



Quantitative methods in Radiation Oncology: Evidence based radiation oncology in the 2020's

01 - 04 December 2024 | Vienna, Austria

Radiation oncology is increasingly evidence based and data driven. This course presents an overview of the most important data analytic techniques covering the range from clinical trials to big data analytics. The focus is on using and understanding quantitative data to improve clinical practice.

Target group

The course is aimed at physicians, medical physicists, biologists and radiation therapists (RTTs), including PhD students in all these fields.

Course aim

- The aim of this course is to introduce the attendees to a range of quantitative methods that are frequently used in radiation oncology research and, in some cases, clinical decision support tool. Radiation oncology probably has the most solid quantitative foundation among medical specialties. As in other specialties, results of randomized controlled trials form the basis for evidence-based treatment guidelines; but in addition, prognostic and predictive models provide clinical decision support for individualized management of cases.
- Radiation bioeffect models of Normal Tissue Complication Probability (NTCP) and Tumor Control Probability (TCP) have become much more refined since the publication of the QUANTEC overviews 10 years ago and are increasingly being used in treatment plan comparisons or selecting cases likely to benefit from proton therapy. New generations of such models are emerging with artificial

intelligence and machine learning (AI/ML) entering the scene for data aggregation, analysis and modeling.

- While integration of quantitative estimates of various treatment outcomes is likely to improve patient care, it is also important to understand the limitations of model estimates and to be able to assess the validity or quality of a statistical data analysis or a mathematical model. Uncritical reliance on model results may compromise patient safety or treatment outcome or may take research down the wrong track.

Learning outcomes

By the end of this course participants should be able to:

- Broadly describe the most commonly used quantitative methods in radiation oncology and radiation biology and the assumptions behind these;
- Identify appropriate quantitative methods of analysis for a given data set;
- Recognize the potential of artificial intelligence, deep learning and machine learning in radiation oncology;
- Critically evaluate modelling results especially with respect to proper validation and estimates of uncertainties.

Teaching methods

The four-day course consists of 27 didactic 45-minute lectures, 4 half-hour interactive discussion sessions, a practical exercise (1.25 h), an interactive data analysis session (1.25 h) and a Meet-the-professor session where you can bring-your-own data analysis project and discuss one-on-one with faculty members (10-minute time slots, 1.25 h total time).

ROADMAP

- RESEARCH
- RADIATION ONCOLOGIST, MEDICAL PHYSICIST, RADIATION THERAPIST, OTHER SPECIALIST

COURSE DIRECTOR

Søren M. Bentzen, (DK)

TEACHERS

Ane Appelt, (UK)
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PROJECT MANAGER

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WORKING SCHEDULE

Thursday 14 November (ONLINE):
16:00 – 17:00 (CET)
Sunday 1 December:
08:30 – 18:00
Monday 2 December:
08:30 – 18:00
Tuesday 3 December:
08:30 – 18:00
Wednesday 4 December:
08:30 – 16:00

LANGUAGE

The course is conducted in English. No simultaneous translation will be provided.

COURSE ORGANISATION

For any further information, contact ESTRO:
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TECHNICAL EXHIBITION

Companies interested in virtual exhibition opportunities during this teaching course should contact the Project Manager

Course content

- Models and modelling, hypothesis testing and parameter estimation, type I and II uncertainties
- Clinical trials and evidence-based medicine, Phase 0, I, II, III, and IV trial designs, meta-analysis, clinical endpoints, survival statistics and the Cox Proportional Hazards Model
- Statistical modelling and exploratory data analysis, external and internal validity of models, bootstrap and Monte Carlo methods, goodness of fit
- Dose-response models, normal tissue complication probability (NTCP) and tumor control probability (TCP) models, modelling combined modality therapy, patient-level risk factors, the linear-quadratic model and beyond, use of models in treatment planning
- Artificial Intelligence and Machine Learning applications. Deep learning and Convolutional Neural Networks in image analysis.
- Big data analytics and Data Science, wide and tall data sets, dimensionality reduction, data mining, over-fitting, training and validation sets, sample splitting.
- Predictive assays, ROC curves and AUC, sensitivity, specificity, positive and negative predictive value

Methods of assessment

- Course evaluation form
- Self-assessment tools are integrated in some of the discussion sessions.

Key words

Data analysis, quantitative methods, bioeffect models, critical appraisal, evidence-based medicine, predictive oncology, clinical trials methodology, outcomes research, machine learning.

PARTICIPANTS SHOULD REGISTER ONLINE [HERE](#)

These pages offer the guarantee of secured online payments. The system will seamlessly redirect you to the secured website of OGONE (see www.ogone.be for more details) to settle your registration fee.

If online registration is not possible, please contact us:
ESTRO OFFICE: education@estro.org

Registration fees

Please check the registration deadline date on our website

	EARLY RATE	LATE RATE
In-training members *	€ 475	€ 625
Members	€ 625	€ 775
Non-members	€ 800	€ 900

* *Members with specialty RadiationTherapist (RTT) may register at the In-Training fee*

REDUCED FEES are available for ESTRO members working in economically less competitive countries. Check the eligible countries and the selection criteria on the website [HERE](#)

ESTRO

ESTRO GOES GREEN Please note that the course material will be available online. No printed course book will be provided during the courses.

Advance registration and payment are required.

On-site registration will not be available.

Since the number of participants is limited, late registrants are advised to contact the ESTRO office before payment, to inquire about availability of places. Access to homework and/or course material will become available upon receipt of full payment.

Insurance and cancellation

The organiser does not accept liability for individual medical, travel or personal insurance. Participants are strongly advised to take out their own personal insurance policies.

In case an unforeseen event would force ESTRO to cancel the meeting, the Society will reimburse the participants fully the registration fees. ESTRO will not be responsible for the refund of travel and accommodation costs.

In case of cancellation, full refund of the registration fee minus 15% for administrative costs may be obtained up to three months before the course and 50% of the fee up to one month before the course. No refund will be made if the cancellation request is postmarked less than one month before the start of the course.

**Early registration deadline:
30 September (23:59 CEST) 2024**

