Aims of the TUM Master of Science Programme in Radiation Biology

The comprehensive approach we take to teaching will establish a wide range of competences for the Master in Radiation Biology. These can form the basis of a successful career in fundamental or translational research in radiation oncology, cancer biology, cell biology, environmental sciences, radiation medicine and other related disciplines. The competences acquired also qualify the successful graduate for a career with a range of NGOs and local or national radiological protection organizations.
More information, in particular on detailed content of modules and the module examinations can be found under https://www.med.tum.de/en/master-program-radiation-biology.

Course directors

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in cooperation with

HelmholtzZentrum münchen
German Research Center for Environmental Health

CCC MÜNCHEN COMPREHENSIVE CANCER CENTER

Target group and Applications

- Students expecting or holding strong **bachelor degrees in natural sciences or a degree in medicine**, who are interested in a career in the field of radiation biology are invited to apply.
- The course will be taught **completely in English**, therefore evidence of a good comprehension of the English language is a condition for acceptance.
- In accordance with Bavarian State law there are **no tuition fees** for attending the TUM Master of Science Programme in Radiation Biology.
- Proof of German language proficiency is not neccessary for admission but sufficient German language skills must be achieved by the end of the programme.
- The course starts in October (winter semester). The application period is set from **January 1 to May 31**.
- Details of the **requirements for application** and the procedures of selecting students from the applicants can be found under https://www.med.tum.de/en/master-program-radiation-biology

Application via TUMonline
http://www.campus.tum.de/

Contact:
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Radiation Biology

Master of Science Programme

Why Radiation Biology?

Radiation is a central discipline in modern oncology. Many patients can be cured with modern radiation oncology techniques, or symptoms can be alleviated effectively. Additional sources of radiation include medical diagnostics, and also environmental exposures. Mankind has always been exposed to ionizing radiation from natural sources, for example cosmic radiation arriving at the surface of the earth and radioactive radon gas produced by the radioactive decay of uranium in subterranean rock formations.

It is essential to understand the molecular and cellular mechanisms of radiation effects on normal tissue as well as tumors, and to use this knowledge for personalized radiation oncology treatments. As cancer survivorship increases, and patients can live for more than 50 years after radiation therapy, we are seeing a small but significant increase in common chronic diseases associated with the earlier radiation treatment which cured the patient. Only through understanding the interaction between ionizing radiation and normal or diseased human tissues and organs can the benefits and the health risks from using radiation be balanced.

Aims of radiation biology

The Master degree course in radiation biology is an interdisciplinary study covering all the relevant aspects of radiation and includes molecular biology, genetics, cancer biology, immunology, radiation-induced early and late morbidities epidemiology, radiation physics, dosimetry and radiation protection. The medical uses of radiation, as well as the broad societal and political implications of radiation, will be at the forefront of our teaching. In the last decade, radiation biology has undergone a shift away from biophysical models of radiation interaction with DNA and is now more closely allied with molecular studies of cellular regulation and cell-cell interaction. These exciting new areas will be highlighted in teaching and research work.

Programme Structure

The Master of Science Programme is Bologna-process compliant and comprises 4 semesters (2 years):

Semester 1 and 2 (1st year)
Semester 1 and 2 cover the foundations of Radiation Biology; each semester consists of 3 modules. The modules are supplemented by research practical work. After each semester students are placed for several weeks for a research practical with scientists working in the field of radiation biology.

Semester 3 and 4 (2nd year)
In Semester 3 two out of three alternative modules can be selected for specialization into different application areas of radiobiological research. The module “research management” will prepare students for their 6-month research project in Semester 4, to complete the MSc course. The research project may be conducted in one of the affiliated Munich research organizations or within another European radiobiological laboratory.

This table describes the timings, topics and credits of the 15 modules of the TUM Master Programme “Radiation Biology”

Semester 1	Semester 2	Semester 3	Semester 4
Human Anatomy/Pathology and Physiology/Pathophysiology Obligatory module *6 Credits*	Radiation Physics and Dosimetry Obligatory module *6 Credits*	Clinical and Experimental Radiation Oncology Elective module *12 Credits*	Master Project Including Master Colloquium *30 Credits*
Radiation Protection and Medical Applications Obligatory module *6 Credits*	Radiation Effects in Cells and Tissues Obligatory module *6 Credits*	Advanced Molecular Radiation Biology Elective module *12 Credits*	
Molecular Biology of the Cell Obligatory module *6 Credits*	Molecular Radiation Biology Obligatory module *6 Credits*	Advanced Radiation Protection Research Elective module *12 Credits*	
Research Practical Options: Cell Biology, Radiation Protection, Clinical Research, Medical Physics Elective module *12 Credits*	Research Practical Options: Cell Biology, Radiation Protection, Clinical Research, Medical Physics Elective module *12 Credits*	Research Management Obligatory module *6 Credits*	