

Journal no.	Title	Course leader	Number of seats	ECTS	Learning outcomes
B16/01	Bone Biology	Jesper Skovhus Thomsen and Thomas Levin Andersen	25	3,5	The students will obtain knowledge about bone cells and bone biology under physiological and pathophysiological conditions such as osteoporosis, rheumatology, rare bone diseases, cancer-induced bone diseases, and parathyroid and kidney diseases, as well as their current therapies. Moreover, the student will obtain basic knowledge about clinical and pre-clinical bone study design, in vitro cell cultures, serum bone markers, bone epidemiology, pre-clinical and clinical computed tomography (CT) and DEXA, and bone pathology and histology. Finally, the students will learn to identify the strengths and weaknesses in their PhD-study, and network with fellow PhD students within the bone field.
B69/30	Flow cytometry	Charlotte Christie Petersen	16	2,3	Understanding the physics behind flow cytometry Understanding the applications and limitations of flow cytometry Practical knowledge and experience with flow cytometry experiment design Understanding essential flow cytometry controls Awareness of common (and not so common) pitfalls Hands-on, practical experience with data analysis Ability to critically evaluate flow cytometry results Requirements for publication of flow cytometry experiments
B100/42	Laboratory animal science	Astrid Gerd Holtet	25	2	The participants should obtain basic knowledge about the Laboratory animal science, which will make it possible for them to participate in research contributing to the humane use of laboratory animals ensuring high standards of animal welfare and quality in the performing, evaluating and reporting of laboratory animal experiments. Insight into Danish legislation concerning animals used for scientific purposes, the ethical aspects working with laboratory animals as well as the principles of the 3 Rs. Basic insight into the biology of laboratory animal, including normal/abnormal behaviour, housing, breeding, welfare and feeding. Basic insight into occupational health and safety when working with laboratory animals. Practical experience with handling and euthanizing laboratory animals as well as minimally invasive injections and blood sampling techniques. Basic knowledge of anaesthesia for minor procedures in common laboratory animals.
B116/19	Advanced course in Laboratory Animal Science	Martin Kristian Thomsen	16	2,6	Advanced insight into Danish and International legislation concerning animals used for scientific purposes, the ethical aspects of working with laboratory animals as well as the principles of the Three Rs. Detailed knowledge of different aspects of ethics and the Three Rs in relation to both ethical and welfare issues raised by the use of animals in scientific procedures. Knowledge of experimental design concepts, possible causes and elimination of bias, statistical analysis and information about where expertise can be found to assist with procedure, design, planning and the interpretation of results. Insight into the use of animal models in biomedical research and their benefits and limitations. Insight into the importance of standardization of environmental, microbiological factors and use of humane endpoints. Knowledge about advanced experimental procedures such as microsurgery, anaesthesia, analgesia and euthanasia in rodent laboratory animals. Write an application for a procedure to the Danish Ministry of Health.

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250/45, 46, 47	Responsible Conduct of Research - 3 courses in the fall	Grethe Elholm, Sebastian Frische and Rikke Nørregaard	30	1	Be familiar with the Danish Code of Conduct for Research Integrity as well as Aarhus University guidelines and Health standards of Responsible Conduct of Research Be able to understand and discuss principles of research integrity and responsible conduct of research Be able to identify, analyse and discuss cases of scientific misconduct and questionable research practices in the grey zone between misconduct and poor science Know where to seek advice concerning responsible conduct of research
C85/21	Stereology	Jens Randel Nyengaard	24	2,1	After completion of the course, the student should be able to: Understand and be able to implement random sampling, systematic sampling and smooth systematic sampling Understand and be able to implement Cavalieri estimator and nucleator/rotator for volume estimation using section planes Understand and be able to implement disector and fractionator for number/connectivity estimation using section planes Understand and be able to implement length and surface estimation using isotropic or vertical section planes Understand the effect of tissue deformation, over- and under projection and ratios on final conclusions
C104/21	From Gene to Function – Molecular Analysis of Disease Genes	Peter Bross	16	3,1	Theoretical assessment of effects of gene variations Protein structure, folding and trafficking and their disturbances in diseases Methods for experimental investigations of effects of gene variations Design and interpretation of cellular and in vitro experiments Exercising and developing skills for communicating scientific knowledge
C119/96, 97, 98	Datamanagement & Stata - 3 courses in the fall	Jakob Hjort	24	0,6	Having completed this course the student will be able to: Handle research data in a way that live up to legal- as well as basic scientific requirements Relate to the basic principles of data documentation Relate to Stata's user-interface and basic functionalities Use Stata's build-in help system Build well-structured command-files ("do-files") to enhance transparency and reproducibility
C171/13	Introduction MATLAB with examples from Health Science	Irene Klærke Mikkelsen	30	2,8	After completion of the course, the student should be able to understand and be able to use: The MATLAB program in general including editor, command window, and help MATLAB data structures including matrices, cells and structs Generic programming principles including loops, conditions, functions MATLAB graphics for plotting and vitalization of data MATLAB Debugging capability
C190/06	Image diagnostic methods for evaluation of the musculoskeletal system	Maiken Stilling	25	2,2	Understand the most common radiologic methods Understand the basic background for methods (physics, instruments) Characterize risks of the methods Understand the advantages and disadvantages/imitations of the methods Obtain inspiration to new methods in research projects
C204/12	Basic and practical course in quantitative immunoassays	Mette Bjerre	16	1,2	The participants obtain theoretical knowledge and practical skills required for development, troubleshoot, and validation of ELISA and TRIFMA assays.

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C205/21	The Talented Researcher	Kamille Smidt Rasmussen	24	2,2	By the end of the course, you should have learned about and strengthened your awareness of own strengths and challenges to enhance leadership in both work and your everyday life. You should have strengthened your project management skills to better control and plan your project and PhD-education with respect to deliverables, milestones and schedules. As a specific outcome, all participants will have a plan with deliverables, milestones, and schedules for their PhD project.
C207/16	Observational epidemiology: Studies of prognosis	Peter Jepsen	24	0,6	After the course, the student will be able to: <ul style="list-style-type: none"> · Understand why we study prognosis · Understand the principles of survival analysis · Know the difference between hypothesis-testing studies and prediction studies · Interpret the result of a Cox regression · Recognise 'competing risks' in studies of prognosis
C236/22	Introduction to Research Training in Health Sciences (Students enrolled in the Research Honours Programme and Research Year will be prioritised)	Kresten Keller	30	0,7	Introduction to basic, clinical, qualitative and epidemiological research Gain knowledge on writing research protocols Gain knowledge on writing successful applications Introduction to structured literature search Reflections on student-supervisor relationships Introduction to ethics and regulations in animal and clinical research
C243/08	How to get published	Søren Dinesen Østergaard	16	3	After the course, the participants should: 1. Have a basic knowledge of most aspects of the publication process in health research 2. Have improved their writing abilities 3. Have learned how to perform peer-review Altogether, this will increase the participants' chances of publishing their scientific work.
C253/07	Prepare yourself on the movement from a PhD in Health to a career in non-academia	Vibeke Broe	24	2,1	After the course, the participants should have gained a basic understanding of business processes and some of the requirements companies have when employing PhDs. Also the participants should be able to identify their transferable skills achieved during doctoral training and be able to explain the value of these skills within as well as outside of academia. The participants will also be expected to reflect on their own possible career paths, and be able to apply the different aspects of the course when marketing their skills in different situations.
C254/07	An introduction to Good Manufacturing Practice (GMP)	Dirk Bender and Anja P. Einholm	24	1,2	Be familiar with basic principles and terms of GMP and its impact in Danish legislation Be able to understand specific challenges arising from GMP Know where to seek advice concerning further development of GMP skills
C262/17	Get ready to work with Biostatistics PhD	Eva Greibe	24	0,7	How to test for assumptions for basic statistical tests How to perform basic statistical tests How to present results in tables How to perform a sample size calculation
C279/04	Personalised Medicine	Deirdre Cronin Fenton	24	1	Define "personalised medicine" in disease diagnosis and treatment Enumerate "omics" and how "omics" can be utilized in routine clinics Describe the role of epigenetics in personalized medicine Understand molecular pathology approaches as a tool in personalised medicine Compare and contrast clinical epidemiology approaches to personalised medicine Describe "big data" approaches to assess the effectiveness of precision medicine Identify ethical issues related to personalised medicine in clinical practice and in clinical epidemiologic research

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C285/04	Introduction to register-based research	Natalie Momen and Oleguer Plana-Ripoll	18	2,1	Describe commonly used Danish health registers and how they can be used in research Identify different epidemiological designs used to investigate register data Discuss strengths and limitations of register data Describe how other sources of data, such as genetic data, cohort data and survey data can complement data in the registers Perform simple data management tasks using artificial register data Plan their own research using registers or to critically read publications from register-based studies
C296/02	Applying clinical epidemiological methods and Danish databases to study chronic disease	Deirdre Cronin Fenton, Mette Nørgaard, Christian F. Christiansen and Reimar W. Thomsen	24	2,1	The course includes lectures, exercises and computer labs on the following: Identify and design a clinical epidemiologic research study using the Danish databases and registries – comparing and contrasting study designs in order to suitably address a research question Identifying and ascertaining data from the Danish databases and registries Assessing study validity and implementing validity checks Data analysis including data cleaning and implementing survival analysis using Stata Evaluating study findings, interpreting and reporting study findings
C305/02	What is research? Ontology, epistemology and methodology	Rune Dall Jensen	15	2	Describe the fundamental concepts and positions in the philosophy of science Articulate the research implications of the various philosophical positions on science Position one's research project in a philosophy of science discourse Formulate research questions, based on various epistemologies
C309/02	The science of stress and resilience	Karen Johanne Pallesen	30	1,3	Present definitions of stress and major stress theories Describe the signaling pathways of the fight-flight response Explain the psychophysiological processes that correspond to commonly experienced stress symptoms such as increases in heart rate, sweaty palms and “the mind going blank” Describe the signaling pathways of the freeze response Describe current insight into the neurobiological foundations of resilience Place fight/flight, freeze, and resilience in the context of evolution and explain why stress has become a big problem in modern societies Give examples of observed associations between personality traits and stress threshold Give examples on the association between genes and individual variation in stress/resilience Explain how environmental/social factors can affect the stress threshold of the individual person, or alternatively, raise resilience Explain how trauma (severe and/or long-term stress) can “lock” victims in fight-flight-freeze mode, simultaneously blocking processes involved in safe social engagement Explain other mechanisms that link ongoing stress to somatic and psychiatric diseases (heart disease, diabetes, anxiety and depression). Explain the processes that lead from long-term stress to inflammation. Why is this insight critical? Explain how different stress reduction methods exert their effects (the psychophysiological mechanisms) Discuss how clinical practice may benefit from scientific insights into the biology of stress
C311/01	Cardiovascular data sources and data quality in Denmark: potential and pitfalls	Morten Schmidt	38	0,4	By the end of the course the student will be have an overview of cardiovascular data sources in Denmark, insights into their data quality, and tools to access data quality in their own research.

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C312/01	Retire statistical significance: a critical approach to p-values	Morten Schmidt	38	0,4	By the end of the course the student will be able to understand the pitfalls of p-values and interpretate research results in light of random error.
P98/23	Epidemiology II	Christina C. Dahm	24	3,3	Advanced insight into epidemiological study design Advanced insight into design and evaluation of epidemiological studies Insight into DAGs Insight into strategies for analyzing epidemiological data Practical experience with analyses of epidemiological data
P155/28	Epidemiology I - Basic Principles of Epidemiology	Bodil Hammer Bech	24	2	Define epidemiologic measures of occurrence and explain the difference between prevalence and incidence. Define the following epidemiologic measures of association; relative risk, risk ratio, odds ratio, and rate ratio, risk difference and excess risk, including attributable risk and population attributable risk. Define and describe strengths, weaknesses, and main applications of the designs; ecological, cross-sectional, follow up, case-control and intervention studies. Define selection bias, information bias and confounding and be aware that evaluating the direction and strength of a possible bias or confounding is essential. Learn to think along the lines that, when faced with data from an analytic epidemiologic study showing an association (or no association), this might reflect; random error, bias (systematic error), including selection bias or information bias, or confounding, or, if all other possibilities seem unlikely, causality.
P255/07	Introductory course in questionnaire technique and clinimetrics	Henrik Hein Lauridsen	25	2	Have knowledge about conceptualisation and operationalisation Know the most important concepts related to questionnaire research Know the basics of how to design a questionnaire and write items Know the COSMIN taxonomy Know the requirements for a questionnaire validation Have the skills to find and select the most appropriate outcome measure Have the skills to translate an international questionnaire into Danish Have basic knowledge of the Cosmin taxonomy, validity and reproducibility Have basic knowledge in how to develop a new measurement instrument
P256/04	Advanced course in questionnaire technique and clinimetrics	Henrik Hein Lauridsen	25	2	Have the skills to complete the process of developing a new measurement instrument Have basic knowledge about item reduction and factor analysis Know how to perform a field test Be able to define, determine and interpret a) validity, b) reproducibility, c) responsiveness and d) interpretation Have an overview of the benefits of modern psychometric methods such as IRT and Rasch analyses Be able to explain the basics of Rasch analysis

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P265/05	Qualitative data analysis: Using Nvivo	Annesofie Lunde Jensen	25	1,2	<p>The students will learn how NVivo supports the qualitative study process from the beginning to the end. Having completed this course, the student will be able to use NVivo's most important functions:</p> <ul style="list-style-type: none"> Create projects Describe units of analysis relevant for the students own project Critical identify element (sources and cases) as a foundation for making queries Create memos, annotations and links Know how to use NVivo together with bibliographic software such as EndNote and RefWorks Code data in relation to different types of qualitative data analysis techniques Analyse data, visualise data analysis and make different kinds of queries Be able to explain and visualise the data analysis the students use in their own Ph.D.-project Know how to build models and make different kinds of graphic presentations and diagrams
P272/04	GIS in Health Sciences	Jörg Schullehner	12	2	<ul style="list-style-type: none"> Describe the basic concepts of GIS Identify the different types of spatial data Retrieve spatial data from open sources and own surveys and load them into a GIS program Design and apply simple spatial analyses and evaluate their results Present spatial data in appropriate maps
P1050/38 - part 1	Basic Biostatistics Part 1	Erik Parner	75	2,4	<ul style="list-style-type: none"> Document and handle data needed for a statistical analysis Chose a relevant statistical model for a given research question and evaluate the assumptions of the statistical analysis Perform a statistical analysis based on the chosen model Describe the results of the statistical analysis, and discuss the results in relation to the scientific question Make simple calculations of sample sizes for the planning of a comparative study
P1050/38 - part 2	Basic Biostatistics Part 2	Erik Parner	75	2,8	<ul style="list-style-type: none"> Document and handle data needed for a statistical analysis Chose a relevant statistical model for a given research question and evaluate the assumptions of the statistical analysis Perform a statistical analysis based on the chosen model Describe the results of the statistical analysis, and discuss the results in relation to the scientific question
P264/04	Public and patient involvement in health research	Annesofie Lunde Jensen	25	2,3	<ul style="list-style-type: none"> Summarise the theory and practice of PPI in the research cycle Assess different approaches of PPI relevance and applicability in various study designs Take an analytical and critical view on the processes and potential outcomes of PPI. Plan, apply, and evaluate PPI in own study.
A132/25	PhD supervision (supervisors)	Mette Krogh Christensen	20	0	<ul style="list-style-type: none"> Describe and give reasons for own supervision practice. Analyse and consider actual dilemmas in supervision. Identify and argue for individual choices in managing one's own supervisor role. Write a supervisory letter in order to explicate values and traditions in the researcher community. Apply communicative methods that underpin progression in the supervision meeting. Give constructive text feedback and thus promote the PhD-student's writing process. Describe and give reasons for the ways in which talent identification and talent development takes place in the supervisor's research environment. Adapt the rules and regulations of the Graduate School of Health. Discuss responsible conduct of research.

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A227/23	Research Presenter - Educational Informatics	Peter Musaeus	24	1,7	Apply rhetorical skills for preparing and delivering research presentations Use reflective skills in evaluating performance in academic and research presentations Produce and present effective scientific posters and talks Apply tools for giving and receiving feedback
A293/04	The PhD-student as supervisor for undergraduate students – how and when?	Mette Krogh Christensen	24	2	Discuss and reflect on requirements and responsibilities of different supervisor and co-supervisor roles, Provide feedback to undergraduate students' written or oral presentation in a way that facilitate the undergraduate students' learning process, and Acquire knowledge about undergraduate students' expectations and interests in order to balance supervisor's control and undergraduate students' own control of their projects
A294/04	The Reflective Teacher	Kamilla Pedersen	24	2,4	Describe the characteristics of student-centred teaching and learning. Describe the characteristics of reflective practice of teaching. Identify, evaluate and reflect on teaching elements in their own teaching in order to enhance student learning. Provide peer-feedback in teaching. Plan, conduct and evaluate a specified lesson including give reasons for learning outcomes, student activities and teacher role in the lesson. Develop a first draft towards a teaching portfolio.
A88/80	Struktureret litteratursøgning (FÅ)	Janne Lytoft Simonsen	24	0,3	To enable the participants to assess the relevance, strengths and weaknesses of different search methods. To enable the participants to build a search strategy and select relevant information sources and search terms. To make the participants familiar with the concept of reference management software in general and EndNote in particular.
A103/92, 93, 94	Basic Course in Written English -3 courses in the fall	Morten Pilegaard	25	2,6	Knowledge about guidelines and conventions governing the structuring of clinical research papers. Knowledge of principles of cohesion and thematic structure in research papers. Knowledge of some of the main differences between English and Danish syntax and grammar. Ability to describe typical structural and linguistic features of poster, abstract and paper. Ability to trace errors of syntax and grammar in English-language texts.
A125/53, 54	Advanced Course in Written English - 2 courses in the fall	Morten Pilegaard	20	2,6	Ability to use existing guidelines and conventions governing the structuring of clinical research papers. Ability to analyse and describe typical structural and linguistic features of poster, abstract and paper. Ability to apply principles of cohesion and thematic structuring in own texts. Ability to analyse and produce select text types. Ability to trace and correct errors of composition and grammar in English-language texts.
A127/17	Linear regression models for continuous and binary data	Morten Frydenberg	24	2,9	Apply both linear normal and binary regression methods Confidently read and understand the output of a regression analysis Understand and evaluate the assumptions behind the model Work with regression models that include interaction/effect modification Communicate the main results of a regression analysis and the assumptions behind these as a part of a paper

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A137/42	Literature search in medical databases (PhD)	Annette Balle Sørensen	24	0,3	<p>To enable the participants to perform qualified searches, systematic as well as citation searches, in relevant medical databases.</p> <p>To introduce the participants to methods of scientific quality measurements, thus enabling them to understand the basic principles of research evaluation.</p> <p>To present a brief overview of different aspects related to research publication such as ORCID, Forskerportalen.dk, Copyright etc.</p> <p>To introduce the basic concept of reference management programs in general and – if requested – to make the participants familiar with the specific reference management program EndNote. The lessons will alternate between theory and exercises at the computer.</p>
A297/03	Advanced R	Florian Franck Privé	25	1,4	<p>By the end of the course, participants should be able to:</p> <ul style="list-style-type: none"> Use RStudio with a better setup to be more efficient in their work Version their code with Git to keep track of changes in their code Understand more R as a programming language and write better, simpler code Manipulate and visualise data with the tidyverse and R Markdown Produce efficient R code Develop an R package
A1000/82, 83	Welcome to the PhD study - 2 courses in the fall	Graduate School Health	70	0	Introduction event for all newly enrolled PhD students at Health, Aarhus University.
A314/01	Introduction to Research Data Management, FAIR principles, and Open Access	Anne Vils and Annette Balle Sørensen	24	0,2	<ul style="list-style-type: none"> will understand the basic principles of RDM will know the different aspects of the research data lifecycle will know what constitutes a data management plan and be familiar with templates and specific tools for writing their own data management plan will know about FAIR principles and how to make their own datasets as FAIR as possible will know the different models of OA: gold, green, hybrid will be aware of potential OA requirements of funders