# Contents

Course overview .............................................................................................................................................. 3  
Course description ...................................................................................................................................... 3  
Learning Outcomes ..................................................................................................................................... 3  
Level of participant ..................................................................................................................................... 4  
For whom is the course designed ............................................................................................................... 4  
Admission Requirements ............................................................................................................................ 4  
Admission Documents ................................................................................................................................ 4  
Date ............................................................................................................................................................. 4  
Application Deadline ................................................................................................................................... 4  
How to apply ............................................................................................................................................... 4  
Course Leader  Co-leader .................................................................................................................... 5  
Key lecturers ............................................................................................................................................... 5  
Certificate ........................................................................................................................................................ 5  
ECTS credits ..................................................................................................................................................... 5  
Course organisation ........................................................................................................................................ 6  
Brightspace ...................................................................................................................................................... 6  
Literature ......................................................................................................................................................... 6  
Assignments .................................................................................................................................................... 6  
Assessment ...................................................................................................................................................... 6  
Overall Schedule Radboud Summer School ............................................................................................... 7  
Preliminary day-to-day programme ............................................................................................................ 8  
Contact information ........................................................................................................................................ 8
Course overview

Course description
This course will update you on the latest developments on the use of radionuclides for diagnosis, treatment monitoring and therapy in oncology, covering the range from basic radiochemistry to preclinical and clinical applications.

Radionuclides are important tools for imaging and therapeutic applications in oncology. When radionuclides are combined with tumor-targeting molecules (tracers), they can be used to non-invasively visualize tumor lesions. A well-known example is positron emission tomography (PET) with $^{18}\text{F}$-fluorodeoxyglucose ($^{18}\text{F}$FDG). Because of recent developments of novel biologics for therapy in oncology, more advanced radio-imaging techniques have become available. For instance, radiolabeled tracers can be used to identify patients who could benefit from the latest immunotherapies, or can be used for treatment response monitoring. In addition to imaging, tracers can also be coupled to therapeutic radionuclides (e.g. alpha- or beta-emitters) which can be used to specifically irradiate tumor lesions while preventing exposure to healthy tissue.

During the course, the characteristics of different radionuclides (e.g. imaging and therapeutic radionuclides) and tumor targeting agents (e.g. antibodies, peptides, small molecules) will be discussed, as well as the latest radiochemical methods to label radionuclides to targeting molecules. Furthermore, the course provides you with both knowledge and hands-on experience with cell-based assays and in vivo evolution of the tumor targeting and therapeutic efficacy of immunotherapy radotracers. Examples are imaging of the PD-L1 checkpoint and in vivo T-cell imaging with antibodies, antibody fragments or by ex vivo cell labeling. You will learn to select the best in vitro experiment and how to set up and perform in vivo imaging and therapy experiments in several practical sessions. The final step, translation in to the clinic, will also be covered during the course, and examples will be provided of bringing imaging and therapeutic radionuclides into the clinic.

The course will contain lectures from several expert speakers, site-visits to research facilities, hands-on work with radiometals in cell assays and in vivo imaging experiments. Furthermore, we will organize meet-the-researchers sessions giving you the chance to have in-depth discussions on your topic of interest. The topics include alpha/beta emitting therapy, immuno-oncology therapy imaging, in vivo cell tracking and radiolabeling methods. When your oncology research can benefit the use of radionuclides, this course will provide you with both basic knowledge and advanced insights in the exciting field of radionuclide imaging and therapy for oncology.

Learning Outcomes
After this course you are able to:

- Select the appropriate radionuclide for your application
- Characterize a radiotracer with in vitro methods
- Set up and perform an in vivo PET/SPECT imaging study
Level of participant
- Master
- PhD
- Post-doc

For whom is the course designed
The course is designed for Master students, PhD students and postdocs with a biomedical/biochemical background. Participants should have a basic level of biomedical, biochemical and/or chemistry and physics knowledge.

Admission Requirements
A finished bachelor of science study in biomedical sciences/medical biology, medicine, chemistry or physics.

Admission Documents
- CV
- Short motivation letter

Date
12 – 16 August 2019

Course fee
€ 600
The course fee includes the registration fee, course materials, access to library and IT facilities, coffee/tea, lunch, and a number of social activities.

Discounts
€ 540 early bird discount - deadline 1 March 2019 (10%)
€ 510 partner + RU discount (15%)
€ 450 early bird + partner discount (25%)

Application Deadline
1 June 2019

How to apply
To apply for this course, please visit our website and press the apply now button.
> More information on how to apply
Course Leader
Sandra Heskamp
Assistant Professor
Radiology and nuclear medicine
Radboud university medical center

Co-leader
René Raavé
Postdoctoral researcher
Radiology and nuclear medicine
Radboud university medical center

Sandra Heskamp is an assistant professor at the Department of Radiology and Nuclear Medicine of the Radboudumc. Her research group develops novel tumor targeting agents for radionuclide imaging and therapy. Her main research focus is immuno-oncology imaging.

René Raavé is working as a postdoc at the department of Radiology and Nuclear medicine on the preclinical imaging of biologics using 89Zr.

Key lecturers
To be announced.

Certificate
You will be awarded a certificate of attendance for actively participating and successfully completing all assignments. The certificate will state the amount of ECTS credits earned.

ECTS credits
Student workload at Dutch universities is expressed in ECTS credits. ECTS stands for European Credit Transfer and Accumulation System, a system widely used throughout the European Union. In the Netherlands, each ECTS credit represents 28 hours of work. We would like to point out that recognition of credits is at the discretion of your home institution. For this course you will be able to obtain 2 credits.
Course organisation

This course makes use of a wide variety of instruction media: lectures, self-study using course literature, Bright Space website, and last but not least, hands-on work. Different people have different preferences and abilities, and by offering many forms for transferring knowledge we hope to address as many students as possible. An active participation is required. Failing to do so will result in exclusion from the course.

Brightspace

During Radboud Summer School, you will have access to our online learning environment Brightspace. One month before the summer course starts you will receive more information about Brightspace and how to access it. In your online course you will find the schedule and course related documents and or reading materials.

Literature

Recommended reading:
  https://doi.org/10.1002/jlcr.3622
  https://doi.org/10.1002/jlcr.3628

Assignments

Thursday afternoon you’ll work in small groups on challenging radionuclide imaging assignments.

Assessment

There will not be a formal assessment. Students are required to participate actively and work on in-course assignments.
Overall Schedule Radboud Summer School

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We will provide you with coffee and tea three times a day and arrange lunch for you. The time slot allocated for lunch is 12.00-14.00, usually lunchtime lasts somewhere between 1–1½ hours.

Radboud Summer School is more than an academic event, it also provides you with a unique opportunity to meet other international students and to broaden your horizon. Our participants come from all over the world and all have a different cultural and academic background. More than 650 participants from 80 different countries joined the Radboud summer schools in 2018. The summer school organization has carefully selected various social activities to bring you in contact with each other and to introduce you to the beautiful city of Nijmegen.

Below you will find some useful links to the Radboud Summer School website:

- Social Events
- Accommodation
**Preliminary day-to-day programme**

**Monday:** Introduction and tracer development  
Morning: Welcome and introduction to molecular imaging  
Afternoon: Tracer molecule and radionuclide selection, conjugation strategies and radiochemical evaluation

**Tuesday:** *In vitro and in vivo* preclinical evaluation  
Morning: Cell assays, animal studies, imaging techniques, and preclinical tracer evaluation  
Afternoon: hands-on radiolabeling, in vitro evaluation and site-tour

**Wednesday:** Hot topics in imaging  
Morning: immune imaging in oncology and life as a PhD in radionuclide imaging  
Afternoon: Site-tour preclinical imaging center and hands-on preclinical SPECT imaging

**Thursday:** Targeted radionuclide therapy  
Morning: radionuclides for therapy and preclinical evaluation  
Afternoon: Challenging assignment

**Friday:** Clinical translation, interactive quiz, farewell ceremony and drinks  
Morning: Regulations and translation from bench to bedside  
Afternoon: Clinical examples and quiz

**Contact information**

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