometry), automatic processing unit (processing cycle), developer & Fixer replenishment and silver recovery.

MODULE-2. Film storage rules and guidelines, film handling and care (size, construction and function), types of intensifying screens and relative advantage, loading and unloading of cassettes and their care/maintenance, effects of kV and mA on variation of emitted radiation intensity, determination of relative speeds, film contrast, film screen contact.

MODULE-3. Image formation, latent image, processing: manual processing, automatic processing. Developer, fixer, rinse components, replenisher. Manual technique of developing film, Automatic film processor, common errors in processing.

MODULE-4. Meaning of radiographic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur, radiographic illuminators and viewing conditions, visual acuity and resolution, quality assurance of the related equipment and its benefits with respect to visual assessment

MODULE-5. Introduction, purpose and location of dark room, layout of dark room, entrance, pass box, hatch, hangers, safe light, criteria of safe light, safe light test.

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained. It will not only help students to understand the fundamentals of Imaging and Quality of Radiographs but also improve skills and techniques for tackling practical problems.

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**

	investigation.	
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Medical Terminology and Record Keeping			
Semester: I	**Course code: 23BMRIT1008**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 40**	

1. Course Introduction

This course mainly deals with medical terms and abbreviations used most commonly by practitioners in the medical field. This course will make students familiar with the record keeping procedures and will introduce students to diagnostic laboratories

Employability-level: Professional core

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

Course Description:

This course provides students with a comprehensive understanding of radiation technology and its applications in medical imaging and therapy. Students will learn about the principles of radiation, radiation safety, imaging modalities, radiation therapy techniques, and patient care in the context of radiation technology. The course will also cover professional ethics and legal considerations in radiation technology.

Course Objectives:

By the end of this course, students will be able to:

Understand the fundamental principles of radiation, including its properties and interactions with matter.

- Identify and explain different imaging modalities used in radiation technology.
- Describe the techniques and procedures involved in radiation therapy.
- Demonstrate knowledge of radiation safety protocols and procedures.
- Develop skills in patient care and management in a radiation technology setting.
- Recognize and adhere to professional ethics and legal responsibilities in radiation technology

Course Outline:

Course Contents

Module 1: Fundamentals of Medical Terminology

1. Derivation of Medical Terms: History of Medical Terminology, Importance of Medical Terminology in Healthcare, Commonly Used Roots from Greek and Latin, Examples of Medical Terms Derived from Greek and Latin.

2. Define Word Roots, Prefixes, and Suffixes: Definition and Role of Word Roots, Common

Medical Prefixes and Their Meanings, Common Medical Suffixes and Their Meanings, Combining Forms: When and How They Are Used, Examples of Medical Terms Using Various Prefixes, Roots, and Suffixes.

3. Conventions for Combined Morphemes and the Formation of Plurals: Rules for Combining Forms and Suffixes, Conventions for Forming Plurals, Hyphenation and Pronunciation Rules.

Module 2: Building and Understanding Medical Terms

1.Basic Medical Terms: Anatomical Terms**,** Pathological Terms**,** Diagnostic Terms**,** Surgical Terms**,** Pharmacological Terms**,** Medical Terms Related to Patient Care.

2.Form Medical Terms Utilizing Roots, Suffixes, Prefixes, and Combining Roots: Constructing Terms for Various Systems (e.g., Cardiovascular, Respiratory), Terms for Symptoms and Conditions, Terms for Procedures and Surgeries, Terms for Diagnostic Tests.

Module 3: Medical Abbreviations, Symbols, and Documentation

1.Interpret Basic Medical Abbreviations/Symbols: Common Abbreviations in Medical Practice, Symbols Used in Medical Documentation, Abbreviations for Drugs and Dosages, Abbreviations for Diagnostic Tests, Abbreviations for Medical Specialties and Departments.

2. Utilize Diagnostic, Surgical, and Procedural Terms and Abbreviations: Integumentary System Terminology, Musculoskeletal System Terminology, Respiratory System Terminology, Cardiovascular System Terminology, Nervous System Terminology, Endocrine System Terminology, Abbreviations for Common Procedures and Surgeries.

3. Interpret Medical Orders/Reports: Structure of Medical Orders, Understanding Physician Notes and Instructions, Reading and Interpreting Lab Reports, Analyzing Radiology Reports, Understanding Surgical and Procedure Notes, Practical Exercises in Interpreting Medical Documentation.

Module 4: Data Management in Healthcare

1.Data Entry and Management on Electronic Health Record System: Introduction to Electronic Health Record (EHR) Systems, Navigation and Interface of EHR Systems, Data Entry Best Practices, Managing Patient Information and Medical History, Recording Diagnostic Tests and Results.

Course References

. Medical Terminology: The Best and Most Effective Way to Memorize, Pronounce and Understand Medical Terms, 2nd Edition

. Medical Terminology: A Living Language

ASSEMENT SCHEME

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Environmental Science			
Semester: I	**Course code: EVS2111**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 40**	

Course Introduction

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

Course Objectives

The broad objectives of this course are

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

3. Course Learning Outcomes

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

CLO1: To gain knowledge on the importance of environmental education and ecosystem.

CLO2: To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution.

CLO3: To understand the treatment of wastewater and solid waste management.

CLO4: To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.

CLO5: To be aware of the national and international concern for environment for protecting the environment.

CLO6: To understand the environmental issues arising from different labs of the hospital

4. Course Pedagogy

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

5. Course Contents

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

Module 1 Introduction

Definition, scope and importance of multi-disciplinary nature of environment. Need for public awareness.

Module 2 Natural Resources

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

Module 3 Ecosystems

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

Module 4 Environmental Pollution

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

Module 5 Social blemishes and the Environment

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

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

Module 5 Understanding the Hospital Environment

Module.6 Understanding the environment in the following clinical laboratories:
Microbiology, Biochemistry, Histopathology, Hematology

Module 7 Clinical laboratory hazards to the environment from the following and means to prevent:
Infectious material, Toxic Chemicals, Radioactive Material, Other miscellaneous wastes

Course Assessment

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

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

Course References
Text Book:
Chawla S., 2012. A Textbook of Environmental Studies, Tata Mc Graw Hill, New Delhi.

Reference Books:
Reference 1: Jadhav, H &Bhosale, V.M., 1995. Environmental Protection and Laws. Himalaya Pub. House, New Delhi.
Reference 2: Gadi R., Rattan, S., 2006. Environmental Studies, KATSON Books, New Delhi.
Reference 3: Mckinney, M.L. & School, R.M., 1996. Environmental Science Systems & Solutions, Web enhanced edition.
Reference 4: Wagner K.D., 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA

Papers:
- Beckerman, W. (1992). Economic growth and the environment: Whose growth? Whose environment? *World Development, 20(4),* 481-496.

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Soft Skill			
Semester: I	**Course code: SS151**	**Credits:01**	**Core**
No of sessions Lectures / Tutorial: 10		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 10**	

Course Objectives:

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

Course Learning Outcomes

Upon successful completion of the course, the student should able to-

CLO1: Understood the role of radiographer, role of medical personal in patient communication and interpersonal relationship

CLO2: Understood the importance of empathy and greetings to the patients and their relatives.

CLO3: Understood the importance of mannerism.

CLO4: Understood the importance of various gestures, body language and moods in greeting the patient.

Module 1: Introduction to soft skills

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

Module 2: Letter writing skills

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

Module 3: Telephone etiquettes

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

Course Assessment Scheme

Students will be continuously assessed on the basis of presenting themselves in front their teachers and colleagues, class assessments, communication skills, behavior skills and mannerism.

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

Course Reference:

www.slideshare.net
www.wikipedia.co.in
www.information.net

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**

	investigation.	
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Human Anatomy and physiology-II			
Semester: II	**Course code: BMRIT2001**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 20		**No of practical hours: 20**	
Course Prerequisites:		**Number of sessions: 40**	

Course Introduction

Allied and healthcare professionals (AHPs) include 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 learning Outcomes-

CLO- 1 Enumerate the function of the brain, Nervous system, motor system, blood supply of brain, anatomy of brain, cranial nerves, CSF formation and about spinal cord.

CLO-2 Enumerate auditory system. Demonstrate anatomy of urinary system, location of kidney.

CLO-3 Enumerates blood vessels of the reproductive system. Enumerate hormone secretion of glands and blood supply.

CLO-4 Enumerate Physiology of kidney

CLO-5 Explain Physiology of lower Urinary tract

CLO-6 Label Physiology of the endocrine glands

CLO-7 Enumerate Physiology of reproductive system

Course Pedagogy

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

Course contents-

MODULE -1

The nervous system

a. Neurons: Structure, types and properties

b. Central nervous system: neurons, neuralgia meninges
c. Ventricles of the brain, CSF
d. Brain, spinal cord: structures, functions, peripheral nervous system.
e. Spinal and cranial nerves: origin distribution and functions.
f. Autonomic nervous system
g. Sympathetic and parasympathetic: origin distribution and function.
h. Common diseases of the system

MODULE-2

Skeletal System

a. Osteology (including whole Skelton, bones and joints)
b. Development of bone (ontogenesis): Cells involved
c. Types and functions of bone, Types of joints and various movements.
d. AXIAL Skelton: Skull: Cranium, face, air sinuses, Vertebral column: regions, movements and characteristics, Sternum, Ribs
e. Appendicular Skelton: Bones involving -Shoulder girdle and Upper limb, Pelvic girdle and lower limb, healing of bones: cellular activity, Factors that delay healing, Diseases of bones and joints.

MODULE-3

The Urinary System

a. Parts of urinary system
b. Position, structure and functions
c. Kidneys, ureters, urinary bladder and urethra
d. Formation and composition of urine
e. Water and electrolyte balance
f. Diseases and conditions of the system

MODULE 54

The reproductive system**:**

a. Female reproductive system: External genitalia: positions and structures and functions. Perineum. Internal organs: positions and structures. Vagina, uterus, uterine tubes, ovaries. Menstrual cycle" stages, hormone control, ovulation. Breasts (Mammary glands) Changes: puberty, in pregnancy, during lactation.

b. Male reproductive system: Scrotum, testis, epididymis: positions. Spermatogenesis, Spermatic Cords, seminal vesicles, Ejaculatory ducts: position, structure & functions Prostate gland: position Functions of male reproductive system, puberty Diseases of female and male reproductive system**.**

MODULE 6.

Practical:

1. Study of Human Skeleton parts with skeletal models.
2. Study with charts and models of all organ systems mentioned above.

Assessment Scheme:

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

ANATOMY PRACTICAL

1) Identification and description of all anatomical structures
2) Demonstration of dissected parts
3) Demonstration of skeleton-articulated and disarticulated.
4) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

Course Reference
Text Books:

- PR Ashalatha& G Deepa ‘s Textbook of ANATOMY & PHYSIOLOGY by
- B.D. Chaurasia’s HUMAN ANATOMY

Reference books:
Online references:
Coursera subscription for physiology topics

Online references: Coursera subscription for online anatomy topics

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Basics and Radiological Physics			
Semester: II	**Course code: 23BMRIT2002**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:** 40	
Course Prerequisites:		**Number of sessions: 80**	

Course Objectives: The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications. This course also provides fundamental ideas about circuit analysis, working principles of machines. In addition, the course is expected to develop scientific temperament and analytical skills in students, to enable them to logically tackle complex engineering problems in their chosen area of application.

Course Learning Outcomes

CLO 1- Use X-ray equipment and maintenance of equipment.
Should know the Warm-up procedures of X-ray machines and cooling methods.

CLO 2-To be able to know how to use X-Ray exposure switches.

CLO 3- Demonstrate work flow Digital/IITV fluoroscopy equipment handling
Demonstrate Handling, care and maintenance of equipment & accessories

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

MODULE 1 Basic Physics: Sound -The nature and propagation of sound wave (the characteristics of sound, wave theory), speed of sound in a material medium, intensity of sound, the decibel, Interference of sound waves, beats, diffraction, Doppler's effect .

MODULE 2 Heat- Definition of heat, temperature, Heat capacity, specific heat capacity, Heat transfer conduction, convection, radiation, thermal conductivity, equation for thermal conductivity (k), the value of k of various material of interest in radiology, thermal expansion, Newton's law of cooling, Heat radiation.

MODULE 3 Applied mathematics: Proportion: Direct proportion and inverse proportion, inverse square law with relevant examples, graphical representation of parameters that obey linear and exponential law: example of linear and semi log plotting. Electricity and Magnetism: A.C. and D.C. power supply with examples, single phase and polyphase power supply, switches, fuses, circuit breakers, earthing etc. main voltage drop: causes and remedy, cables; low tension, high

tension. DC circuit, Ohm's law, resistivity, series and parallel combination, EMF, Kirchhoff's law, heating effect of current, Ammeter, voltmeter, Galvanometer. Magnets and magnetic field, force on an electric current in a magnetic field, force on electric charge moving in a magnetic field, magnetic field due to straight wire; force between two parallel wires, Ampere's law, electromagnet and solenoids.

MODULE 4 Rectification and Transformers: Thermionic emission; - variation of anode current with anode voltage and filament temperature; principle of rectification, wave form of half wave and full wave current/voltage waveform; Rectifiers: Introduction, energy bands in solids, the semiconductor, p-type and n-type semiconductors, density of charge carriers and conductivity, p-n junction, p-n junction diode, p-n junction diode as rectifier (half- wave and full-wave rectifier), rectifiers relative merits and demerits; silicon, germanium diodes. Principles of transformer, Electromagnetic induction, transformer design, efficiency of transformer, source of power loss

MODULE 5 Electromagnetic radiation: Electromagnetic radiation spectrum, common properties of electromagnetic radiation; relationship between energy, frequency, wavelength and velocity e.g. X-rays and gamma rays. Properties of X-rays and gamma rays; General properties of X-rays, velocity, frequency etc., photographic effect, photochemical effect – discoloration of salts, heating effect, biological effect; ionization of gasses e.g. air. Interaction of radiation with matter: Transmission through matter, law of exponential attenuation, half value layer, attenuation coefficients; interaction of radiation with matter, classical scattering, Compton scatter, photo electric absorption, pair production; practical aspects of radiation absorption and transmission through body tissues. Measurement of X-rays: Unit of quantity of radiation exposure - definition and application of 'roentgen', unit of quantity of radiation dose - definition and application of 'rad', 'gray' and 'rem';

MODULE 6 Principle and application of ionizations chamber and ionization reader unit, film and densitometer, thermo luminescent dosimeter (TLD). X. Quality and quantity of X-rays: Specification and explanation of electron volt (eV), kilovolt (kV) and half value layer (H.V.L) as an index of penetration of the radiation. 9. Basic radiation protection: Historical development, dose equivalent limit, international recommendations and current code of practice for the protection of radiation workers and the public against ionizing radiation arising from medical and dental use; protective materials, lead - impregnated substances; building materials, lead equivalents of protective, personal monitoring; film badge, pocket dosimeter TLD badges and their uses and relative merits

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

PRACTICAL

- X-Ray tubes and accessories, general features.
- Portable X-Ray Equipment.
- Image intensifier, its features, spot film.
- Radiation protection devices
- Effects of kV and mAs.
- Maintenance of X-ray equipment and accessories.
- Mammography X-Ray tube
- Dental X-Ray unit.

Reference and Text Books-

Text book of radiology for residents and technicians- S K Bhargava.
Text book of Radiation physics.
www.wikiedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Conventional Radiography and equipment			
Semester: II	**Course code: BMRIT2003**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:** 40	
Course Prerequisites:		**Number of sessions: 80**	

Course Objectives

The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications. This course also provides fundamental ideas about circuit analysis, working principles of machines. In addition, the course is expected to develop scientific temperament and analytical skills in students, to enable them to logically tackle complex engineering problems in their chosen area of application.

Course learning Outcomes

CLO 1-Able to know the production of X-ray.

CLO 2- Explain high tension circuits, meters and exposure timers.

CLO 3-Able to know interlocking systems, control of scattered radiation.

CLO 4- Able to know handling and mechanism of Fluoroscopy.

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

MODULE 1 Production of x-rays: X-ray tube, gas filled x-ray tube, construction working and limitations; stationary anode x - ray tube; construction, working, methods of cooling the anode, rating chart and cooling chart; rotating anode x - ray tube: construction, working rating chart, speed of anode rotation, angle of anode inclination, dual focus and practical consideration in choice of focus, anode heel effect, grid controlled x - ray tube; effect of variation of anode voltage and filament temperature; continuous and characteristics spectrum of x - rays, inherent filter and added filter, their effect on quality of the spectrum.

MODULE 2 High tension circuits: H.T. generator for x-ray machines, three phase rectifier circuits, three phase six rectifier circuit, three phase 12 rectifier circuit, high and medium frequency circuits; capacitance filter control and stabilizing equipment; mains voltage compensator, mains resistance compensator, compensation for frequency variation, control of tube voltage, kV compensator; high tension selector switch, filament circuit, control of tube current, space charge compensation.

MODULE 3 Meters and exposure timers: Moving coil galvanometer: construction and

working/conversion to millimetre, ammeter and voltmeter, meters commonly used in diagnostic x-ray machines, pre-reading kV meter and millimetre, digital panel meters. Clockwork timers, synchronous motor timer, electronic timers, photo metric timers (fluorescent and photoelectric effect as applied in timers), ion chamber-based timers, integrated timer. 4. Interlocking circuits: Relays: description and working, use of relays in diagnostic machines for overload protection, circuit diagram; simplified circuit and block diagrams illustrating sequence of events from mains supply to controlled emission of x-rays.

MODULE 4 Control of scattered radiation: Beam limiting devices: cones, diaphragms, light beam collimator, beam centring device, methods to verify beam centring and field alignment; grids; design and control of scattered radiation, grid ratio, grid cut-off, parallel grid, focused grid, crossed grid, gridded cassettes, stationary and moving grid potter bucky diaphragms, various types of grid movements; single stroke movement, oscillatory movement and reciprocator movement.

MODULE 5 Fluoroscopy: Fluorescence and phosphorescence - description, fluorescent materials used in fluoroscopic screens, construction of fluoroscopic screen and related accessories, tilting table, dark adaptation. Image intensifier - Construction and working, advantages over fluoroscopic devices, principles and methods of visualizing intensified image, basic principles of closed-circuit television camera and picture tube. Vidicon camera, CCD. Automatic brightness control, automatic exposure control, chamber selection during fluoroscopy. Serial radiography: Manual cassette changer, rapid automatic film changer, basic principles of cine fluoroscopy and angiography use of grid-controlled x-ray tube.

MODULE 6 Care and Maintenance of X-ray equipment; General care; functional tests; testing the performance of exposure timers, assessing the MA settings, testing the available KV, measurement of focal spot of an x-ray tube, testing the light beam diaphragm, practical precautions pertaining to Brakes and locks, H.T. cables, meters and controls, tube stands and tracks as well as accessory equipment.

Course Assessment

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Reference and Text Books-

Text book of radiology for residents and technicians- S K Bhargava.

Text book of Radiation physics.

www.wikiedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1	***3***	***1***	***2***	***3***		***3***	***3***	***2***	***3***	***1***	***3***
CO2	***3***	***3***		***3***		***3***	***3***		***3***		***3***
CO3	***3***	***3***	***2***	***3***	***1***	***3***	***3***	***2***	***3***		***3***
CO4	***3***	***3***	***2***	***3***	***1***	***3***	***3***	***2***	***3***	***1***	***3***

1= LOW 2= MEDIUM 3= HIGH

MAPPING BETWEEN CO AND PO	
Course outcome (CO's)	**Mapped program outcome**
Able to know production of X-ray.	P01,P02,P03,PO4,PO5,PO6,PO8,PO10,PO11
Explain high tension circuits, meters and exposure timers.	PO1,PO2,PO3,PO6,PO7, PO8,PO10
Able to know interlocking systems, control of scattered radiation	PO1.PO2,PO4,PO10,PO11
Able to know handling and mechanism of Fluoroscopy.	PO1,PO3,PO6,PO7,PO8,PO9,PO10

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Image Processing Techniques			
Semester: II	**Course code: 23BMRIT2004**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:** 40	
Course Prerequisites:		**Number of sessions: 80**	

Course Description:
This course focuses on the application of image processing techniques in radiology for the enhancement, analysis, and interpretation of medical images. Students will learn various methods and algorithms specific to radiological image processing, including image enhancement, noise reduction, segmentation, feature extraction, and computer-aided diagnosis. The course will cover both theoretical concepts and practical implementation of image processing techniques in the context of radiology.

Course Objectives:
By the end of this course, students will be able to:
CO1**.**Understood the basic concepts, fundamental principles, and the scientific theories related to cassette screens.
CO2. Acquired the skills in handling film screens.
CO3.Understand the fundamentals of automatic image processing in the context of radiology.

CO4.Utilize image processing techniques to aid in the interpretation and diagnosis of radiological images

Course Outline:
Module 1: Intensifying screens and cassettes. Luminescence: fluorescence and phosphorescence. Construction of an intensifying screen.
The fluorescent materials, types of intensifying screens, intensification factor. The influence of KV, scattered radiation. Detail, sharpness and speed, size of the crystals, reciprocity failure, and quantum mottle.
Module2: Cassette design, care of cassettes, types of cassettes, and mounting of intensifying screens,
loading and unloading of cassettes.
Care of intensifying screens, tests to check screen film contact and light leakage

Module 3: Automatic Film Processor.

- Functions of various components.
- Film roller transport-transport time, film feed system.
- Importance and relation to temp, fixed and variable time cycles.
- Care and maintenance (cleaning routine and methods of cleaning).

Module 4: Factors affecting Image Quality:

- Meaning of radiographic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur.
- Radiographic illuminators and viewing conditions, visual acuity and resolution.

- **Course Pedagogy**
- The course will use the mixed technique of interactive lectures, regular assignments. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained. It will not only help students to understand the fundamentals of Imaging and Quality of Radiographs but also improve skills and techniques for tackling practical problems.

- **Assessment Scheme:**

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Reference and Text Books-
Text book of radiology for residents and technicians- S K Bhargava.

Text book of Radiation physics.
Text book: basics of radiological physics- k. thayalan
www.wikiedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Medical Ethics and Legal Aspects			
Semester: II	**Course code: 23BMRIT2005**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 10		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 10**	

Course Introduction:

Allied and healthcare professionals (AHPs) include 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 legal aspects and medical ethics helps them in putting into perspective the knowledge that they gain for better future

Course Objectives:

This course is designed to provide the students the basic knowledge in laws and ethics to follow 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:

CLO1: Understood the importance of the professional laws and ethics.

CLO2: Understood the legal aspects and medical ethics in health setups.

Course Pedagogy

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

Course Contents

Module 1

Role, Definition and Interaction with the patients and health care professionals, Ethical, Moral, and Legal Responsibilities, Patient safety and quality, restrain policies and role of health professionals.

Biomedical waste Management, medical records and reports.

Module 2

Medical terminology- The course employs a body systems-oriented, word-analysis approach to learning medical terminology.

Module 3

The goal of the class is to prepare students for the terminology they might encounter in their subsequent coursework, in their clinical rotations and ultimately in their roles as health care professionals.

Course Assessment Scheme

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

Assessment Criteria

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*

COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

	Sushant School of Health Sciences **BMRIT**		
Course Title: Introduction to National Health Care Delivery system in India (Workshop)			
Semester: II	**Course code: BMRIT2006**	**Credits:01**	**Core**
No of sessions Lectures / Tutorial: 1		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 1**	

ASSESMENT SCHEME

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Communication in English			
Semester: II	**Course code: 21ENG11**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 20		**No of practical hours:**	
Course Prerequisites:		**Number of sessions: 20**	

Course Introduction:

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

Course Objectives:

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

Course Learning Outcomes

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

CLO1: Understood the role of radiographer in personal and professional ethics.

CLO2: Understood the handling of patient with good language.

CLO3: Understood the importance of good communication with patient as a health care professional.

CLO2: Understood the handling of patient with good language.

CLO3: Understood the importance of good communication with patient as a health care professional.

Course Pedagogy

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

Module 1: Basics of Grammar- Part I

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

Module 2: Basics of Grammar – Part II

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

Module 3: Writing Skills

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

Module 4: Writing and Reading

Summary writing, Creative writing, newspaper reading

Module 5: Practical Exercise

Formal speech, Phonetics, semantics and pronunciation

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

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

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

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

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

Course Assessment

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Clinical Radiography Positioning-I			
Semester: III	**Course code: 23BMRIT3001**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:** 80	
Course Pre-requisites:		**Number of sessions: 120**	

Course Objectives

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

1) Explain the role of radiographer and positioning of various body parts, normal functioning of various organ systems of the body and their interactions.
2) Elucidate the radiological aspects of normal growth and development.
3) Describe the patient response and adaptations to environmental stresses.

Course learning Outcomes

CLO 1-Explain how to take good quality images with as low as radiation dose in upper limb and lower limb.

CLO 2-Enumerate immobilization technique and immobilization devices.
Use positioning devices.

CLO 3-Work in clinical practice and know about patient care

CLO 4 Able to know and perform dental radiography

CLO 5 Able to know abdominal radiography.

Course Pedagogy

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

and evaluate the students. They are taught on simulators for a live feeling. The practical includes the study of structures through mannequins which helps in holding the interest of the students.

Course contents

MODULE 1 Upper limb: Technique for hand, fingers, thumb, wrist joint carpal bones, forearm, elbow joint, radio ulnar joints and humerus supplementary techniques for the above. E.g. Carpal tunnel view, ulnar groove, head of the radius, supracondylar projections. Lower limb: Technique for foot, toes, great toe, tarsal bones, calcaneum, ankle joint, lower leg, knee, patella & femur. Supplementary techniques: Stress view for torn ligaments, a. Subtalar joint and talo calcaneal joint. b. Inter condylar projection of the knee. c. Tibial tubercle. d. Length measurement technique.

MODULE 2 Shoulder girdles and thorax: Technique for shoulder joint, scapular, clavicle, acromio clavicular joints, sternum, ribs, sterno-clavicular joint. Supplementary projections and techniques a. Recurrent dislocation of shoulder. b. Traumatic dislocation of shoulder. c. Cervical ribs.

MODULE 3 Vertebral column: Technique for atlanto-occipital joint, cervical spine, cervico thoracic spine, thoracic spine, thoraco- lumbar spine, lumbo sacral spine, sacrum and coccyx. Supplementary techniques to demonstrate: a. Scoliosis. b. Kyphosis c. Spondylolisthesis d. Disc lesion e. Union of spinal graft. Adaptation of techniques to demonstrate specific pathologies. Pelvic girdle and hip region: Technique for whole pelvis. Ilium, ischium, pubic bones, sacro iliac joint, symphysis pubis, hip joint, acetabulum neck of femur, greater and lesser trochanter.

MODULE 4 Supplementary techniques- a. Congenital dislocation of hips b. Epiphysis of femur: c. Lateral projections for hip joints to show femoral head and neck relationship. Skeletal survey: Skeletal survey for metabolic bone disease, metastases, hormonal disorder, renal disorders. 8. Skull: Basic projections for cranium, facial bones, nasal bones and mandible. Technique for a. Petrous temporal for mastoids. Internal auditory canal. - Accessory nasal sinuses. b. Tempero - mandibular joint. - Orbits and optic foramen. - Zygomatic arches. c. Styloid process. - Pituitary fossa. - Jugular foramen.

MODULE 5 Dental Radiography: Technique for intra oral full mouth, occlusal projections, extra oral projections including orthopantomography, Supplementary techniques. Upper respiratory system: Technique for post nasal airways, larynx, trachea, thoracic inlet - Valsalva maneuver. - Phonation. Lungs and Mediastinum:

MODULE 6 Technique for routine projections: Projections: Antero-posterior, obliques, lordotic, apical projection, use of penetrated posteroanterior projection. - Expiration technique. - Technique for pleural fluid levels and adhesions. Abdominal viscera: For plain film examination, Projection for acute abdomen patients. Technique to demonstrate

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination	Quiz(s), Presentation(	Assignment(s)	Continuous Assessment	**Total**

Theory	s), Lab/ practical performed & Lab report			
15	15	5	5	**40**

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

PRACTICAL

Topic
Regional Radiography:. • All Views of Hip and Pelvis: Theatre procedure for Hip, Pinning and Reduction, Pelvis, Sacro-ilac Joint, Pelvis Bone, Acetabulum**.** • All Views and techniques of Vertebral Column: Cervical Spine, Thoracic spine, Lumbar spine, Sacrum, Coccyx • All views and techniques Abdomen: Gastro-intestinal tract, urinary tract Skeletal Survey.

Books Recommended-

Clark's Radiography- Clark
Radiographic positioning- Garkal
www.wikipedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**

CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: physics of modern Radiological and Imaging Equipment			
Semester: III	**Course code: 23BMRIT3002**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

Course Objectives

The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications of mammography and computed radiography and DSA. Should able to scanning also in mammography, computed radiography and DSA.

Course learning Outcomes

CLO 1-Perform the procedure of mammography scanning.
CLO 2-Enumerate and able to know the principle computed radiography.
CLO 3-Able to know and perform vascular imaging with PACS

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 physics of mammography and CT scan but also improve skills and techniques for tackling practical problems.

Course contents

MODULE-1 Mammography, History of mammography, Mammographic equipment, Mammographic radiation dose and exposure Dedicated mammographic unit and its special features, Types of mammography Routine Mammographic Positioning & Views with additional views and technical considerations, Wire localization in mammography.

MODULE 2 Special equipment: Portable and mobile x-ray units, dental x-ray machine, skull table Generator, x-ray tubes; Accessories; Resolution; Quality control; Application and role in medicine. , digital radiographic equipment, digital subtraction techniques. Tomography: Body section radiography, basic principle and equipment, multi section tomography, various types of tomographic movements, Dual energy x-ray absorptionometry (DEXA), stats can.

MODULE 3 Computed radiography: its principle, physics & equipment. Digital Radiography. Flat panel digital fluoroscopy and radiography system, Direct and indirect digital radiography and fluoroscopy systems. Digital radiography and Computed radiography its advantages, disadvantages and applications.

MODULE 4 Vascular Imaging Equipment: Introduction, historical developments, Principle, scanned projection radiography, digital subtraction angiography, applications and definition of terms. 4. Picture archiving and communication system (PACS)

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Practical

1) X-Ray tubes and accessories, general features.
2) Portable X-Ray Equipment.
3) Image intensifier, its features, spot film.
4) Radiation protection devices
5) Effects of kV and mAs.
6) Maintenance of X-ray equipment and accessories.
7) Mammography X-Ray tube
8) Dental X-Ray unit.

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
www.wikipedia.co.in
www.radiopedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Contrast Media and Radiography Procedures			
Semester: III	**Course code: 23BMRIT3003**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

Course Objectives-

This course is designed to provide the students the basic knowledge in systematic investigations with using contrast media and image intensifier.

Course learning outcomes-

CLO 1- Explain indication, contraindication and reactions of contrast media.
Demonstrate how to take in minimum numbers of exposures in each special investigation.

CLO 2-Demonstratethe positioning and technique of the special studies**.**

CLO 3- Explain the technique of all GIT study according to investigation.

CLO 4- Demonstrate surface anatomy. To be able to know the technique behind the radiography.

Course contents

MODULE 1 Special radiographic procedures Responsibility of Radiographer during Radiological Procedures. Preparation of Patient for Different Procedures. Contrast Media - Positive and Negative, Ionic & Non – Ionic Adverse Reactions To Contrast Media and Patient Management Emergency Drugs in the Radiology Department Emergency Equipments In the Radiology Department Aseptic technique Indications, contraindications, basic techniques and relationship to other techniques of the following special procedures

MODULE 2 Gastrointestinal Tract: Fluoroscopy, general considerations, responsibility of radiographers Barium swallow, pharynx and esophagus Barium meal and follow through Hypotonic duodenography Small bowel enema Barium Enema routine projections for colon and rectum, colonic activators; double contrast studies; colostomy. Special techniques for specific disease to be examined Water soluble contrast media - eg. gastrograffin studies b. Salivary glands: Routine technique, procedure – sialography c.
MODULE 3 Biliary system: Plain film radiography Intravenous cholangiography Percutaneous

cholangiography Endoscopic retrograde Cholangio-pancreatography (ERCP) Operative cholangiography Post-Operative cholangiography (T - tube Cholangiography)
MODULE 4 Urinary system: Intravenous urography Retrograde pyelography Antegrade pyelography Cystography and micturating cystouresthrography Urethrography (ascending) Renal puncture

MODULE 5 Female reproductive system: Hysterosalpingography. Respiratory system: Bronchography: Awareness. h. Sinusography: Routine technique and procedure.

MODULE 6 Multiple radiography. Uses of soft tissue radiography. l. High kV Radiography: General principles Relation to patient dose Change in radiographic contrast. Scatter elimination; beam collimation; grid ratio. Speed and type of grid movement. Radiographic factor; application and uses. m. Localization of foreign bodies: General location principles. Ingested; inhaled; inserted; embedded foreign bodies. Foreign bodies in eye. Preparation of the area to be investigated. Appropriate projection for all Techniques to locate non-opaque foreign body.

Assessment Scheme:

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

PRACTICAL

- Radiography in various positions for all the special radiological procedures, using contrast media
- Identification of various films for all the special radiological procedures, using contrast media and related pathologies

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – champman.
www.wikipedia.co.in//www.radiopedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Workshop (Telemedicine)			
Semester: III	**Course code: 23BMRIT3004**	**Credits:01**	**Core**
No of sessions Lectures / Tutorial:0		**No of practical hours:** 2	
Course Pre-requisites:		**Number of sessions: 1**	

ASSESMENT SCHEME

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Summer Training with evaluation-I			
Semester: III	**Course code: BMRIT335**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:** 8	
Course Pre-requisites:		**Number of sessions: 4**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Physics of newer imaging modalities			
Semester: IV	**Course code: BMRIT4001**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:** 80	
Course Pre-requisites:		**Number of sessions: 120**	

Course Objectives

This course is designed to provide the students the basic knowledge in Radiography with using newer modalities of radiology. At the end of the course, the student should be able to know about ultrasonography Computed Tomography, Generation of CT Scanner, Magnetic resonance imaging, fusion imaging PET, Contrast media using, handling and tele radiology.

Course learning Outcomes

CLO 1 Able to know Computed Tomography its principle, various generations and advancements

CLO 2 Able to know Magnetic Resonance Imaging- its principle, advancements and applications.

CLO 3 Able to know Fusion Imaging including PET-CT, PET- MRI. Digital Mammography, DEXA equipment- principle, advancements and applications.

CLO 4 Able to know tele radiology HIS,RIS and PACS, Image processing in digital radiography systems: Post processing techniques in console using CR, DR and flat panel fluoroscopy systems

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 physics of mammography and CT scan/ultrasound/ PACS but also improve skills and techniques for tackling practical problems.

Course Contents

MODULE 1-Basic principle of CT scan, history of CT Scan, EMI, advantages and disadvantages, Equipment description.

MODULE 2-Scanning principle, Image acquisition, Image reconstruction, Image manipulation, Image display and documentation, Scanning parameters. Advantages and disadvantages.

MODULE 3-History of MRI, Magnetism, Basic Principle, hardware etc.Types of Contrast agents used in MRI. Physical and physiological basis of magnetic relaxation, Image contrast and noise. Spin Echo, Inversion Recovery, Gradient Echo

MODULE-4 Applications and Apparatus for nuclear medicine, Application, Function and instrumentation . Definition, Applications, Clinical uses, advantages & disadvantages of PET-CT. Definition, Applications, Clinical uses, advantages & disadvantages of PET-MRI

MODULE -5 Benefits vs risk or PET-CT and PET-MRI. Characteristics and half-life of Radionuclides Commonly used Radionuclides. Routine protocols Indication and contraindications of PET. Patient preparation technique in PET Scan.

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – champman.
CT made Easy
www.wikipedia.co.in
www.radiopedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**

CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Clinical Radiography Positioning -II			
Semester: IV	**Course code: BMRIT4002**	**Credits:06**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:** 40	
Course Pre-requisites:		**Number of sessions: 80**	

Course Objectives

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

Course Learning Outcomes

CLO1-Explain the role of radiographer and positioning of various body parts, normal functioning of various organ systems of the body and their interactions.

CLO2-Elucidate the radiological aspects of normal growth and development.

CLO3-Describe the patient response and adaptations to environmental stresses.
CLO4- Describe various positioning of different body parts.

Course Pedagogy

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

Course contents-

MODULE 1 Radiography technique comprising of the complete. Radiography of Skull and Radiography of cranial bones; including special techniques for sellaturcica, orbits, opticforamina, superior orbital fissure and inferior orbital fissure etc. Facial bones; Paranasal sinuses, Temporal bone and Mastoids. Dental Radiography: Radiography of teeth-intra oral, extra oral and occlusal view.

MODULE 2 Abdomen: Preparation of patient. General abdominal radiography and positioning

for fluid and air levels. Plain film examination. Radiography of female abdomen to look for pregnancy. Radiography in case of acute abdomen. Macroradiography: Principle, advantage, technique and applications. Stereography - Procedure - presentation, for viewing, stereoscopes, stereometry.

MODULE 3 High KV techniques principle and its applications. Soft tissue Radiography . Localization of foreign bodies. Various techniques Ward /mobile radiography - electrical supply, radiation protection, equipment and instructions to be followed for portable/ward radiography.

MODULE 4 Operation theatre techniques: General precautions, Asepsis in techniques - Checking of mains supply and functions of equipment, selection of exposure factors, explosion risk, radiation protection and rapid processing techniques. Trauma radiography/Emergency radiography . Neonatal and Paediatric Radiography, Tomography and Tomosynthesis Dual energy X-ray absorptiometry . Forensic Radiography

Assessment Scheme:

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Practical

- **a.** All views and techniques Abdomen: Gastro-intestinal tract, urinary tract
- **b.** Skeletal Survey.

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – champman.
www.wikipedia.co.in//www.radiopedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Imaging of CT and MRI			
Semester: IV	**Course code: 23BMRIT4003**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

Course Objectives

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinRadiography with patient care and code of ethics. At the end of the course, the student should be able to

Course Learning Outcomes

CLO1- Understood about Introduction to hospital staffing and Medical records and documentation.

CLO2 – Must know about Legal issues and Professional ethics.

CLO3- How to handle and must know Departmental Safety and Infection control

CLO4- Understood Body mechanics and transferring of patient

Course Contents-

MODULE 1 Interventional Radiography: Basic angiography and DSA: a. History , technique, patient care b. Percutaneous catherisation, catheterization sites, Asepsis c. Guidewire, catheters, pressure injectors, accessories d. Use of digital substraction- single plane and bi-plane All forms of diagnostic procedures including angiography, angioplasty, bilary examination, renal evaluation and drainage procedure. Central Nervous System: a. Myelography b. Cerebral studies c. Ventriculography Arthrography: Shoulder, Hip, Knee, and Elbow 4. Angiography: a. Carotid Angiography (4 Vessel angiography) b. Thoracic and Arch Aortography c. Selective studies: Renal, SMA, Coeliac axis d. Vertebral angiography e. Femoral arteriography f. Angiocardiography Venography: a. Peripheral venography b. Cerebral venography c. Inferior and superior venocavography d. Relevant visceral phlebography 6. Cardiac catheterization procedures: PTCA, BMV, CAG, Pacemaker, Electrophyiology,

MODULE 2 Microbiology 1.Introduction and morphology - Introduction of microbiology, Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria. 2. Growth and nutrition -nutrition, culture media, types of medium with example and uses of culture media in diagnostic bacteriology, antimicrobial sensitivity test Sterilization and disinfection - principles and use of equipments of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, anti-septic and disinfectants. Introduction to immunology, bacteriology, parasitology, mycology.

MODULE 3 Hospital procedure: Hospital staffing and organization; records relating to patients and departmental statistics; professional attitude of the technologist to patients and other members of the staff; medico- legal aspects; accidents in the departments, appointments, organization; minimizing waiting time; out-patient and follow-up clinics; stock-taking and stock keeping. Care

of the patient : FIRST contact with patients in the department; management of chair and stretcher patients and aids for this, management of the unconscious patient; elementary hygiene; personal cleanliness; hygiene in relation to patients (for example clean linen and receptacles , nursing care; temperature pulse and respiration; essential care of the patient who has a tracheostomy; essential care of the patient who has a colostomy; bedpans and urinals; simple application of a sterile dressing.

MODULE 4 First aid: Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. Shock; insensibility; asphyxia; convulsions; resuscitation, use of suction apparatus, drug reactions; prophylactic measures; administration of oxygen; electric shock; burns; scalds; hemorrhage; pressure points; compression band. Fractures; splints, bandaging; dressing, foreign bodies; poisons. 4. Infection: Bacteria, their nature and appearance; spread of infections; auto-infection or cross-infection; the inflammatory process; local tissue reaction, general body reaction; ulceration; asepsis and antisepsis. Universal precautions, hospital acquired infections- HIV, Hepatitis B, C, and MRSA etc. 5. Principles of asepsis: Sterilization - methods of sterilization; use of central sterile supply department; care of identification of instruments, surgical dressings in common use, including filamented swabs, elementary operating theatre procedure; setting of trays and trolleys in the radio imaging department (for study by radio imaging students only) 6. Departmental procedures: Department staffing and organizations; records relating to patients and departmental statistics; professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department;

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

PRACTICAL

Newer Modalities Imaging Techniques including patient care

1. Medical records and documentation
2. Legal issues in radiology department, PNDT Act
3. Professional ethics and Code of conduct of radiographer
4. Handling of patients: Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients, infectious patients
5. Departmental Safety
6. Infection control: skin care, donning of gowns, gloves, face masks, head caps, shoe covers.
7. Vitals signs
8. Body mechanics and transferring of patient, draw sheet lift, use of slide boards, and wheelchair to couch, couch to wheelchair, couch to table, three men lift and four men lift.
9. First aid: artificial respiration, haemostasis
10. Local anesthesia and general anesthesia
11. Facilities regarding general Anesthesia in the X-ray department
12. Management of adverse reactions to contrast media

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – champman.
www.wikipedia.co.in
www.radiopedia.co.in

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**

CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Quality control and patient safety			
Semester: IV	**Course code: 23BMRIT4004**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:** 40	
Course Pre-requisites:		**Number of sessions: 80**	

Course Objectives

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinRadiography.
At the end of the course, the student should be able to:
1-Radiation protection
2-Biological effects of radiation
3-Planning of radiation installation-protection primary & secondary radiation
4-Personnel monitoring systems

Course learning Outcomes

CLO 1-Enumerate the guidelines of all respective organizations. Enumerate the risk and effects of the radiation.

CLO 2-Label Demonstrate how to use and care of all types of lead aprons
CLO 3-Demonstrate the handling and how to use TLD's and badges as per guidelines
CLO 4- Able to know about biological effects of radiation.

Course contents

MODULE 1 Objectives of quality Control: Improve the quality of imaging thereby increasing the diagnostic value; to reduce the radiation exposure; Reduction of film wastage and repeat examination; to maintain the various diagnostic and imaging units at their optimal performance. Quality assurance activities: Equipment selection phase; Equipment installation and acceptance phase; Operational phase; Preventive maintenance. Quality assurance programme at the radiological faculty level: Responsibility; Purchase; Specifications; Acceptance; Routine testing; Evaluation of results of routine testing; Quality assurance practical exercise in the X ray generator and tube; Image receptors from processing; Radiographic equipment; Fluoroscopic equipment; Mammographic equipment; Conventional tomography; Computed tomography; Film processing, manual and automatic; Consideration for storage of film and chemicals; Faults tracing; Accuracy of imaging- image distortion for digital imaging devices. LASER printer calibration

MODULE 2 Quality assurance programme tests: General principles and preventive maintenance for routine, daily, weekly, monthly, quarterly, annually – machine calibration. Basic concepts of quality assurance – LASER printer - Light beam alignment; X-ray out-put

and beam quality check; KVp check; Focal spot size and angle measurement; Timer check; mAs test; Grid alignment test; High and low contrast resolutions; Mechanical and electrical checks; Cassette leak check; Proper screen-film contact test; Safe light test; Radiation proof test; Field alignment test for fluoroscopic device; Resolution test; Phantom measurements - CT, US and MRI.

MODULE 3 Quality assurance of film and image recording devices: Sensitometry; Characteristic curve; Film latitude; Film contrast; Film speed Resolution; Distortion; Artifacts of films and image recording. Monitor calibration. SMPTE pattern 6. Maintenance and care of equipment: Safe operation of equipment; Routine cleaning of equipment and instruments; Cassette, screen maintenance; Maintenance of automatic processor and manual processing units; Routine maintenance of equipments; Record keeping and log book maintenance; Reject analysis and objectives of reject analysis programme. Care and maintenance of diagnostic equipment: General principles and preventive maintenance for routine - daily, Weekly, monthly, quarterly, annually: care in use, special care of mobile equipment.

MODULE 4 Radiation safety in diagnostic Radiology 1. Radiation Quantities and Units: Radiation- Radioactivity- Sources of radiation - natural radioactive sources -cosmic rays terrestrial radiation - - man made radiation sources. Units of radiation - Quality factor - Flux-Fluence-Kerma- Exposure- Absorbed dose- Equivalent Dose- Weighting Factors-Effective Dose - Occupational Exposure Limits - Dose limits to public.

MODULE 5 Biological Effects of radiation: Ionization, excitation and free radical formation, hydrolysis of water, action of radiation on cell-Chromosomal aberration and its application for the biological dosimetry- Effects of whole body and acute irradiation, dose fractionation, effects of ionizing radiation on each of major organ system including fetus -Somatic effects and hereditary effects- stochastic and deterministic effects-Acute exposure and chronic exposure-LD50 - factors affecting radio sensitivity. Biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields. Radiation detection and Measurements: Ionization of gases- Fluorescence and Phosphorescence -Effects on photographic emulsion. Ionization Chambers – proportional counters- G.M counters-scintillation detectors – liquid semiconductor detectors – Gamma ray spectrometer. Measuring systems – free air ionization chamber – thimble ion chamber – condenser chamber – Secondary standard dosimeters – film dosimeter – chemical dosimeter- Thermoluminescent Dosimeter. - Pocket dosimeter Radiation survey meter- wide range survey meter -zone monitor-contamination monitor their principle function and uses. Advantages & disadvantages of various detectors & its appropriateness of different detectors for different type of radiation measurement. Dose and Dosimetry, CT Dose Index (CTDI, etc.), Multiple Scan Average Dose (MSAD), Dose Length Product (DLP), Dose Profile, Effective Dose, Phantom Measurement Methods, Dose for Different Application Protocols, Technique Optimization. Dose area product in fluoroscopy and angiography systems, AGD in mammography. 4. Radiation protection: Radiation protection of self and patient- Principles of radiation protection, time - distance and shielding, shielding - calculation and radiation survey – ALARA- personnel dosimeters (TLD and film batches) occupational exposure.

MODULE 6 Radiation Hazard evaluation and control: Philosophy of Radiation protection, effects of time, Distance & Shielding. Calculation of Work load, weekly calculated dose to radiation worker & General public Good work practice in Diagnostic Radiology. Planning consideration for radiology, including Use factor, occupancy factors, and different shielding

material.

Course Assessment

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***

CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

PRACTICAL

1) Knowledge of all hazards, education of general Public by posters and seminars
2) Safety of women and children , pregnant women, safety of patient attendants, radiation workers and hospital staff, checking of lead aprons, leakage radiation from tube head, radiation survey in and around X – ray installation.
3) Use of TLD film badges, GM counters, Scintillation detectors, Liquid scintillator, Pocket dosimeters and use of protective devices etc. Keeping of dose records of radiation workers, steps after high exposure report and investigations.
4) Biological effects of radiation- The cell effect of ionizing radiation on cell. Somatic effects and hereditary effect. Stochastic and deterministic effect.

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – champman.
www.wikipedia.co.in // www.radiopedia.co.in

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Quality Protocols in Radiology (Workshop)			
Semester: IV	**Course code: BMRIT4005**	**Credits:01**	**Core**
No of sessions Lectures / Tutorial: 1		**No of practical hours:** 0	
Course Pre-requisites:		**Number of sessions: 0**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Health Research Fundamentals (MOOC)			
Semester: IV	**Course code: BMRIT4006**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 02		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	Continues Assessment (10)	Lab work (10)	Presentation (30)	Viva (20)	Practical File (10)	Total (100)

Sushant University soaring high	Sushant School of Health Sciences BMRIT		
Course Title: Cross Sectional anatomy and Physiology			
Semester: V	**Course code: BMRIT5001**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

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 learning outcomes-

CLO 1 Identify cross-sectional anatomy in the sagittal, coronal and axial planes on CT and MR images.

CLO 2 Describe anatomical structural relationships. Recognize normal anatomy and build a personal resource system for future study.

CLO 3. Locate and identify pertinent cerebral, upper thorax, mid-thorax, and abdominal anatomy. On CT and MR images, identify anatomical structures of the body and of the head.

CLO 4 Distinguish between arterial and venous anatomy of the entire body’s vascular system. Classify the various sections of anatomical regions and their associated parts.

Course Pedagogy

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

Course contents

MODULE 1 Introduction to Sectional Anatomy & Terminology- Sectional planes, Anatomical relationships/terminology.
MODULE 2 Anatomy of the upper thorax- Surface anatomy relationships, Bony structures and muscles, Blood vessels. Divisions of the mid-thorax, heart and great vessels- Lungs, heart and great vessels, Esophagus
MODULE 3 CT/MRI Images of the Thorax - Normal and pathologic . Anatomy of the Abdomen- Major organs and their accessories, Abdominal blood vessels CT/MR Images of Abdomen - Normal and pathologic
MODULE 4 Anatomy of the Pelvis- Bony structures and associated muscles, Digestive and urinary systems . Reproductive Organs CT/MR Images of the Male/Female Pelvis- Normal and pathologic . Neuro Anatomy- Scan planes . Brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts, Arterial/venous systems, Basal ganglia, Cranial nerves Spine- Vertebra and disc, Spinal cord and meninges Neck- Arterial/venous systems, Muscles, Glands and pharynx

Course Assessment

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Text Books:

- PR Ashalatha& G Deepa ‘s Textbook of ANATOMY & PHYSIOLOGY by
- B.D.Chaurasia’s HUMAN ANATOMY

Reference books:

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

Assessment Scheme:

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M

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

	Sushant School of Health Sciences **BMRIT**		
Course Title: Physics of advance imaging technology			
Semester: V	**Course code: BMRIT5002**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

COURSE OBJECTIVES-

This course is designed to provide the students the basic knowledge in Megnatic resosnance imaging investigations with using contrast media and imaging instrumentation ,pulse sequences, bio-effects and safety in advance CT,MRI and USG.

Course learning outcomes-

CLO 1-Enumerate the principle and hardware of the equipment.
Explain the dose of contrast media and conduct all procedure of CT.

CLO 2-Demonstrate how to take good quality of image
Perform the scan &Should know the principle of protocol

CLO 3-Demonstrate the patient care in MRI
Enumerate technical aspects, protocol and planning techniques for all scans

CLO 4-Enumerate all types of artefacts and its correction

CLO 5 Able to know all procedure and patient care in USG

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 physics of mammography and CT scan/ultrasound/ PACS but also improve skills and techniques for tackling practical problems with patient handling in MRI scans also.

Course contents

MODULE 1 Basic Computed Tomography- Basic principles of CT, generations of CT, CT instrumentation, image formation in CT, CT image reconstruction, Hounsfield unit, CT image quality, CT image display Advanced Computed Tomography Helical CT scan: Slip ring

technology, advantages, multi detector array helical CT, cone – beam geometry, reconstruction of helical CT images, CT artifact, CT angiography, CT fluoroscopy, HRCT, post processing techniques: MPR, MIP, Min IP, 3D rendering: SSD and VR, CT Dose, patient preparation, Imaging techniques and protocols for various parts of body, CT contrast enhanced protocols – CT angiography – (Aortogram, selective angiogram head, neck and peripheral) image documentation and Filing, maintenance of equipment and accessories.

MODULE 2 Advanced techniques & instrumentation of MRI a. Basic Principles: Spin – precession – relaxation time – pulse cycle – T1 weighted image – T2 weighted image – proton density image. b. Pulse sequence : Spin echo pulse sequence – turbo spin echo pulse sequence - Gradient echo sequence – Turbo gradient echo pulse sequence - Inversion recovery sequence – STIR sequence – SPIR sequence – FLAIR sequence – Echo planar imaging – Advanced pulse sequences.

MODULE 3 MR Instrumentation: Types of magnets – RF transmitter – RF receiver – Gradient coils – shim coils – RF shielding – computers. d. Image formation: 2D Fourier transformation method – K-space representation – 3D Fourier imaging – MIP. e. MR contrast media – MR angiography – TOF & PCA – MR Spectroscopy – functional MRI

MODULE 4 Ultrasonography a. Basic Acoustics, Ultrasound terminologies: acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity. b. Interaction of US with matter: reflection, transmission, scattering, refraction and absorption, attenuation and attenuation coefficients, US machine controls, US focusing. c. Production of ultrasound: Piezoelectricity, Medical ultrasound transducer: Principle, construction and working, characteristics of US beam. d. Ultrasound display modes: A, B, M e. Real-time ultrasound: Line density and frame rate, Real-time ultrasound transducers: mechanical and electronic arrays, ultrasound artifacts, ultrasound recording devices, and Distance, area & volume measurements. f. Techniques for imaging different anatomic areas, ultrasound artifacts, biological effects and safety. g. Doppler Ultrasound- Patient preparation for Doppler, Doppler artifacts, vascular sonography,

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

PRACTICAL:

1) Physics, scanning principle and image formation in USG,CT and MRI
2) Identification of different parts of MR scanner
3) Applications of various procedures in well-equipped Hospitals and Diagnostic Centers.

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – chapman.
www.wikipedia.co.in // www.radiopedia.co.in
MRI made easy
CT made easy

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1	***2***	***3***	***3***	***2***	***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***2***	***3***		***2***	***3***	***2***	***1***	***3***	***3***	***3***
CO3	***3***	***3***	***2***	***1***	***3***	***2***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***	***3***	***3***	***3***	***3***	***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos

	Course Outcomes (COs)	Mapped Programme Outcomes
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO3, PO8, PO7, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Imaging of USG and Nuclear Medicine			
Semester: V	**Course code: 23BMRIT5003**	**Credits:05**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

COURSE OBJECTIVES-

This course is designed to provide the students the basic knowledge in Computed Tomography imaging and Magnetic resonance imaging investigations with using contrast media and imaging instrumentation Generation of Quality assurance and control .

Course learning outcomes-

CLO-1 Able to know scanning of MSK, Vascular and cardiopulmonary system.
Enumerate- distinguish all types of bones, joints and connective tissue
CLO 2-Explain The history and generations CT/MRI
Perform the scan and Demonstrate all technical aspects and protocols
CLO 3-Explain different types of Artefacts and correction.
Demonstrate the QA and QC doing himself and take care of QA & QC papers
CLO 4 Able to know USG and Doppler techniques

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 physics of mammography and CT scan/ultrasound/ PACS but also improve skills and techniques for tackling practical problems with patient handling in MRI scans also.

Course contents

MODULE 1 Ultrasonography/ Doppler studies: Techniques of sonography-selection-Preparations - instructions and positioning of patient for TAS, TVS, TRUS, neck USG and extremities- patient care and maintenance protocols clinical applications display methods – quality image reproducible extend – biopsy procedures, assurance to patients.

MODULE 2 CT scan studies acquisition/ protocols /techniques: CT of head and neck – thorax – abdomen – pelvis – musculo skeletal system – spine – PNS. Anatomy – clinical indications and contraindications – patient preparation – technique – contrast media-types, dose, injection technique; timing, sequence - image display – patient care – utilization of available techniques & image processing facilities to guide the clinician- CT anatomy and pathology of different organ systems.

MODULE 3 MRI Scanners: Methods of MRI imaging methods – Head and Neck ,Thorax, Abdomen, Musculoskeletal System imaging - Clinical indications and contraindications- types of common sequences effects of sequence on imaging - Protocols for various studies- slice section- patient preparation-positioning of the patient -patient care-calibration - paramagnetic agents and dose, additional techniques and recent advances in MRI - image acquisition-modification of procedures in an unconscious or un co-operative patient - plain studies-contrast studies -special procedures- reconstructions- 3D images- MRS blood flow imaging, diffusion/perfusion scans - strength and limitations of MRI.

Assessment Scheme:

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

PRACTICAL

1) Physics, scanning principle and image formation in CT/MRI/USG
2) Identification of different parts of CT /MRI/USG scanner
3) Applications of various procedures in well-equipped Hospitals and Diagnostic Centers
4) Quality control of CT /MRI

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal

Radiology- Special investigation – champman.
www.wikipedia.co.in // www.radiopedia.co.in
MRI made easy
CT made easy

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: RESEARCH METHODOLOGY & BIOSTATISTICS-I			
Semester: V	**Course code: 23BMRIT5004**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 20		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions: 20**	

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, the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. The basic knowledge of research methodology will help them in their chosen profession and will be of immense use in the same.

Course Objectives:

This course is designed to provide thestudents the basicknowledge 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 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 (knowledge based):

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

CLO1: Understand the needs of research in the clinical field of Radiology.

CLO2: Understand the difference between the various types of research methodologies.

CLO3: Understand the various types of data collecting methods.

CLO4: 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

Course contents

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

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

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

Course Assessment

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

Course References

1. Research Methodology: Kothari
2. Methods in Biostatistics by BK Mahajan
3. Probability and Statistics by Murray
4. Research Methodology by SMIsrani

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Regulatory Requirements in Radio Imaging			
Semester: V	**Course code: 23BMRIT5005**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions: 40**	

COURSE OBJECTIVES-

AERB safety code and ethics
Patient Protection-Safe work practice in diagnostic radiology-
Radiation emergencies- situation handling.

Course learning outcomes-

CLO 1-Enumerate how to work as per the AERB safety guideline in clinical setup.
CLO 2-Demonstrateradiation protection and patient care
CLO 3-Enumerate radiation emergencies &radiation protection and patient care
CLO 4 Enumerate Quality Assurance (QA) Requirements.

Course contents

MODULE 1 Regulatory Bodies & regulatory Requirements: International Commission on Radiation Protection (ICRP) / National Regularity body (AERB - Atomic Energy Regulatory Board) - Responsibilities, organization, Safety Standard, Codes and Guides, Responsibilities of licenses, registrants & employers and Enforcement of Regulatory requirements.

MODULE 2. Role of Radiographer in Planning, QA & Radiation Protection: Role of technologist in radiology department - Personnel and area monitoring., Setting up of a new X-Ray unit, staff requirement, AERB specifications for site planning and mandatory guidelines – Planning of X-ray rooms, dark rooms – Inspection of X-Ray installations - Registration of X-Ray equipment installation- Certification

MODULE 3 Evaluation of workload versus radiation factors – Occupational exposure and protection Tools/devices. ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection. NABH guidelines, AERB guidelines, PNDT Act and guidelines

Assessment Scheme:

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Books Recommended-
Text book of radiology for residents and technicians- s k bhargava
www.wikipedia.co.in // www.radiopedia.co.in
Guide lines of AERB

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***

CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs
Matrix 1- Mapping of COs with POs and PSOs
Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Clinical Posting part III & IV (studentship)			
Semester: V	**Course code: 23BMRIT0535**	**Credits:06**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 8**	
Course Pre-requisites:		**Number of sessions:**	

ASSESMENT SCHEME

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**

Course Title: Quality assurance & radiation safety (AERB guide line) in diagnostic radiology-II			
Semester: VI	**Course code: BMRIT6001**	**Credits:06**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

COURSE OBJECTIVES-

AERB safety code and ethics
Patient protection-Safe work practice in diagnostic radiology-
Radiation emergencies- situation handling.

Course learning outcomes-

CLO 1-Enumerate how to work as per the AERB safety guideline in clinical setup.
CLO 2-Demonstrateradiation protection and patient care
CLO 3-Enumerate radiation emergencies &radiation protection and patient care

Course contents

MODULE 1 Quality Assurance and quality control of Modern Radiological and Imaging Equipment which includes Digital Radiography, Computed Radiography, CT scan, MRI Scan, Ultrasonography and PACS related.

MODULE 2 Image artifacts their different types, causes and remedies, Newer Radiation safety protocols and recent advances in radiation safety including AERB guidelines

MODULE-3 National & international agencies, AERB, BARC, ICRP, WHO, IAEA and their role.

MODULE- 4AERB safety code and ethics: Built in safety specifications for diagnostic x-ray, fluoroscopy and CT units, Specifications for radiation protection devices-room layout. Operational safety-Radiation protection programme- Personnel requirements and responsibilities-regulatory controls.

MODULE-5 Radiation emergencies- situation handling, safety and prevention-legal requirements recent developments in radiation safety related topics.

Assessment Scheme:

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

MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

Books Recommended-

Text book of radiology for residents and technicians- s k bhargava

www.wikipedia.co.in // www.radiopedia.co.in

Guide lines of AERB

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**
CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Research Methodology & Biostatics-II			
Semester: VI	**Course code: BMRIT6002**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial: 20		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions: 20**	

Course Introduction

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

Course Objectives:

This course is designed to provide the students the basic knowledge 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):

CLO1: Understand the various research methodology (Remember & Understand)

CLO2: Compare the differences between the central tendency and measures of dispersion.

CLO3: Learn to apply the knowledge of various types of research to clinical aspect of diseases (Apply &Analyze)

CLO4: 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.

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

Course contents

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

Module 2: Introduction to Biostatistics

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

Course Assessment

For a course of 100 marks containing only theory Component:

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

Theory (40)				
Assignment(s)	Continuous Assessment	Mid Semester Examination Theory	Quiz(s), Presentation(s), Faculty Student Interaction	**Total**
5	5	15	15	**40**

END SEMESTER EXAMINATION (60)
Theory (60)

Course References

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

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1		***3***	***3***		***3***	***3***	***3***		***3***	***3***	***3***
CO2	***1***	***3***	***3***	***3***	***3***	***3***		***1***	***3***	***3***	***3***
CO3	***3***	***3***		***1***	***3***	***3***	***1***		***3***	***3***	***3***
CO4	***3***	***3***	***3***		***3***	***3***		***2***		***3***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	Explain indication, contraindication and reactions of contrast media. Demonstrate how to take in minimum numbers of exposures in each special investigation.	**PO1, PO2, PO3, PO8, PO9 PO10, PO11**

CO2	Demonstrate the positioning and technique of the special studies**.**	**PO1, PO2, PO3, PO9 PO10, PO11**
CO3	Explain the technique of all GIT study according to investigation.	**PO1, PO2, PO3, PO6, PO7, PO8, PO9 PO10, PO11**
CO4	Demonstrate surface anatomy. To be able to know the technique behind the radiography.	**PO1, PO4, PO5, PO6, PO8, PO11**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs) / Program Specific Outcomes (PSOs)

Matrix 1- Mapping of COs with POs and PSOs

Matrix 1- Mapping of COs with POs and PSOs

Course Outcomes (COs) Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Course Outcomes (COs) Program Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	M	M			M
CO2	H	H		H	H	M
CO3	M	M	H	H	H	
CO4	M	H	H	M		M

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: Hospital Practice and Care of Patient			
Semester: VI	**Course code: BMRIT6003**	**Credits:06**	**Core**
No of sessions Lectures / Tutorial: 40		**No of practical hours: 40**	
Course Pre-requisites:		**Number of sessions: 80**	

COURSE OBJECTIVES-

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinRadiography.

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

Course learning Outcomes-

CLO 1 Introduction to hospital staffing, Medical records and documentation

CLO 2 Understood the Legal issues, Professional ethics.

CLO 3 Must know Departmental Safety and Infection control

CLO 4 Body mechanics and transferring of patient

Course Pedagogy

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

Course contents

MODULE 1 Hospital staffing and administration, records, professional, ethics, co-operation with other staff and departments, Departmental organizations. Handling of the patients, seriously ill and traumatized patients, visually impaired, speech and hearing impaired, mentally impaired, drug addicts and non-English speaking patients. Understanding patient needs - patient dignity of inpatient and out patients. Interaction with the patient's relatives and visitors.

MODULE 2 Methods of effective communication - verbal skills, body language, professional appearance, visual contact etc. Elementary personal and departmental hygiene, dealing with receptacles, bed pans and urinal etc. General preliminaries to the exam.

MODULE 3 Moving chair and stretcher, patient. Unconscious patient, general comfort and reassurance for the patient. Vital signs and oxygen - patient's Haemeatasis status. Body temp, respiratory rate, pulse, blood pressure, oxygen therapy, oxygen devices, Chest tubes and lines.

MODULE 4 First aid - shock, electrical shock, haemorrhage, burns, Asphyxia, fractures, loss of consciousness. Emergency treatment to the collapsed patient. Artificial respiration and resuscitation. Preparation of patient for general and special radiological examinations. Supervision of patients undergoing special examination. Administration of drugs and contrast

media. Aseptic and sterile procedures. Handling of infections patients in the department or in the ward. Regulation of dangerous drugs. Trolley set up for special x-ray examinations, Radiation hazardous and protective measures.

Assessment Scheme:

For a course of 100 marks containing both theory and Lab Component:
MID SEMESTER EVALUATION (40) – Theory (25 Marks) + Lab (15 Marks)

Theory (25 Marks) + Lab (15 Marks)				
Mid Semester Examination Theory	Quiz(s), Presentation(s), Lab/ practical performed & Lab report	Assignment(s)	Continuous Assessment	**Total**
15	15	5	5	**40**

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

PRACTICAL

Medical records and documentation

Legal issues in radiology department, PNDT Act

Professional ethics and Code of conduct of radiographer

Handling of patients: Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients, infectious patients

Departmental Safety

Infection control: skin care, donning of gowns, gloves, face masks, head caps, shoe covers.

Vitals signs

Body mechanics and transferring of patient, draw sheet lift, use of slide boards, and wheelchair to couch, couch to wheelchair, couch to table, three men lift and four men lift.

First aid: artificial respiration, haemostasis

Local anesthesia and general anesthesia

Facilities regarding general Anesthesia in the X-ray department

Management of adverse reactions to contrast media

Course References

1) PR Ashalatha& G Deepa's Textbook of ANATOMY & PHYSIOLOGY
2) N Geetha's Textbook of physiology

Reference Books:

3)C C Chatterjee's Human Physiology
4C C Chatterjee's Practical Physiology for Paramedical Courses
5)CN Chandrashekhar's Manipal Manual of Medical Physiology
6)RK Maurya's Medical Physiology

Online references: Coursera subscription for online anatomy topics

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

0-PO Keywords	*Knowledge & Expertise of Medical radio-imaging technology*	*Leadership and mentorship*	*Problem solving*	*Ethics and accountability*	*Communication & presentation skills*	*Commitment to professional excellence*	*Research*	*Lifelong learning*	*Employability, Entrepreneurship*	*Organizational Behavior*	*Ethical, Social and professional understanding*
COURSE OUTCOMES	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	***PO11***
CO1	***2***	***3***	***3***	***3***	***2***	***3***	***3***	***2***	***3***	***3***	***3***
CO2	***3***	***3***		***3***	***3***	***3***	***3***	***3***	***3***	***3***	***3***
CO3	***3***	***3***	***2***	***2***	***3***		***2***	***3***	***3***	***2***	***2***
CO4	***3***	***3***	***1***	***3***	***3***	***1***	***1***	***3***	***3***	***1***	

1= LOW 2= MEDIUM 3= HIGH

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Programme Outcomes**

CO1	Understand the various research methodology (Remember & Understand)	**PO1, PO2, PO3, PO6, PO7, PO9 PO10, PO11**
CO2	Compare the differences between the central tendency and measures of dispersion.	**PO1, PO4, PO5, PO6, PO8, PO9, PO11**
CO3	Learn to apply the knowledge of various types of research to clinical aspect of diseases (Apply &Analyze)	**PO1, PO3, PO6, PO7, PO8, , PO10, PO11**
CO4	Augment their learning by making abstracts, charts, diagrams, graphs and learning on visiting hospitals for practical skills in research methods (Synthesize, evaluate & create)	**PO1, PO4, PO5, PO8, PO7, PO9 PO10,**

Sushant University soaring high	**Sushant School of Health Sciences BMRIT**		
Course Title: Project			
SEMESTER VI	**Course code: 23BMRIT6004**	**Credits:6**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences BMRIT**		
Course Title: Quality assurance & radiation safety (Workshop)			
SEMESTER VI	**Course code: BMRIT6005**	**Credits:1**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 2**	
Course Pre-requisites:		**Number of sessions:**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: RESEARCH PROJECT AND EVALUATION			
SEMESTER VII	**Course code: BMRIT7001**	**Credits:08**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 1440**	
Course Pre-requisites:		**Number of sessions:**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**		
Course Title: INTERNSHIP			
SEMESTER VII	**Course code: BMRIT0735**	**Credits:18**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**

Course Title: RESEARCH PROJECT AND EVALUATION			
Semester: VIII	**Course code: BMRIT8001**	**Credits:08**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 1440**	
Course Prerequisites:		**Number of sessions:**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

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Sushant University soaring high	**Sushant School of Health Sciences** **BMRIT**

Course Title: INTERNSHIP			
SEMESTER VIII	**Course code: BMRIT0835**	**Credits:18**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 1440**	
Course Pre-requisites:		**Number of sessions:**	

ASSESMENT **SCHEME**

For a course of 100 marks containing only practical Component:

nternal (20)	**Continues Assessment (10)**	**Lab work (10)**	**Presentation (30)**	**Viva (20)**	**Practical File (10)**	**Total (100)**

	Postings	Duration
1	Conventional radiography	1 months
2	Radiographic special procedures including diagnostic and Therapeutic Interventional Procedures	2 months
3	CR and DR	2 months
4	Nuclear Medicine	1 month
5	Doppler Imaging	1 month
6	Computed Tomography	3 months
7	Magnetic Resonance Imaging	2 months