



ESMPE

ESMPE European School for Medical Physics Experts

Uncertainty analyses and Statistical methods in Medical Physics

8th-10th February 2024, Prague, Czech Republic

EFOMP in collaboration with the Czech Association of Medical Physics (CAMP) would like to invite you to the next ESMPE on **8th-10th February 2024**.

The school will be aimed at advanced tasks connected with the use of uncertainty analyses and statistical methods in data handling and interpretation. The school will cover the methods of inferential statistics most frequently used in the medical field in the first day, and the treatment of errors and uncertainties in medical imaging, radiation dosimetry, radiomics and epidemiology in the following days. The focus will be on worked examples

This two-and-half day event will be accredited by EBAMP (European Board of Accreditation for Medical Physics) and is intended for practicing clinical Medical Physicists who are involved in data management and research. There will be an optional examination at the end for those seeking a higher level of certification beyond attendance.

ESMPE have decided this event will be in a hybrid format. All lecturers will give their talks on-site in Prague but participants can choose if they want to attend the school on-site (limited number of participants) or online, it will be live-streamed.

Please note: All times shown are in CET

Content

Sample Size determination. Sample size determination for different study designs
Evaluation of a diagnostic test – Sensitivity, specificity, diagnostic accuracy, ROC methods
Applied regression analysis. Analysis of variance, Analysis of Covariance, multiple regression, logistic regression
Survival analysis – Relative risks Odds ratio. Survival curves with Kaplan Meyer; Log-rank test; Cox models
Reproducibility and repeatability in radiomics.
Errors and uncertainties in radiation dosimetry – Theory of error and uncertainty analysis: Type A and B uncertainty, assessment of the quality of a measurement or calculation.
Agreement in Radiotherapy – How to assess agreement in Dose distributions and Volume

Final exam

The final exam is voluntary. Participants can gain additional credits when successfully pass the test.

Organisers

Brendan McClean (Chair of the School)
Marco Brambilla (Scientific Chair)





Faculty

Jonas Andersson	Umeå University Hospital, Sweden
Anna Bäck	Sahlgrenska University Hospital and University of Gothenburg, Sweden
Marco Brambilla	University Hospital, Novara, Italy
Pierre Henri Conze	IMT Atlantique, LaTIM, Inserm, France
Brendan Mc Clean	Saint Lukes Radiation Oncology Network, Dublin, Ireland
Osvaldo Rampado	Citta della Salute e della Scienza, Torino, Italy
Peter Sharp	University of Aberdeen, Scotland, UK
Jenia Vassileva	National Center of Radiobiology and Radiation Protection, Sofia, Bulgaria.



ESMPE

Thursday 8th February 2024

	Session	Title	Description	Lecturer
8:00-9:00	<i>Registration</i>			
9:00-9:15	Introduction	Setting the scene	Presentation of the ESMPE and introduction to the course	Brendan McClean
9.15-10.00	Diagnostic tests	Agreement and reproducibility .	How to assess the agreement between two methods of clinical measurement How to assess the reproducibility of different observers	Marco Brambilla
10:00-10.30	<i>Coffee break</i>			
10:30-11:15	Diagnostic tests	Evaluation of a diagnostic test. I: Theory	Sensitivity, specificity, diagnostic accuracy, ROC, FROC, AFROC	Oswaldo Rampado
11.15-12.00		Evaluation of a diagnostic test. I: Worked examples	The practical session will focus on how to lead ROC analyses	Oswaldo Rampado
12:00-12:30			Question & Answer discussion on the morning lectures	All Faculty
12:30-14:00	<i>Lunch break</i>			
14.00-14.45	Applied Regression Analysis	ANOVA, ANCOVA. Worked Examples	Design of the experiment. One-Way ANOVA; Multiple-way ANOVA (Main effects; Factorial; Repeated Measures). Analysis of Variance Tables. The practical session will focus on how to interpret the results of ANOVA/ANCOVA studies lead in the field of medical physics	Marco Brambilla
14.45-15.30		Multiple linear regression. Worked examples	Selecting the best regression equation; Strategy for selecting variables; Reliability with split samples. Coefficient of determination, Standardized regression coefficients. The practical session will focus how on how to lead and interpret multiple regression studies in the field of medical physics.	Oswaldo Rampado
15:30-15:50	<i>Coffee break</i>			
15:50-16:20	Survival Analysis	Survival Analysis. I. Theory	Relative Risks. Odds ratio. Survival curves with Kaplan Meyer; Log-rank Test; Cox Models	Peter Sharp
16:20-17:00		Survival Analysis. II. Worked examples	The practical session will focus how on to build and interpret survival curves	Peter Sharp
17.00-17.30			Question & Answer discussion on the afternoon lectures	All Faculty
20:00-23:00	Social dinner - participants + lecturers			



ESMPE

Friday 9th February 2024

	Session	Title	Description	Lecturer
09:00-09:45	Introduction	Uncertainty analysis in Medical Physics	On the need to understand and communicate uncertainty in academia as well as healthcare.	Jonas Andersson
09:45-10:30	Uncertainty in surveys	Biases and errors in surveys	A guide to the development and use of health scales, questionnaires and surveys	Marco Brambilla
10:30-11:00	<i>Coffee break</i>			
11:00 – 11:45	Uncertainty in Radiation Protection	Stochastic effects and radiation detriment: uncertainty analyses	Uncertainties in effective dose assessment. Uncertainties in the derivation of risk. Sensitivity analysis	Jenia Vassileva
11:45-12:15	Uncertainty in Radiomics	I - Workflow and feature categories.	Definition and rationals. Radiomics workflow. Histogram-based, textural and higher order statistical features.	Pierre Henri Conze
12:30-14:00	<i>Lunch break</i>			
14:00-14:30			Question & Answer discussion on the morning lectures	All Faculty
14:30-15:30	Uncertainty in Radiomics	II - Properties of an ideal radiomics feature. Methodology for evaluation.	Radiomics standardization. Multi-centric harmonization (image, feature domains). Deep radiomics. Explainability and interpretability.	Pierre Henri Conze
15:30-16:00	<i>Coffee break</i>			
16:00-16:45	Uncertainty in medical image segmentation	Tackling uncertainty in deep medical image segmentation	Problem formulation. Convolutional encoder-decoders. Epistemic and aleatoric uncertainty. Monte-Carlo dropout. Test-time augmentation.	Pierre Henri Conze
16:45-17:30	Agreement in Radiotherapy	Comparing doses	Comparing measured and calculated dose distributions: distance to agreement, dose difference and gamma evaluation	Brendan McClean
17.30-18:00			Question & Answer discussion on the afternoon lectures	All Faculty



Saturday 10th February 2024

	Session	Title	Description	Lecturer
09:00-9.45	Errors and Uncertainty analysis in Radiation Dosimetry	Treatment of uncertainties in Radiation Dosimetry. I: Theory	The lecture will go through theory of error and uncertainty analysis: Type A and B uncertainty, Standard deviation of the mean, probability density functions	Brendan McClean
09:45-10:30		Treatment of uncertainties in Radiation Dosimetry. II: worked examples	The practical session will focus on the assessment of the quality of a measurement or calculation; the quantitative comparison of results from different investigators; the critical analysis of measurement or calculation method	Brendan McClean
10:30-10:50	<i>Coffee break</i>			
10.50-11.30	Absorbed dose uncertainty in radiotherapy	Sources of absorbed dose uncertainties in radiotherapy and the importance of minimizing them	Sources of absorbed dose uncertainty in radiotherapy and how this uncertainty affects clinical trials and can impact the knowledge which future treatments are based on.	Anna Bäck
11.30-12.15		Methods to assess absorbed dose uncertainties in radiotherapy clinical practice	Methods to assess dosimetric uncertainties in radiotherapy, such as measurements, complexity metrics, robustness analyses, etc.	Anna Bäck
12.15-12.45			Question and Answer discussion on the afternoon lectures	All Faculty
130.0-14:00	<i>Final examination (optional ; for those seeking a higher number of CPDs beyond attendance)</i>			



ESMPE

Course language	English
Level	Medical Physics Expert
Registration fee* (2 main meals, 5 coffee breaks, 1 social dinner)	300 € 350 € (from 15th January 2024)
Reduced registration fee* <ul style="list-style-type: none">• subsidized by EFOMP• first-come, first-served policy	150 € - for the first 30 participants (max. 2 from one country) coming from the following European countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Estonia, Greece, Hungary, Latvia, Lithuania, Moldova, North Macedonia, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Ukraine.
Maximum number of onsite/online participants	60/90
Duration	8 th -10 th February 2024
Study load	15 hours of lectures and demonstrations
Venue	Department of Dosimetry and Application of Ionizing Radiation, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Břehová 7, 115 19 Prague 1, CZECH REPUBLIC
GPS coordinates	50°5'27.737"N, 14°24'58.713"E
Accommodation	Individual
Information, programme at:	www.efomp.org
Registration	Electronic registration via EFOMP website
Registration period	1 st September 2023 – 15 th January 2024 (4 th February 2024 for online participation only)

* payment must be done in 7 days following the pre-registration, otherwise pre-registration will be cancelled and neither free place nor subsidized or ordinary fee can be granted for repeated registration

Follow ESMPE editions on

EFOMP [website](http://www.efomp.org)
EFOMP [Twitter](#)
EFOMP [LinkedIn](#)
EFOMP [Facebook](#)
EFOMP [Instagram](#)

