Catalogue of

Reesbe+ Courses

Feb. 2016

**Seminar Course with Scientific Writing, part I and II**

**Extent**

2,5 + 2,5 ECTS

**Objectives**

The main objective of the course is to train the doctoral student in communicative tasks and procedures encountered in doctoral studies and research. This includes various aspects of scientific writing, publication and presentation of research outcomes, as well as exercises and preparation for licentiate seminar and doctoral dissertation. Another objective is to provide a forum for the preparation of proposals of PhD projects.

**Contents**

Part 1:

* Spring 16: proposals of own project, literature search;
* Autumn 16: publication and reference management systems;
* Autumn 16: popular science writing;
* Spring 17: presentation and poster technique, and;
* Autumn 17: scientific writing and scientific conduct.

Part 2:

* Autumn 18: rehearsal before licentiate seminar;
* Spring 19: papers in process, oral presentation and opposition;
* Autumn 19: papers in process, oral presentation and opposition;
* Spring 20: papers in process, oral presentation and opposition, and;
* Autumn 20: rehearsal before doctoral dissertation.

The contents are preliminary and open to suggestions on thematic topics in participation with the companies.

**After completed course**

The doctoral student should:

* be able to use scientific databases to find relevant literature;
* demonstrate ability to critically, independently, and creatively, and with scientific accuracy identify and formulate research questions and to plan and use appropriate methods to conduct research and other advanced tasks within specified time frames and to review and evaluate such work;
* be able to critically review literature;
* be familiar with major reference management systems;
* demonstrate ability to provide proper poster presentations;
* be aware of scientific conduct;
* be able to make proper references and citations, and;
* be able to make oral presentations and oppositions with authority.

**Teaching format**

Seminars

**Course literature**

No compulsory course literature. The student has to independently search for information. Reference documents supporting particular areas will be provided in due time before the respective seminar.

**Examination**

Seminars

Oral presentation and opposition

Poster presentation

Presentation and opposition of drafted scientific papers

**Coordinator**

Per Jernberg

**Academy**

University of Gävle, Academy of Technology and Environment, Department of Building, Energy and Environmental Engineering

**Energy Systems**

**Extent**

7,5 ECTS

**Objectives**

The main objective of the course is to provide broad knowledge and a systematic thinking and understanding of energy systems, including the steps of conversion, distribution, and usage. Particular focus is put on energy efficiency together with the environmental and economic implications. Introduction of renewable energy in energy systems and the role of energy systems in the built environment are other major topics.

**Contents**

* Introduction to energy systems
* Energy in a systems perspective
* Energy systems – definition and examples
* Socio-technical energy systems
* Policy incentives in built environment
* Obstacles and drivers for energy efficiency
* A system perspective on energy and buildings
* Energy efficient neighbourhoods
* Energy efficient cities
* Solar energy in energy systems
* Some examples of renovation of Million programme buildings
* Energy and environmental aspects – problem shifting
* Users within the energy system
* Renewable energy in energy systems
* Environmental assessment of buildings
* Individual project works

**After completed course**

The doctoral student should:

* be able to explain and analyse the design, operation, and utilization of energy systems;
* demonstrate broad knowledge and a systematic understanding and thinking within the research area energy systems, particularly regarding energy efficiency, sustainability, and environmental issues, and;
* demonstrate an understanding of the possibilities and limitations of energy systems, their role in the built environment, the responsibility for how they are used, and future needs.

**Teaching format**

Lectures, seminars, and study visits. The language may vary between English and Swedish.

**Course literature**

The literature will consist of different kinds of handouts delivered during the course.

**Examination**

Examination of individual project work 1, oral presentation

Examination of individual project work 2, oral presentation

Written exam

**Coordinator**

Mathias Cehlin

**Academy**

University of Gävle, Academy of Technology and Environment, Department of Building, Energy and Environmental Engineering

**Quantitative and qualitative methods**

**Extent**

10 ECTS

**Objectives**

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**Contents**

* Quantitative (psychometrics, experimental methodology, survey methodology) and qualitative (interview, hermeneutical analysis) methods and tools
* Basic and advanced statistical analysis tools
* Computerized tools for statistical analysis

**After completed course**

The doctoral student should:

* demonstrate familiarity with scientific methodology in general and in a specific research area in particular.

**Teaching format**

Lectures and seminars

**Course literature**

* David Howell (latest edition). Statistical Methods for Psychology. Wadsworth Publishing. P. 792
* Julie Pallant (latest edition). The SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM Spss. Open University Press. P. 368
* Michael Q. Patton (latest edition). Qualitative research and evaluation methods. London: Sage

**Examination**

Written and oral exam

**Coordinator**

Marina Heiden

**Academy**

University of Gävle, Academy of Health and Working Life, Department of work- and public health science, CBF – Centre for Musculoskeletal Research

**Business for Sustainability**

**Extent**

5 ECTS

**Objectives**

The course aims to provide a deeper understanding of theoretical perspectives and a deeper ability to critically analyze and evaluate data related to sustainable development. The course will also impart a thorough knowledge of the work on environmental and social issues in business. The aim is that the student after completing the course should have the ability to, within the working life, actively address issues with respect to sustainable development.

**Contents**

The course covers concepts such as sustainable development, CSR, green business, key stakeholders and their views on corporate responsibility and critical perspectives on corporate environmental and social commitments.

**After completed course**

The doctoral student should be able to:

* demonstrate an understanding of the theoretical perspectives in relation to sustainable development;
* demonstrate in-depth knowledge of the work on environmental and social issues in business, and;
* on a scientific basis, critically analyze and evaluate information related to sustainable development.

**Teaching format**

Lectures, seminars, and tutorials

**Course literature**

* Guziana B. (2013). Corporate greening. Product and Production Perspectives. Doctoral Thesis 137, Mälardalen University Press

**Examination**

Assignments

**Coordinator**

Bozena Guziana

**Academy**

Mälardalen University, School of Business Society and Engineering, Division of Natural and Environmental Science

**Energy Systems Optimisation and Simulation**

**Extent**

7,5 ECTS

**Objectives**

The aim of this course is to present different computerized tools for analysing industrial energy systems, building energy systems, municipal energy system, national energy systems and district heating systems from a system perspective. Environmental and economical impacts of the analysed energy systems will be covered.

**Contents**

By means of optimisation and simulation programs, the design and possible changes of energy systems in the areas of buildings, industries, and municipal/regional energy systems are studied and analysed in respect of:

* Energy supply
* Energy use
* Energy efficiency
* New investment
* Load management
* Change of energy carrier

**After completed course**

The doctoral student should be able to:

*Knowledge and comprehension*

* present methods for energy system analysis;
* present the principles of the programs that are provided in the exercises;
* describe the system implications of energy management measures;
* describe the system implications of supply measures;

*Skills and abilities*

* use simulation and optimisation tools for the analysis of energy systems;
* find limitations and prerequisites when the program is used;
* assess and analyse the results from the program and perform sensitivity analyses;
* plan and, using appropriate methods, undertake a project within predetermined time frames;
* in writing report their project work and discuss their conclusions and the knowledge and arguments on which they are based;

*Judgement and approach*

* demonstrate awareness of ethical aspects of research and development work;
* make assessments informed by disciplinary issues related to the course content, and;
* make assessments informed by social issues related to the course content.

**Teaching format**

Lectures and project work/computer labs

**Course literature**

The course literature will be available on Blackboard ([www.lms.se](http://www.lms.se)).

**Examination**

Project work

**Coordinator**

Nawzad Mardan

**Academy**

University of Gävle, Academy of Technology and Environment, Department of Building, Energy and Environmental Engineering

**Philosophy of Science**

**Extent**

5 ECTS

**Objectives**

The overall aim is to provide students with the opportunity to systematically reflect on their own research in a broader philosophical and epistemological perspective, and also to raise awareness of the general methodological issues. Key issues and problems concerning the nature of scientific knowledge will be discussed and addressed in seminars.

**Contents**

* Central concepts in philosophy of science (theory, hypothesis, determinism, induction, deduction, paradigm, etc.)
* Ontological perspectives – idealism, materialism and related perspectives
* Epistemological perspectives – empiricism, rationalism and related perspectives
* Perspectives on philosophy of science – logical positivism, hermeneutics and related perspectives
* Research ethics

**After completed course**

The doctoral student should be able to:

*Knowledge and comprehension*

* describe the meaning of concepts central to philosophy of science
* demonstrate familiarity with perspectives within the philosophy of science generally and within a specific research field specifically
* state for the relation between various perspectives of philosophy of science and scientific methods

*Skills and abilities*

* discuss central issues in philosophy of science
* show ability to conduct analyses grounded in philosophy of science, make syntheses and independently and critically examine hypotheses, theories and explanations

*Judgement and approach*

* make research ethical judgments
* demonstrate advanced insight into science's possibilities and limitations, its role in society and people's responsibility for how it is used.

**Teaching format**

Lectures and seminars

**Course literature**

* Bem, S., & De Jong, H. L. (latest edition). Theoretical issues in psychology: An introduction. Sage Publications Ltd
* Chalmers, A. F. (latest edition). What is this thing called science? An assessment of the nature and status of science and its methods. Open University Press
* Mark Israel (latest edition). Research Ethics and Integrity for Social Scientists. SAGE
* Rosenberg, A. (latest edition). Philosophy of science: A contemporary introduction. Routledge

*Reference literature:*

* Kjellberg Anders & Sörqvist Patrik (latest edition). Etiska synpunkter på experiment med människor. Experimentell metodik för beteendevetare (s. 287–294). Lund: Studentlitteratur
* von Wright Georg Henrik (latest edition). Vetenskapen och förnuftet. Albert Bonniers Förlag

**Examination**

Written examination and oral examination

**Coordinator**

Patrik Sörqvist

**Academy**

University of Gävle, Academy of Technology and Environment, Department of Building, Energy and Environmental Engineering

**Advanced Measurement Techniques for Building Energy and Indoor Climate**

**Extent**

5 ECTS

**Objectives**

The course deals with practical measurement techniques in the area of energy and fluid mechanics, with particular reference to energy consumption of buildings and factors in the indoor environment that affect health, comfort, and working performance of people.

**Contents**

The main measurement items are:

* temperature (incl. IR-thermography);
* pressure;
* fluid flow rate;
* air velocity and flow visualization;
* thermal comfort;
* building tightness and air leakage;
* air change rate (tracer gas techniques);
* wind effects on buildings and power stations;
* humidity and moisture in buildings;
* power and energy consumption of electrical appliances, and;
* instrument calibration and uncertainty.

**After completed course**

The doctoral student should:

* be able to give an account of the measurement techniques dealt with in the course regarding
	+ underlying physics
	+ essential technical functioning of measurement instruments, and;
	+ applicability and limitations;
* show practical ability regarding the measurement methods and instruments dealt with in the laboratory work of the course;
* be able to calculate and present the uncertainty of measurement results in accordance with international standards;
* be able to suggest appropriate measuring strategies for practical cases;
* be able to present results of laboratory experiments orally and in written reports according to international scientific practice, and;
* be able to evaluate and critically discuss measurement reports in view of method and uncertainty aspects.

**Teaching format**

Lectures of the course include measurement theory as well as demonstration and practical handling of a diversity of measurement equipment. At the end of the course, five laboratory works will be performed. Results of the laboratory works will be evaluated in groups and discussed at a concluding seminar.

**Course literature**

The literature will consist of different kinds of handouts delivered during the course.

**Examination**

Examination includes fulfilled assignments and active participation on the following items:

Laboratory work 1, 1 ECTS

Laboratory work 2, 1 ECTS

Laboratory work 3, 1 ECTS

Laboratory work 4, 1 ECTS

Laboratory work 5, 1 ECTS

**Coordinator**

Magnus Mattsson

**Academy**

University of Gävle, Academy of Technology and Environment, Department of Building, Energy and Environmental Engineering

**Solar Thermal Design**

**Extent**

7,5 ECTS

**Objectives**

The course aims to provide a practical understanding of solar thermal systems and components used in solar systems and also provide an understanding of how different design parameters influence the system performance and functionality. In the course, the student will, among other things, design and dimension a solar heating system. The aim is that the student after completing the course should have the ability to design effective and efficient solar installations.

**Contents**

The course is project based. The course starts with lectures on solar thermal systems, their function and integration into existing heating systems, after which students are introduced to the case study (project). Students will then calculate the load for the case.

The next step is to learn about the simulation program Polysun. Students independently choose a suitable system design and then use that design in Polysun. By using parametric studies the students calculate the dimensions of the system and present their results at an evaluation seminar.

The last part of the course consists of making a detailed design of the complete system including choice of pumps, valves, arrangement of collector field, choice of method to protect against overheating , calculating the dimensions of the system and submitting a written report of their conclusions.

**After completed course**

The doctoral student should be able to:

* independently size a solar heating system;
* show understanding of the various methods for protecting the system from damage due to frost and overheating as well as be able to choose the most suitable method for a specific application;
* design collector fields;
* use simulation tools to calculate the energy gain of a solar thermal system;
* analyze the function and characteristics of different types of solar thermal systems, and;
* evaluate the influence of different design and operational parameters on solar thermal systems.

**Teaching format**

Lectures, exercises, assignment, seminar. The course is given in English.

**Course literature**

* Duffiee, John A., Beckman, William A. (2006) Solar engineering of thermal processes. 3rd ed. Hoboken, NJ: Wiley. (908 s). ISBN 0-471-69867-9
* Compendium from the department: Bales, C., Persson, T., Fiedler, F. Perers, B. Zinko, H. Solar heating systems and storage compendium, SERC, Högskolan Dalarna

**Examination**

Written homework assignment 1, 2 ECTS

Written homework assignment 2, 1,5 ECTS

Simulation assignment 3, 3 ECTS

Written individual homework assignment 1, 1 ECTS

**Coordinator**

Tomas Persson

**Academy**

Dalarna University, School of Technology and Society, Energy and Environmental Technology

**Design of PV and PV Hybrid Systems**

**Extent**

7,5 ECTS

**Objectives**

The course aims to provide a practical understanding of PV and hybrid systems and their components, and also provide an understanding of how different design parameters influence the system performance and functionality. In the course, the student will, among other things, design and dimension a PV or hybrid system. The goal is that the student after completing the course should have the ability to design effective and efficient PV and hybrid systems.

**Contents**

The course deals with electricity production using photovoltaic modules in off-grid, grid-connected and hybrid systems, which also include other types of electricity generators, especially wind power and diesel generators. The course is comprised of the sizing and designing of components and complete PV- and hybrid systems. The students will use the computer simulation and design programs PVsyst and Homer. The final segment of the course will cover system analysis and evaluations. Project planning will also be covered in portions of the course.

**After completed course**

The doctoral student should be able to:

* select components for PV- and hybrid systems for electricity generation;
* describe the main types and concepts of PV- and hybrid systems;
* independently size PV systems based on basic design procedures and calculations;
* have a good command of computer programs for sizing, optimization, and performance studies of commonly used types of PV- and hybrid systems;
* critically analyze and evaluate sizing and performance of components and complete PV- and hybrid systems, and;
* describe environmental and socio-economic aspects of PV- and hybrid systems.

**Teaching format**

Lectures, exercises and project work

**Course literature**

* Deutsche Gesellschaft für Sonnenenergie. (2007) Planning and installing photovoltaic systems: a guide for installers, architects, and engineers. 2 uppl. Earthscan. ISBN 1844074420
* Green, M. A., Watt, M. E., Wenham, S. R., Corkish, R. (2007) Applied photovoltaics. 2 uppl. London: Earthscan. (323 s). ISBN 978-1-84407-401-3

**Examination**

Written assignments of the project 4,5 ECTS

Written exam 3 ECTS

**Coordinator**

Frank Fiedler

**Academy**

Dalarna University, School of Technology and Society, Energy and Environmental Technology

**Sustainable Innovation Processes and Systems**

**Extent**

7,5 ECTS

**Objectives**

This course focuses on concepts and methods for developing and managing sustainable innovation processes both within organisations and in collaboration between organisations.

**Contents**

Theories on sustainable innovation processes and systems:

* types of innovation and innovation processes;
* innovation management;
* technology strategies;
* sustainable innovation: continuous innovation and innovation driven by sustainability;
* knowledge in integration and innovation, and;
* open innovation.

Innovation in practice:

* examples of innovation processes and systems in practice;
* regional innovation systems;
* globalization of innovation, and;
* innovators in emerging economies.

**After completed course**

The doctoral student should be able to:

* describe, contrast and critically assess different concepts and methods for developing and managing sustainable innovation processes and systems;
* identify and analyse how sustainable innovation is applied and managed in organisations in different industries;
* apply relevant innovation concepts and methods for analysing and suggesting improvements in one organisation or a group of organisations, and;
* write a scientific paper on the topic.

**Teaching format**

The course is based on lectures, seminars, and supervision. It is organised in four two-day seminars, which combine lectures of academics and practitioners with analysis of literature. Prior to the seminars the student provides an analysis of the recommended literature. The final paper is presented and defended at a concluding literature seminar. The student is also active as opponent in this seminar.

**Course literature**

A literature list is provided at course start.

**Examination**

Literature reviews and active participation in seminars, 3 ECTS (A, B, C, D, E, and F (FX))

Final paper including presentation and opposition, 4,5 ECTS (A, B, C, D, E, and F (FX))

**Coordinator**

Lars Bengtsson

**Academy**

University of Gävle, Academy of Technology and Environment, Department of Industrial Development, IT and Land Management

**Energy Efficient Buildings**

**Extent**

7,5 ECTS

**Objectives**

This course will provide a sound knowledge regarding building technology and building services engineering (HVAC) that contribute to a low demand for purchased energy to buildings. The course will also provide additional knowledge regarding building physics, ventilation technology, and indoor climate, etc. that provide a better understanding of building-related problems of various kinds, in order to apply technologies that will contribute to both energy efficient and healthy buildings.

**Contents**

Calculations of the energy balance of buildings without available software, primarily monthly calculations for one-family houses. Building and HVAC technology for extremely energy efficient buildings, e.g. passive houses. Experiences from existing extremely energy efficient buildings. Building technology with respect to moisture, etc. Investigations and calculations relating to moisture problems. Building materials. Mould. Radon. Building acoustics. Energy efficiency and healthy buildings – potential contradictions. Building planning for healthy and energy efficient buildings. Thermal indoor climate. Indoor air quality. Building related problems (sick building syndrome – SBS), health issues. Ventilation requirements and design with different methods. Possibilities and limitations of different ventilation systems. Ventilation efficiency. Air filters. Electric efficiency of fans, pumps, etc. Energy saving by means of heat exchangers, heat pumps, and solar collectors.

**After completed course**

The doctoral student should:

* demonstrate ability to calculate the energy balance of buildings without the help of available energy calculation programs (existing software);
* be able to evaluate different possibilities to save energy with measures regarding both building technology and building services engineering in both new and existing buildings;
* be able to assess the existence of a potential conflict between energy conservation and indoor climate for different energy saving measures;
* independently and critically be able to both analyze and interpret results relating to energy and indoor climate in buildings based on both measured values as well as calculations, and;
* demonstrate ability to work independently to investigate energy and indoor climate issues of buildings and to present the results both orally and in writing in a well-prepared technical report.

**Teaching format**

Lectures, supervision (tutorials), study visits, seminars, and presentations. Written and oral presentations, study visits, seminars, opposition and some supervision are compulsory.

**Course literature**

Electronically available documents

**Examination**

Written exam (grade 3, 4, or 5)

**Coordinator**

Robert Öman

**Academy**

Mälardalen University, School of Business Society and Engineering, Department of Energy, Building and Environment

**Tips on courses from PhD students**

**Sustainable economy**

<http://www.handels.gu.se/english/education/master/graduate-school/msc-programmes/programmes-2013-2014/specializations/environmental-sustainability/>

<http://www.kth.se/student/kurser/kurs/MJ2350?l=en>