

RABBIT^{PhD}

RADIATION BIOLOGY
& BIOPHYSICS



Radiation Biology & Biophysics

**DOCTORAL
TRAINING
PROGRAMME**



PROGRAMAS DE
DOUTORAMENTO
FCT



FACULDADE DE
CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

ABOUT RABBIT

The Radiation Biology and Biophysics Doctoral Training Programme (RaBBiT) brings together knowledge from Physics, Chemistry, Biochemistry and Biophysics to set up a unique advanced learning environment. Within the programme, students will find expert researchers, from world class research centres, involved in research programmes ranging from the biologic effects of radiation to medical applications or from the fundamental aspects of atom-molecule interactions to molecular characterization of enzyme mechanism by means of spectroscopic tools. While focused on specific research topics, the programme includes complementary and transferable activities that will support students' personal and professional development.

The RaBBiT programme is international in nature. Hosted by Faculdade de Ciências e Tecnologia (FCT/UNL) - School of Science and Technology, one of the most prestigious Portuguese public school of science and engineering today, it is built upon a strong collaboration effort with three other top European universities, The Open University, United Kingdom, Queen's University Belfast, United Kingdom, and Universität Innsbruck, Austria, together with Consejo Superior de Investigaciones Científicas, Spain. RaBBiT students will obtain a degree by Universidade Nova de Lisboa as well as a European Mention in the doctoral diploma, and can obtain a double degree from one of the other partner universities (depending on co-tutorial agreements).

The RaBBiT programme is open to students from all over the world and with different academic backgrounds. Applying students can bring their own scholarships or, depending on availability, apply for financial support under particular conditions.



MOTIVATION FOR RABBIT

The current societal need for advanced research in radiation biology and biophysics, is getting extremely relevant when modern societies are facing several clinical pathologies related to aging, oxidative stress and cancer. Probably the best example is that in 2012 an estimated 14.1 million new cases of cancer were diagnosed worldwide, i.e. today cancer accounts for one in every eight deaths worldwide – more than HIV/AIDS, tuberculosis, and malaria combined.¹

Environmental and/or occupational exposures to radiation are becoming more relevant as different health care professionals' awareness is increasing. These exposures have had particular attention not only from the scientific community but also from political agents at national and European levels. Also, different radiation sources have been used to help probing atomic and molecular processes and unveil essential biological reaction mechanisms. The continuous development of spectroscopic methods, either applied to simple molecules, complex macromolecules or even macromolecular systems and organisms is undoubtedly of the utmost relevance in modern science.

¹ Source: Cancer Research United Kingdom and American Cancer Society.





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TRAINING OVERVIEW

The programme curricular structure was designed to bring up a new generation of postgraduates in an area of highly interdisciplinary research by setting up the appropriate research training standards. The success of training and the career development stimulated by the curricular structure is backed by experienced professionals in research and teaching.

Following modern EU standards, RaBBiT uses the European Credit Transfer and Accumulation System (ECTS) aiming to achieve a more transparent and comparable European-wide performance of students of higher education. For the purpose of RaBBiT programme, 1 ECTS credit point equals 28 working hours. RaBBiT curricular structure has 240 ECTS corresponding to a four year postgraduate programme and is divided into modules of 3, 6, 18 and 180 ECTS. The first semester consists of three mandatory 6 ECTS modules and two to three optional modules amounting 12 ECTS. The second semester will include two 6 ECTS modules and a thesis preparation plan (18 ECTS) module, all mandatory. Modules can also be taken individually with certificates awarded upon successful completion of the assessments. For the remaining three postgraduate study years, a total of 180 ECTS will be involved in the PhD research work, international scientific dissemination and thesis submission.



CURRICULAR STRUCTURE

1st semester:

- Historical Perspectives on Radiation Biochemistry and Physical Engineering (6 ECTS)
- Advanced Topics in Radiation Biology and Biophysics I (6 ECTS)
- Research Rotation I (6 ECTS)
- 12 ECTS from the optional modules listed below:



- Physical Biochemistry (3 ECTS)
- Cell and Membrane Biophysics (3 ECTS)
- Biochemistry for Engineering and Physical Sciences (6 ECTS)
- Radiation Sciences (3 ECTS)
- Atomic and Molecular Spectroscopy (3 ECTS)
- Physics for Life Sciences (6 ECTS)
- NOVA doctoral school transferable skills training courses (3 ECTS)

2nd semester:

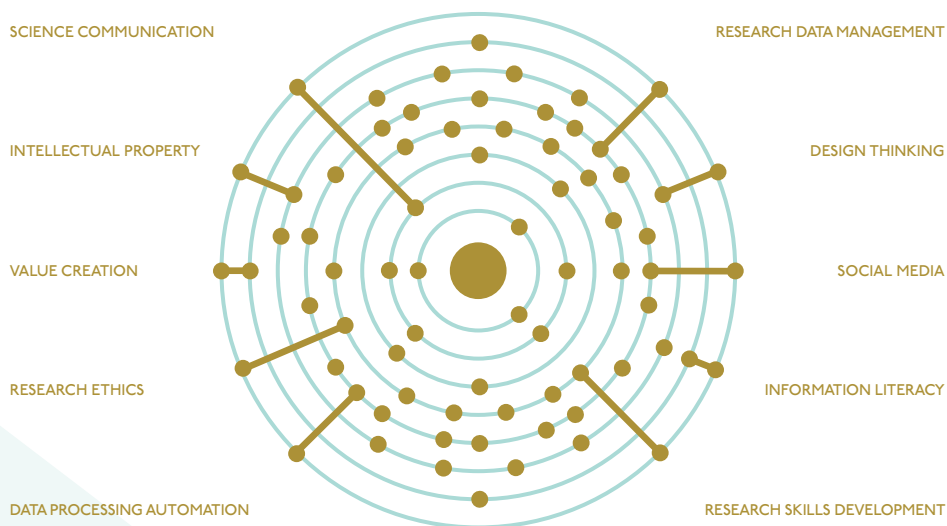
- Advanced Topics in Radiation Biology and Biophysics II (6 ECTS)
- Research Rotation II (6 ECTS)
- Preparation of the Thesis Plan (18 ECTS)

3rd – 8th semester:

- Research work, international scientific dissemination and thesis submission (180 ECTS)

TRANSVERSAL AND COMPLEMENTARY COMPETENCES

Adding to a strong core curricular structure in physics and life sciences, the programme includes optional modules chosen according to the student's background. Furthermore, students are encouraged to attend NOVA Doctoral School transferable skills training courses (unl.pt/en/doctoral-school) either integrated in the ECTS curricular structure or as a supplement to the diploma. This is regarded as an extraordinary integrated opportunity to top up students with technical and intellectual accomplishments. Hence, while RaBBiT guarantees the core training, NOVA Doctoral School adds valence competences in additional transferable skills.



TAILORING YOUR ACADEMIC PROFILE

RaBBiT students benefit from individual guidance and advice of a postgraduate studies tutor which will help building a proper teaching scheme. Such guidance aims to improve students' background knowledge and success throughout the programme

INTERNATIONAL PARTNERSHIP

The PhD programme comprises research groups from four European universities in Portugal, Austria, United Kingdom, and the national reference research centre in Spain.



QUEEN'S UNIVERSITY BELFAST

Belfast, United Kingdom

Queen's University Belfast (QUB) has been recognized as a university since 1908 and has become an international centre for research and education being a member of the Russell Group of 24 leading United Kingdom research-intensive universities. QUB is also a dynamic and diverse institution, a magnet for inward investment, a patron of the arts and a global player in areas ranging from cancer studies to sustainability, among many others.

FACULDADE DE CIÊNCIAS E TECNOLOGIA

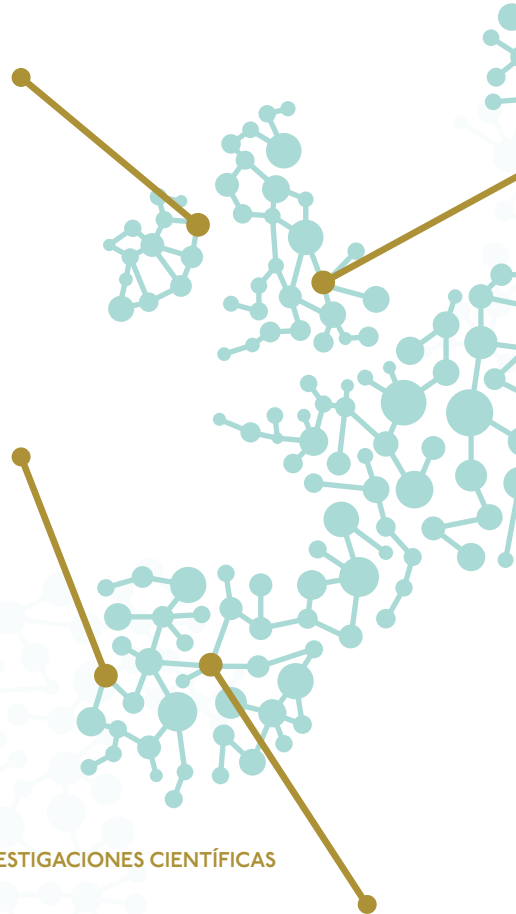
Almada, Portugal

Faculdade de Ciências e Tecnologia (FCT/UNL), established in 1977, has been recently defined as a research oriented institution, which enables students to enjoy being taught and working alongside, by world leading academics at the cutting edge of science, technology and engineering. An important measure of academic quality at FCT/UNL is provided by the growing employers' satisfaction and successful job market insertion of FCT/UNL graduates and postgraduates. The largest college campus in Portugal harbours an assemble of teaching departments, research units and spin-off companies.

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

Madrid, Espanha

Consejo Superior de Investigaciones Científicas (CSIC), established in 1907, is a nationwide Spanish top research centre and the third largest in Europe, in areas including biology and biomedicine, as well as physical sciences and technologies. Its main objective is to develop and promote research that will help bring about scientific and technological progress, and it is prepared to collaborate with Spanish and foreign entities in order to achieve this aim.



OPEN UNIVERSITY

Milton Keynes, United Kingdom

The Open University (OU) is a world leader in modern distance learning and a pioneer of teaching and learning methods, such as “supported open learning”. In fact, OU was the world first successful teaching university, being founded in 1969 on the belief that communication technology could bring high quality degree-level learning to those without opportunity to attend traditional campus universities. As so, OU became one of the top three United Kingdom universities for satisfied students with an overall satisfaction rate of 93%. Nevertheless, research is central to the OU mission fostering research teams which compete with top rank research institutions worldwide.

UNIVERSITÄT INNSBRUCK

Innsbruck, Austria

Universität Innsbruck (UI) is the most important research and education institution in western Austria. The main mandate is to focus on research and development, teaching and continuing professional education and training. Since 1669, UI has been a reference in Austrian society with a major influence on its region. This relevance has been recognised by the numerous award-winning alumni and current and former scientists teaching and researching at UI.

OUR RESEARCH

The research consortium established has a unique solid background on radiation biology, biochemical and biophysics techniques applied to atomic, molecular, macromolecular and cellular studies as well as to radiation induced processes.

In recent years, the involved research centres have based part of their research activities on:

- Electron transfer processes in atom-(bio)molecule experiments;
- Electron induced processes on gas and condensed phases;
- Biophysical characterization of ionising radiation damage comprising at the molecular level as well as of ionising radiation damage metabolic products;
- Biochemical studies of macromolecular systems involved in cellular detoxification and oxidative stress as well as bioremediation of toxic/radioactive metals;
- Biomembranes, biomimetic membranes and nanoscale functional materials and devices;
- Theoretical physical chemistry applied to automatic learning of chemical reactivity and metabolism;
- Fundamental molecular physics;
- Modelling secondary electron generation and induced fragmentation by synchrotron radiation in condensed biomolecular systems;
- Validation with experimental data on atomic and molecular scattering;
- Experimental validation of Monte Carlo models with clinical sources, code compatibilities, valorisation of the simulation software and transferable skills training;
- Theoretical calculations on atoms, molecules, clusters and complex molecules;
- Nuclear structure and multi-particle emission mechanisms.

The former set of research themes is just an example of the most prolific activities. Nonetheless, these are not limited to the topics covered before but fall within the border of interconnected topics fostering an always-evolving research environment.

OUR FACILITIES

The RaBBiT programme is coordinated under the association of two Portuguese R&D Units in close partnership with four international research centres in Spain, United Kingdom and Austria.

At FCT/UNL Campus de Caparica, CEFITEC (Centre of Physics and Technological Research, cefitec.fct.unl.pt) we are focused not only at the fundamental research but mainly at the applied level, bringing together researchers on Physical Engineering, Applied Physics, Physics, Technological Physics and Biophysical sciences. CEFITEC has installed scientific and technical capabilities capable of competing at the international level on Surface Science and Vacuum Technology, Atomic and Molecular Interactions, Thin Films production, Solar Pumping Laser and Functional Molecular Systems. CEFITEC laboratories are installed in ca. 4100 sq ft, with an additional 1000 sq ft of offices and common room facilities. Here a set of unique experimental setups such as multitechnique surface analysis systems, systems for vacuum technology and metrology, atom-molecule collision experiment, electron energy loss spectrometer, He(I) photoelectron spectrometer, magnetron assisted glow discharges, Atomic Force Microscope, solar pumped laser and layer-by-layer technique.

Also at Caparica Campus, UCIBIO (Research Unit on Applied Molecular Biosciences, regimte.pt/ucibio) combines key expertise in Chemistry and Biological Sciences with an ambitious strategic plan to maximize its national and international impact in terms of scientific productivity, advanced training and translation to society. At UCIBIO teaching and research go hand in hand, with more than 5000 sq ft of specialized laboratory space being used for research and graduate teaching. Research groups are equipped with EPR, Mössbauer, NMR, IR and UV/Visible spectrometers, and spectrofluorometers. Specialized facilities for aerobic and anaerobic rapid kinetics coupled to such spectroscopies are available. Also several electrochemical techniques can be performed including EQCM measurements. All equipment needed to support cloning and recombinant protein expression and purification is available.

The international partners are distributed over reference R&D units in particular the Centre for Cancer Research & Cell Biology, Queen's University Belfast, Centre for Earth, Planetary, Space and Astronomical Research (CEPSAR), The Open University, United Kingdom, Institut für Ionenphysik und Angewandte Physik, Universität of Innsbruck, Austria and Consejo Superior de Investigaciones Científicas, Spain. These partnerships add fundamental scientific and technological know-how, where RaBBiT participants take advantage of the strong base laboratories with state-of-the-art modern instrumentation. Such gives a unique environment where students work alongside with experienced researchers in their specialised fields.





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LISBOA/ALMADA EXPERIENCE

Lisboa (38°42'50"N 9°8'22"W), the Portuguese capital, is located in a privileged geographic location with unique natural landscape and temperate climate. It effectively bridges Europe from the Americas and Africa, making easy to access other European cities either by car, train or air travel. Greater Lisboa has the largest hub of universities and research units of Portugal, which attracts many foreign students, in particular at PhD and postdoctoral levels. The existent well-qualified human capital, known for being flexible, creative and competitive, attracts a wealth of national and foreign investors creating synergies between the academic world and the job market.

Just across the Tejo river (at the south bank) we can find Almada (38°40'44"N 9°09'24"W), the 9th largest city in Portugal also well-known for being one of the best seaside cities, that harbours the biggest college of Universidade Nova de Lisboa, FCT/UNL - School of Science and Technology. The well-located campus is the heart of the RaBBiT programme and, besides the good academic environment, provides a pleasant living experience. Housing is easily available and can be found either at the town centre or close to the beach at less than 10 minutes from FCT/UNL.

Hospitals, childcare, schools, city parks sports facilities and commerce are some of the available infrastructures that add to a high quality of life. No wonder that in recent years Lisboa was top ranked for its quality of living: World's 23rd Best City for Living, Monocle, July/August 2011 and 41st position in the MERCER - Quality of Living Worldwide City Rankings 2011.

In a PhD programme that excels at students' mobility, the Lisboa/Almada location is crucial since enables students to reach the partner institutions within a few hours of travel. The nearby Lisboa airport has daily connections to all major cities.

FCT/UNL – A PLACE TO STUDY

Established in 1977, FCT/UNL has a stated mission of teaching, research and public service. Located just 15 min south of Lisboa, the FCT/UNL campus is the largest college campus in Portugal harbouring more than 8000 students, ca. 500 faculty members over 14 teaching departments and 16 research units. These departments provide training at the BSc, MSc and PhD levels under the Bologna Accord, covering from fundamental sciences to highly specialized engineering. This is a unique cosmopolitan scientific and technical environment with students sharing personal and professional experiences.

At the national and international levels, FCT/UNL is recognized for its commitment in a teaching/learning environment dedicated to provide advanced training to students giving competences capable of competing at the global level.

FCT/UNL promotes and supports mobility of students and teachers of higher education through different programmes such as through Erasmus+, Science Without Borders (Brazil) and numerous cooperation agreements with foreign universities and research institutions.

Students at FCT/UNL benefit from a modern green campus easily accessible by car, train, bus and boat with a set of conveniences that include sport activities, a national bank branch, several restaurants, a supermarket and a modern equipped central library.

R E A D Y



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ARE YOU READY FOR THE CHALLENGE?

WHEN AND HOW TO APPLY

Simply go to sites.fct.unl.pt/rabbit/pages/applications. In case you have any enquiries just send an email to rabbit.coordenador@fct.unl.pt.

SELECTION/ADMISSION CRITERIA

At the time of enrolment, successful applicants must hold either an MSc degree or the legal equivalent. Alternatively, candidates with especially relevant academic and/or scientific CV can propose themselves for an application. Satisfaction of minimal criteria will not guarantee admission, since the number of qualified applicants can exceed the number of students to admit in each programme edition. Selection and ranking will not be performed on the basis of gender and/or ethnic issues and the implemented criteria ensure that a purely meritocratic basis is used. The selection criteria are ²:

- a) Excellence of the student's academic degrees and record (25);
- b) Personal history statement (10);
- c) Statement of purpose (15);
- d) Letters of recommendation (5);
- e) Preparation in the scientific areas of interest (10);
- f) Relevant work experience (10);
- g) Personal interview (25).

FINANCING YOUR PHD

The programme annual fee amounts to €2750. Most students have the annual fees covered by a PhD fellowship awarded by national/government financing agencies. The RaBBiT programme will help applying to individual fellowships. Normally, a yearly call is also made available to award RaBBiT programme dependent fellowships. For more specific information please send an email to rabbit.coordenador@fct.unl.pt or visit the programme webpage.

² Maximum score for each criterion is indicated in brackets, with 100 being the highest ranking attainable.

STUDENTS PROFILES



MARCELO RODRIGUES

Holds a BSc in Biochemistry by Universidade Nova de Lisboa, Portugal, and an MSc in Pharmaceutical Biotechnology, Universidade de Coimbra, Portugal, and is currently at Queen's University Belfast working on NAD metabolome and biomarkers in normal and Breast Cancer Cells.



ALEXANDRA LOUPAS

First year RaBBiT programme student with a BSc in Applied Chemistry and a MSc in Bioorganics from FCT/UNL, Portugal, with particular interests in biochemical damage produced by radiation, using computational methods.



MÓNICA MENDES

A MSc Biomedical Engineer from Universidade de Coimbra, Portugal, is attending RaBBiT lecture courses with particular interests in charge transfer processes in DNA/RNA subunits as well as radiation response in human cells and tissues.



EMANUELE LANGE

A Brazilian citizen with a BSc and MSc degrees in Physics from Universidade Federal do Paraná, Brazil, joined the RaBBiT programme under the support of Science Without Borders initiative from Brazil (cienciasemfronteiras.gov.br). She is actively working on the electronic state spectroscopy of volatile anaesthetics by electron and photon interactions at FCT/UNL.



KATERYNA KRUPA

Originally from Ukraine, holds an MSc in Chemical Engineering from Universidade do Porto, Portugal. She now pursues a PhD on the study of secondary particle interactions generated by ion irradiation of biological molecules at CSIC, Madrid, Spain.



DANIELA PENAS

With a BSc in Biochemistry and a MSc in Biotechnology from FCT/UNL, Portugal, she joined in the RaBBiT programme to gain further training in biophysics and biological effects of radiation and oxidative stress. She is now studying key steps of the iron metabolism and cellular ROS detoxification.

FREQUENTLY ASKED QUESTIONS

WHEN CAN I APPLY TO THE PROGRAMME?

Applications are permanently open throughout the year. Just simply go to sites.fct.unl.pt/rabbit/pages/applications or just email the programme director at rabbit.coordenador@fct.unl.pt. (For further details see p. 13)

AM I A SUITABLE CANDIDATE FOR THE PROGRAMME?

All candidates are deemed suitable as long as they hold a background in science and/or engineering related areas (MSc or equivalent are required). The programme is tailored to fulfil possible gaps in the students' background and proper mechanisms are made available through dedicated individual support from a tutor of post-graduate studies. (For further details see pp. 4, 5)

WHERE AM I EXPECTED TO DEVELOP MY PhD THESIS WORK?

While students are expected to initially stay at FCT/UNL to comply with their academic initial studies, main thesis work will be developed in one of the research laboratories within the international partnership. (For further details see pp. 6, 7)

HOW CAN I APPLY FOR FUNDING?

One annual call is advertised for Portuguese citizens as well as foreigner citizens with legal residence permit in Portugal. Calls are advertised at the researcher's mobility portal (eracareers.pt). Certain selection rules apply. (For further details see p. 13)

Students with their proper funding scheme (from their home countries) are not subject to the yearly call. The programme will work alongside such students helping to prepare a strong application in their home countries. (For further details contact the programme director)

WHICH SORT OF DEGREE AM I ENTITLED TO?

Upon successful completion, students will get a PhD diploma from Universidade Nova de Lisboa, and depending on previous established co-tutored agreements, a diploma from one of the international universities involved within RaBBiT. If candidates fulfil the conditions established by the European Universities Association, a title of Doctor Europaeus can be awarded.

HOW LONG DOES IT TAKE TO GET ANY ANSWER?

All enquires will be promptly answered through RaBBiT programme director email address. Usually candidates will receive some feedback within no longer than a week (except in cases where the programme is legally bound to comply an established schedule).

FOR ANY OTHER ENQUIRIES, WHO SHOULD I GET IN CONTACT WITH?

Email the programme director at rabbit.coordenador@fct.unl.pt who will be happy to help answering any enquiries.

CONTACT:

rabbit.coordenador@fct.unl.pt

+ info:



sites.fct.unl.pt/rabbit



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twitter.com/twitt_rabbit