

Study Program

Program

Methods and Tools

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Organization

Modules and Courses - Organization of the Program

In the image below, program modules are represented by colored rectangles.

Mathematical Methods and Software Tools

There are a many diverse tasks in energy technology and energy economics that require the application of mathematical methods. Finding optimal solutions for complex problems with multiple objectives is greatly aided by the use of advanced software tools. For this reason students are trained to use the computer algebra tool EES (Engineering Equation Solver) at the very beginning of their ECM studies. EES is applied to solve the large sets of equations that occur when balancing energy systems (e.g. as required in Energy Systems 1 (Module ECM-05). Every student receives a copy of EES, which is used throughout the study program. Additionally, as EES also provides a powerful property database, it can be effectively used for thermodynamic analysis (see screenshot).

Statistics and data analysis are applied e.g. when analyzing the fluctuating energy availability of renewable energies (see the example of wind velocity over time and the respective velocity distribution, taken from a lecture about hydro and wind power). Statistics also play a major role on the demand side, as for example when demand patterns are analyzed in order to develop forecast models. Such forecast models are the basis for optimization, a part of operation research that is covered extensively in Energy Economics 2.

Special attention is given to the dynamic behavior of energy systems. Within the ECM program, methods are investigated for developing various mathematical models of energy systems, usually as sets of differential-algebraic equations. Following that, techniques for solving such problems with software tools are introduced. Each student receives a copy of the powerful Dymola software and uses it to solve various problems. The screenshot shows an example of an energy system with a boiler, heat exchanger, pumps, and volumes that was developed by students.

Within the module "Project Planning of Energy Facilities" the applied tool chain of the process from project idea, through first design, to realization and operation is discussed.

Study Regulations

Every study program at Offenburg University is defined and regulated as described in:

"Regulations concerning Study and Examinations (RSE) of Offenburg University".

Some of the topics covered are:

- ▮ Regular periods of study and structure of study
- ▮ Modular Structure of Studies
- ▮ Loss of Admission to the Degree Program, loss of the right to take
- ▮ Examinations, Deadlines
- ▮ General Rules of Admission
- ▮ Examination Requirements
- ▮ Oral Examinations

- Seminar Papers and other written Assignments
- Evaluation of Examination Results
- Omission, Withdrawal, Deception, Irregularities
- Passing and Failing an Examination

These study regulations consist of a general part and a special part. The general part of the study regulations covers the topics common to all the Master's programs. Each individual Master's program has a special part that explains the regulations specific to its program. For legal purposes, only the German version is binding. The link to both the general and the ECM specific parts of the study regulations are provided below:

[ECM study regulation: general and specific part](#)

Organization of Studies

Courses are conducted in English for the first two semesters (ECM-S-1, ECM-W-1). Courses during the remaining two semesters (ECM-S-2, ECM-W-3) will be conducted in either German or English.

The modules are structured according to following table. The choice of modules will provide students with an overview on various topics in power engineering, power engineering and energy management. The names are specified in the table below.

The course (expected progression) of the ECM study program is described in the "Studium", "Studien- und Prüfungsordnungen". These study regulations consist of a general part and a special part. The general part of the study regulations covers the topics common to all the masters programs. Each individual masters program has a special part that explains the regulations specific to its program. For legal purposes, only the German version is binding. Links to both the general and the ECM specific parts of the study regulations are provided below:

Study Regulations relevant to ECM (Mainly German)