



Advanced Specialization Certificate in Clinical Oncology and Research

A Joint Programme of TMC Kolkata and IIT Kharagpur



Prospectus and Information Brochure

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Introduction

The Advanced Specialization Certificate in Clinical Oncology is a unique course offered by Tata Medical Center in partnership with Indian Institute of Technology, Kharagpur. The course aims to train radiation oncologists in the nuances of clinical oncology as well as giving a systematic initial experience in translational scientific research. The certificate course will encompass three years. During these three years, trainees will undergo credentialed training in Clinical Oncology as well as training in translational research.

The program is designed to provide a credentialed and standardized clinical oncology training to so that trainees can provide safe and effective care for cancer patients. In addition, they will gain practical experience in conducting translational and interdisciplinary clinical oncology research. The certificate programme is also expected to result in a series of well planned research projects which will be jointly spearheaded by the two centers. It is likely that the trainees will evolve into future thought leaders and clinician scientists, who will have clinical expertise, in addition to knowledge and expertise in translational research. Also, the current graduate and post-graduate students of IIT-Kharagpur will have an unprecedented opportunity to work in clinically relevant and cutting-edge research projects which will be conducted as a part of this certificate programme.

Current Fellowship Programme at TMC

Tata Medical Center has been running a successful clinical oncology fellowship program for the past five years. This fellowship is a two-year program for post-MD/DNB radiotherapy candidates. Hands-on clinical experience is imparted in Clinical Oncology, in addition to clinical research. Most of the existing trainees are well placed in major cancer centers in India and abroad. Trainees have also conducted several prospective as well as retrospective clinical research studies which have been presented in international and national conferences and published in peer-reviewed international journals. Several of the candidates have also appeared for and passed the Fellowship of Royal College of Radiologists (Clinical Oncology) exam during their Fellowship process. Candidates have also had an opportunity to train further in different centers in the United Kingdom to obtain further experience in clinical oncology and research.

Need for this course

It is projected that India will have nearly 17 lakh cancer cases diagnosed every year and almost 8 lakh new deaths due to cancer by the year 2020. Part of the reason for the high mortality from the disease is the lack of trained oncologists who know how to treat patients in a multidisciplinary setting according to evidence-based guidelines. Most of the nonsurgical oncological care is provided by radiation oncologists who undergo a three year MD/DNB Radiation Oncology course after their MBBS but are not thoroughly trained in providing safe oncological care.

This shortcoming is a direct consequence of the inadequate training they receive as a part of post-graduate programme. Barring few major academic centers, most centers do not have the physical infrastructure in place to train candidates in the current standard technology in radiotherapy. Multidisciplinary care is fragmented and ad-hoc or even non-existent, and systemic therapy is practiced without institutional protocols. As a consequence, there is a broad disparity in the standard of training received.

It is felt by most of the trainees, as well as cancer centers, that the three years MD/DNB radiotherapy course does not provide sufficient experience to handle patients independently in the clinical setting. As a result majority of them train further as senior residents or fellows in government and private sector institutes in the country after obtaining their degree. Unfortunately, none of these training programs have a standardized teaching curriculum and a credentialing process. The same shortcoming exists in the current fellowship program, and this Advanced Specialization Certificate in Clinical Oncology course is being designed to fill this lacuna.

Benefits

The Advanced Specialization Certificate in Clinical Oncology course will be the first course that provides standardized and credentialed training in both clinical oncology and practical experience in translational research. As such there are benefits expected for all stakeholders.

Benefits for the trainees will include:

1. Standardized training in Clinical Oncology as practised in modern MDT setting using evidence based guidelines.
2. Training in the world-class radiation oncology technology including Image guided radiotherapy, SRS , SBRT, VMAT and Adaptive radiotherapy.
3. Translational research experience at the best technology institute at IIT-Kharagpur involving research in areas which are not a part of any medical teaching curriculum in India.
4. Training in following systematic, evidence based systemic therapy protocols.
5. A first of it's kind systematic credentialing and certification for the work experience at Tata Medical Center.
6. Gaining experience on how to build cross-disciplinary research networks.

Benefits for the Institutes will include:

1. Availability of trainees who are trained in clinical oncology as well as technology is the need of the hour.
2. Multiple and concurrent research projects in previously identified thematic areas involving faculty from both IIT-Kharagpur and TMC.
3. All projects are likely to have a significant translational component with substantial industry and commercial interests. As a consequence, they are likely to attract significant extramural funding.
4. It is expected that this certificate programme will not only result in several cutting-edge research projects and several patents.

5. With IIT-Kharagpur venturing into the field of medical education, this programme is expected to provide the best landing platform for medical graduates of this programme.
6. Undergraduate and postgraduate trainees enrolled in current courses across IIT-Kharagpur will be able to access these highly topical and clinically relevant research projects and improve their skills as a result.
7. These benefits will be in addition to the direct benefit that SMST is going to get in terms of research and teaching.
8. Also, this course will further cement the research and education ties that both institutes have build up over the past few years.

Eligibility Criteria and Selection

All candidates must have completed a postgraduate degree in Radiotherapy or Radiation Oncology which also includes training in systemic treatment. In case of Indian candidates, MD and DNB from a recognized centers are considered equivalent. Candidates must hold valid registration from the Medical Council of India and must have a pass certificate of the MD/DNB radiotherapy course. Candidates from outside of India must have equivalent experience and training in a three-year course where they have learned radiotherapy. They must also have MCI approval for training in India.

The selection process starts in July every year usually in the first week. Applications will be invited through advertisements, placed through the TMC and SMST websites by April every year.

Participants will be selected for this advanced certification course based on their aptitude as well as willingness to commit time for a three year course. The selection process would involve one or more interviews and assessments with faculty from both Tata Medical Center and IIT Kharagpur. TMC, Kolkata will take sole responsibility of the admission process in the course. However, semester registration at the starting of each semester is compulsory by physically presence of candidates at IIT Kharagpur.

The total number of candidates included in the course will differ as per the aptitude and desire of the applicants, but likely to be between 3 - 6 per batch. However the number of trainees may be increased in the future depending on the availability of research projects, candidate aptitude and availability of funding.

Course Duration and Structure

The 3 year course will be organized into six semesters of 6 month each. Dedicated research time will be provided for each participant each year for the project work. This time will depend on the nature of the project and may require the candidate to spend time in IIT Kharagpur working in their laboratories and attending some of the essential teaching programs as per the directions of the guides. However, it is expected that the students will spend at least 1 - 2 weeks per semester at IIT-Kharagpur for their project. Given the nature of research projects that will be taken up as a part of this certificate course, the training and education schedule will be flexible and will be customized as per the requirements of the study being conducted. Nonetheless, given the nature of the projects being contemplated as a part of this program, it is likely that the students will gain significant exposure into fields of education that are not taught as a part of a traditional medical curriculum. The students will earn credit points as per the activities performed and the learning objectives attained in each semester. The credit points will be allocated as per the following schedule indicated in Table 1.

Table 1: Table showing the course structure and credit points that can be accrued during the course.

Clinical Oncology Training		Research Project	
Activity	CP	Activity	CP
Semester 1			
General OTC*	20	GCP Certification*	20
Site Specific OTC*	20	Project Formulation*	20
Case Based Discussion (CbD)	20	Seminar (Project Dependant)	20
DORPS, DOST , TO	20		
Semester 2			
Site Specific OTC*	20	Interim Project / Mentor assessment	20
Case Based Discussion (CbD)	20	Seminar (Project Dependant)	20
DORPS, DOST , TO	60		
Semester 3			
Site Specific OTC*	20	Interim Project / Mentor assessment	20
Case Based Discussion (CbD)	20	Seminar (Project Dependant)	20
DORPS, DOST , TO	60		
Semester 4			
Site Specific OTC*	20	Interim Project / Mentor assessment	20
Case Based Discussion (CbD)	20	Seminar (Project Dependant)	20
DORPS, DOST , TO	60		
Semester 5			
Site Specific OTC*	20	Project based GCP evaluation	10
Case Based Discussion (CbD)	20	Seminar (Project Dependant)	20

DORPS, DOST , TO	60	Interim Project / Mentor assessment	20
Semester 6			
Site Specific OTC*	20	Interactive Assessment	20
Case Based Discussion (CbD)	20	Final Project Seminar	70
DORPS, DOST , TO	60	Dissertation of Project	70
Grand Total	600	Grand Total	400

CP= Credit Points, GCP= Good Clinical Practice, OTC = Onboarding Training Certification, CbD = Case Based Discussion, DORPS = Direct Observation of RT Planning Skills, DOST = Direct Observation of Systemic Therapy, TO = Teaching Observation

The total number of credit points that can be achieved is 600 for Clinical Oncology Training and 400 for Research training. In order to successfully complete and obtain the certificate the candidates must obtain at least 80% of the credits in both segments (ie. 480 points in clinical oncology and 320 points in research training) over the period of 3 years. Of these some of the points are absolute requirements which have been marked with an asterisk in the table. The certificate will only be issued after completion of the three year course with the required number of credits.

Duration of course will be extended maximum upto 4 years (8 semesters) in case of candidate's health issues, personal problems and / or failure to achieve 80% of the total credit in both segments. Semester registration at IIT Kharagpur beyond three years is compulsory in such cases. Receiving salary beyond three years would be subject to terms and conditions of TMC, Kolkata.

On successful completion of the course certificate will be issued to the candidates by CEP, IIT Kharagpur signed jointly by Dean, CE, IIT Kharagpur and Director, TMC, Kolkata displaying the logo of both the Institutes (see Annexure-I)

In addition to the certificate received at the end of the course, the students will also receive a credentialing certificate which will contain a list of all procedures and treatments they are credentialed to conduct independently.

Evaluations

As a part of the certificate course the following evaluations will be performed.

Clinical Oncology

1. **Case Based Discussions (CbD):** These are discussions focussed on a specific case that are designed to encourage analytic thinking and application of evidence for deciding the management of a specific case. Participants have to conduct at least two CbDs per semester for credit point.
2. **Direct Observation of Systemic Therapy (DOST):** This will be an evaluation of how the candidate is able to determine the appropriate systemic therapy for a patient, as well as decide the correct treatment regimen and explain the process of the therapy to the patient. At least 1 DOST is required to be performed per semester for credit point.
3. **Direct Observation of Radiotherapy Planning Skills (DORPS):** This will be an evaluation of how the trainee decides and performs a Radiotherapy planning for a given patient. At least 1 DORPS is required to be performed in a semester for credit point.
4. **Teaching Observation (TO):** This evaluation will be performed while the trainee is participating in the teaching obligations at TMC and IIT-Kharagpur. At least one TO is required to be performed in a semester for credit point.
5. **Onboarding Training Certification (OTC):** This certification will be provided on satisfactory completion of the onboarding training. This onboarding training will have defined components that will need to be completed on a case by case basis.

Research Training

1. **Good Clinical Practice (GCP) perspective:** Good clinical practice aims at precision diagnostics and effective therapeutic cum preventive management. Therefore, clinico-fundamental research endorses dimensions like prevailing

challenges in decision making, applicability of the medical gadgets/methods/options and value addition to the processes through embodiment of relevant domain knowledge in an interdisciplinary manner.

2. **Project Formulation:** A complete project proposal related to the research project being planned as a part of the certificate programme would have to be submitted by the 1st semester before the JRCC and subsequently to the IRB.
3. **Project Dependant Seminars:** These seminars will be held at least once every semester and will be derived from the project related deliverables which will be decided with the trainee at the beginning of each semester.
4. **Interim Project / Mentor assessment:** These assessments would be completed at the end of each semester (from 2nd to 5th Semester) by the mentors related to the project and will be based on achievement of the deliverables for the said semester. The assessment will be conducted through a viva and focused discussion between the trainee and the mentors.
5. **Project based GCP evaluation:** The trainee will be expected to complete at least one clinical audit while working at TMC under the guidance of their mentor. Value addition to the processes will be derived through GCP and embodiment of relevant domain knowledge in an interdisciplinary manner.
6. **Final Project Seminar:** Candidate will deliver a comprehensive seminar of his/her entire project work during the course emphasizing on effective contribution. Assessment will also cover candidate's knowledge gain in clinico-fundamental and translational delivery aspects.
7. **Dissertation of the project:** A completed dissertation based on the research project would be presented before a project assessment committee at the end of the certificate programme. At least one publication quality manuscript would be needed to be ready based on the project proposal by the last semester to obtain the credit point.

Credentialing

One of the unique aspects of this certificate course is the clinical credentialing of the trainees for performing specific activities related to patient care. The credentialing process aims to ensure that trainees are graded for their ability to safely and independently perform key competencies. This will include information from the activity logs that are kept in the e-portfolio system in addition to the clinical evaluations completed by the trainee. The trainees will thus have a list of clinical competencies which they will be credentialed to perform independently.

A new formal credentialing system is being designed on the Tata Medical Center online education portal. Using the system will not only allow the fellows to access all the teaching courses available through Tata Medical Center but also have certification of their progress through course. The credentialing process will ensure that at the end of the fellowship period the fellows will have documentary evidence of their experience, knowledge and skills which in turn will help them in their future careers. This unique credentialing process will aim to leverage course content from Tata Medical Center, IIT Kharagpur, as well as external resources.

Course Fees and Salary

The course fee for the certificate course is proposed to be INR 10,000 for Indian Candidates payable each semester. The total course fee over 6 semesters is thus INR 60,000. Semester fees will be payable in advance in July and January every year.

IIT Kharagpur will bear no obligation towards providing financial support to the trainees during their stay in IIT Kharagpur. Efforts will be made to meet up the expenses of local hospitality of the participants of the TMC personnel during their stay at IIT Kharagpur through the grants available with the concerned research mentor/DDF of SMST/ any other resources identified on a mutually agreeable basis. Learning material and transportation would have to be arranged by the trainee themselves.

All trainees will receive a salary as per extant rules and regulations at Tata Medical Center each month. The amount is subject to revisions as per the rules and regulations in place. The trainees will continue to receive their salary during the three year training period. No separate salary / allowance will be paid by IIT Kharagpur for participation in this course. Trainees will be eligible to all the facilities currently available to fellows in Tata Medical Center for the duration of their training period. They would also be subject to TMC rules and regulations of employment in the Institute and it's HR policies.

Joint Research Coordination Committee

A Joint Research Evaluation Committee will be setup for this course comprising of faculty members from TMC as well as various departments and divisions in IIT Kharagpur. This committee will include members for diverse disciplines to ensure that the project proposals are scientifically valid and to ensure that appropriate mentors are selected for the research project in advance. The JRCC will be responsible for suggesting the required number of mentors for a given research project, but at the minimum one faculty member from each center will be mentees for any research project. Project proposals will have to be vetted and passed through Institutional Review Boards in addition as required.

Course Content

The course content of the certification programme will comprise of the clinical oncology curriculum and the research project based learning. Our clinical oncology curriculum has been aligned with the Royal College of Radiology curriculum for FRCR Clinical Oncology. This is because we strongly believe in the core values underlying the FRCR clinical oncology program viz. improved clinical management evidence-based care, active participation in clinical trials, developing good communication skills, ensuring empathy and compassion towards patients and encouraging collaborative research and education.

Research Project

The research project is the centerpiece of the certificate programme. Students are expected to present a research proposal within the first semester of the course. This project proposal will consist of a research project with defined deliverables and objectives. The research projects that will be conducted as a part of the certificate course will be designed as joint projects between TMC and IIT-Kharagpur. These research projects will be evaluated by a Joint Research Coordination Committee (JRCC) which will oversee all projects submitted. The JRCC will evaluate the research projects and suggest the required mentors for the project.

Research Areas

Four broad thematic research areas have been decided preliminarily in meetings between IIT-Kharagpur and Tata Medical Center. These areas were identified based on the potential for research and development as well as existing research interests of the faculty members at both institutes. Tata Medical Center will provide the clinical expertise and the clinical requirements for the project, while faculty members of the IIT Kharagpur will be providing the technological expertise and know-how. It is expected that research projects under the thematic areas would be lead as joint projects between the TMC and IIT faculty members. The breadth of expertise that IIT provides would

ensure that several of these projects will be large projects spanning multiple years and it is likely the students enrolled in the certificate programme will be participating in defined aspects of the project. It is also expected that part of the project work would be contributed through students in IIT Kharagpur who would also be benefitted through the interdisciplinary cross pollination of ideas.

The four broad thematic areas identified are as follows:

1. **Big Data and Artificial Intelligence:** This broad area will investigate the use of structured and unstructured data generated in radiation oncology along with machine learning and predictive algorithms for clinical applications.
2. **Image processing and radiomics:** This area will investigate the features of different imaging procedures performed for cancer diagnosis and treatment and use them to generate predictive algorithms that can predict response and outcomes.
3. **Cancer Biology and Cancer Genomics:** This is the science which studies why cells and tissues react to the cancer therapy in the way they do. Research project in these areas will investigate issues like therapy sensitivity of tumors and normal organs and development of therapy sensitivity / resistance genomic signatures.
4. **Novel therapeutics and Device development:** Radiation therapy relies significantly on integration of the latest technology and cancer therapy is witnessing new revolutions every year. This broad area will attempt to investigate applications of immunotherapy, nanotechnology and device engineering to improve patient outcomes.

Learning Methodology

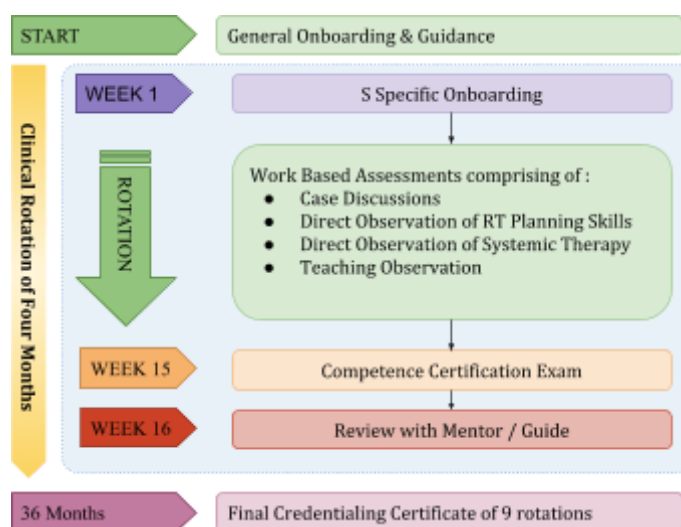
Depending on the project requirements the mentors will decide on a educational objectives and the theoretical and practical education schedule to be followed for the trainee. This will include some or all of the following:

- Didactic teaching in each center regarding GCP, study design and research methodology.
- Wet lab and dry lab experience at IIT-Kharagpur
- Workshops for learning on dedicated topics funded through extramural grants
- Active participation in related lectures and educational series at IIT-Kharagpur as students as well as resource persons.
- Mentors will also assist the trainee in finding and reviewing the research related literature.

Additionally, the course will actively encourage participation of post graduate and graduate students of IITK in the projects that will be conducted as a part of the course. Participants in the course will be encouraged to work with these students whose existing work exhibits strong synergy with the project under consideration. This would lay a strong foundation for building up cross-disciplinary research collaborative networks for future research projects.

Clinical Oncology

The clinical oncology training will be organized so that participants gain practical experience in both latest radiation and systemic therapy protocols. Trainees will be undergoing rotations of 4 months with the different consultants in the department. During each rotation, the trainees will be responsible for patient care as per the hospital protocol. The training outline will follow the Royal College of Radiologists learning



methodology which emphasizes learning on the job through Work Based Assessments (WBA).

The figure shows the general outline of the training programme in Clinical Oncology. Each clinical rotation of 4 months will start with an onboarding

certification in which the trainee will be made to understand the important aspects of the working of each of the site group. This would be followed by the rotation over the period of 4 months during which period the trainee would be continually evaluated during the training process. At the penultimate week of the rotation, a certification examination will be held followed by an interview with the mentor / guide in the last week. The final credentialing statement will carry a summary of the work done during the rotation, comments of the observer during the period and the results of the certification examination.

General Onboarding

The general onboarding process is designed to ensure that the trainee gain an understanding of the working of the Institute and the department. The onboarding process provides an overview and training in the following domains:

1. Acute Oncological Care
2. The HMS, PACS, LAN, ARIA OIS and Webmail
3. Review of trainee entitlements and responsibilities
4. GCP certification and training in Research Methodology and Clinical Trial basics
5. Eclipse and Tomotherapy TPS training (if not trained in the Eclipse treatment planning system) for contouring, image registration, plan evaluation and offline / online reviews.
6. Radiation Safety briefing by the Radiation Safety Officer
7. Application for TLD badge and eLORA registration.
8. Referral processes available for social / financial / psychological support services

The onboarding training will be delivered through a mixture of in person classes demonstrations as well as online courses. Online education will utilize a mix of online presentations, prepared documents, videos as well as external links. A certification examination comprising of questions from each of the modules will need to be

completed. Certifications obtained will be recorded in the e-portfolio system that will be used for this credentialing.

The general onboarding process will be completed by the trainees within the first month of joining the certificate course. Parts of the teaching material will be available online which can be completed once the trainee has been accepted after the interviews. Certification of completion of the on-boarding training will be mandatory for continuation of the certificate training beyond 2 months. However the fellowship coordinator and/or the departmental head may decide to extend this by a further 2 months on a case by case basis.

Site Specific Training During Rotations

During each rotation, the trainee would be assigned a consultant who will be overseeing the training of the candidate for that rotation. Residents would be expected to deal with patients of one or more sites depending upon the nature of their primary consultants work. However, they would be expected to pitch in, and help in the care of other patients as and when required by the department. The learning objectives during the training process will be discussed with the primary consultant at the start of the rotation.

It would be expected that the trainee would be able to identify the standard management, discuss the management options and know about the common side effects and benefits associated with the therapy contemplated as a part of this management. In order to correctly assess the extent of work performed by the trainee during this rotation they would be expected to keep a record of their progress in a e-portfolio system. In addition formal evaluation based on their work will be performed from a time to time basis.

Prior to the start of the rotation the trainees would be expected to complete rotation specific onboarding training. After completing this onboarding training they would be able to understand the following:

1. Site specific treatment guidelines being followed at Tata Medical Center

2. Basic workup and treatment scheduling of patients presenting at the outpatient department
3. Databases that need to be maintained prospectively by the trainees
4. The site specific contouring guidelines and plan evaluation criteria in place
5. Review of the site specific systemic chemotherapy guidelines in place
6. Ongoing departmental studies

During the rotation trainees would be expected to complete a minimum number of work based assessments. The requirement of the nature of work based assessments as well as the minimum number would be prespecified at the time of the start of the rotation. Part of the work based assessment workload will be completed during the Thursday morning teaching sessions as case based discussions. Direct observation of systemic therapy and radiotherapy planning will be done as a part of the clinical work. All trainees would be expected to participate in as well as lead the MDT discussions during the rotation. trainees would also be expected to present seminars, journal clubs and participate in the other educational activities of the department like the DRT and MSc physics courses. In addition trainees would be expected to participate in the site specific audits that will be ongoing. They would be expected to perform one or more departmental audits themselves.

A complete record of the work based assessments, audits, educational activities as well as the research work done by the trainee would be maintained in the e-portfolio system. at the end of the traineeship rotation a certification examination will be conducted following which a review with the primary consultant will be conducted. The results of the work based assessments and certification examination results will be used to certify the completion of the rotation training which would be necessary for credentialing trainee in site specific skills.

Site specific Skills

The specific skills that the trainee will be expected to gain or improve upon will vary as per the requirements of the specific rotation. However they will be expected to have the acquire and enhance the following broad skills in each site:

1. Describe the clinical and radiological anatomy and abnormalities related to the site.
2. Describe the investigative workup required for diagnosis and staging of cancer including calculation of commonly used prognostic indices.
3. Discuss the evidence based treatment options for the patients as discussed in the MDT.
4. Assess the patient for radiotherapy including discussion on the prognosis, acute and late side effects as well as the process for the radiotherapy.
5. Assess the patient for first line chemotherapy including discussion on the prognosis and the acute side effects as well as the long term risks associated with chemotherapy
6. Prescribe systemic therapy (chemotherapy/hormonal therapy and targeted therapy) including understanding of the supportive care and the investigative workup needed prior to prescribing and continuation of therapy
7. Obtain and document the informed consent for radiotherapy and systemic therapy.
8. Radiotherapy treatment modality selection and image segmentation following standard guidelines.
9. Assess and evaluate the treatment plan generated for the patient including simple 3DCRT and complex IMRT / SRS treatment plans.
10. Assess and evaluate the setup and movement of the patients using DRRs, CBCTs and understand the methods to account for and minimize motion and setup errors
11. Assist and participate in Brachytherapy procedures.
12. Perform and lead the chart QA process.
13. Participate in and lead the MDT discussions.

14. Understand how to deal with treatment gaps and modifications during radiotherapy.
15. Obtain informed consent on trials and maintain clinical records required for the study
16. Assess the need for second and subsequent line chemotherapy including development of a treatment plan for second and subsequent lines, explaining the prognosis and provide the prescription.
17. Provide symptomatic care for the symptoms of the patient during the continuum of their care including radiotherapy, chemotherapy and on relapse.
18. Evaluates the evidence base for situations of uncertainty and devise a basic treatment plan for the situation.

Bibliography

The course draws heavily from the course design philosophy of the Fellowship of Royal College of Radiologists (FRCR) Clinical Oncology course.

The clinical oncology curriculum is derived from the FRCR clinical oncology curriculum which has the training structure and the methodology which will be followed for the purpose of the certificate course. This pertains to the methodology of Work Based Assessments that have been devised and pioneered by the Royal College. The following are the references to the Current Clinical Oncology Curriculum.

1. **Speciality Training Curriculum For Clinical Oncology.** The Faculty of Clinical Oncology The Royal College of Radiologists, London, 2016
(<https://www.rcr.ac.uk/clinical-oncology/specialty-training/clinical-oncology-curriculum>)
2. **RCR Clinical Oncology Syllabus.** The Faculty of Clinical Oncology The Royal College of Radiologists, London, 2016
(<https://www.rcr.ac.uk/clinical-oncology/specialty-training/clinical-oncology-curriculum>)
3. **Workplace based assessment | The Royal College of Radiologists** [cited 2018 Jan 11].
(<https://www.rcr.ac.uk/clinical-oncology/specialty-training/workplace-based-assessment>)

For the purpose of assessment of the work based assessments we will be adopting the methodology developed by the Royal College of Physicians and Surgeons of Canada which has been designed for continuing professional development. The assessment methodology is relies on evaluation using an entrustment scale which asks the evaluator to rate the trainee based on the observation of the activity performed.

We could not identify similar programs as the current proposed certificate course in India. While there are some translational research programs for Radiation Oncology

training they do not have potential for significant interactions with technology and engineering. It is noteworthy that none of them will be conducting research and training with relevance to developing nations like India. Some of the programs that have somewhat similar training structure are as follows:

1. **The University of California San Diego School of Medicine Medical Student Research Fellowship.** A 1 year research fellowship program with the Department of Radiation Medicine and Applied Sciences for medical students (<https://healthsciences.ucsd.edu/som/radiation-medicine/research/student-research-fellowship/Pages/default.aspx>)
2. **The Memorial Sloan Kettering Cancer Center Clinical Translational Research Fellowship.** A two year fellowship programme that aims at helping Radiation Oncology trainees gain expertise in translational research. (<https://www.mskcc.org/hcp-education-training/fellowships/clinical-translational-research-fellowship>)
3. **Institute of Medical Science University of Toronto, Canada, MSc and PhD programs in research.** (<https://ims.utoronto.ca/programs/doctoral/>)
4. **CRUK and MRC Oxford Institute of Radiation Oncology, UK, Clinical Research Training Fellow.** A 3 year fellowship that allows a DPhil degree while working towards a dedicated research project. (<http://www.rob.ox.ac.uk/>)
5. **Koch Institute Partnerships for Postdoctoral Catalytic Cancer Research at MIT.** This is a postdoctoral training program for physicians, engineers and scientists who want to undertake cancer research at Koch Institute of Integrative Cancer Research. However this program is not dedicated towards training physicians as clinical scientists.

In addition, following documents were referenced extensively during the design process.

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- Radiation Oncology Residents. *Int J Radiat Oncol Biol Phys*. 2016 Jul 15;95(4):1298–303.
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 4. Warm EJ, Mathis BR, Held JD, Pai S, Tolentino J, Ashbrook L, et al. Entrustment and mapping of observable practice activities for resident assessment. *J Gen Intern Med*. 2014 Aug;29(8):1177–82.
 5. Prisciandaro JI, Willis CE, Burmeister JW, Clarke GD, Das RK, Esthappan J, et al. Essentials and guidelines for clinical medical physics residency training programs: executive summary of AAPM Report Number 249. *J Appl Clin Med Phys*. 2014 May 8;15(3):4763.
 6. Harris KA, Frank JR. *Competence by Design: Reshaping Canadian Medical Education*. Royal College of Physicians and Surgeons of Canada; 2014.
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Annexure-I



Indian Institute of Technology, Kharagpur

Tata Medical Center, Kolkata



Certificate of Participation

This is to certify that Dr. _____ from _____ participated in the course

Advanced Specialization Certificate in Clinical Oncology and Research

and successfully completed in the year _____.

Dean, CE IIT Kharagpur

Director, TMC Kolkata