University for Continuing Education Krems

PhD Program

Applied Evidence Synthesis in Health Research

Modules and Courses

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1 Introduction

The PhD program "Applied Evidence Synthesis in Health Research" spans three-years, divided into six semesters, and encompasses a total of 180 European Credit Transfer System (ECTS) credits (*Figure 1*). Of these, 35 ECTS credits are allocated to coursework as follows:

- PhD colloquia: 6 ECTS credits (see 2.1.1);
- Mandatory modules : 17 ECTS credits (see 2.1.2, 2.1.3 and 2.1.4);
- Electives: 12 ECTS credits (see 2.2).

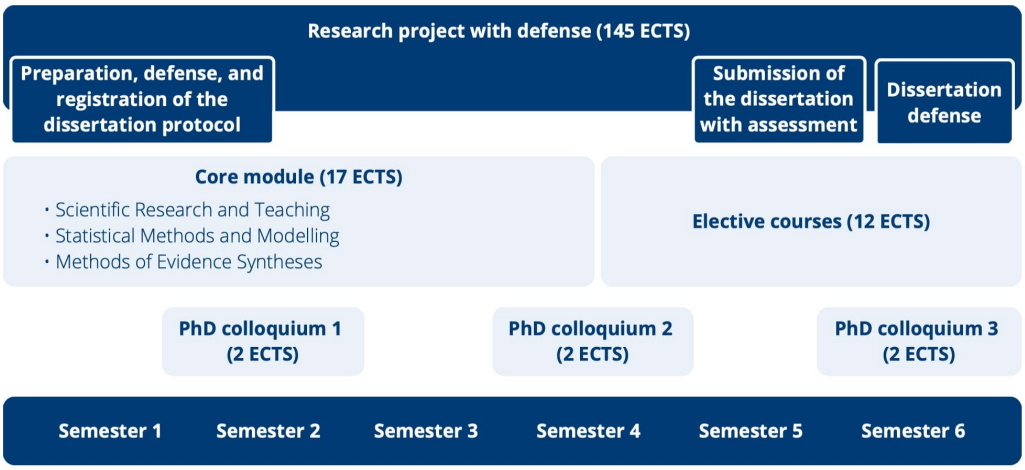

Figure 1: PhD program overview

A significant portion of the program – 140 ECTS credits – is dedicated to research and dissertation writing. An additional 5 ECTS credits are reserved for the final examination.

General information, e.g., on study objectives, qualification profile, admission and examination regulations, has been published in the University Bulletin (Mitteilungsblatt) 2023 / No. 40 from June 20, 2023 (Ordinance of the University for Continuing Education Krems on the curriculum of the PhD program "Applied Evidence Synthesis in Health Research" (Faculty of Health and Medicine).

2 Modules and Courses

2.1 Mandatory Modules

2.1.1 Module 1: PhD Colloquia

Module Coordinator: Gerald Gartlehner

Total ECTS Credits: 6

Teaching Goals:

The PhD colloquia provide students with a regular podium to engage in scientific discussion about their research project and its progress. The colloquia are also intended to prepare students for their PhD examination and familiarize them with the process of explaining and defending their research.

Contents:

Students will present the progress of their dissertation projects and engage in critical professional discourse with other participants. Students will also conduct formal peer reviews of other students' research projects.

Learning Objectives:

PhD students can

- present their scientific research results in front of peers and defend these results in scientific discourse, and
- prepare structured questions on their research project challenges and problems and discuss these with supervisors and other students.

Through peer reviewing other students' research results, PhD students will gain practical experience by providing differentiated feedback.

Teaching Methods:

The colloquia are held once a year as seminars and are mandatory. For each colloquium, students prepare an oral presentation and a written progress report (3–5 pages) of the dissertation project and their main questions. At the colloquium, students give their oral presentation. After each presentation, participants will have the opportunity to discuss comments and take questions from the other participants. At the end of the third year, students participate in a practice PhD defense before a committee composed of supervisors and the course director.

Course Descriptions:

PhD colloquia 1–3 are to be completed in three consecutive years. The PhD colloquia have an identical structure and pursue achievement of the teaching goals defined for the module based on the content and teaching methods described for that module.

2.1.2 Module 2: Basics of Scientific Research and Teaching

Module Coordinator: Isolde Sommer

Total ECTS Credits: 3 ECTS

Teaching Goals:

In Module 2, students develop an understanding of scientific work, good scientific practice, and ethics in science. Furthermore, students learn how to write a scientific paper as an essential part of the PhD program. They learn the practical elements of project management, didactics and teaching, and scientific publishing.

Contents:

This module provides an overview of the development of approaches in the theory of science. It contains solid, relevant knowledge of scientific work and promotes the ability to work on a topic independently and correctly in terms of content and methodology. Furthermore, ethical issues in science and research in the field of health sciences are discussed. The module imparts knowledge in scientific work, presentation and publishing, and project management as well as in the implementation of scientific findings from evidence syntheses into practice.

Learning Objectives:

PhD students have theoretical and practical knowledge of scientific work and good scientific practice.

PhD students can

- recognize ethical problems in science and research and critically reflect on the values behind them, and
- give an overview of the methodological approaches in science and are clear about the relevant location of their research approach.

PhD students have

- first practical experience in scientific presentation,
- an understanding of scientific publishing, and
- skills in managing a complex project.

Teaching Methods:

Mandatory seminars, introductory lectures by the course leader, joint reading, and discussion of texts.

Assessment and Grading:

Seminars are courses with an immanent examination character, requiring corresponding preparation and follow-up by the students. Assessment is based on students' written and oral contributions and ongoing observation or verification of compliance with mandatory attendance.

L 2.1 Good Scientific Practice, Research Integrity, and Ethics

Instructors	TBD
Course ECTS Credits	1 ECTS
Teaching Goals	Students will learn the principles of good scientific practice and actively deal with the issues of integrity and ethics in research.
Contents	The course covers the following topics: • Principles of good scientific practice • Integrity • Ethical considerations when conducting research projects

- "Do no harm" approach
- Informed consent for study participation
- Vulnerable populations
- Data protection

Learning Objectives	PhD students can • conduct their dissertation project according to the principles of good scientific practice, and • question, discuss, and act upon integrity and ethics in research projects
Teaching Methods	Mandatory seminar.
Assessment and Grading	Active participation in group work.
Expected Prior Knowledge	The academic training required as part of the admission.
Readings and Texts	Will be provided for the course.

L2.2 Project Management and Grant Acquisition

Instructors	TBD
Course ECTS Credits	1 ECTS
Teaching Goals	PhD students receive an introduction to project management and project planning to successfully plan and implement their dissertation project and to be able to submit funding applications.
Contents	The course covers the following topics: • Project management (time management, controlling/audits/reporting) • Project life cycle • Project plan creation (aims, objectives, deliverables, work packages, timeline, milestones)
Learning Objectives	PhD students know • what project management means and how to apply it, • where to look for funding opportunities, and • the networks and tools for applying for funding. PhD students can • successfully create a project plan.
Teaching Methods	Mandatory seminar.
Assessment and Grading	Active participation in group work.
Expected Prior Knowledge	The academic training required as part of the admission.
Readings and Texts	Will be provided for the course.

L2.3 Scientific Presentations, Scientific Writing, Peer Review, and Publications

Instructors	Martin Kainz Irma Klerings
Course ECTS Credits	0,5 ECTS
Teaching Goals	PhD students receive an introduction to scientific writing and presentation. They gain an understanding of scientific work (scientific objectives and hypotheses, methods for achieving objectives and hypotheses testing, and the production and critical interpretation of results).
Contents	The course covers the following topics: • Scientific theory • Examination of the structure of scientific literature

- Critical discussion of the contents of selected literature
- Structure of scientific publications and presentations
- Publication options, Open Access, predatory journals, and peer review

Learning Objectives

PhD students can

- formulate scientific goals and hypotheses,
- develop the necessary methods to test hypotheses and to achieve the goals of the scientific work to be produced,
- critically interpret results (produced by themselves as well as through literature comparisons), and
- draw final conclusions based on data.

Teaching Methods

Mandatory seminar, lecture, and group discussion so that PhD students can work independently on selected teaching content.

Assessment and Grading

Homework.

Expected Prior Knowledge

The academic training required as part of the admission.

Readings and Texts

- Required readings: Selected articles from specialist literature (will be handed out).
- Supplementary readings: Schimel, J. (2012). Writing Science. How to Write Papers That Get Cited and Proposals That Get Funded. Oxford University Press.

L 2.4 Theory of Teaching and Didactics

Instructors

Stefan Oppl

Course ECTS Credits

0,5 ECTS

Teaching Goals

Students learn the basic features of a theoretically sound teaching concept as well as the practice-oriented conception of teaching–learning arrangements on the basis of theory-guided selection decisions. After completing the course, students are able to independently plan individual courses and justify their structures and procedures on the basis of didactic considerations.

Contents

The course covers the following topics:

- Didactic design
- Taxonomy of Educational Objectives according to Bloom
- Methods and applications of constructive alignment
- Media Synchronicity Theory and its application in teaching–learning scenarios

Learning Objectives

PhD students can

- formulate verifiable learning outcomes,
- apply constructive alignment in the planning of teaching programs, and
- design needs-based support services in learning processes and select appropriate tools for this purpose.

Teaching Methods

Mandatory seminar.

Assessment and Grading

Students will create a course relevant to the respective research topic, including learning outcomes, a curriculum based on the rationale of constructive alignment, and the application of adequate support tools.

Expected Prior Knowledge

The academic training required as part of the admission.

Readings and Texts

- Bloom, B. S. (1956). Taxonomy of educational objectives. Vol. 1: Cognitive domain. New York: McKay, 20–24.
- Krathwohl, D. R. (2002). "A revision of Bloom's taxonomy: An overview." Theory into practice 41, no. 4: 212–218.
- Biggs, J. (1996). Enhancing teaching through constructive alignment. Higher education, 32(3), 347–364.
- Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. MIS Quarterly, 32(3), 575–600.

- Reinmann, G. (2019). Vom Eigensinn der Hochschuldidaktik. Hochschuldidaktik erforscht wissenschaftliche Perspektiven auf Lehren und Lernen, 15.

2.1.3 Module 3: Statistical Methods and Modeling

Module Coordinator: Doris Behrens

Total ECTS Credits: 6 ECTS

Teaching Goals:

Module 3 deals with statistical methods, data analysis, and modeling, and provides an introduction to the free programming language R for statistical calculations and graphics. The module imparts relevant basic knowledge from these areas to give students basic skills that they can specifically deepen during the dissertation work.

Contents:

Statistical methods and data analysis: This part of the module provides basic knowledge of statistical methods and data analysis for the fields of life science and evidence-based healthcare as well as an introduction to the R programming language. Descriptive evaluations and graphical presentations are carried out based on practical exercises. Furthermore, the students practice frequently used statistical tests with R.

Decision-analytic modeling: This module covers situations in which decision analyses and health economic modeling are useful as a methodological tool for evidence synthesis. The parameters that must be considered for such modeling are addressed. Students deal with the possibilities and limitations of decision analysis and health economic modeling.

Learning Objectives:

PhD students have

- acquired basic knowledge of the analysis of biomedical data, and
- acquired a basic understanding of the R programming language.

PhD students can

- apply appropriate statistical methods,
- carry out simple modeling independently,
- critically read and interpret published modeling studies, and
- apply knowledge of the R programming language in their dissertation project.

Teaching Methods:

Mandatory seminars with exercises, instruction and demonstration of basics, and working on case examples in a group and individually.

Assessment and Grading:

Seminars are courses with an immanent examination character, requiring corresponding preparation and follow-up by the students. Assessment is based on students' written and/or oral contributions and ongoing observation or verification of compliance with compulsory attendance

L3.1 Statistics for the Life Sciences

Instructors	Raimund Kovacevic
Course ECTS Credits	2 ECTS
Teaching Goals	The course provides a knowledge of the study designs and statistical methods relevant for all PhD students in the medical field. It takes into account the heterogeneity of PhD students to ensure comparable formal knowledge regardless of prior education.
Contents	The course covers the following topics:

- Requirements of an empirical study to be analyzed using statistical methods
- Planning and design of an empirical study
- Differentiation between causality difference and association (hypotheses)
- Correct specification of the hypotheses and the dependent study variable (endpoint)
- Performing basic descriptive and exploratory statistical analyses
- Checking data-specific assumptions for performing simple tests and correlation and association analyses
- Appropriate use of statistical tests in medical studies
- Building efficient statistical models
- Drawing appropriate conclusions from statistical results
- Writing reports based on statistical results
- Distinguishing between classical ("textbook") statistical tasks and advanced tasks that require the assistance of statistical experts
- Correct use of statistical terms in discussions with statistical experts

Learning Objectives

PhD students have

- the ability to successfully conduct an empirical PhD project,
- a comprehensive understanding of the requirements of data-based research in the medical field (also beyond the requirements of their own dissertation topic), and
- the ability to carry out simple to moderately difficult data analytical tasks.

Teaching Methods

Mandatory seminar, lectures, discussions, and students' independent learning and active participation.

Assessment and Grading

25% short presentation, 75% test.

Expected Prior Knowledge

Mathematics at A levels, basic data processing with the R language.

Readings and Texts

- Samuels, M. L., & Witmer, J. A. (2003). Statistics for the Life Sciences. Pearson Education, Upper Saddle River, NJ.
- Riffenburgh, R., & Gillen, D. (2020). Statistics in Medicine. Elsevier, Amsterdam.
- Shahbaba, B. (2012). Biostatistics with R. An Introduction to Statistics through Biological Data. Springer, New York.

L3.2 Statistics for Evidence-Based Healthcare

Instructors

Claus Peter Nowak
Gernot Wagner

Course ECTS Credits

1 ECTS

Teaching Goals

The course deepens the knowledge from the L3.1 Statistics for the Life Sciences seminar. Additional statistical content is taught that is highly relevant to the field of evidence-based healthcare. This includes data integration requirements, the diversity of relevant data, critical assessment tools for medical studies, and the inferential boundaries of evidence-based medical research.

Contents

The course covers the following topics:

- Converting among effect sizes; back-calculations (Cochrane handbook, MetaHelper)
- Effect estimation vs. hypothesis testing
- Basics of meta-analysis
    - Data preparation
    - Unit of analysis considerations
    - Missing values
    - Generic inverse variance method
    - Random-effects meta-analyses
        - Estimating between-study variance
        - The DerSimonian & Laird method
        - Other random-effects models
        - Prediction intervals

	◦ Fixed-effect meta-analyses ◦ Sensitivity analyses • Meta-analyses of continuous outcomes (Slidecast; including change vs. endpoint values) • Meta-analyses of dichotomous outcomes (Slidecast; including continuity correction, rare events) ◦ Peto's odds ratio ◦ The Mantel–Haenszel method • Cumulative meta-analyses • Practical exercises in R
Learning Objectives	PhD students know • different relevant data sources and their potential areas of application. PhD students can • critically evaluate statistical results (their own and others'), and • recognize false statistical results.
Teaching Methods	Mandatory seminar, lectures, discussions, and students' independent learning and active participation.
Assessment and Grading	Active participation in class, assignment(s), and/or test(s).
Expected Prior Knowledge	L3.1 Statistics for the Life Sciences and L3.3 Data Analysis with R.
Readings and Texts	Will be provided for the course.

L3.3 Data Analysis with R

Instructors	Matthias Pilecky
Course ECTS Credits	1 ECTS
Teaching Goals	The course objectives include programmatic problem-solving in R, importing various datasets into the R environment, and preparing data for subsequent analysis, as well as visualization methods and simple modeling techniques.
Contents	This course introduces PhD students to programming with R and provides the necessary tools to solve common tasks related to data analysis in R. We start by presenting methods for transforming data into a format that can be used for further analysis. Since the effective presentation of the results is at least as important as the analysis itself, the module presents methods for creating plots ready for publication. This includes conventional presentations such as histograms, scatter plots, and line plots. Finally, students are provided with general information related to programming documentation, debugging, best practices, and programmatic problem-solving. These aspects are relevant to facilitate collaboration with others and to improve code quality.
Learning Objectives	PhD students can • prepare data efficiently for further analysis and collaboration with others, • install and use relevant R packages, • create publication-ready visualizations, • create simple statistical models, and • solve recurring data-driven tasks efficiently within the R environment.
Teaching Methods	Mandatory seminar. This interactive course combines didactic sessions with practical exercises.
Assessment and Grading	50% participation, 50% self-study.
Expected Prior Knowledge	Academic training required as part of the admission.
Readings and Texts	• Wickham, H., & Grolemund, G. (2016). R for data science: import, tidy, transform, visualize, and model data. "O'Reilly Media, Inc.:" R for data science provides a general introduction into R and the use of the tidyverse. • Wickham, H. (2009). Elegant graphics for data analysis. Media, 35(211), 10–1007: This book provides detailed information on the use of ggplot2. • Xie, Y., Allaire, J. J., & Grolemund, G. (2018). R markdown: The definitive guide. CRC Press: This book provides detailed information on the use of R markdown.

L3.4 Introduction to Modeling for Healthcare

Instructors	Doris Behrens Raimund Kovacevic
Course ECTS Credits	1 ECTS
Teaching Goals	Students learn about basic model classes and some related applications in epidemiology, public health, disease modeling, and hospital management. They will be able to classify and understand models from the literature and develop, implement, and interpret simple model instances independently.
Contents	The course covers the following topics: • Differential equations and their application in epidemiology (basics, modeling, implementation in R, presentation of results, parameter estimation) • Markov chains and process modeling (basics, modeling, implementation and simulation in R, estimation) • Discrete event simulation and applications in hospital management (basics, modeling, implementation, and interpretation in R) • Decision-making - Aims and Optimization (cost–benefit comparisons, QALY [Quality-Adjusted Life Year], efficiency frontier, simple optimization models)

Learning Objectives	PhD students can • describe the model classes covered and know the associated terms and definitions, as well as basic results, as far as covered in the course, • assess for which questions the individual model classes are suitable, • understand the content of mathematical models from the literature and create a suitable model in a mathematical form based on a described situation, and • implement and solve simple model instances using the R software and interpret the results.
Teaching Methods	Mandatory seminar, demonstration of the basics, solving examples in a group as well as individually.
Assessment and Grading	Prerequisite: Active participation in group work. Grading based on homework (case studies) and an oral examination.
Expected Prior Knowledge	Basic knowledge of R, basic knowledge of mathematics.
Readings and Texts	• Vynnycky, E., & White, R. G. (2010). An introduction to infectious disease modeling, Oxford University Press, Chap 1–4. • Hillier, F. S., & Lieberman, G. J. (2010). Introduction to Operations Research, 9th Edition, Chap 15, 16 (cave: This chapter is not present in the following editions). • Ucar, I., Smeets, B., & Azcorra, A. (2017). Simmer: discrete-event simulation for R. arXiv preprint arXiv:1705.09746.

2.1.4 Module 4: Evidence Syntheses

Module Coordinator: Gerald Gartlehner

Total ECTS Credits: 8 ECTS

Teaching Goals:

Module 4 provides knowledge about different types of evidence synthesis methods and addresses how these methods can be used in healthcare. Students learn how to create methodologically sound systematic reviews with meta-analyses according to Cochrane methodology. Diagnostic and prognostic review methods as well as network meta-analysis methods are also addressed. The module also provides an understanding of the basics of graphical risk and effect presentation.

Contents:

The module covers the methodological basics of evidence syntheses, especially systematic reviews, meta-analyses, and network meta-analyses. In-depth seminars additionally deal with the conduct of systematic literature searches, the visual presentation of risks and benefits, and the assessment of the trustworthiness of the evidence. The module also provides knowledge about other formats of evidence syntheses (overviews of reviews, rapid reviews, scoping reviews, and qualitative evidence syntheses) and explains their strengths, weaknesses, and areas of application. In addition, the module covers how clinical guidelines are produced using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) and Confidence in the Evidence from Reviews of Qualitative research (CerQual) methodologies.

Learning Objectives:

PhD students can

- produce systematic reviews and meta-analyses and have acquired a basic understanding of other evidence syntheses and the production of clinical guidelines,
- independently conduct a systematic literature search for a simple clinical question, and critically evaluate other authors' literature searches, and
- choose an optimal graphical presentation to depict risks and effects.

PhD students understand

- the advantages and disadvantages of different evidence synthesis formats,
- the main steps in the production of a clinical practice guideline, and

- how to apply the GRADE methodology to assess the trustworthiness of the evidence in a systematic review.

Teaching Methods:

Mandatory seminars with exercises, joint readings, and discussion of texts.

Assessment and Grading:

Seminars are courses with an immanent examination character, requiring corresponding preparation and follow-up by the students. Assessment is based on students' written and oral contributions and ongoing observation or verification of compliance with compulsory attendance.

L4.1 Methods of Evidence Synthesis

Instructors	Andreea Dobrescu Gerald Gartlehner Ursula Griebler Lotty Hooft Claus Nowak Barbara Nußbaumer-Streit Isolde Sommer Gernot Wagner
Course ECTS Credits	4 ECTS
Teaching Goals	The primary objectives of this course include instructing students in the fundamental methodologies of evidence syntheses, with a particular focus on systematic reviews, meta-analyses, and network meta-analyses. Additionally, students will gain practical experience in conducting these types of syntheses. Students will also explore alternative formats of evidence syntheses, including overviews of reviews, rapid reviews, scoping reviews, and qualitative evidence syntheses.
Contents	The course covers the following topics: • Basics of evidence synthesis and writing a review protocol • Logic models • Methods of systematic reviews of interventions, Cochrane methodology • Critical appraisal of studies (randomized controlled studies, nonrandomized studies, systematic reviews, diagnostic studies) • Rapid reviews, scoping reviews, overviews of reviews • Methods of qualitative evidence syntheses • Advanced topics of meta-analysis • Meta-analysis with R • Network meta-analysis • Diagnostic and prognostic reviews • Synthesis without meta-analysis • Publication of evidence syntheses, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology
Learning Objectives	PhD students understand the methodological approaches of different evidence syntheses. PhD students • know the strengths and weaknesses of different evidence syntheses, • can critically appraise publications of studies with different designs, • carry out simple evidence syntheses independently, and • conduct meta-analyses with R.
Teaching Methods	Mandatory seminar with exercises.
Assessment and Grading	Grading is based on the exercises.
Expected Prior Knowledge	Basic understanding of clinical epidemiology.
Readings and Texts	• Cochrane Handbook.

- Borenstein, M., et al. (2021). Introduction to Meta-Analysis, Springer, New York.

L4.2 Evidence-Informed Decision-Making in Healthcare and Health Policy

Instructors	Dimitra Panteli **Brigitte Piso**
Course ECTS Credits	1 ECTS
Teaching Goals	During their doctoral studies, PhD students acquire highly specialized methodological skills. Yet, even the best and most robust decision-support tools cannot influence decisions if they are unknown or are useless to the decision-maker. Therefore, after attending this course, students will be able to examine healthcare decisions from different perspectives. This ability will encourage them to consider different information needs to improve the impact of their future work.
Contents	In the first step, we will distinguish between different levels of decision-making (from the individual patient to the general political perspective). We will discuss the specific information needs and drivers of decision-making. Furthermore, we will highlight governance mechanisms and the potential role of "evidence" as a decision-support tool. In an introduction to health technology assessment (HTA), students will receive an overview of factors other than efficacy and safety that are important in healthcare. We will examine economic, organizational, ethical, social, and legal aspects. Finally, we will consider even more complex policy decisions that affect health and healthcare and discuss barriers and possible solutions to evidence generation.
Learning Objectives	PhD students can • describe the different information needs of decision-makers in the health sector, • adopt different perspectives, • identify some drivers and governance mechanisms for decision-making in healthcare, • understand the complexity of decision-making processes in healthcare, • explain the principles of HTA, • consider aspects other than the effectiveness and safety of interventions in decision-making processes, and • identify limitations and opportunities for the use of evidence in healthcare decision-making.
Teaching Methods	Blended learning (lectures, videos, reading material, and individual and group assignments) in a seminar room or online.
Assessment and Grading	20% class participation, 50% project work, 30% assessment of self-study/homework.
Expected Prior Knowledge	Basic knowledge of public health and basic understanding of the functioning of health systems (e.g., organization, financing).
Readings and Texts	Will be provided for the course.

L4.3 Systematic Literature Searches and Information Retrieval

Instructors	**Irma Klerings**
Course ECTS Credits	1 ECTS
Teaching Goals	Systematic literature searches are one of the foundations for systematic reviews and other evidence syntheses. While systematic searches should be designed and conducted by or in collaboration with search experts (information specialists, librarians), researchers need to understand the basics and requirements of the research process. Therefore, students will learn the basics and requirements of performing a systematic literature search in this course.
Contents	This course teaches the basics of systematic database search and complementary search methods. This includes the implementation and reporting of standards for systematic search processes and the evaluation and quality control of search strategies.

Learning Objectives

PhD students know

- the reporting and implementation standards of systematic search processes (e.g., MECIR, PRISMA 2020, PRISMA-S),
- that different types of evidence synthesis may require different search methods, and
- important databases relevant to systematic searches.

PhD students can

- describe the elements of a systematic search process,
- apply Boolean operators, truncation, and keywords in database searches,
- design a systematic search strategy for a simple research question using a block building approach,
- conduct a systematic database search for a simple research question using MEDLINE (PubMed or Ovid MEDLINE),
- assess whether their research question can be answered with a simple search or whether they need the assistance of a search expert,
- communicate effectively with search experts to plan and conduct complex systematic searches,
- read and understand a MEDLINE search strategy and identify logic errors, and
- correctly document a systematic search process.

PhD students understand

- the requirements for transferring search strategies from MEDLINE to other databases,
- the role of quality assessment in the search process,
- the types of and requirements for supplementary searches, including citation searching, using trial registries, and other grey literature searching, and
- the role of reference management in the search process.

Teaching Methods

Blended learning: Theoretical basics are taught in online self-study (e.g., texts, videos, exercises), and advanced knowledge is taught in practical classroom sessions. Finally, students must design and evaluate a systematic MEDLINE search strategy for a specific research question relevant to their PhD topic. This forms the basis for an evidence synthesis, which the students must produce in the L4.1 Methods of Evidence Synthesis course.

Assessment and Grading

20% class participation, 30% exercises in class, 50% group work: conducting a systematic literature search.

Expected Prior Knowledge

Students must know the basic steps for conducting a systematic review.

Readings and Texts

- Lefebvre, C., Glanville, J., Briscoe, S., Featherstone, R., Littlewood, A., Marshall, C., Metzendorf, M-I., Noel-Storr, A., Paynter, R., Rader, T., Thomas, J., & Wieland, L. S. on behalf of the Cochrane Information Retrieval Methods Group (2022). Chapter 4: Searching for and selecting studies. Cochrane Handbook for Systematic Reviews of Interventions, version 6.3 (updated 2022).
- European network for Health Technology Assessment (EUnetHTA). (2020). "Process of information retrieval for systematic reviews and health technology assessments on clinical effectiveness. Version 2.0."
- Rethlefsen, M. L., Kirtley, S., Waffenschmidt, S., Ayala, A. P., Moher, D., Page, M. J., & Koffel, J. B. (2021). "PRISMA-S: an extension to the PRISMA Statement for Reporting Literature Searches in Systematic Reviews." Systematic Reviews 10 DOI: 10.1186/s13643-020-01542-z.

L4.4 Certainty of Evidence and Guideline Development

Instructors

Andreea Dobrescu
Heather Munthe-Kass
Barbara Nußbaumer-Streit
Isolde Sommer

Course ECTS Credits	1 ECTS
Teaching Goals	This course introduces participants to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach in both contexts: systematic reviews and guideline recommendation development. Students will learn what to consider when setting up a guideline development panel, how to prioritize findings, how to assess the certainty of evidence from systematic reviews, and how this can be presented in summary of findings tables and GRADE profiles. Participants will also learn how to derive recommendations from the evidence, taking into account additional relevant factors. Students will also learn about the GRADE–CerQual approach that assesses the confidence in the evidence from qualitative evidence syntheses.
Contents	The course covers the following topics: • Basics of guideline development • Assessing the trustworthiness of the evidence using the GRADE approach • Preparation and interpretation of summary of findings tables/GRADE profiles • Informative statements • Derivation of recommendations and consideration of additional factors (patient preferences and values, costs, feasibility) • Basics and application of the GRADE–CerQual approach to assess the trustworthiness of qualitative research findings
Learning Objectives	PhD students can • convene a guideline development panel, • prioritize outcomes, • assess the trustworthiness of the evidence for the main outcomes of a systematic review, • assess the confidence in the evidence from qualitative evidence syntheses, • produce tables summarizing results and GRADE profiles using software, • derive recommendations based on the evidence (evidence-to-decision tables), and • formulate recommendations.
Teaching Methods	Through a mix of theoretical input and practical exercises, participants will learn the key steps of the guideline development process, how to assess the certainty of evidence in systematic reviews and qualitative evidence syntheses, and how to derive recommendations from evidence.
Assessment and Grading	30% class participation, 20% in-class exercises/quizzes, 50% completion of a summary of results/GRADE table.
Expected Prior Knowledge	L.4.1 Methods of Evidence Synthesis.
Readings and Texts	• GRADE article series in the *Clinical Epidemiology* journal (articles 1–15). • CerQual article series in the *Implementation Science* journal (articles 1–7).

L4.5 Presentation and Visualization of Risks and Treatment Effects

Instructors	Kathryn Hoffmann Jana Meixner Dimitra Panteli **Brigitte Piso**
Course ECTS Credits	1 ECTS
Teaching Goals	This seminar aims to teach participants how to convey and communicate science content so that it can successfully reach the intended target groups. This includes approaches to visualization as well as science communication (e.g., how to compose key messages).
Contents	This course teaches risk communication for shared decision-making in clinical practice as well as the characteristics of good health information for the general population. It will take a closer look at communication in social media as well as the requirements of plain language texts. The course will also provide examples from national and international initiatives that use visualization or

	other instruments of science communication. Relevant experts will be invited (e.g., Organisation for Economic Co-operation and Development [OECD]/European Observatory on Health Systems and Policies data visualization group for informing health policymakers).
Learning Objectives	PhD students • know the characteristics of balanced risk communication for shared clinical decision-making, • know the characteristics of good health information for the general population, • are able to write plain text summaries and explain scientific topics in easy-to-understand video presentations, • know national and international examples of health data visualization.
Teaching Methods	Mandatory seminar.
Assessment and Grading	Group presentation.
Expected Prior Knowledge	Basic understanding of epidemiology.
Readings and Texts	Will be provided for the course.

2.2 Electives

2.2.1 Module 5: Further Academic Achievements and Electives

Module Coordinator: Barbara Nußbaumer-Streit

Total ECTS Credits: 12 ECTS

Teaching Goals:

Module 5 serves to deepen the subject matter of the dissertation topic. In addition, the module offers the opportunity to gain international experience within the framework of the Cochrane International Mobility Programme, as well as experience in the field of academic teaching, the supervision of bachelor theses, and other university tasks (e.g., speaking at a conference, academic collaboration in external projects).

Contents:

The learning content of Module 5 can be individually designed and serves to deepen the dissertation topic.

Learning Objectives:

PhD students

- have deepened the specific methods skills necessary for conducting the thesis project,
- may have gained experience in international and interdisciplinary collaboration after participating in the Cochrane International Mobility Programme or in other external projects and know best practice examples in their field, and
- may have gained experience as instructors, supervisors of bachelor theses, and/or speakers at conferences.

Teaching Methods:

Research exchange, seminars and/or lectures, holding courses under supervision, supervising bachelor theses under supervision, presentations at conferences.

Assessment and Grading:

When participating in the Cochrane International Mobility Programme, the assessment is carried out by scientists of the hosting Cochrane team. In the case of free electives, the assessment is based on the student's oral contributions or fulfillment of the attendance requirement. Successful teaching, bachelor thesis supervision, or academic collaboration in external research projects is confirmed by the respective program director. In the case of being a speaker at a conference, the student's name must be on the congress program as confirmation.

L5.1 Cochrane International Mobility I and L5.2 Cochrane International Mobility II

Instructors	Barbara Nußbaumer-Streit Cochrane host institution
Course ECTS Credits	4 ECTS - Cochrane International Mobility I 6 ECTS - Cochrane International Mobility II
Teaching Goals	PhD students work with experts in the field of their dissertation topic and thus deepen their knowledge of the dissertation topic. In addition, they learn international and interdisciplinary cooperation.
Contents	The Cochrane International Mobility Programme provides networking opportunities for students who want to learn from experts in other parts of the world. Participating students visit a Cochrane team (geographical, review, or methods group) and work with experienced researchers on a systematic review (ideally a Cochrane review) or a methods research project in the field of evidence synthesis. For the research visit, students should choose a Cochrane team that has expertise in the dissertation topic. A minimum stay of 4 weeks is required. An extension for a further 6 weeks is possible. It is also possible to continue the physical collaboration online after the research stay. The research stay should be used to prepare or implement a publication for the dissertation.
Learning Objectives	PhD students can • work successfully in international and interdisciplinary teams, and • improve their dissertation project through the experience gained. • At the end of the research stay, PhD students have • created a concept for a publication or have already started to implement it.
Teaching Methods	Concrete collaboration on one or more research projects that fit the dissertation topic content.
Assessment and Grading	Successful research exchange is confirmed in writing by the host Cochrane team.
Expected Prior Knowledge	L4.1 Methods of Evidence Synthesis and L4.3 Systematic Literature Searches and Information Retrieval.
Readings and Texts	None.

L5.3 Teaching or University-Related Activities I, L5.4 Teaching or University-Related Activities II, and L5.5 Teaching or University-Related Activities III

Instructors	Gerald Gartlehner
Course ECTS Credits	1 ECTS each for 6 teaching hours 1 ECTS for the supervision of a bachelor thesis The ECTS for academic collaboration in external projects and speaking at conferences must be determined by the program management.
Teaching Goals	This course introduces participants to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach in both contexts: systematic reviews and guideline recommendation development. Students will learn what to consider when setting up a guideline development panel, how to prioritize findings, how to assess the certainty of evidence from systematic reviews, and how this can be presented in summary of findings tables and GRADE profiles. Participants will also learn how to derive recommendations from the evidence, taking into account additional relevant factors. Students will also learn about the GRADE–CerQual approach that assesses the confidence in the evidence from qualitative evidence syntheses.
Contents	The course deals with the following topics: • Basics of guideline development • Assessing the trustworthiness of the evidence using the GRADE approach

- Preparation and interpretation of summary of findings tables/GRADE profiles
- Informative statements
- Derivation of recommendations and consideration of additional factors (patient preferences and values, costs, feasibility)
- Basics and application of the GRADE–CerQual approach to assess the trustworthiness of qualitative research findings

Learning Objectives

PhD students can

- convene a guideline development panel,
- prioritize outcomes,
- assess the trustworthiness of the evidence for the main outcomes of a systematic review,
- assess the confidence in the evidence from qualitative evidence syntheses,
- produce tables summarizing results and GRADE profiles using software,
- derive recommendations based on the evidence (evidence-to-decision tables), and
- formulate recommendations.

Teaching Methods

Through a mix of theoretical input and practical exercises, participants will learn the key steps of the guideline development process, how to assess the certainty of evidence in systematic reviews and qualitative evidence syntheses, and how to derive recommendations from evidence.

Assessment and Grading

30% class participation, 20% in-class exercises/quizzes, 50% completion of a summary of results/GRADE table.

Expected Prior Knowledge

L.4.1 Methods of Evidence Synthesis.

Readings and Texts

- GRADE article series in the *Clinical Epidemiology* journal (articles 1–15).
- CerQual article series in the *Implementation Science* journal (articles 1–7).

L5.6 Journal Club I, L5.7 Journal Club II, and L5.8 Journal Club III

Instructors

Isolde Sommer
Senior researchers of the Department of Evidence-based Medicine and Evaluation

Course ECTS Credits

2 ECTS each

Teaching Goals

The main objectives of the Journal Club are: (a) to improve students' knowledge of the relevant literature on their research topic and (b) to gain experience in evaluating studies.

Contents

This course is a forum in which students critically appraise and present a primary study of their choice. The student prepares at least one article during the semester. In addition, students moderate a discussion on a fellow student's article. For each course, a designated student will prepare and present a scientific article. This article will then be discussed in the group, highlighting the principles and potential flaws of the different research approaches and study designs. Fellow students will comment on and ask questions about the content of the paper.

Learning Objectives

PhD students have

- a better scientific understanding, and
- stronger presentation and discussion skills.

PhD students can

- think critically, and
- critically evaluate the strengths and weaknesses of different study designs.

Teaching Methods

Presentation and discussion.

Assessment and Grading

70% preparation and presentation of a study, 15% active participation in discussions, 15% moderation of a discussion.

Expected Prior Knowledge

L4.1 Methods of Evidence Synthesis.

Readings and Texts

Selected scientific journal publications.

L5.9 Survey Research and Questionnaire Design

Instructors	Ursula Griebler Christina Kien
Course ECTS Credits	1 ECTS
Teaching Goals	The primary objectives of this course include instructing students in the basics of quantitative empirical social research and delving deeper into the conduct of surveys used within cross-sectional studies. Furthermore, students will learn about the quality assessment of cross-sectional studies.
Contents	This course provides an overview of the entire research process, applying surveys or questionnaires, and includes the following topics: • Relevance of survey research and questionnaire design within methods of evidence synthesis (e.g., prioritization of outcomes, assessment of patient-reported outcome measures) • Quantitative research designs • Target population and sampling strategies • Different data collection methods • Questionnaire/survey design principles (formulation of questions and answer options, sequencing questions, etc.) • Response rates • Pretesting and piloting questionnaires • Ethical considerations • Assessment of the quality of cross-sectional studies and reporting guidelines
Learning Objectives	PhD students know • survey research designs, • different data collection methods including tools for administering online surveys and sampling strategies, • reporting guidelines for survey research, and • the strengths and weaknesses of the data produced in this way. PhD students can • develop, revise, and apply questionnaires, • assess the validity and reliability of published questionnaires, • use software for survey conduct, • recognize possible potential sources of bias in the recruitment of study participants and response tendencies and bias in answering questionnaires, and • report survey research according to reporting guidelines. PhD students understand the concepts of reliability and validity.
Teaching Methods	This is an interactive training program in which frontal lectures alternate with exercises. Students can use this course to prepare for their dissertation project or work on their chosen question.
Assessment and Grading	50% class participation and exercises, 50% group or individual work: conducting a small survey (seminar paper).
Expected Prior Knowledge	L.4.1 Methods of Evidence Synthesis.
Readings and Texts	• Punch, K. F. (2003). Survey Research. The Basics. First edition. SAGE Publications. • Schaeffer, N. C., & Presser, S. (2003). The Science Of Asking Questions, Annu. Rev. Sociol. 29:65–88. • Choi, B. C. K., & Pak, A. W. P. (2005). A Catalogue of Biases in Questionnaires. Preventing Chronic Disease Vol 2, No. 1. • Streiner, D. L., Norman, G. R., & Cairney, J. (2014). Health Measurement Scales: A practical guide to their development and use (5 edn). https://doi.org/10.1093/med/9780199685219.001.0001.

- Edwards P. J., Roberts, I., Clarke, M. J., DiGuiseppi, C., Woolf, B., & Perkins, C. (2023). Methods to increase response to postal and electronic questionnaires. Cochrane Database of Systematic Reviews, Issue 11. Art. No.: MR000008. DOI: 10.1002/14651858.MR000008.pub5. Accessed January 30, 2024.
- Callegaro, M., Manfreda, K. L., & Vehovar, V. (2015). Web Survey Methodology. Sage, London. DOI: 10.4135/9781529799651.

L5.10 Qualitative Methods

Instructors	Yvonne Schaffler Isolde Sommer
Course ECTS Credits	1 ECTS
Teaching Goals	The aim of the course is to teach the basics of using qualitative methods and their initial applications.
Contents	The course deals with the following topics: • Basics of qualitative research (input) • Designing a qualitative research question (input and exercise) • The qualitative research process (media lecture followed by discussion in plenary) • Common qualitative research methods (input and discussion) • Sampling, interview guide development, data preparation, and research ethics (input and discussion) • Media lectures on inductive and deductive coding (media lectures followed by discussion in plenary) • Demo of the analysis software Atlas.ti/MAXQDA • Joint evaluation (depending on time budget) in the form of joint work on a text passage
Learning Objectives	PhD students have a basic knowledge of qualitative research. PhD students can • formulate a qualitative research question, • make informed decisions regarding the type of sampling, data collection, and analysis, • and deepen their knowledge of methods independently and in a targeted manner.
Teaching Methods	The course takes place online over two days. Day I and Day II take place about three weeks apart. Media lectures and exercises will be prepared independently between Day I and Day II. Literature and a sample project for independent and targeted study and follow-up are provided.
Assessment and Grading	Continuous active attendance on Day I and Day II, planning, conducting, and analyzing an interview.
Expected Prior Knowledge	Academic training required as part of the admission.
Readings and Texts	• Elliott, R., & Timulak, L. (2021). Essentials of Descriptive-Interpretive Qualitative Research - A Generic Approach; Essentials of Qualitative Methods Series. • Silverman, D. (2013). Doing qualitative research; Los Angeles, California: Sage. • Witzel, A. (2000). The problem-centered interview [26 paragraphs]. Forum Qualitative Sozialforschung / Forum: Qualitative Social Research, 1(1), Art. 22, http://nbn-resolving.de/urn:nbn:de:0114-fqs0001228.

L5.11 Evaluation Research

Instructors	Christina Kien
Course ECTS Credits	1 ECTS

Teaching Goals	The primary objectives of this course include instructing students on the central concepts of evaluation research and enabling them to recognize and assess the strengths and weaknesses of the conducted evaluations.
Contents	This course offers an overview of the following contents: • Different approaches to evaluation research • Different study designs for evaluating complex interventions • Framing evaluation questions and the role of logic models within evaluation • Communication with and involvement of different stakeholders in evaluation projects • Standards of evaluation
Learning Objectives	PhD students know • the importance of logic models in evaluation research, • the advantages and disadvantages of different approaches to method triangulation (focus on quantitative and qualitative research), and • how to discuss the importance of communication in evaluation projects. PhD students can • distinguish between relevant concepts of evaluation research, and • frame evaluation questions. PhD students understand the relevant concepts of evaluation research (e.g., purpose of evaluation).
Teaching Methods	An interactive training program in which lectures alternate with exercises and group discussions.
Assessment and Grading	50% class participation, 50% exercises in class.
Expected Prior Knowledge	Basic knowledge of qualitative and quantitative empirical social research.
Readings and Texts	Patton, M. (2008). Utilization-Focused Evaluation. SAGE Publications, Inc; 4. Edition, Saint Paul, Minnesota. Better evaluation. (2021). www.betterevaluation.org. U.S. Department of Health and Human Services Centers for Disease Control and Prevention. Office of the Director, Office of Strategy and Innovation. (2011). Introduction to program evaluation for public health programs: A self-study guide. Centers for Disease Control and Prevention. Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., et al. (2021). A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance BMJ; 374 :n2061 doi:10.1136/bmj.n2061.

L5.12 Evidence-Based Public Health

Instructors	Ursula Griebler Christina Kien
Course ECTS Credits	1 ECTS
Teaching Goals	Students learn the concept of evidence-based public health and how it can be applied.
Contents	This course provides an orientation to the most important current public health problems using evidence-based approaches. Students will gain a familiarity with the principles of evidence-based public health. They will learn how to apply these principles in the critical appraisal of public health issues, from program design and implementation to evaluation and assessment. This course will focus on the principles of scientific reasoning and how these inform evidence-based public health interventions. It also focuses on the issue of social justice in public health interventions. Students will be able to examine issues from different analytical perspectives and how these perspectives can suggest different solutions to a particular public health problem.
Learning Objectives	PhD students know

- how to apply these principles from program design to evaluation, and
- the social determinants of health.

PhD students can

- distinguish between different approaches to public health problems and determine when they are most appropriate, and
- critically evaluate strategies, interventions, and programs in the public health field.

PhD students understand

- the principles of evidence-based public health, and
- the role of social justice in public health interventions.

Teaching Methods

The course is delivered through a combination of lectures, workshops, small group exercises, and seminar discussions. Students will develop their fictional public health intervention using an evidence-based approach. Reading the provided relevant literature is required.

Assessment and Grading

100% active participation in class (e.g., preparation of readings, participating in discussion).

Expected Prior Knowledge

Knowledge of epidemiology and epidemiological study designs.

Readings and Texts

- Brownson, R. C., Baker, E. A., Deshpande, A. D., & Gillespie, K. N. (2017). Evidence-Based Public Health. 3rd Edition. Oxford University Press, New York.
- Liburd, L. C., Hall, J. E., Mpofu, J. J., Williams, S. M., Bouye, K., & Penman-Aguilar, A. (2020). Addressing Health Equity in Public Health Practice: Frameworks, Promising Strategies, and Measurement Considerations Annual Review of Public Health Vol. 41:417–432.
- Rychetnik, L., Hawe, P., Waters, E., Barratt, A., & Frommer, M. (2004). A glossary for evidence based public health. J Epidemiol Community Health 58(7):538–45.

L5.13 Registries and Analyses of Registry Data

Instructors

Stefanie Auer

Course ECTS Credits

2 ECTS

Teaching Goals

Students learn the basics about registers and their possible areas of application. They know the advantages and disadvantages of registry data and their technical background. They recognize registers as a special case of relational databases and can conduct simple SQL queries independently. Students will also be able to perform analyses based on large datasets. In addition, basic techniques for anonymization are taught in this course.

Contents

The course covers the following topics:

- Relational databases
- SQL basics
- Examples showing the use of registers in research
- Dealing with large amounts of data
- Basics of anonymization

Learning Objectives

PhD students can

- name the characteristics of relational databases and know their advantages compared to conventional two-dimensional datasets,
- independently perform simple queries from relational databases using SQL, and
- handle large amounts of data efficiently and reliably.

PhD students know

- the risks and limitations of analyzing large datasets, and
- basic anonymization procedures.

Teaching Methods

Seminars, demonstration of the basics, and solving examples as a group as well as individually.

Assessment and Grading	Prerequisite: Active participation in group work, grading based on homework (case studies).
Expected Prior Knowledge	L3.1 Statistics for the Life Science and L3.3 Data Analysis with R.
Readings and Texts	• Wickham, H., & Grolemund, G. (2016). R for data science: import, tidy, transform, visualize, and model data. "O'Reilly Media, Inc." • Beaulieu, A. (2009). Learning SQL: master SQL fundamentals. "O'Reilly Media, Inc." • Pop, B., et al. (2019). "The role of medical registries, potential applications and limitations." Medicine and Pharmacy Reports 92.1: 7.

L5.14 Modeling Approaches for Health Technology Assessment

Instructors	Beate Jahn
Course ECTS Credits	2 ECTS
Teaching Goals	Students gain in-depth knowledge and understanding of methods of decision analysis, modeling, and public health research.
Contents	This course will cover five different decision-analytic modeling approaches used in public health and health technology assessment. Case studies from practice on various acute and chronic diseases will be discussed. The following topics will be presented: • Part 1: Overview of modeling and taxonomy, hands-on application of decision trees, state transition models (Markov models), and partitioned survival models, dealing with uncertainty and variability using various software. • Part 2: Microsimulation models, discrete event simulation models, and individual behavior and queues (theory and hands-on exercises). • Part 3: Infectious disease models, dealing with dynamic transmission and herd immunity, and other modeling approaches (e.g., agent-based models, system dynamics models, causal inference models) (including interactive breakout sessions).
Learning Objectives	PhD students can • describe the role of decision analysis and simulation in healthcare, • build and evaluate state transition models, discrete event simulation models, and infectious disease models, • assess when different modeling approaches are appropriate and when they are not, and • critically evaluate modeling studies and the conclusions derived from them.
Teaching Methods	This course combines theoretical concepts with practical exercises. The Hands-on Modeling Workshop is offered as a comprehensive module over three days. Participants will receive preparatory material in advance. While working through the preparatory material, they must complete an at-home mini-exam consisting of several exercises, which must be handed in before the face-to-face workshop. During the three-day face-to-face workshop, the relevant theoretical principles are presented and discussed. After each theory session, students program several decision models with different decision-analytic software packages under the teachers' guidance and discuss the results and their impact on decision-making. For the guided self-study assignments following the course, students are given specific tasks to complete independently or in smaller groups (e.g., a specific review of decision-analytic modeling studies for a predefined intervention, development of a decision-analytic model for a new health technology). The topics are determined by the course instructors and discussed with the students. International modeling experts will share further insights into the application of decision analysis to inform health technology assessment and decision-making bodies.
Assessment and Grading	Written exam, at-home mini-exam (preparation), and result report self-learning task (follow-up).
Expected Prior Knowledge	Academic training required as part of the admission.
Readings and Texts	• Siebert, U. (2003). When should decision-analytic modeling be used in the economic evaluation of health care? [Editorial]. European Journal of Health Economics. 4(3): p. 143–150.

- Hunink, M., Weinstein, M., Wittenberg, E., Drummond, M., Pliskin, J., Wong, J., & Glasziou, P. (2014). Choosing the best treatment. In Decision Making in Health and Medicine: Integrating Evidence and Values. Cambridge: Cambridge University Press.
- Roberts, M., et al. (2012). Conceptualizing a Model. A Report of the ISPOR-SMDM Modeling Good Research Practices Task Force-2. MDM.32:678–689.
- Siebert, U., et al. (2012). State-Transition Modeling: A Report of the ISPOR-SMDM Modeling Good Research Practices Task Force -3. Medical Decision Making. 32(5): p. 690–700.

L5.15 Selected Methods of Evidence Synthesis or Other Topic-Specific Courses

Instructors	External instructors
Course ECTS Credits	Must be clarified with the program director
Teaching Goals	Specialized deepening of the thesis topic: If specific, content-related, topic-specific competences are required for the thesis project, these courses can be completed internally at the UWK as well as externally and credited as electives.
Contents	Dependent on the thesis topic.
Learning Objectives	Subject-specific deepening of the thesis topic.
Teaching Methods	Different teaching/learning methods.
Assessment and Grading	Dependent on the course chosen.