



ESMPE

e-LEMENT online asynchronous course

ESMPE European School for Medical Physics Experts

Statistical methods in Medical Physics

The course is aimed at advanced tasks connected with the use of statistical methods in data handling and interpretation. It covers the methods of inferential statistics most frequently used in the medical field, and the treatment of errors in surveys and uncertainties in radiation protection. The focus is on worked examples

This e-learning event is accredited by EBAMP (European Board of Accreditation for Medical Physics) with 28 CPD credits and is intended for practicing clinical Medical Physicists who are involved in data management and research.

Content

- Experiment design: Hypothesis testing, Sample Size determination for different study designs.
- Reproducibility of different observers; Agreement between two methods of clinical measurement.
- 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 risk, odds ratio. Survival curves with Kaplan Meyer; Log-rank test; Cox models.
- Biases and errors in surveys.
- Uncertainty in radiation protection.

Tutorship and Forum

A discussion forum and an online tutor are available to participants, who can post questions in the forum addressed to all or specifically to the tutor, who will respond in a short time.

Final exam

The final exam is mandatory. To obtain the CPDs, at the end of the course the participants must correctly answer a quiz examination.

Organisers

Brendan McClean (Chair of the School)

Marco Brambilla (Scientific Chair)

Veronica Rossetti (Chair of Education and Training Committee)





Faculty

Marco Brambilla	University Hospital, Novara, Italy
Osvaldo Rampado	Citta della Salute e della Scienza, Torino, Italy
Michael Sandborg	Linköping University hospital, Linköping, Sweden
Peter Sharp	University of Aberdeen, Scotland
Jenia Vassileva	National Center of Radiobiology and Radiation Protection, Sofia, Bulgaria.
Federica Zanca	Palindromo Consulting, Leuven, Belgium





ESMPE

2025

	Session	Title	Description	Lecturer
	Introduction	Statistics with Confidence	How to design the experiment How to analyze the data How to report the data: Hypothesis testing or confidence intervals?	Marco Brambilla
	Diagnostic tests	Agreement	How to assess the agreement between two methods of clinical measurement How to assess the reproducibility of different observers	Marco Brambilla
	Diagnostic tests	Reproducibility	How to assess the reproducibility of different observers	Marco Brambilla
	Diagnostic tests	Evaluation of a diagnostic test. I: Theory	Sensitivity, specificity, diagnostic accuracy, ROC, FROC, AFROC	Federica Zanca
		Evaluation of a diagnostic test. I: Worked examples	The practical session will focus on how to lead ROC analyses	Federica Zanca
	Applied Regression Analysis	ANOVA, ANCOVA. I. Worked Examples	Design of the experiment. One-Way ANOVA; Multiple-way ANOVA (Main effects; Factorial; Repeated Measures). Analysis of Variance Tables.	Marco Brambilla
		ANOVA, ANCOVA. II. Worked Examples	The practical session will focus on how to interpret the results of ANOVA/ANCOVA studies lead in the field of medical physics	Marco Brambilla
	Applied Regression Analysis	Multiple linear regression.	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



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	Session	Title	Description	Lecturer
	Applied Regression Analysis	Logistic Regression. I Theory	Logistic Function, Logistic Transformation; odds	Michael Sandborg
		Logistic Regression. II Worked examples	Analyzing data from visual grading experiments with logistic regression models	Michael Sandborg
	Survival Analysis	Survival Analysis. I. Theory	Relative Risks. Odds ratio. Survival curves with Kaplan Meyer; Log-rank Test; Cox Models	Peter Sharp
		Survival Analysis. II. Worked examples	The practical session will focus how on to build and interpret survival curves	Peter Sharp
	Uncertainty in surveys	Biases and errors in surveys	A guide to the development and use of health scales, questionnaires and surveys	Marco Brambilla
	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



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Course language	English
Level	MPE
Registration fee with a special launch price (50% of discount)	Course reserved for EFOMP Individual Associate Members of EFOMP with addition fee of: Normal fee: 80 € => You pay € 40 + VAT 21% if needed , i.e. € 48,40 50 € => You pay € 25 + VAT 21% if needed, i.e. € 30,25
Reduced registration fee subsidized by EFOMP (50% of discount)	for the attendees 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, Spain, Ukraine.
Maximum number of participants	Unlimited
CPDs	28 CPD Credits Obtained after a multiple choice examination
Study load	13 hours of video lectures
Venue	e – LEMENT, the EFOMP e-learning platform
Website	https://e-lement.efomp.org/
Information at	https://e-lement.efomp.org/?course-details=65
Registration	Electronic registration at this link
Duration of the course:	6 months online (22nd April 2025 – 22nd October 2025)
Registration period:	possible until 22nd September 2025

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