Biometrics and Multiparameter Diagnostics

Kennnummer	Workload	Credits/LP	Studiensemester	Häufigkeit des Angebots	Dauer
	180 Std.	6	1	Jedes Semester	1 Semester

1	Lehrveranstaltungen	Sprache	Kontaktzeit	Selbststudium	Geplante Gruppengröße
	a) Biometrics and Multiparameter Diagnostics b) Design of Clinical Trials	a) English b) English	a) 33,75 Std. b) 22,5 Std.	a) 86,25 Std. b) 37,5 Std.	a) 15 b) 15

2 Lernergebnisse/Kompetenzen

After successful participation in the module the students

Anwendung (3)
... gain knowledge of and learn to apply important reporting guidelines for study planning such as CONSORT, STARD, PRISMA etc.
... are able to plan a straightforward clinical trial including sample size and power calculation

Analyse (4)
... analyse biomedical data with appropriate statistical procedures
... validate statistical results and models

Synthese (5)
... write a report for a straightforward clinical trial

Evaluation / Bewertung (6)
... evaluate a clinical trial
... question the validity of the results of a clinical trial
... select appropriate methods for the statistical analysis

3 Inhalte

a) Statistical software R, simple parametric probability models, maximum likelihood estimators, minimum distance estimators, robust estimators, exact and asymptotic confidence intervals, bootstrap confidence intervalls, basics about statistical tests (type I error, type II error, p value), important statistical tests for categorical and metric data (e.g. t-tests, rank tests), bootstrap and permutation tests, post-hoc testing, 1-way ANOVA, multiple testing

b) PIO/PICO, clinical trial registries, useful and reproducible biomedical research, AllTrials initiative, reporting of trials (Equator network), important reporting guidelines (e.g. CONSORT, STROBE, PRISMA, STARD), learning curve,

	specificities of studies (e.g. in surgery or drug trials), placebo and nocebo, phases of pharmaceutical trials, primary and secondary questions, basic clinical trial designs, randomization, blinding, sample size and power calculation, multiple primary endpoints, group sequential methods, intention-to-treat analysis, types of missing data, imputation of missing data, meta-analysis, evidence based medicine
4	**Lehrformen** a) Seminar b) Vorlesung
5	**Teilnahmevoraussetzungen** Fundamentals in mathematics and statistics
6	**Prüfungsformen** a) Prüfungsleistung 1sbL (Laborarbeit) (4 LP) b) Prüfungsleistung 1K (Klausur) (2 LP)
7	**Verwendung des Moduls** Precision Medicine Diagnostics M.Sc. (PMD)
8	**Modulbeauftragte/r und hauptamtlich Lehrende** Prof. Dr. Matthias Kohl (Modulverantwortliche/r) Prof. Dr. Matthias Kohl (Dozent/in)
9	**Literatur** a) Hastie, Tibshirani and Friedman (2009). The Elements of Statistical Learning. Springer Verlag. Venables and Ripley (2010). Modern Applied Statistics with S. Springer Verlag. Kohl (2021). Introduction to Statistical Data Analysis in R. Second Edition. bookboon.com b) Friedman LM, Furberg CD, DeMets DL (2010). Fundamentals of clinical trials. Springer Verlag. Chow, Shao and Wang (2008). Sample size calculations in clinical research. Chapman & Hall. Higgins JPT, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.