RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M.S. Ramaiah University of Applied Sciences

Programme Structure and Course Details

Of

MD Radiation Oncology 2022 onwards

M.S. Ramaiah University of Applied Sciences

Ramaiah Medical College

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

Shalini
Principal and Dean
M.S. Ramaiah Medical College and Hospital
M.S. Ramaiah University of Applied Sciences
Bangalore-560054

Dean - Academics
M.S. Ramaiah University of Applied Sciences

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M.S. Ramaiah University of Applied Sciences

Programme Specifications

MD Radiation Oncology Programme 2022

onwards

Programme Code: MD139

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Shalini
Principal and Dean
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University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment

Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavors. We inspire critical thinking, personal development and a passion for lifelonglearning. We serve the technical, scientific and economic needs of our Society.

Objectives

1. To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society
2. To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society
3. To promote health, human well-being and provide holistic healthcare
4. To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences
5. To instill the spirit of entrepreneurship in our youth to help create more career opportunitiesin the society by incubating and nurturing technology product ideas and supporting technology backed business
6. To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in
7. To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmental programme

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M.S. Ramaiah University of Applied Sciences

Programme Specifications: MD Radiation Oncology

Faculty	Ramaiah Medical College
Department	Radiation Oncology
Programme	MD Radiation Oncology
Programme Code	MD139
Dean of Faculty	Dr Shalini C Nooyi
Head of the Department	Dr Kirthi Koushik A.S

1. **Title of the Award:** MD in Radiation Oncology
2. **Mode of Study:** Full-Time
3. **Awarding Institution /Body: M. S. Ramaiah University of Applied Sciences, Bengaluru**
4. **Joint Award:** Not Applicable
5. **Teaching Institution:** Ramaiah Medical College
6. **Date of Programme Specifications:** September 2022
7. **Date of Programme approval by the academic Council of MSRUAS :** 27th September 2022
8. **Programme Approving Regulating Body and Date of Approval:** National Medical Council of India
9. **Rationale for the Programme**

The purpose of PG education is to create specialists who would provide high quality healthcare and advance the cause of science of oncology through research & training. Oncology is a highly specialized and technical discipline in clinical medicine comprising treatment with ionizing radiations and cytotoxic agents as major arms in non-surgical management and treatment of cancer. With a view to update, by inclusion of newer topics, and to provide a uniform syllabus and course contents in Indian universities and teaching medical institutions, the proposed guidelines provide course outlines based on recent developments in clinical medicine and other disciplines related to oncology.

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Programme objectives (PO) for MD Radiation Oncology Postgraduate students

PO1. Develop the knowledge, skills and attitude to be a competent Radiation Oncologist (C, P).

PO2. Demonstrate a commitment to excellence and continuous professional development with integrity, compassion and sensitivity to patient care. (A)

PO3. Acquire and develop the knowledge, skills and attitude required to be a competent and ethical researcher and teacher. (A, C, P)

PO4. Be able to independently perform teletherapy and Brachytherapy procedures with a reasonable degree of professionalism and competence. (P)

Programme specific outcome (PSO) for MD Radiation Oncology Postgraduate students

PSO1 -Demonstrate the ability to diagnose and treat all cases of malignancies using updated guidelines in medical and Radiation Oncology with special ability to maintain interdisciplinary coordination. (C, A, P)

PSO2- Demonstrate the ability to address all emotional issues in patients and family members in relation to diagnosis, therapy, terminal care and mortality related to malignancies. (C, A, P).

PSO3 - Organise proper promotive and preventive care strategies in the community aimed at reducing the burden of care in malignancies (C, A, P).

PSO4-Lead and participate in planning and execution of team work related to establishment and maintenance of infrastructure related to radiation therapy, conforming to the updated guidelines. (C, A, P)

PSO5 - Plan and conduct research related to the topic(C)

PSO6 - Demonstrate the ability to organise teaching / training sessions for students and health workers in topics related to cancer prevention and care. (P)

Note: A- Affective Domain, C- Cognitive Domain & P- Psychomotor Domain

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Course-PO-PSO Mapping

Course Code and name	Program Outcomes				Program Specific Outcomes					
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
MDC549A Basic Principles in practice of Radiation Oncology	2	1		2	1		2	3	1	3
MDC550A Clinical Radiation Oncology	3	3	2	3	3	3	3			2
MDC551A Allied Oncology Practices		3	2		3	3	3			
MDC552A Recent advances, Cancer Control Programmes and Research methodologies.	2	2	3	2	1		3	2	2	3
MDP513A Thesis-Radiation Oncology			3						3	

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M.S. Ramaiah Medical College and Hospital
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10. Regulations:

(A) Attendance, Progress and Conduct

1. A candidate pursuing degree course should work in the concerned department of the institution for the full period as a full time student. No candidate is permitted to run or work in clinic/laboratory/nursing home while studying postgraduate course. No candidate shall join any other course of study or appear for any other examination conducted by this university or any other university in India or abroad during the period of study.
2. Each term shall be taken as a unit for the purpose of calculating attendance. Attendance of 80% every term is mandatory for appearing in the final university examination.
3. Every student shall attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons.
4. Every candidate is required to attend a minimum of 80% of the training during each academic term of the post graduate course. Provided further, leave of any kind shall not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.
5. Any student who fails to complete the course in the manner stated above shall not be permitted to appear for the University Examinations.

(B) Monitoring of progress of Studies

1. Work diary / Log Book - Every candidate shall maintain a work diary and record of his/her participation in the training programmes conducted by the department such as journal reviews, seminars, etc. as per the model checklists and logbook specimen copy.
2. Special mention may be made of the presentations by the candidate as well as details of clinical or planning procedures, if any conducted by the candidate. The work diary shall be scrutinized and certified by the Head of the Department and Head of the Institution, and presented in the university practical/clinical examination.
3. Procedure for defaulters: There will be a committee constituted by all teachers to review such situations. The defaulting candidate is counselled by the guide and head of the department. In extreme cases of default, the departmental committee may recommend that defaulting candidate will be withheld from appearing the examination, if she/he fails to fulfil the requirements in spite of being given adequate chances to set himself or herself right.

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11. Teaching Learning Methods:

This being a highly dedicated PG specialty introducing several new concepts/subjects in the course, it is recommended to divide the entire course into two components consisting of First Year of BASIC CONCEPTS OF THE SPECIALTY and the next two years of INTENSIVE CLINICAL TRAINING IN THE SPECIALTY.

Didactic lectures are of least importance; seminars, journal clubs, symposia, reviews, and guest lectures should get priority for acquiring theoretical knowledge. Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. Students should have hands-on training in performing various procedures and ability to interpret results of various tests/investigations.

Exposure to newer specialized diagnostic/therapeutic procedures should be given. Importance should be attached to ward rounds especially in conjunction with emergency admissions. Supervision of work in outpatient department should cover the whole range of work in the unit. It is particularly necessary to attend sub-specialty and symptom specific clinics. The development of independent skills is an important facet of postgraduate training. Joint meetings with physician colleagues, e.g. radiologists and pathologists play a valuable part in training.

The training techniques and approach should be based on principles of adult learning. It should provide opportunities initially for practicing skills in controlled or simulated situations. Repetitions would be necessary to become competent or proficient in a particular skill. The more realistic the learning situation, the more effective will be the learning.

Clinical training should include measures for assessing competence in skills being taught and providing feedback on progress towards a satisfactory standard of performance. Time must be available for academic work and audit. The following is a rough guideline to various teaching/learning activities that may be employed:

1. Intradepartmental and interdepartmental conferences related to case discussions.

2. Ward rounds along with emergency admissions.

3. Attendance at sub-specialty and Tumour Board

4. external rotation postings in departments like Medical Oncology, Surgical Oncology

5. Skills training

6. Conferences, Seminars, Continuing Medical Education (CME) Programmes.

7. Journal Club

8. Research Presentation and review of research work.

9. A postgraduate student of a postgraduate degree course in broad specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

10. Participation in workshops, conferences and presentation of papers etc.

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11. Maintenance of records. Log books should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.

12.Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

14 Department should encourage e-learning activities.

12. Innovative teaching learning practices

1. Theme based teaching learning activities eg..Cervical cancer for a full month.

2. Focused discussion during journal club inculcates culture in the areas of research and publication

4. FacultyLectureduring4th week: Helps in bridging the gap between what is presented during the month and what is not about particular topic. Also it reinforces learning

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13. Assessment: It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only also helps teachers to evaluate students, but also students to evaluate themselves. The monitoring will be done by the staff of the department based on participation of students in various teaching/learning activities.

1. Formative assessment during 4th week of every month to include methods like pedagogy, chart analysis, histopathology report analysis, Viva, standardized patients, MCQs, Open book exams, OSCE will be done. Impact: SWOT analysis can be done and timely counselling can be done.

2. Theory paper covering Radiation physics and Radiobiology at the end of 1st year. FA at the end of second year will be on common cancers such as Head and neck, breast and cervical cancer. Mock SA will be conducted in the same pattern as university exams one month before the final exams.

3. Teaching skills: Candidates are encouraged to teach undergraduate medical students and paramedical students, if any. In addition, the second year student acts as a mentor for the immediate junior in all aspects of the course.

4. Pedagogy as a tool in formative assessment helps the student to be a better teacher.

Scheme of Examination:

A. Theory (Written Paper) 400 marks

There shall be four question papers, each of three hours' duration. Each paper shall consist of 10 short essay questions each carrying 10 marks. Total marks for each paper will be 100. Questions on recent advances may be asked in any or all the papers. Details of distribution of topics for each paper will be as follows.

Name of the course	Course Code	Topics	Marks
Basic Principles in the practice of Radiation Oncology	MDC549A	Applied Anatomy, Pathology, Radiation Physics, Radiobiology, General Principles of Radiation Oncology and Oncology.	100
Clinical Radiation Oncology	MDC550A	Principles and Practice of Radiation Oncology of all sites.	100
Allied Oncology Practice	MDC551A	Principles and Practice of Surgical Oncology/ Chemotherapy in Malignant Diseases, Preventive Oncology Palliative care.	100
Recent advances Cancer Control Programes and Research methodologies.	MDC552A	Recent Developments in Oncology, Cancer Control Programmes, Research methodologies in oncology	100
Thesis – Radiation Oncology	MDP513A	Approval 6 months before final examination.	

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A. Clinical:200marks

One long case of 80 and three short cases of 40 each.

B. Viva Voce: 100 marks

1) Viva-Voce Examination:(80Marks)

All examiners will conduct viva-voce conjointly on candidate's comprehension, analytical approach, expression and interpretation of data. It includes all components of course contents. In addition, candidates may be also be given case reports, charts, gross specimens, pathology slide, Instruments, X-rays, ultrasound, CT scan images for interpretation. It includes discussion on dissertation also.

2) Pedagogy Exercise:(20Marks)

A topic be given to each candidate in the beginning of clinical examination. He/she is asked to make a presentation on the topic for 8-10 minutes.

C. Total Marks Distribution:

Maximum marks for M.D degree course	Theory	Practical	Viva	Grand Total
	400	200	100	700

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Shalini

Principal and Dean
M.S. Ramaiah Medical College and Hospital
M.S. Ramaiah University of Applied Sciences
Bangalore-560054

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M.S. Ramaiah University of Applied Sciences

Annexures

Annexure 1_ Competency list

Annexure 2_Overall course plan year-wise

Annexure 3_Sample of monthly schedules

Annexure 4_PG outside posting policy

Annexure 5_Logbook entry

Annexure 6_Students appraisal form

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Annexure 1: Competency list

1. Following is the table where you will find the details
2. Idea is to teach, assess in an on-going manner and document.
3. K/S/A refers to Knowledge/skill/affective domain and what is mentioned is the predominant domain to gain that particular competency
4. M stands for must know, N stands for nice to know and D stands for desirable to know

Table 1: Radiotherapy – Basic Techniques

Sl No	Competency	Sub competency	K/S/A Predominant and M/N/D	Teaching method	Assessment	Teacher's Signature
1.	Positioning the Patient	Setting up of a patient in each of the three basic treatment positions (supine, prone and lateral)	S/M	DOAP		
		Setting up the source skin distance for fixed FSD, and extended FSD treatment,	S/M	DOAP		
		Setting up patients using laser beam alignment	S/M	DOAP		
		Making temporary and permanent marks on the patient for field positions (Gentian violet, tattoo	S/A	DOAP		
2.	Immobilisation Techniques	Application of some of the following immobilisation techniques: head clamp, Velcro strap, polystyrene beads, vacuum bag, breast arm rest.	S/M	DOAP		
		The construction of thermoplastic beam direction shell.	S/M	DOAP		
3.	Methods of Target volume delineation	using direct vision of the tumour (eg skin tumours),	S/M	DOAP		
		from surface landmarks (eg the parotid bed, breast tumours),	K/M	DOAP		
		with direct screening using simulator (eg lung tumours, bone metastases), including opacification techniques (eg barium swallow, cystogram),	K/S/M	DOAP		
		by volume transfer to orthogonal radiographs (eg. head and neck tumours, brain tumours),	S/N	DOAP		
		Volume determination from planning CT scans for creating a central axis plan and for 3-dimensional CT planning.	K/M	Small group discussion		
4.	**Outline Techniques**	Use of manual techniques (flexi-curves, plaster of Paris bandage) and CT derived outlines.	K/S/D	Small group discussion		
		Single direct field,	K/M	Small group discussion		
		Opposed pair of fields using equal and unequal weightings,	K/M	Small group		

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Principal and Dean
M.S. Ramaiah Medical College and Hospital
M.S. Ramaiah University of Applied Sciences
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				discussion		
		Opposed pair using wedges,	K/M	Small group discussion		
		Wedged right-angled pair,	K/M	Small group discussion		
		Wedged oblique pair,	K/M	Small group discussion		
		Plans using 3 and 4 fields,	K/M	Small group discussion		
		Total body irradiation	K/D	Small group discussion		
5.	**Tissue Compensation**	Planning of patients requiring tissue compensation using bolus, wedges and remote tissue compensators	K/D	Small group discussion		
6.	**Shielding**	Planning of patients using lead cut outs and lead masks for simple superficial tumours,	K/M	Small group discussion		
		Knowledge of the thickness of lead required for superficial, Ortho voltage and electron treatments at various energies.	K/M	Small group discussion		
		Prescription and insertion of eye shields.	K/D	Small group discussion		
7.	**Megavoltage Techniques**	Planning of patients incorporating simple lead blocking techniques using standard blocks and cast blocks from templates.	K/M	Small group discussion		
8.	**Electrons**	The indications for, and planning of, electron treatments,including the selection of electron energy,	K/M	Small group discussion		
		A technique for total skin electron therapy and experience of its use.	K/M	Small group discussion		
9.	**Dose Calculation**	Proficiency in the use of equivalent square tables,	K/S/M	DOAP		
		Performance of depth dose calculations for single fields and opposed fields using various energies,	k/S/M	Small group discussion		
		The principles applied to convert dose to machine units for a range of machines,	K/D	Small group discussion		
		The principles of computer based treatment planning.	K/M	Small group discussion		
10.	**Radiotherapy Prescriptions**	Writing radiotherapy prescriptions (countersigned where necessary) for all the field arrangements mentioned above.	K/M	DOAP		
		Understanding of dose specification as in ICRU 50 and 62	K/M	Small group discussion		
11.	**Radiotherapy Machines** [Planning of patients for treatment on a full spectrum of	superficial x-ray therapy	K/N	Small group discussion		
		megavoltage x-ray therapy	K/M	Small group		

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	equipment]			discussion		
		megavoltage electron therapy	K/M	Small group discussion		
		Ortho voltage x-ray therapy and cobalt-60 therapy, (if available)	K/N	Small group discussion		
12.	**Quality Assurance in External Beam Therapy**	Requesting portal imaging and interpreted their appearance satisfactorily in all sites	K/S/M	Small group discussion		
		Principles of in vivo dosimetry and interpretation of results	K/M	Lecture		
13.	**Brachytherapy**	The insertion and removal of radioactive sources manually or using an appropriate after-loading device,	S/M	DOAP		
		Interpretation of subsequent check films,	K/M	DOAP		
		Interpretation of the corresponding dose calculation and writing of an appropriate prescription,	K/M	Small group discussion		
		Removal of live sources and the after-loading device,	S/M	Small group discussion		
		Principles of oral and intravenous radionuclide therapy.	K/N	Small group discussion		
14.	**Radiation Safety**	The role of the radiation safety and radiation protection supervisor	K/M	Small group discussion		
		The meaning of and requirements for controlled and supervised areas and their location,	K/M	Small group discussion		
		The procedure to be adopted in the case of a spill of radioactive material,	K/D	Lecture		
		Quality assurance practices in radiotherapy and the procedures for dealing with errors in treatment delivery.	K/M	Lecture		

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Table 2: Radiotherapy Assessment and the Care of Patients on Treatment:

Sl No	Competency	Sub competency	K/S/A Predominant/ and M/N/D	Teaching method	Assessment	Doctors Signature
1	Treatment Review Clinics	Regular weekly treatment review clinics	A/M	DOAP		
2	Treatment Checks	Assessment of patient position and treatment field placement(s) in relation to the target volume at the start of treatment	K/S/M	DOAP		
		Performance of checks during the course of treatment on the implementation of the treatment plan, position of shielding for critical normal structures and the use of portal imaging,	K/M	DOAP		
		Assessment of changes occurring in patient parameters during treatment and resultant modification of treatment when appropriate,	S/A/M	DOAP		
		Assessment of normal tissue reactions to radiotherapy,	A/M	DOAP		
		Use of dose volume histograms and in vivo radiation dosimetry techniques.	K/M	Small group discussion		
3	Symptom Control	Giving advice on skin care during radiation treatment and on the management of skin reactions, including desquamation,	A/M	DOAP		
		Managing mucosal reactions in oral cavity, oropharynx, nasopharynx, trachea, oesophagus, anus and vagina,	A/M	DOAP		
		Giving dietary advice during abdominal radiotherapy	A/M	DOAP		
		Managing radiation induced nausea and vomiting,diarrhoea, dysphagia, xerostomia and cystitis,	A/M	DOAP		
		Giving prophylaxis for radiation induced cerebral oedema,	A/M	DOAP		
		Giving advice on timing and extent of hair loss with respectto radiation dose,	A/M	DOAP		
		Giving advice for hospitalization, if necessary.	A/M	DOAP		
4	Follow-up	Managing acute and chronic radiation sequelae, such as pneumonitis, cystitis, chronic bowel complications, gynaecological sequelae (vaginal stenosis, vaginal dryness,infertility and dyspareunia)	A/M	Small group discussion		

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Principal and Dean
Medical College and Hospital
M.S. Ramaiah University of Applied Sciences

Table 3: Supportive and Palliative Care [Pain Relief and others]

Sl No.	Competency	Sub competency	K/S/A Predominant and M/N/D	Teaching method	Assessment	Doctors Signature
1	**Drug treatment**	A wide range analgesic techniques, including simple analgesics, mild and strong opioids, given by a variety of routes	A/M	Small group discussion		
		Management of the complications of analgesics, including constipation, nausea, gastro-intestinal discomfort and analgesic intolerance.	A/M	Small group discussion		
2	**Mechanical methods**	Prescription, siting and evaluation of TENS analgesia,	K/M	Small group discussion		
		Referral of patients with refractory pain for procedures such as a nerve block, intrathecal analgesia, rhizotomy or orthopaedic stabilization.	K/M	Small group discussion		
3	**Radiotherapy**	Use of radiation to treat painful metastatic disease with single fractions, multiple fractions and hemi body radiotherapy	S/M	DOAP		
4	**Nausea and Vomiting**	Treatment of nausea and vomiting arising in advanced illness using anti-emetics,	A/M	DOAP		
		Palliative management of sub-acute intestinal obstruction	A/M	Small group discussion		
5	**Anorexia and Dysphagia**	Management, where appropriate, with corticosteroids, progestogens and nasal gastric feeding	A/M	DOAP		
6	**Pleural Effusions and Ascites**	Drainage of pleural effusions and ascites	S/N	DOAP		
		Other treatments such as pleurodesis.	K/N	DOAP		
7	**Depression and Anxiety**	Knowledge regarding treatment of depression at all stages of cancer management, using counselling and drug techniques with anti-depressants,	A/M	Small group discussion		
		Knowledge regarding treatment of anxiety with counselling, anxiolytics and major tranquilisers.	A/M	Small group discussion		
8	**Hospice Care**	Awareness of local hospice facilities	K/N	Small group discussion		
		A one week (at least) attachment to a hospice or palliative care team.	A/M	DOAP		
9	**Counselling**	Counselling of patients and relatives at all stages of the disease	A/M	DOAP		

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Principal and Dean
M.S. Ramaiah Medical College and Hospital
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Table 4: Investigational Techniques

Sl No.	Competency	Sub competency	K/S/A Predominant/ and M/N/D	Teaching method	Assessment	Doctors Signature
1	**Laboratory Investigations**	Interpretation of the results of haematological, biochemical and radioimmunoassay investigations	K/M	DOAP		
2	**Radiology**	Attendance at regular radiological review sessions involving a consultant clinical radiologist for the examination of plain x-rays, CT scans, magnetic resonance imaging and ultrasound covering the whole spectrum of cancer radiology,	K/M	DOAP		
		Current indications and techniques in interventional procedures.	K/M	Small group discussion		
3	**Radiation Medicine Procedures**	Diagnostic Imaging – Gamma Camera, SPECT, PET Scanner, PET-CT and PET-MRI image fusion studies in Treatment planning, response evaluation and follow up.	K/M	Small group discussion		
4	**Pathology**	Attendance at regular pathological review sessions involving a consultant pathologist	K/M	Small group discussion		
5	**Genetics**	**in diagnosis, prognosis and treatment of cancer**	K/N	Small group discussion		
6	**Other Procedures**	Indirect laryngoscopy	S/M	Small group discussion		
		Lumbar puncture	S/D	Small group discussion		
		Skin biopsy	S/D	Small group discussion		
		Fibre optic naso-endoscopy	S/D	Small group discussion		
		Pelvic EUA and cystoscopy	S/N	Small group discussion		

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M.S. Ramaiah University of Applied Sciences
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Table 5: Others

Sl No.	Competency	Sub competency	K/S/A Predominant and M/N/D	Teaching method	Assessment	Doctors Signature
1	**Site or Disease Specific Procedures**	Assessment, treatment and follow-up, in detail, for each of the anatomical sites and types of tumour,	A	DOAP		
		Presentation and assessment of patients discussed at multidisciplinary team meeting,	K	DOAP		
		Staging,	K	DOAP		
		Radiotherapy – adjuvant, radical and palliative,	K	DOAP		
		Hormone and biological therapy,	K	Small group discussion		
		Palliative care,	A	DOAP		
		Appropriate follow up,	A	DOAP		
		Acute and late side effects of treatment.	A	DOAP		
2	**Clinical Trials, Literature and Research**	The aims and format of Phase I to IV clinical trials,	K/M	Small group discussion		
		Obtaining informed consent, following study protocols and using data forms,	A/M	Small group discussion		
		Research programmes (although research experience is not a prerequisite)	K/D	Small group discussion		
		Major areas of current research and of recent important publications,	K/N	Small group discussion		
		Submission of a research project to an Ethics Committee	K/N	Small group discussion		
		Structure and functioning of local and national clinical and research cancer networks	K/N	Small group discussion		
		Ethics guidelines of research	K/N	Small group discussion		
3	**Communication and Publication**	Effective communication with colleagues, patients and their careers,	A/M	Small group discussion		
		Giving clear and comprehensive descriptions of disease processes, investigations and treatment,	A/M	Small group discussion		

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		Clear expression in English/local script and production of legible script	K/M	Small group discussion		
		Preparing work for publication.	K/N	Small group discussion		
		Ethics of research publication	K/N	Small group discussion		
4	**Outpatient and Joint Clinics**	Participation in joint consultative clinics and regular general oncology outpatient sessions,	K/A/M	DOAP		
		Seeing review and new patients and planning their overall management.	A/M	DOAP		
5	**Resource Management and Quality Assurance**	Introduction to the resource management and quality assurance of an oncology service, so as to be able to develop these skills at a later stage	K/D	Lecture		
6	**Prevention**	A broad knowledge of the environmental causes of cancer and possible strategies for prevention	K/M	Small group discussion		
7	**Screening**	Details of screening programs for cervical, breast, Head &Neck, Lungs, Prostate, GIT and other cancers which might form a major proportion of cancer cases in the country in the years to come.	K/M	Small group discussion		
8	**Genetics**	The familial aspect of some cancers as in colorectal, breast, ovary, retinoblastoma, multiple cancer syndromes etc and the management of high risk families and genetic counselling.	K/N	Lecture		

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Annexure 2

MONTHWISE TEACHING SCHEDULE FOR POST GRADUATES DEPARTMENT OF RADIATION ONCOLOGY

MONTH	SITE	Teacher
January	Head & Neck	Moderator
February	Gastro Intestinal Tract	Moderator
March	CNS Tumours	Moderator
April	Pediatric Oncology	Moderator
May	Carcinoma Lung	Moderator
June	Genitourinary Tumours	Moderator
July	Head & Neck	Moderator
August	Carcinoma Breast	Moderator
September	Gynaec Oncology	Moderator
October	Radiobiology/Physics	Moderator
November	Basic Oncology	Moderator
December	Sarcoma/Lymphoma	Moderator

Note:

1. The respective faculty will be in charge of the entire process...planning, implementation and assessment.
2. It is preferable to put the time table latest by 20th of previous month.
3. PGs are expected to keep in touch with the respective teachers well ahead of the class

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Annexure 3

APRIL TEACHING SCHEDULE FOR POST GRADUATES THEME: PAEDIATRIC ONCOLOGY

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 Chart rounds	2 Case presentation	3 Grand rounds
4 Sunday	5 Journal club	6 Subject seminar	7 Subject seminar	8 Chart rounds	9 Case presentation	10 Grand rounds
11 Sunday	12 Journal club	13 Holiday	14 Subject seminar	15 Chart rounds	16 Case presentation	17 Grand rounds
18 Sunday	19 Subject seminar	20 Subject seminar	21 Subject seminar	22 Chart rounds	23 Case presentation	24 Grand rounds
25 Sunday	26 Subject seminar	27 Subject seminar	28 Faculty lecture	29 FA	30 Case presentation	

Instructions: -

- All classes will be based on discussion
- PPTS to be used only to show images /staging /RT planning details
- Both students should discuss with each other prior to the class and present
- The team shall discuss with the teacher atleast 3-5days before the date of the class.
- The week's doubts clarifications to be discussed with the faculty on Saturdays.
- All the best

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ANNEXURE – 4
DEPARTMENT OF RADIATION ONCOLOGY

POLICY FOR OUTSIDE PG POSTINGS

Year wise PG Posting

1. 1st year students are posted for 2 weeks each in the Departments of Anatomy and Pathology.
2. 2nd year students are posted for 1 month each in the Department of Surgical oncology and Medical oncology
3. During the second year students will also have postings to Nuclear Medicine, Palliative Care for 1 week each
4. Three months District rural postings as per NMC.

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Annexure 5

Logbook entry

Date	
Setting/method	
Presented/attended	
Summary in brief	
Reflection	
Teachers comments	

Student's signature

Guide's Signature

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ANNEXURE-6

Postgraduate Students Appraisal Form Name of the PG Student Period of Training Duration:.....to.....

Sl. No	Particulars	Not satisfactory (1,2,3)	Satisfactory (4,5,6)	More than Satisfactory (7,8,9,10)	Remarks
1	Journal based learning				
2	Patient care and rounds				
3.	Bedside teaching, Clinical seminars				
4.	Communication skills				
5.	Log book				
6.	Thesis work				
7.	CME/Outreach programmes/Conference presentations				
8.	Self-directed learning				
9.	Under-graduate teaching				
10.	Research/Publication				

Sign of the student Sign of the assessor Sign of Head of the Department

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Course Specifications MD Radiation Oncology

2022 onwards

Course Code: MDC549A

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Course Specifications

Course Title	**Basic Principles in the practice of Radiation Oncology**
Course Code	**MDC549A**
Department	**Radiation Oncology**
Faculty	**Ramaiah Medical College**

Course summary:
This course is designed in such a way that the student will master the basics of radiation physics, radiation biology, oncology, applies sciences, various investigations and staging of cancer.

Course Outcomes:
CO 1: Demonstrate comprehensive knowledge of applied anatomy, classification, histopathology, investigations and staging of various tumours. (C)

CO 2: Demonstrate the understanding of various concepts of radiation physics and their application in the delivery of radiation. (C)

CO 3: Demonstrate the understanding of radiobiological concepts behind the causation of radiation damage to tissues. (C)

Course Content:

Radiation Physics
The following courses of study and the subjects are recommended for training in MD Radiation Oncology and Oncology. It is essential that these topics be covered in detail for better Understanding of the basics of radiation treatment, as per subject heads given below:

1. **Atomic and Nuclear Structure**
A. Atomic structure
    1. Energy levels, binding energy
    2. Transitions, characteristic radiations
B. Nuclear structure
    1. Mass, atomic and neutron numbers
    2. Nuclear binding energy
    3. Fission, fusion
    4. Nuclear reactors

2. Radioactive Decay
A. Modes of decay
    1. N/P ratio, even-odd relationship
    2. Beta decay
    3. Positron decay and electron capture
    4. Alpha decay
    5. Isomeric transitions, gamma emission, internal conversion

B. Mathematics of Radioactive Decay

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1. Units, half-life, graphing
2. Transient and secular equilibrium
3. Radionuclide generators

C. Natural Radioactivity
1. Naturally occurring isotopes
2. Decay series

D. Artificial Radioactivity
1. Production by neutron bombardment
2. Fission products
3. Production by charged particle bombardment
4. Radioactivity equilibrium

3. Production of X-rays

A. X-ray tubes
1. Requirements for X-ray production
2. Historical development
3. Focal spot size
4. Reflection and transmission targets
5. X-ray production efficiency

B. X ray circuits
1. Primary circuits
2. Secondary circuit
3. Filament circuit
4. Modes of rectification

4. High Energy Treatment Machines

1. Cobalt units
2. Van de graaff generators
3. Linear accelerators
4. Betatrons
5. Resonance transformers
6. Cyclotrons for neutron therapy
7. Microtron, Synchrocyclotron and Particle Accelerators

5. Interactions of X - and Gamma-rays

A. Attenuation of a beam of x- or gamma-rays
1. Attenuation and absorption coefficients
2. Attenuation in the body

B. Modes of interaction
1. Photoelectric absorption
2. Compton scattering
3. Pair production
4. Photo-disintegration

6. Interactions of Particulate Radiations

A. Types of interactions
1. Elastic, inelastic
2. Excitation, ionization

B. Properties of particulate radiations
1. Specific ionization

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2. LET

C. Interactions of heavy charged particles and pions
   1. Bragg's peak
   2. Applications in radiation therapy

D. Interactions of electrons
   1. Interactions with electrons
   2. Interactions with nuclei
   3. Applications to radiation therapy

E. Neutron interactions
   1. Slow neutron interactions
   2. Fast neutron interactions
   3. Applications with radiation therapy

F. Radioactive sources used in diagnosis and therapy - Production and properties.

7. Measurement of Radiation Exposure

A. Photon and energy flux density and fluence
B. The roentgen
C. Electronic equilibrium
D. Ionization chambers
   1. Free-air chambers
   2. Thimble chambers
   3. Condenser chambers
   4. Electrometers
   5. Extrapolation chambers

E. Exposure calibration of an X - or gamma - ray beam
   1. Selection of calibration variables
   2. Selection of chamber
   3. Positioning of chamber
   4. Corrections to readings

F. Quality assurance checks on radiation therapy units

8. Radiation Quality

A. Measures of quality
   1. HVL and effective energy

B. Factors influencing quality
   1. Variations in quality across a beam
   2. Filtration an acceleration potential

9. Measurement of Absorbed Dose

A. Units of radiation dose, dose equivalent, RBE-dose
B. Calculation of dose from exposure
C. Measurement of absorbed dose with an ionization chamber
   1. Bragg-Gray cavity theory

D. Direct measurement of absorbed dose
   1. Film
   2. TLD
   3. Calorimetry
   4. Chemical dosimetry

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10. Calibration of High Energy Photon and Electron Beams

A. Photons
1. Stopping power ratios and energy absorption coefcients
2. Acq
3. C

B. Electrons
1. CE

11. Dose Distribution, External Beam Therapy

A. Dosimetric variables
1. Backscatter factor
2. Percent depth dose
3. Tissue - air ratio
4. Scatter - air ratio
5. Tissue - maximum and tissue-phantom ratios
6. Isodose distributions
7. Treatment time calculations
8. Fixed SSD and isocentric treatment techniques
9. Beam Modulation

B. Single and multiple field dose distributions
1. Corrections for wedges
2. Design for compensating filters
3. Corrections for surface obliquities
4. Corrections for heterogeneities
5. Dose perturbations at interfaces
6. Adjoining fields
7. Integral dose

C. Dose distribution for rotational therapy

D. Calculation of dose in large, irregular fields

12. Dose Distribution, Sealed Source Therapy

1. Handling of sealed radioactive sources
2. Dose distributions for sealed implant sources
3. Design of sealed source implants
4. Radium and its substitutes
5. Special techniques for 192Ir and 125Ir
6. Other sealed sources in therapy

13. Computerized Treatment Planning

A. External X-and gamma-ray beams
1. Rectangular fields
2. Irregular fields
3. Inverse Planning

B. Electron beams

C. Implanted sources
1. Intracavitary sources

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2. Interstitial implants
3. Surface mould

14. Radiation Protection from External Sources

A. Concepts and units
   1. Quality factors
   2. Dose equivalent
   3. Protection regulations

B. Treatment room design
   1. Primary radiation
   2. Scatter
   3. Leakage
   4. Special problems with high energy photon and electron beam
   5. Special problems with neutron, proton and □-meson

C. Sealed source storage

D. Protection surveys

E. Personnel monitoring

15. Radiation Protection from Internal Sources

A. Body burdens and critical organs
   1. Effective half-lives for uptake and elimination.

B. Internal dose computations
   1. Locally absorbed radiation
   2. Penetrating radiation

C. Handling radionuclide therapy patients

D. Licensing procedure for using radionuclides

16. Planning of a Radiation Oncology Department

1. Building designs
2. Choice of various equipments and sources
3. Acceptance and Calibration Tests
4. Various maintenance steps and procedures

17. New Radiation Modalities:

A. Protons
   1. Production
   2. Processes of absorption
   3. Depth dose patterns
   4. Advantage compared with x-rays
   5. Facilities available

B. Neutrons
   1. Production
   2. Processes of absorption
   3. Depth dose patterns
   4. Advantages compared with x-rays
   5. Facilities available

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C. Pions
1. Production
2. Processes of absorption
3. Depth dose patterns
4. Advantages compared with x-rays
5. Facilities available

D. High energy heavy ions
1. Production
2. Processes of absorption
3. Depth Dose Patterns
4. Advantages compared with x-rays
5. Facilities available

Radiobiology (Radiobiology and Laboratory Radiation Oncology)

1. Mammalian Cell Radiosensitivity

A. Apoptosis, Interphase and reproductive death
B. Cell survival curves in vitro
C. Characterization of cell survival curves
D. Critical sites and target theory
1. DNA
2. Membranes
E. Dose response curves in vivo
1. Skin clone
2. Surviving crypts
3. Bone marrow colonies growing in spleen, monolayer culture

F. Quantitative normal tissue reaction based on systems
1. Pig skin
2. Rodent skin
3. Lung
4. Esophagus
5. Kidney
6. CNS and spinal cord

2. Factors that Modify Radiation Response

A. The Oxygen effect
1. Effect of oxygen concentration
2. Time of action of oxygen
3. Mechanism of the oxygen effect
4. Implications for Radiation Oncology
5. Methods to overcome problems of hypoxic cells

B. The age response function
1. The cell cycle
2. Age response for cells cultured in vitro
3. Age response for tissues in vivo
4. Age response for neutrons
5. The oxygen effect through the cell cycle
6. Implications for Radiation Oncology

C. Potentially Lethal damage
1. Repair in vitro

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2. Repair in vivo
3. PLD and high LET radiations
4. Implications in Radiation Oncology

D. Sublethal damage
1. Split-dose experiments with cell in vitro

2. Sublethal damage repair in normal tissues
3. Sublethal damage repair in tumours
4. Sublethal damage and hypoxia
5. Sublethal damage and high LET radiations
6. Dq as a measure of repair

E. Dose-rate
1. Dose-rate effects in cells in vitro
2. Dose-rate effect in normal tissues
3. Dose-rate effect in tumours
4. Interstitial therapy
5. Beam therapy at low dose rate

F. Radio sensitizers
1. The halogenated pyrimidines
2. Hypoxic cell radio sensitizers
a. Structure and mode of action
b. Enhancement ratio
c. Metronidazole/misonidazole
d. Pharmacokinetics in the human
e. Clinical limitations
3. Antibiotics

G. Radio protectors
1. Free radical scavengers

3. Linear Energy Transfer
A. Definition
B. Track and energy average
C. LET for different types of radiation
D. OER as a function of LET

4. Relative Biological Effectiveness (RBE)
A. Definition
B. RBE for different cells and tissues
C. RBE as a function of dose
D. RBE and fractionation
E. RBE as a function of LET
F. Q factor

5. Cell and Tissue Kinetics
A. The cell cycle
B. Autoradiography
C. Constituent parts of the cell cycle
D. Percent labeled mitoses technique

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E. Growth fraction
F. Cell loss factor
G. Growth kinetics of human tumours

6. Tissue Radiosensitivity

A. Classification based on radiation pathology
B. Types of cell populations
    1. Self-renewal
    2. Conditional renewal
    3. Stem cell
    4. Differentiated

7. Time-Dose and Fractionations

A. The 4 R's of radiobiology
B. The basis of fractionation
C. The Strandquist's plot
D. Nominal standard dose
E. Linear Quadrate equation

8. Hyperthermia

A. Methods of heating
    1. RF microwaves
    2. Ultrasound
    3. Water baths
B. Systematic hyperthermia
C. Localized heating
D. Cellular response to heat
E. Repair of thermal damage
F. Thermotolerance
G. Hyperthermia combined with ionizing radiations
H. Time sequence of heat and irradiation
I. Hypoxic cells and heat
J. Effect of pH on the response to hyperthermia
K. Response of transplanted tumours to heat
L. Response of spontaneous tumours to heat
M. Response of normal tissues to heat
N. Heat and the therapeutic gain factor
O. Hyperthermia and chemotherapy

9. Total Body Irradiation – Acute Effects

A. Prodromal radiation syndrome
B. Central nervous system / cerebrovascular syndrome
C. Gastrointestinal syndrome
D. Haematopoietic syndrome
E. Mean lethal dose: (LD50)
F. Treatment of radiation accident

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10. Late Effects

A. Probabilistic/Deterministic (Stochastic/Non-Stochastic) effects
B. Non-specific life shortening
1. Definition
2. In animals
3. In man

C. Carcinogenesis
1. The latent period
2. Dose response curve in animals
3. Leukemia
4. Breast cancer
5. Thyroid cancer
6. Bone cancer
7. Skin cancer
8. Lung cancer
9. Other tumours
10. Malignancies in prenatally exposed children

11. Mechanisms of Radiation Carcinogenesis

A. Genetics of irradiation
1. Point mutations
2. Relationship to dose
3. Chromosome aberrations
4. Relationship to dose
5. Doubling dose
6. Genetically significant dose (GSD)
7. Genetic effect in humans
8. Background radiation in relation to the GSD

12. Radiation Effects in the Developing Embryo and Fetus

A. Intrauterine death
B. Congenital abnormalities including neonatal death
C. Growth retardation
D. Dependence of the above effects on dose, dose-rate and stage in gestation
E. Carcinogenesis following in utero exposure
F. Human experience of pregnant women exposed to therapeutic doses
G. Occupational exposure of potentially pregnant women
H. Elective booking or "10 day rule"
I. The "Practical threshold" for therapeutic abortion

Radiation Pathology:

Radio physiology of Human Tissues

1. Effects or irradiation of the skin
   1) Clinical manifestations
   2) Histological substratum of effects
   3) Repair
   4) Degree of sequelae
2. Injurious effects

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3. Effects of irradiation of bone and cartilage
    1) Effects on growing bones and cartilage
    2) Effects on adult bones and cartilage
    3) Clinical manifestations
    4) Histological substratum of effects
    5) Functional consequences and sequelae
4. Effects of irradiation of the kidney
    1) Clinical manifestations
    2) Histological substratum of effects
    3) Acute and chronic functional repercussions
    4) Permanent Sequelae
5. Effects of irradiation of the lung
    1) Acute clinical effects
    2) Ultimate effects
    3) Histologic substratum of effects
    4) Measures to reduce final effects
    5) Sequelae
6. Effects of irradiation of nervous tissues
    1) Effects on the brain
    2) Effects on the spinal cord
    3) Effects on the peripheral nerves
    4) Clinical manifestations
    5) Histological substratum
    6) Sequelae
7. Effects of irradiation of the ovary
    1) Clinical manifestations
    2) Histological substratum
    3) Reversibility of effects
    4) Therapeutic implications
8. Effects of irradiation of the testis
    1) Clinical consequences
    2) Histological substratum
    3) Reversibility
    4) Protective measures
9. Effects of irradiation of the eye
    1) Clinical consequences
    2) Histological substratum
    3) Protective measures
    4) Time-dose connotations
    5) Sequelae-therapy
10. Effects of irradiation of lymphoid tissues
    1) Clinical manifestations
    2) Histological manifestations
    3) Reversibility
11. Effects of irradiation of the bone marrow
    1) Clinical and laboratory manifestations
    2) Chronology of effects
    3) Recovery
    4) Therapeutic applications

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12. Effects or irradiation of the oral, pharyngolaryngeal and esophageal mucous membrane
    1) Clinical manifestations
    2) Histological manifestations
    3) Repair
    4) Sequelae
13. Effects of irradiation of the salivary glands
    1) Acute manifestations
    2) Histological substratum
    3) Dental consequences
    4) Prophylaxis
14. Radiation effects observable in clinical Radiation Oncology
    1) Technological protection
    2) Role of total dose
    3) Role of fractionation
    4) Measures of prevention
    5) Therapeutic measures
15. Effects of irradiation of human embryo
    1) Role of age
    2) Role of dose
    3) Teratogenic effects
    4) Measures of prevention
    5) SOMA Scales

Basic Sciences

1. Applied Anatomy and Physiology

1) Applied anatomy of oral cavity, larynx, pharynx, paranasal sinuses, CSF pathways salivary glands, middle ear, external orbit, breast, bronchopulmonary segments, mediastinum, oesophagus, liver, spleen, stomach, small and large bowels, pelvic and genitor-urinary organs (bladder, uterus, ovary, testis rectum, anal canal etc.), spinal segments
2) Lymphatic system and lymphatic drainage pathway of various organs
3) Relationship of vital structures,Surface Anatomy pertaining to various organs
4) Cross Sectional Anatomy pertaining to US/CT/MR/PET images
5) General principles of physiology of respiratory, cardio-vascular, nervous, biliary, reproductive and endocrine systems and fluid-electrolyte-metabolic balance

1. **Various Investigative and Imaging Procedures** including radio-isotope based
2. procedures in Diagnosis, Staging, Treatment Planning and follow up of cancer
3. patients

4. **Pathology of Benign and Malignant Diseases**
    1) Carcinogenesis - epidemiological studies, molecular studies, genetic basis,oncogenes, tumour growth kinetics
    2) Pre-cancerous conditions
    3) Methods of dissemination of cancer and its biological behaviour
    4) Degree of differentiation of cancer
    5) Principles and methods of definite diagnosis
    6) Surgical biopsy - various procedures of biopsy

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7) Exfoliative cytology
8) Fine Needle Aspiration Cytology (FNAC) and biopsy
9) Tumour markers
10) 4.General histologic and cytological features of malignancy including features
11) of special staining, surface markers, intracellular marker

5. Classification of benign and malignant tumours and their interpretation

1) Molecular pathology, molecular basis of diagnosis and prognosis of cancers
2) Radiation pathology

6. Staging of various cancers:

1. Evolution of different staging systems for various cancers over the years.
2. Clinical Staging, WHO Staging, TNM Staging, AJCC Staging and FIGO staging etc of various cancers, as applicable, with their inter-comparisons.

7. International Coding and classification of various neoplastic disorders

1ICD-9, ICD-O and ICD-10 system of classification and coding of various tumours.

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes				Program Specific Outcomes					
		PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
MDC549A Basic Principles in practice of Radiation Oncology	CO 1	3			3				3		3
	CO 2	2			3			1	3		3
	CO 3				3					2	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution											

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Course Specifications MD Radiation Oncology

2022 onwards

Course Code: MDC550A

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Course Specifications

Course Title	Clinical Radiation Oncology
Course Code	MDC550A
Department	Radiation Oncology
Faculty	Ramaiah Medical College

Course Summary:

This course is designed in such a way that the student will master the evidence based management of cancers with a focus on radiation treatment.

Course Outcomes:

CO 1: Demonstrate the role of radiation and its sequelae for skin, head and neck, nervous system and gastrointestinal cancers. (C,A,P)

CO 2: Demonstrate the role of radiation and its sequelae for thoracic, breast, Genitourinary, lymphatic system, bone and pediatric cancers. (C,A,P)

CO 3: Demonstrate the role of radiation and its sequelae for benign tumours. (C,A,P)

Course Content:

GROUP A:
Skin, Classic and Acquired Immunodeficiency Syndrome (AIDS)-Related Kaposi's Sarcoma, Cutaneous T-Cell Lymphoma, Brain, Pituitary, Spinal Canal, Eye, Ear, Nasopharynx, Nasal Cavity and Paranasal Sinuses, Salivary Glands, Oral Cavity, Tonsillar Fossa and Faucial Arch, Base of Tongue, Hypopharynx, Larynx, Unusual non epithelial Tumors of the Head and Neck, Head and Neck: Management of the Neck, thyroid.

GROUP B:
Lung, Mediastinum and Trachea, Oesophagus, Heart and Blood Vessels, Breast: Stage Tis, T1 and T2 Tumors, Breast: Locally Advanced (T3 and T4) and Recurrent Tumors, Pancreas and Hepatobiliary Tract, Colon and Rectum, Anal Canal, Kidney, Renal Pelvis, and Ureter, Bladder, Female Urethra, Prostate, Testis, Penis and Male Urethra.

GROUP C:
Uterine Cervix, Endometrium, Ovary, Fallopian Tube, Vagina, Vulva, Retro peritoneum, Adrenal Gland, Hodgkin's Disease, Non-Hodgkin's Lymphomas, Multiple Myeloma and Plasmacytomas, leukemias, Bone, Soft Tissue Sarcomas (Excluding Retro peritoneum, Paediatric Tumors: An Overview, Brain Tumors in Children, Wilms' Tumour, Neuroblastoma, Rhabdomyosarcoma, Lymphomas in Children, Radiation Treatment of Benign Disease,

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes				Program Specific Outcomes					
		PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
MDC550A Clinical Radiation Oncology	CO1	3	3		3	1	1			2	2
	CO 2	3	3		3	1	1			2	2
	CO 3	3	3		3		3				
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution											

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Course Specifications MD Radiation Oncology

2022 onwards

Course Code: MDC551A

Course Specifications

Course Title	**Allied Oncology Practices**
Course Code	**MDC551A**
Department	**Radiation Oncology**
Faculty	**Ramaiah University College**

Course Summary:

The course is designed in such a way that the student will master multidisciplinary management of cancer in addition to palliative care.

Course Outcomes:

CO1: Demonstrate the application of principles of surgical/systemic therapy in the treatment of cancer. (A,C,P)

CO2: Demonstrate comprehensive knowledge of advanced cancer, palliative care, pain management, best supportive care and end of life issues. (A,C,P)

Course Content:

A. Surgical Oncology

1. Principles and practice of general surgery, gynecology and pediatric surgery as related to cancer.
2. Surgical treatment decisions
3. Surgical diagnosis and staging of cancer

B. Basics of Chemotherapy:

1. Classification, mechanisms of action and pharmacokinetics of anti-cancer (cytotoxic) drugs including Biological Response Modifiers.
2. Rationality of using cytotoxic drugs as single agents and as multi-drug protocol in various clinical settings.
3. Dosages/Modes/routes of administration of cytotoxic drugs.
4. Complications/adverse effects of various cytotoxic drugs.
5. Hormone Treatment in Cancer
6. Immunotherapy and Role of Monoclonal antibodies in diagnosis, staging and management of cancer.

C. Pain Management, Supportive Care and quality of life in Radiation Oncology.

1. Oncologic Emergencies: Superior Vena Cava Syndrome, Spinal Cord Compression, Metabolic Emergencies, Surgical Emergencies, Urologic Emergencies,
2. Treatment of Metastatic Cancer: Brain, Lung, Liver, Bone, Malignant Pleural and Pericardial Effusions, Malignant Ascites
3. Infections in the Cancer Patients
4. Adverse Effects of Treatment: Nausea and Vomiting, Oral complications, Cystitis, Pulmonary Toxicity, Cardiac Toxicity, Hair Loss, Gonadal Dysfunction, Second Cancers, Miscellaneous Toxicities,
5. Supportive Care and Quality of Life:
6. Management of Cancer Pain, Nutritional Support, Sexual Problems, Genetic Counseling, psychological Issues,
7. Specialized care of the terminally ill, Approaches to Meeting the Needs of the Dying Patient, Rehabilitation of the Cancer Patient

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes				Program Specific Outcomes					
		PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
MDC551A Allied Oncology Practices	CO 1	2	3			3	3				
	CO 2		3	1			3	3			3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution											

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Course Specifications MD Radiation Oncology

2022 onwards

Course Code: MDC552A

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Course Specifications

Course Title	**Recent advances, Cancer Control Programmes and Research methodologies.**
Course Code	**MDC552A**
Department	**Radiation Oncology**
Faculty	**Ramaiah Medical College**

Course Summary:

The course is designed in such a way that the student will master recent developments in oncology, research in oncology and cancer control programmes.

Course Outcomes:

CO 1: Apply newer advances in the comprehensive management of cancer.(C)

CO 2: Demonstrate comprehensive knowledge of causation of cancer, its application in creating awareness, screening and early diagnosis. (C,A,P)

CO 3: Apply legal aspects with respect to radiation treatment for cancers.(A,C)

Course Content:

A. Newer Approaches to Cancer Treatment:

Gene Therapy, Cancer Vaccines, Immunotoxin Therapy, Antisense Inhibition of Gene Expression, Antiangiogenic Therapy, Radiation and Chemotherapy Protectors, Intensity Modulation of the Radiation Beam, Fractionated Stereotactic Radiation Oncology, Molecular Targets for Drug Development.

Quality Assurance, Recent Advances in Radiation Therapy, Altered Fractionation, Biologic Modeling and Plan Evaluation, Conformal Therapy, Proton Therapy, Neutron Brachytherapy, Neutron Capture Therapy, Neutron Beam Therapy, Heavy Ion and Pion Therapy, Physics of High Linear Energy Transfer (LET) Particles and Protons, Intra-operative Radiation Therapy, Hyperthermia, Three-Dimensional Physics and Treatment Planning, Stereotactic Irradiation.

B. **Cancer Control Programmes.**

1. Cancer registry and epidemiology
2. Prevention and early detection in cancer
3. Cancer education and oncology organization

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C. Biomedical Research:

1. Sampling – Random sampling, purposive sampling, advantages of sampling, Various methods of sampling (Simple random, systematic, stratified, cluster, Multistage & multiphase), sampling error, non-sampling error.
2. Descriptive statistics – Arithmetic mean, Median, Mode, and Standard error, coefficient of variation.
3. Graphics presentation of date – Bar diagram, histogram frequency curve, line graph, pie chart.
4. Normal distribution – Definition and properties/Confidence interval, Basic concept of testing of hypothesis, p-value, power of the test.
5. Test of significance –t-test, test of proportion, chi-square test, concept of analysis of variance.
6. Study design – Descriptive studies, analytical studies. Observational studies, experimental studies, prospective studies, retrospective studies, odds ration, relative risk, attributable risk percent, population attributable risk percent.
7. Correlation and regression – Simple correlation, linear regression, concept of multiple regression.
8. Survival analysis – Life table, Survival analysis, K – M Method, Cox regression, log ran k test.
9. Sample size determination – Basic concept, sample size determination of estimating proportion and mean.
10. Clinical trials in cancer research – Basic concept.

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes				Program Specific Outcomes					
		PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
MDC552A Recent advances Cancer Control Programmes and Research methodologies.	CO 1	3	1		3	2					2
	CO 2				3		3	3		1	3
	CO 3		2	2	3	2	3		1		
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution											

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Course Specifications MD Radiation Oncology

2022 onwards

Course Code: MDP513A

Course Specifications

Course Title	Thesis - Radiation Oncology
Course Code	MDP513A
Department	Radiation Oncology
Faculty	Ramaiah Medical College

Course Summary:

The course is designed in such a way that the student will master the science of research in terms of designing, conducting and interpreting the results.

Course Outcome:

Describe the techniques of research, identify available literature and critically analyse the same. (C)

Course details:

Every candidate pursuing MD Medicine degree course is required to carry out work on a selected research project under the guidance of a recognised post graduate teacher. The results of such a work shall be submitted in the form of a dissertation.

The dissertation is aimed to train a post graduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, comparison of results and drawing conclusions.

Every candidate shall submit to the Registrar (Academic) of the University in the prescribed proformas, a synopsis containing particulars of proposed dissertation work within six months from the date of commencement of the course on or before the dates notified by the University. The synopsis shall be sent through the proper channel.

Such synopsis will be reviewed and the dissertation topic will be registered by the University. No change in the dissertation topic or guide shall be made without prior approval of the University. The dissertation should be written under the following headings:

1. Introduction
2. Aims or Objectives of study
3. Review of Literature
4. Material and Methods
5. Results
6. Discussion
7. Conclusion
8. Summary
9. References (Vancouver style)
10. Tables
11. Annexures

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Course Mapping (CO-PO-PSO Mapping)

Course Code and name	Course Outcomes	Program Outcomes				Program Specific Outcomes					
		PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
MDP513A Thesis-Radiation Oncology	CO 1		1	3						3	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution											

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Course Materials:

Books

1. Principles of Practice of Radiation Oncology by Carlos A. Parez, Luther W. Brandy (Lippincott Raven)
2. Cancer – Principles & Practice of Oncology by Vincent T De Vita, Samuel Hellman Steven A. Rosenberg, 5th edition. (Lippincott – Raven)
3. The Physics of Radiation Therapy, 2nd Edition, Fiaz M. Khan, William and Wilkins
4. Radiation oncology physics: a handbook for teachers and students: © IAEA, 2005
5. Clinical Oncology A multidisciplinary approach for Physicians and Students Philip Rubin WB Saunders,
6. Paediatric Radiation Oncology 2nd Edition, Halperin, Raven,
7. Basic Science of Oncology, Tannock, Hill Mc Graw Hill,
8. Nancy lee
9. Gunderson
10. Radiobiology for the Radiologist, Eric J. Hall, J.B. Lippincott
11. Francis C.M., Medical Ethics, 1 Ed, 1993, Jaypee Brothers, New Delhi, p 189

Journals

- Seminars in Oncology - W.B. Saunders Company,
- Seminars in Radiation Oncology – WB Saunders Company,
- International Journal of Radiation Oncology, Biology, and Physics – Elsevier
- Radiation Oncology and Oncology – Elsevier.
- Journal of cancer research and therapeutics
- Journal of Contemporary brachytherapy
- Journal of Medical physics
- Indian Journal of Palliative care
- Lancet
- Journal of Clinical Oncology

Additional Reading

1. ICMR
2. National Cancer Grid/Registries
3. UpToDate

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