



Universität Potsdam · Postfach 601553 · 14415 Potsdam

**Humanwissenschaftliche Fakultät
Hochschulambulanz**

**Exzellenzbereich Kognitionswissenschaften
Professur Sportmedizin & Sportorthopädie**

**Univ.-Prof. Dr. med. Frank Mayer
Ärztlicher Direktor**

Sekretariat:

Telefon: (0331) 977 1768

Telefax: (0331) 977 1296

Datum:

Curriculum CES

Winter Semester 2010/2011

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University of Potsdam

Sports medicine and Sports orthopedics

Bankverbindung:
WestLB Düsseldorf
Kontonummer: 7110402844
BLZ: 30050000

Dienstgebäude:
Am Neuen Palais 10
Haus 12
14469 Potsdam

Internet:
www.uni-potsdam.de/u/sportmedizin

Lecture „Exercise Physiology I“

Introductory lecture CES program
Internal medicine & exercise physiology I – III
Epidemiology: Cross sectional and longitudinal studies
Orthopedics I
Internal medicine & exercise physiology IV & V
Orthopedics II

Seminar „Test Procedures I“

History, clinical examination and functional testing
History and clinical examination, blood pressure, ECG
Anthropometry and basics in nutritional assessment
X-ray, ultrasonography, MRI, CT in musculoskeletal system
Cycle ergometry (stepwise incremental exercise test)
X-ray, echocardiography, MRI, CT in cardiovascular system
Treadmill ergometry and blood lactate measurements
Strength measurements I & II
Anaerobic tests (Wingate test, anaerobic treadmill test)
Kinetic measurements (PPD, GRF)
Basics in gas exchange measurements CPX
Basics in EMG

Lecture „Methods“

Generating knowledge in science: Journals & literature databases (Evidence based medicine, peer review process, impact factors, scopes of different journals; PubMed, ISI Web of Knowledge, Cochrane)
Finding and managing literature (Search strategies, inclusion criteria, documenting the search process, software, summarizing results)
Epidemiological studies (Principles of epidemiological studies, terms & definitions, advantages & disadvantages, landmark studies) <i>Study work:</i> Preparing presentations of selected studies
Types of scientific articles (Original investigations, case reports, short reports, narrative reviews, systematic reviews, meta-analyses, opinion letters)
Designing experiments: The research process (Generating research questions, flow chart of the research process, GCP and CONSORT criteria) Hypotheses & study designs (Working hypotheses, study designs, evidence levels) Choosing subjects (inclusion & exclusion criteria, sample size, randomization, blinding) Choosing tests & variables (operationalization, quality criteria, dependent and independent variables, confounder, bias)
The research process continued (Data processing, the purpose of statistics, accepting or rejecting hypotheses, interpreting and discussing results)
Organizing scientific projects (Recruitment of subjects, informed consent, ethics committee, financing studies, clinical trial registration)
Presenting scientific results I: Scientific presentations (Abstract, poster presentation, oral presentation, how to do a PowerPoint presentation) Scientific articles (Master thesis, PhD thesis, journal guidelines, submission process)

Seminar „Literature & Presentation“

Using scientific databases (How to get full text papers, search items and strategies)
Systematic search – literature review (Publication bias, use of bibliography software, developing and documenting systematic search strategies) <i>Study work: A literature review in written form and as an oral presentation at the symposium + organizing the symposium</i> (Current state of the literature review, pitfalls and problems) <i>Study work: Peer review of another student’s literature review</i>
Epidemiology (Presenting the study work on epidemiological studies; Discussion: The specificity of epidemiological studies)
Analyzing article types (Search of different types of scientific papers [in groups] and analyzing the structure) <i>Study work: Preparing a presentation on structural criteria</i>
Structures of articles (Presenting the study work, merging the knowledge)
Analyzing study designs (Discussion of suitable and non-suitable designs, advantages and disadvantages/limits, evidence levels, GCP & CONSORT criteria)
Scientific projects: (Randomization & matching possibilities, blinding procedures; Quality criteria: objectivity, reliability, validity; Development of a study information sheet and an informed consent form; Pre-study interview, development of an ethics proposal) <i>Study work: Writing an informed consent form</i>
Presenting results (Conferences, abstract submission, program & arrangements for the symposium)

Seminar/Practical „Applied Methods“

Quality control of the therapy process
Clinical biomechanical testing
Endurance testing and training prescription
Validity and reliability of biomechanical tests to characterize trunk stability and trunk function in young athletes with and without low back pain
Analysis of the influence of foot orthoses on the H-reflex of lower leg muscles
Survey of eating habits and supplement use in athletes undergoing pre-participation examination
How many exercise tests per day? Changes in performance parameters over four consecutive maximal cycling tests
Tutorial course for lectures
Tutorial course in scientific methods & soft skills
Echocardiographic wall motion analysis

Lecture „Statistics“

Levels of measurement (nominal/categorical, rank-order, interval, ratio level), variables (discrete, continuous, dependent, independent)
Distribution of data (normal distribution, skewness & kurtosis, unimodal & multimodal, histogram) & tests for normality
Descriptive statistics: Measures of central tendency (mode, median, mean, confidence interval), measures of variability (range, quartiles, percentiles, variance, standard deviation, coefficient of variation), other common measures (SEM) Visual methods for displaying data (bar graphs, boxplots, diamonds, individual courses, choosing an appropriate kind of graph, tables vs. graphs)
Inferential statistics I: Different kinds of statistical tests (tests for differences, tests for associations), scientific hypotheses (null & alternative hypotheses, one-tailed & two-tailed testing, alpha level, type I and type II error, power) Tests for differences: Parametric and nonparametric tests employed with two samples (t-test for dependent and independent samples, Mann-Whitney U-Test, Wilcoxon-Test) Tests for differences: Parametric and nonparametric tests employed with more than two samples (one-way ANOVA, one-way ANOVA for repeated measures, Kruskal-Wallis-ANOVA, Friedmann-ANOVA) Tests for differences: Parametric and nonparametric tests employed with more than two samples continued (two-way ANOVA, interaction effect, post-hoc tests, decision table for selecting the appropriate statistical procedure) Tests for associations I (Pearson product-moment correlation, Spearman's rank-order correlation, ICC, TRV, graphs) Tests for associations II (regression analyses, multiple regression analyses, Bland-Altman method)
Estimating sample size (longitudinal and cross-sectional studies, power, effect size, alpha level, smallest difference worthwhile to detect)
Interpretation of statistics (statistical vs. practical significance, efficacy vs. effectiveness vs. efficiency, intention-to-treat vs. per-protocol analysis)

Seminar „Test Procedures II“

Advanced Anthropometry & Advanced Nutrition Analysis
Kinematics
Advanced Analysis in EMG
Postural Control
Questionnaires in Social Science
Perturbation analysis
Clinical strength analysis
Gait Analysis
Ergometric test protocols
Threshold concepts
Mobile performance diagnostics (Lactate/Gas Exchange)

Seminar „Statistics & Papers“

Presenting original articles: preparation of articles in the journal club format. Study work for next week: Presentation of a self selected article (original investigation)
Presentation and discussion of the articles (~7 min presentation + 7 min discussion)
Scientific Posters: Design, content, presentation. Study work for the end of the semester: Preparation of an own poster (on original data) for the poster presentation.
Using SPSS: Organizing data sheets (data arrangement, calculation of variables, group assignment), testing for normality, creating graphs (bar graphs, boxplots, diamonds, individual courses) Study work for next week: Descriptive statistics (tables & graphs) for a given set of data.
Data presentation: Discussing advantages and disadvantages of the different kinds of graphs and measures. Analyzing data presentation of articles.
Using SPSS: t-test for dependent and independent samples, Mann-Whitney U-Test, Wilcoxon-Test. Study work for next week: Applying these tests for a given set of data.
Poster update: Problems and questions regarding the poster presentation, abstract deadline, organization.
Using SPSS: one-way ANOVA, one-way ANOVA for repeated measures, Kruskal-Wallis-ANOVA, Friedmann-ANOVA. Study work for next week: Applying these tests for a given set of data.
Using SPSS: two-way ANOVA, interaction effect, post-hoc tests, applying the decision table for selecting the appropriate statistical procedure. Study work for next week: Applying these tests for a given set of data.
Using SPSS: Pearson product-moment correlation, Spearman's rank-order correlation, regression analyses, multiple regression analyses, Bland-Altman-analysis. Study work for next week: Applying these tests for a given set of data.
Articles revisited: Review of original investigations: Were appropriate statistical methods used? Was the sample size estimated a priori? Were the statistical results practically relevant? (Working in groups)
Poster deadline! Problems and Questions regarding the poster presentation, organization.

Lecture „Exercise Physiology II“

Introduction
Orthopedics
Neurology I
Neurology II
Exercise Physiology
Cardio-vascular I
Social Science I
Social Science II
Cardiovascular II