EI1120 Administrative information (KursPM)

Please read this page carefully! This page is particularly important because it explains what you have to do in order to get through the course. It is an online "KursPM" document that describes details such as registration, timetable, contact details for teachers, requirements about exams and homework, etc.

Schedule

The EI1120 homepage has as link to the KTH Schedule with the dates, times and rooms for course events such as lectures and tutorials. The homepage itself presents all the course-material, in the sequence in which it is expected to be used for lectures, tutorials, exercises, homeworks, labs and tests.

Disability

Support via Funka: if you have a disability, you may receive support from Funka.
Support from teachers: Funka does not automatically inform the teacher, so we recommend you inform the teacher about any need you have that cannot be met by Funka.

Admin: registering for the course and exams

The Student Office, **STEX**, is the proper contact **for all questions about registrations** to the courses and exams: e.g. late registration, web-based registration not working, re-registration, problems with viewing marked exams, etc. See the STEX webpage for contact details: email to `stex@ee.kth.se` is a convenient choice.
These sorts of administrative questions should **not** initially come to the course teachers -- we do not even have access to some features of the administrative systems, and the rules and details are complex beyond our comprehension.

You should **register for the course** as soon as you start it. For new registrations, use Mina Sidor. If you're repeating the course you should **re-register**, by emailing STEX or visiting STEX (see above).

For exams (tentor), re-exams (omtentor), and mini-exams (kontrollskrivningar), registration should be made **at least 16 days before** the event. This is also done through Mina Sidor. Registration is usually open many days *before* the deadline – so please try being early, to be on the safe side!

Registration to tests is important in order that there are sufficient rooms and staff. If you are not registered you have no guarantee of a place, and may have to wait (e.g. 45 minutes) to see if a registered student fails to arrive to their place. If you've forgotten to register, then at least email to STEX *as soon as you can*, to increase the chance of there being enough places.

When multiple rooms are booked for exams/KS, STEX will **email to each** exam-registered student (between 1 and 3 days before the event) to say which room to go to. Do check your (KTH) mail, including the junk, if you find you haven't had this notice a day before the exam.

Teachers in the course

Nathaniel Taylor
Kun Zhao
Per Westerlund

Books

See the Books page for more information. There is no book that you are supposed to use as the main course book. The files provided on this website are the course literature, along with questions and solutions from homeworks and past exams. An old KTH compendium is suggested as a source of further practice questions and correct Swedish terminology.

Exhortations about Working Habits!

See study habits ... please!

Syllabus (content) and Aims

If you're looking for a Syllabus (list of "learning outcomes", purpose of course, etc), it is probably most useful to look at the content of the notes, homeworks and past exams of the last two years. These give a detailed view of the included subjects and our emphasis, and of the typical style of problems that we solve. If you prefer formality, you can try the official course-plan: however, in view of the small space this inevitably cannot provide much information about the style and level (note also that we don't do much "mesh analysis" now).

The course is about *analysis of linear circuits*.

The main aim is to get competent at taking a circuit diagram and finding what values certain variables such as voltages, currents and powers would have. We will also sometimes look at the backward question of what parameters, such as sources and resistors, should be chosen in order to make a variable have a specified value.

We would like students to develop abilities in two rather different approaches to circuit analysis. One is the "intuitive sense", of being able to estimate some of the behaviour of a circuit from just looking at a circuit diagram. The other is to use systematic methods to translate a circuit diagram into a set of equations that allow a variable or parameter to be determined. Both of these are useful for real situations, and they are often used together. In practical use of circuit analysis, the former skill is important for making estimates and starting in the right direction with a design. The latter skill is important for dealing with later stages of analysis where more detail is needed, such as solutions of complicated circuits where we have to program computers to generate and solve the equations. The latter seems generally easier to train, particularly if the equations are to be solved by computer. In view of the large number of methods and concepts that we need to introduce in this course, and the opportunity of developing more "feeling" for circuits during practical applications in later courses, the course assessment is designed without rigid demands about demonstrating skills of estimation and conceptual thinking; however, some minor parts of exam questions can benefit from these skills.

A circuit diagram represents an idealised model: for example, a voltage source is assumed to give an exact voltage regardless of the current through it. The diagrams are thus directly related to equations. Idealised circuit analysis is basically a mathematical puzzle, with a special sort of representation! A large part of *practically applied* circuit analysis consists in *choosing* a suitable model (diagram) for an actual circuit, then solving the diagram (the straightforward part!), then analysing what the results means the context of the actual circuit. This can be surprisingly difficult; one has to decide what phenomena can safely be neglected. In this course we almost entirely omit the parts other than solving the diagrams. The other parts could be very educational, but we do not have time to deviate far from our quite idealised content. In our limited time, we want to get good core skills at solving the diagrams. Later courses will build on these skills, and apply them to the more practical applications in power, communications, control, etc.

Students taking this course should also use it as an opportunity to improve their general skills at checking the reasonableness of answers by methods such as extreme cases ("suppose we set R to zero, ...") and dimensional analysis. These skills are only required to a small extent in the course's assessment, but some sort of checking should ideally be used for all results; some credit is given for correctly identifying a wrong solution as being wrong. Checking is important in later studies and work, as well as in homeworks and exams in the course.

Course structure

The course's *subjects* are divided into three Sections, which are studied in this sequence:

- ***Section A:*** **Direct current (dc)** (likström). This corresponds to the subject of *statics* in mechanics. We introduce some basic circuit components of resistors, constant-valued sources of voltage or current, and later the operational amplifier. Each of these components puts some constraint (requirement) upon a voltage or current, or on the relation *between* voltages and currents. The connection of components by nodes imposes further constraints, described by Kirchhoff's laws. Together, all these constraints determine the circuit's solution. We learn methods for simplifying a circuit and converting it to equations that can be solved to find a desired value.
- ***Section B:*** **Transients**. Some new components are now added: the energy-storing components called inductors and capacitors are the most important, but we also introduce switches, diodes, and components whose value changes as a `step-function' at some time. The circuit quantities, with these components present, become time-functions instead of single values. In general, differential equations must now be solved to get circuit solutions. We look at equilibria and sudden changes from equilibria, and at simple cases of finding time-functions.
- ***Section C:*** **Alternating current (ac)** (växelström). AC analysis means an assumption that all voltages and currents are sinusoidal time-functions; this is sometimes called harmonic excitation. In this case, circuit solutions can be made using a similar approach to dc analysis, but using complex numbers instead of real numbers. This is of course somewhat more difficult than dc analysis, but it is a great deal easier than working with high-order differential equations for a circuit with several inductors and capacitors! The ac situation is of great practical importance. Most electric power systems work with approximately sinusoidal time-functions. Communication systems too have traditionally depended on modulation of sinusoids to convey information. Other waveforms can also be studied as a mixture of different sinusoids.

The exam has three Sections: A, B, and C, corresponding to the above list.

Assessment (required work)

There are three `Ladokmoment' (PRO1,PRO2,TEN1) that make up the full 7.5p course. The criteria are the same for all students, new- or re-registered.

Partial completion of a Ladokmoment in a previous year is ignored: if you haven't passed it you need to fulfil the entire requirement during this new study period in order to pass it. However, any Ladokmoment that is already completed (registered as a pass) is kept (it's a basic rule that given grades can't be reduced).

To pass **PRO1**: Homework.

- There is a homework task corresponding to each Topic from 2--13, i.e. for every lecture+tutorial except the first and last. Submitted solutions do not have to be perfectly correct, as long as they show a "sincere attempt"!
- Homeworks will be submitted by emailing scans or photographs. In some cases, equations or numbers in plain text in the email might be requested. The exact details will be given within each homework task.
- A proportion of homeworks (half of them: any 6) must be approved in order to pass PRO1.
- Some exam *bonus points* are given, in proportion to the number of approved homeworks that were submitted before their deadlines. This bonus is added to the total exam score before setting the grade. The bonus is directly proportional to the number of approved homeworks. At the most (for 12 in-time approved homeworks) the bonus is 4% of the exam points: this is nearly half a grade-boundary, and thus has a good chance of making a significant difference.

  The exact calculation of exam grades can be seen at the top of last year's exam, 2016-03_EM_tenta.pdf. The bonus can thus affect even the pass/fail decision, but it cannot help

if you get below the minimum for a particular section of the exam (40% for A and B, 30% for C); it only helps to change the total score, for which 50% is the pass level.

To pass **PRO2**: Lab tasks.

- There are two obligatory laboratory tasks (1 and 3), and two optional tasks (2 and 4). The aim is to get some experience with concepts and measurements, including familiarity with common instruments.
- Active participation in the lab session is all that is required. Careful reading of the notes beforehand, and of the `solutions' afterwards, is of course *advised* in order to get the most benefit from the lab work. For each of the lab tasks there will be several sessions provided, with up to 20 people at each.

To pass **TEN1**: Written Examination (optionally including Kontrollskrivningar)

- The exam will be structured with the same "cumulative" nature as it had during VT14 to VT16. That seemed very popular, for spreading the load of the course, reducing stress, and giving a second chance for some parts. See the instructions on the 2016-03_EM exam for a better understanding of the Sections in the exam, and the way that KS1 results can be included.
- You do not *need* to attend the mini-exams KS1 or KS2. However, KS1 fully covers Section A of the course, and KS2 fully covers Section B: if you get a good grade in a KS, you can use this in the exam, and thereby avoid writing the corresponding Section in the exam. See the "Course Structure" paragraphs, above, for more detail.
- If you have already passed Sections A and B through your KS grades, then you don't need to answer these part in the final exam in March, but can instead focus on just Section C. Or you can try to improve your grade by answering A and/or B in the final exam (after completing Section C). If you have not already passed Section A or B, you can take another chance at the respective sections in the exam. (You will probably find that the system is more simple in practice than in the above description!)
- The results from a KS can only be used to replace Exam sections from the same course-round. For example, results from KS1 or KS2 taken in VT17 can be used within the exam in March 2017, or the re-exam in June 2017, but cannot be transferred to later years.
- The re-exam is treated a *substitute* to the main exam, not as an extension. In the re-exam you *can* use the better score out of e.g. KS2 and the re-exams's Section B. But you *can't* e.g. use the better score out of Section C in the re-exam and Section B from the main exam. If you've taken both exams, you can keep the result from whichever one gave you the better result (this is relevant to anyone who tries to improve their grade -- plussa -- after already passing in the first exam).

Permitted material at exam or KS (**hjälpmedel**).
(Added 2017-02-15 after a suggested change in the rules.)
Traditionally (see old KS/TEN) this has been `one A4 sheet of paper, with anything you like written/drawn/printed on any part of it'. This is based on avoiding students wasting time memorizing little details, while also avoiding noises from shuffling of papers, and overconfidence through thinking that lots of notes will substitute for sufficient study and practice.
Now, for VT17, we're changing this: it's still 1 A4 paper at KS1, but then it's permitted to have 2 at KS2, and 3 at the final exam or re-exam. That's to allow earlier carefully-written papers to be used again in the later tests, supplemented by further papers with the later topics.

If you are **re-registering** from a previous year and have **not already passed PRO1 or PRO2**, then you should do the homeworks and labs (same conditions as the new students). If lab times are a great trouble due to a job or other course, we may consider alternative work.

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