Course memo 2025

The latest news can be found on Canvas (canvas.kth.se). It is also possible to contact the involved teachers:

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Assistance with administrative matters, such as course registration, is managed by the student service desk:

- **Web:** KTH | EECS | Contact
  https://www.kth.se/en/eecs/kontaktt
- **Service Center Borggården:** Lindstedtsvägen 3, floor 4 (open Mo-Fr 9:00–15:00)
- **Service Center Q:** Malvinas väg 10, entrance hall (open Mo-Fr 9:00–15:00)

Learning Outcomes

The course covers planning models for electricity producers and other players in the electricity market. The participants ·will learn to formulate planning problems and to use appropriate software for solving the problems and analysing the results.

After passing the course, the student should be able to

- formulate, solve and analyse the results of short- and long-term planning problems for electricity producers and other players in power systems with large part continuously varying electricity generation (for example wind power),
- give a short oral presentation (both individually and in groups) of the solution to a power system planning problem.

Course Registration

In order to access the course on Canvas you need to be registered on the course. Most students can register themselves through their personal KTH menu. Contact student service if there is any problem.

Learning Activities

In order to fulfil the learning objectives of the course, students will have to put some effort into their studies. You can to a large extent decide yourself how to organise your studies, but it is of course important that you plan your work so that you can complete the examination (see below) on the available times.

The following learning activities are offered in the course:

- **Lectures.** The lectures present the most important theory as well as practical examples. There are also ready-made lecture notes for most of the lectures as well as recorded lectures.[1] Lecture

Table 1 Schedule for the lectures.

Lecture	Time and place	Topics	Compendium
Introduction	Tuesday 14 January, 10–12, H1	Course organisation.	–
L1	Wednesday 15 January, 13–15, H1	Linear programming.	A
L2	Friday 17 January, 13–15, H1	LP model of hydro power plants.	6
L3	Tuesday 21 January, 10–12, H1	LP model of thermal power plants. Additional modelling. Dual variables.	6
L4	Wednesday 22 January, 13–15, H1	Short-term planning problems in GAMS.	A
L5	Thursday 23 January, 13–15, H1	Solving and analysing power system planning problems.	A
Reserve	Friday 24 January, 13–15, H1		
L6	Tuesday 11 February, 10–12, H1	Stochastic programming.	A
L7	Friday 14 February, 13–15, H1	Introduction. Uncertain prices.	7
L8	Tuesday 18 February, 10–12, H1	Examples of stochastic short-term planning problems.	7
L9	Wednesday 19 February, 13–15, H1	Scenario generation. Risk management.	7
Reserve	Friday 21 February, 13–15, H1		
L10	Tuesday 18 March, 10–12, H1	Dynamic programming. Optimality conditions.	A
L11	Wednesday 19 March, 13–15, H1	Examples of long-term planning problems	8
L12	Friday 21 March, 13–15, H1	The water value method (deterministic)	8
L13	Monday 24 March, 10–12, H1	The water value method (stochastic)	8
Reserve	Tuesday 25 March, 10–12, H1		
L14	Tuesday 8 April, 10–12, H1	Simulation models.	–
L15	Thursday 10 April, 13–15, H1	Simulation models.	–
L16	Friday 11 April, 13–15, H1	Simulation models.	–
Reserve	Wednesday 16 April, 10–12, H1		

notes and recorded lectures are found on the course web page.

Please notice that lectures marked "Reserve" will not be used unless another occasion has been cancelled. Information about changes in the schedule can be found on the course web page.

- **Lecture assignments.** The lecture assignments are small problems that are solved during the lectures. The idea behind these assignments are that you should get an opportunity to master the basic definitions and calculation methods that are required to pass the course. What is important is therefore not to answer these questions correctly, but to learn something from them (preferably in cooperation with your fellow students). The lecture assignments are therefore not part of the examination in the course.
- **Self-study.** The most important literature in this course are the lecture slides. In addition to the slides, there is also some additional reading on the course web page and an exercise booklet.

1. Please notice that the recorded lectures are not updated annually and there can therefore be minor differences between the lecture notes and the recorded lectures.

Support for Students with Disabilities

Students at KTH with a permanent disability can get support during studies from Funka (see https://www.kth.se/en/student/stod/studier/funktionsnedsattning/funka). Please inform the course coordinator if you have special needs not related to the written exam, and show your certificate from Funka.

- Support measures under code R (i.e. adjustments related to space, time, and physical circumstances, e.g. longer writing time) are always granted.
- Support measures under code P (pedagogical measures) may be granted or rejected by the examiner after you have applied for this in accordance with KTH rules. Support measures under code P are usually always granted for courses given at EECS.

Examination

The examination of this course is divided in multiple parts: seminars (SEM1), project assignment I (PRO1) and project assignment II (PRO2). Students are required to have a Pass grade on the seminars and at least the grade E on project assignment I in order to receive a final grade. The final grade will be equal to the highest grade from project assignments I and II respectively.

The examination includes two types of problems:

- **Basic problems.** The problem text is relatively short and there is a direct question. The problems may include calculations, short theoretical questions and multiple choice questions.
- **Advanced problems.** The problem text is relatively long. The student will have to identify the problem from the text, choose an appropriate solution method and be able to discuss the conclusion of the results.

The grading criteria are shown in table 2. Familiar problems refers to problems that have been explained in lectures, course literature or seminars. New problems refers to problems that can be solved using methods explained in the course, but which have not yet appeared in the course. Moreover, new advanced problem may require that the students have to adjust models and methods in order to apply them on the problem and that they can see the connection between different topics of the course. Advanced problems may also intentionally be formulated so that there are more than one possible solution; thus, not only the solution itself but also the motivation for the chosen solution will be evaluated.

Table 2 Grading criteria.

Grade	Requirement	Examination
E	• Ability to solve advanced but familiar problems for both deterministic and stochastic short-term planning as well as long-term planning. • Ability to give a short oral presentation of power system planning problems and to discuss the solutions with other students.	Project assignment I (II, comp) Seminars
D	As for E, as well as very good ability to solve advanced but familiar power system planning problems.	Project assignment I (II)
C	As for E, as well as very good ability to solve advanced but familiar problems for both deterministic and stochastic short-term planning as well as long-term planning.	Project assignment I (II)
B	As for E, as well as ability to solve new advanced power system planning problems.	Project assignment II
A	As for E, as well as very good ability to solve new advanced power system planning problems.	Project assignment II

Seminars

There will be four seminars during the course. There is one problem (with multiple questions) for each seminar. The questions include a mix of familiar basic and advanced problems on deterministic and stochastic short-term planning, long-term planning and simulation models.

The total score for the seminars is 60 points and you need at least 54 points to pass. The points are

valid during the spring semester. If you have not completed the seminars at the end of the semester then you will have to redo them from the beginning next academic year. Hence, if you are at the end your studies and want to get your degree later this academic year then it is important that you plan your studies so that you can complete the seminars in time.

The rules for the seminars are as follows:

- **Group.** Problems 1–3 may be solved in groups of up to four students. Students may choose themselves who to work with and you do not need to register your group in Canvas. Problem 4 is solved in groups of three or more students and the groups are decided by the teachers. There will be an announcement in Canvas when the groups have been created.
- **Solution.** The problems should be solved according to the EECS code of honour (see https://www.kth.se/en/eecs/utbildning/hederskodex/inledning). Please notice that each group should solve the assignment on their own and it is not allowed to cooperate with anyone else. However, it is allowed to ask teachers, other students or to use generative AI to get advice on how to solve a small part of a problem (for example to troubleshoot code). It is also allowed to compare numerical results with other groups.
- **Preparation.** The solution should be explained in slides. The slides do not need to be submitted in advance. The front page of the solution should state the name of all group members, the course code (EG2240) and the date when the report was prepared. The text, figures and tables in the slides must include sufficient detail that the argument and calculations can be easily followed also for someone who is not attending the presentation. The principles of calculations that are performed in Matlab or any other software must be described in the slides.

  The slides for problem 4 should be uploaded in Canvas using the "Assignments" section. The deadline for submitting the presentation is Tuesday 6 May at 8:00.
- **Presentation.** The solutions are presented in seminars. The schedule for the seminars are shown in table 3. The number of participants is limited in each seminar; therefore, each student has to sign up for the seminars in advance using the calendar function in Canvas. All group members do not need to attend the same seminar for problems 1–3.

  In seminar 4, students sign up as groups. The number of groups that can present in each seminar is limited; therefore each group has to sign up for the seminar in advance using the calendar function in Canvas. All group members are expected to participate in the same presentation; however, if there are special circumstances that prevent a student from attending then it is also possible to present the work alone in a repetition seminar.
- **Score.** Students get points for the questions which they are prepared to present in the seminar. It should be noted that the presented solution does not have to be completely correct. To pass a presentation it is sufficient that the student shows that he or she is able to discuss the solution with other students and the teaching assistant. This means that the student must be able to explain why he or she decided to solve the problem in a particular way and to explain all details in the solution, such as for example how input values have been chosen or why a particular formula has been used. The student should also be able to compare his or her solution to alternative solution methods suggested by the other participants and discuss which method that should be used.

  Please notice that group members who are not active during the presentation of problem 4 will not receive any points.

At the beginning of the seminar each student states which questions he or she is ready to present. It is the responsibility of the student to make sure that their participation in the seminar is recorded in the attendance list organised by the teaching assistant. The ordinary seminars comprise a given selection of questions, as shown in the schedule above. For each question, the course assistant chooses[2] which student that is giving his or her presentation. If there is time left, several students may present the same question. The repetition occasions can be used to present those questions that the student has been skipped earlier or have failed to present. For each participating student, the course assistant then chooses[3] one or more questions to present.

If a student has passed all presentations during a seminar (or if the student is not selected to present) then points will be rewarded for all questions that the student was prepared to present. However, if a

2. The selection is done almost, but not quite entirely, randomly.
3. This selection is also done almost, but not quite entirely, randomly.

Table 3 Schedule for the seminars

Seminar	Problem	Time and place
Ordinary	1	Tuesday 28 January, 13:15–15:00, Zoom Tuesday 28 January, 15:15–17:00, Zoom Wednesday 29 January, 13:15–15:00, Zoom Wednesday 29 January, 15:15–17:00, Zoom
Ordinary	2	Tuesday 25 February, 13:15–15:00, Zoom Tuesday 25 February, 15:15–17:00, Zoom Wednesday 26 February, 13:15–15:00, Zoom Wednesday 26 February, 15:15–17:00, Zoom
Ordinary	3	Thursday 27 March, 13:15–15:00, Zoom Thursday 27 March, 15:15–17:00, Zoom Friday 28 March, 8:15–10:00, Zoom Friday 28 March, 13:15–15:00, Zoom
Ordinary	4	Wednesday 7 May, 10:15–12:00, Dahlander room Wednesday 7 May, 13:15–15:00, Velander room Thursday 8 May, 13:15–15:00, Dahlander room Thursday 8 May, 15:15–17:00, Dahlander room
Repetition	1–4	Will be decided according to the need

student fails at least one oral presentation, no points at all will be rewarded for this seminar, regardless of which other questions that the student have been prepared to present!

Project assignment I

The first project assignment is mandatory and can yield the grades C–E if completed successfully. The problems are familiar advanced problems on deterministic and stochastic short-term planning as well as long-term planning.

The total score of project assignment I is 50. To pass the project assignment, students must receive at least 10 points for each problem. Students who in addition to this receives at least 38 points will get the grade D and students who receive at least 45 points will receive the grade C.

The rules for project assignment I are as follows:

- **Group.** The problems may be solved individually or by a group of two students. Students may choose themselves who to work with, but students are requested to set up their group in Canvas using the “People” section.
- **Solution.** The problems should be solved according to the EECS code of honour (see https://www.kth.se/en/eecs/utbildning/hederskodex/inledning). Please notice that each group should solve the assignment on their own and it is not allowed to cooperate with anyone else. However, it is allowed to ask teachers, other students or to use generative AI to get advice on how to solve a small part of a problem (for example to troubleshoot code). It is also allowed to compare numerical results with other groups.
- **Preparation.** The solution should be explained in slides. The slides should be uploaded in Canvas using the “Assignments” section. There are two Canvas assignments for each problem: one for the slides themselves and one for additional program code. The deadlines for submission are shown in table 4.

  The front page of the solution should state the name of all group members, the course code (EG2240) and the date when the report was prepared. The text, figures and tables in the slides must include sufficient detail that the argument and calculations can be easily followed *without an oral explanation*. The principles of calculations that are performed in Matlab or any other software must be described in the slides.
- **Defence.** Each group member must orally defend the group’s solution. Sign up for a defence time using the calendar function in Canvas. Notice that you sign up as a group, but that each group member will have to explain the solution individually (while the other group member is waiting).
- **Score.** The solutions will be marked in Canvas. There will be a score reduction for errors in the presented solutions. However, students will not receive any score for a problem if they did not

attend the defence or if they cannot respond well enough to the course assistant's questions about how they have solved the problem.

Table 4 Schedule for project assignment I.

Problem	Release date	Deadline for submission
1	Thursday 30 January	Thursday 6 February, 8:00 am.
2	Thursday 27 February	Thursday 6 March, 8:00 am.
3	Friday 28 March	Friday 4 April, 8:00 am.

Project assignment II

The second project assignment is voluntary and can yield the grades A to E if completed successfully. The total score of the project assignment II is 50. Students who receive at least 40 points will get the grade A and students who receive at least 30 points will receive the grade B. Students who do not get at least 30 points in project assignment II can get the grades C–E by combining the results from both project assignments. For each problem, the student may count the best score from project assignments I and II respectively. The combined score will then be compared to the grading scale for project assignment I.

The rules for project assignment II are as follows:

- **Group.** The problems may be solved individually or by a group of two students. Students may choose themselves who to work with, but students are requested to set up their group in Canvas using the "People" section.
- **Solution.** The problems should be solved according to the EECS code of honour (see https://www.kth.se/en/eecs/utbildning/hederskodex/inledning). Please notice that each group should solve the assignment on their own and it is not allowed to cooperate with anyone else. However, it is allowed to ask teachers, other students or to use generative AI to get advice on how to solve a small part of a problem (for example to troubleshoot code). It is also allowed to compare numerical results with other groups.
- **Preparation.** The solution should be explained in slides. The slides should be uploaded in Canvas using the "Assignments" section. There are two Canvas assignments for this project assignment: one for the slides themselves and one for additional program code. The deadline for submission is Friday 23 May, 8:00.

  The front page of the solution should state the name of all group members, the course code (EG2240) and the date when the report was prepared. The text, figures and tables in the slides must include sufficient detail that the argument and calculations can be easily followed *without an oral explanation*. The principles of calculations that are performed in Matlab or any other software must be described in the slides.
- **Defence.** Each group member must orally defend the group's solution. Sign up for a defence time using the calendar function in Canvas. Notice that you sign up as a group, but that each group member will have to explain the solution individually (while the other group member is waiting).
- **Score.** The solutions will be marked in Canvas. There will be a score reduction for errors in the presented solutions. However, students will not receive any score for a problem if they did not attend the defence or if they cannot respond well enough to the course assistant's questions about how they have solved the problem.

Complementary project assignment

The complementary project assignment is only intended for students who have not yet received a passing grade from project assignments I and II. This assignment can yield the grade E if completed successfully. The problems are familiar advanced problems on deterministic and stochastic short-term planning as well as long-term planning.

In order to pass the complementary project assignment you need to get at least 10 points for each problem (1–3). The score for each problem will be the maximal score of the corresponding problem from project assignment I, II and this assignment. Thus, if you already have at least 10 point for one

problem in either project assignment I or II then you can skip the corresponding problem in this project assignment.

The rules for the complementary project assignment are as follows:

- **Group.** The problems may be solved individually or by a group of two students. Students may choose themselves who to work with, but students are requested to set up their group in Canvas using the "People" section.
- **Solution.** The problems should be solved according to the EECS code of honour (see https://www.kth.se/en/eecs/utbildning/hederskodex/inledning). Please notice that each group should solve the assignment on their own and it is not allowed to cooperate with anyone else. However, it is allowed to ask teachers, other students or to use generative AI to get advice on how to solve a small part of a problem (for example to troubleshoot code). It is also allowed to compare numerical results with other groups.
- **Preparation.** The solution should be explained in slides. The slides should be uploaded in Canvas using the "Assignments" section. There are two Canvas assignments for this project assignment: one for the slides themselves and one for additional program code. The deadline for submission is Monday 18 August, 8:00.

  The front page of the solution should state the name of all group members, the course code (EG2240) and the date when the report was prepared. The text, figures and tables in the slides must include sufficient detail that the argument and calculations can be easily followed *without an oral explanation*. The principles of calculations that are performed in Matlab or any other software must be described in the slides.
- **Defence.** Each group member must orally defend the group's solution. Sign up for a defence time using the calendar function in Canvas. Notice that you sign up as a group, but that each group member will have to explain the solution individually (while the other group member is waiting).
- **Score.** The solutions will be marked in Canvas. There will be a score reduction for errors in the presented solutions. However, students will not receive any score for a problem if they did not attend the defence or if they cannot respond well enough to the course assistant's questions about how they have solved the problem.

Course Evaluation Committee

To evaluate and improve the course, we need a few students who are willing to participate in the course evaluation committee. The committee is meeting shortly after the ordinary exam. In connection with this meeting, the Division of Electric Power and Energy Systems will treat the participants to lunch. Students who are interested in participating can contact the course coordinator by e-mail or in connection to a lecture.