TEK/NAT Kursrapport

Kurs	*Kurskod*	*Poäng*	*År*	*Start v.*
Fysikalisk mätteknik	5FY190	7,50	2021	45

Institution	*Antal registrerade (män/kvinnor)*	*Antal aktiva studenter (deltagit i minst en examinerande del)*
Institutionen för fysik	45 (32/13)	-

Genomströmning (i %) och betygsutfall efter första tillfälle för examination (för varje betyg som satts på kursen ange antal som uppnått detta på formen ???

Genomströmning: 58% Betyg: 3(9) 4(8) 5(9)

Hur mycket schemalagd lärar-/assistent-ledd tid har studenten tillgång till på kursen?

38 lektioner/föreläsningar à 45 minuter,
plus 3 handledda laborationstillfällen à 4 timmar ("halvdag").
1 handledda laborationstillfällen 8 timmar

Hur är undervisningen upplagd?

26 x 45 min föreläsningar, som tar upp alla väsentliga och svåra delar av kursen.
12 x 45 minuter problemlösning.
5 laborationer; en av dessa är en programmeringsövning som utförs enskilt och examineras genom att slutresultatet (ett program) demonstreras för handledare. Övriga laborationer utförs i grupper om 3 personer och examineras genom inlämnande av en kort skriftlig dokumentation. För att ge realistiska förutsättningar och ingenjörsmässig koppling baseras problem och övningar på verkliga datablad och komponenter, och vid problemlösning och examination är all kurslitteratur och alla kompendier, laborationsinstruktioner och datablad (utom lösta problem) tillåtna hjälpmedel.

För vart och ett av lärmålen (FSR:en) i kursplanen, beskriv kortfattat hur det examineras.

redogöra för funktioner och egenskaper hos laboratorieinstrument som oscilloskop, strömmätare, spänningsmätare och resistansmätare

Examineras dels genom utförandet av en laboration, dels genom skriftlig sluttentamen

redogöra för egenskaper hos vanliga typer av givare för mätning av temperatur, kraft, tryck, vibration och deformation

Examineras genom skriftlig slutttentamen

beskriva hur ett auto- eller korskorrelationssystem används för att mäta signaler och/eller brusegenskaper

Examineras dels genom utförandet av en laboration, dels genom skriftlig sluttentamen

analysera lik- och växelspänningskretsar och finna teoretiska spänningsnivåer och strömmar i godtyckliga punkter eller noder

Examineras genom skriftlig slutttentamen

ersätta ett komplicerat nätverk av spännings- och/eller strömkällor och impedanser med en tvåpol av Norton- eller Thévenintyp

Examineras genom skriftlig slutttentamen

läsa och förstå datablad för givare, läsa ut storheter som mätområde, utsignal, känslighet, noggrannhet och känslighet för yttre störningar och med hjälp av sådan information kunna uppskatta förväntad mätnoggrannhet

Examineras genom skriftlig slutttentamen

beräkna det dynamiska felet som funktion av tid eller frekvens för ett första eller andra ordningens mätsystem

Examineras genom skriftlig slutttentamen

analysera och koppla upp operationsförstärkarkretsar

Examineras genom skriftlig slutttentamen

koppla in och handha laboratorieinstrument som oscilloskop, strömmätare, spänningsmätare och resistansmätare

Examineras dels genom utförandet av en laboration, dels genom skriftlig sluttentamen

göra en analys av störnivåer som följd av kapacitiv/induktiv/resistiv koppling av yttre störningar, beräkna signal/brusförhållandet och föreslå åtgärder för att förbättra förhållandet mellan signalnivå och störningsnivå

Examineras genom skriftlig slutttentamen

analysera, koppla in och bestämma egenskaper för en transmissionsledning

Examineras genom skriftlig slutttentamen

koppla ihop ett störningsskyddat mätsystem med givare, mätinstrument och spänningskällor samt konstruera och använda ett program för automatisk datainsamling och lagring med dator

Examineras dels genom utförandet av en laboration, dels genom skriftlig sluttentamen

visa på progression i förmåga att skriftligt och muntligt kommunicera resultat vid laborativt arbete, särskilt inför fördjupande kurser i fysik

Examineras genom skriftlig slutttentamen

visa samarbetsförmåga med andra personer i laborativ miljö

Examineras genom skriftlig slutttentamen

Beskriv hur betygssättningen på kursen fungerar. (Vilka betyg ges på kursen och hur sker bedömningen, dvs vilka delar betygssätts och hur vägs de samman? Finns det skrivtliga betygskriterier och/eller lärmål (FSR) för de olika betygen?)

För godkänt betyg krävs dels att samtliga laborationer genomförts med godkänt resultat, dels att tillräckligt goda resultat erhålls på den kursavslutande skriftliga tentamen.

Vid tentamen används de poänggränser som länge varit standard vid civilingenjörsutbildningarna i Umeå. Betyg fördelas i relation till uppnådda poäng vid sluttentamen, så att betyget 3 motsvarar minst 40% av maximalt antal poäng, betyg 4 minst 60% och betyg 5 minst 80%.

Samläses denna kurs med andra kurser??

Nej

Om ja, hur många?

Hur stor andel av kursen samläses?

Samläser flera program denna kurs?

Ja

Om ja, hur många?

2

Arbetar studenterna i projektform på kursen?

Nej

Om ja, uppskattad omfattning i poäng på projektdelen:

Antal projekt som varje student deltog i:

Antal studenter i projektgrupp:

Förväntades studenterna använda en projektmetodik för dokumentation och styrning (tex LIPS)?

Nej

Hur skedde indelning av studenter i projektgrupper?

Har studenterna uppmanats föra projektdagbok?

Om ja, Har dagboken utgjort grund för examination?

Kursens samverkan med forskning

Lärare som bedriver forskning (>25% av tjänsten) är aktiva på kursen

Annan samverkansform, nämligen:

Kursens samverkan med näringsliv eller offentlig verksamhet

Annan samverkansform, nämligen

Genomförda förändringar till detta kurstillfälle

Some power point lectures modified for better clarity. Equipment for laboratory works was verified to exclude technical issues.

Förändringsförslag från föregående kursrapport

The course was given online due to Covid19 in 2020. Therefore, all lectures and problem solving lessons were converted into power point presentations. Adding more examples and text information was suggested for parts which are not described in Bentley book.

Lärare

Information om inblandade lärare

Kursansvarig

Alexander Talyzin

Antal övrig personal som ej föreläser

Antal övriga föreläsare

Hur stor del av den schemalagda tiden på kursen undervisas av forskande lärare (dvs lärare med mer än 25% forskning i sin tjänst)?

100

Hur stor del av den schemalagda tiden på kursen undervisas av lärare verksamma i näringsliv/offentlig verksamhet (dvs lärare med mer än 25% av sin tjänst förlagd till näringsliv/offentlig verksamhet)?

Kursvärd.

Totalt antal svarande

28

Sammanställningsdatum

4-11 January

När genomfördes kursvärderingen?

Före examinationen

För varje lärmål på kursen ange hur stor del av de studerande som uppger att det har behandlats på kursen - ange svaret i procent på formen
har behandlats/har inte behandlats/vet ej

redogöra för funktioner och egenskaper hos laboratorieinstrument som oscilloskop, strömmätare, spänningsmätare och resistansmätare

100%

redogöra för egenskaper hos vanliga typer av givare för mätning av temperatur, kraft, tryck, vibration och deformation

82/11/7

beskriva hur ett auto- eller korskorrelationssystem används för att mäta signaler och/eller brusegenskaper

57/18/25

analysera lik- och växelspänningskretsar och finna teoretiska spänningsnivåer och strömmar i godtyckliga punkter eller noder

89/7/4

ersätta ett komplicerat nätverk av spännings- och/eller strömkällor och impedanser med en tvåpol av Norton- eller Thévenintyp

79/18/4

läsa och förstå datablad för givare, läsa ut storheter som mätområde, utsignal, känslighet, noggrannhet och känslighet för yttre störningar och med hjälp av sådan information kunna uppskatta förväntad mätnoggrannhet

86/7/7

beräkna det dynamiska felet som funktion av tid eller frekvens för ett första eller andra ordningens mätsystem

75/11/14

analysera och koppla upp operationsförstärkarkretsar

93/4/4

koppla in och handha laboratorieinstrument som oscilloskop, strömmätare, spänningsmätare och resistansmätare

96/4/0

göra en analys av störnivåer som följd av kapacitiv/induktiv/resistiv koppling av yttre störningar, beräkna signal/brusförhållandet och föreslå åtgärder för att förbättra förhållandet mellan signalnivå och störningsnivå

82/11/7

analysera, koppla in och bestämma egenskaper för en transmissionsledning

93/7/0

koppla ihop ett störningsskyddat mätsystem med givare, mätinstrument och spänningskällor samt konstruera och använda ett program för automatisk datainsamling och lagring med dator

93/4/4

visa på progression i förmåga att skriftligt och muntligt kommunicera resultat vid laborativt arbete, särskilt inför fördjupande kurser i fysik

100/0/0

visa samarbetsförmåga med andra personer i laborativ miljö

100/0/0

Sammanf.

Sammanfattning av åsikterna i kursvärderingen - positivt och negativt kring föreläsningar, seminarier, grupparbeten, laborationer, examination etc

Learning outcome. To the question to state whether the learning outcomes were reached, three outcomes scored 100%, 4 outcomes scored over 90%, 4 outcomes in the range 80-to 90%, 2 outcomes in the range 70-80% and one at 57%.
Positive feedback was received about laboratory works, availability of equipment and support from laboratory supervisors. Students evaluated work of laboratory work supervisors as very good to excellent. Overall quality of laboratory work got score 4.5 and supervisors 4.8
The way how students were treated. Few comments were given on this section. One student felt that lecturer was “little dismissive” when approached with comments on the course structure. Another student cites his experience as “overall well treated”. One more comment wrote was about lecturer not following opinion about change by single student, but only opinion of several. One student criticised lecturer for not sending e-mail in connecting with missed lecture.
Overall the way how student were treated on the course was given a score 3.6
Critical review was given to the course content, lectures, lecturer and course literature. The criticism is summarized below.
Several students experienced that their prior knowledge was not sufficient and the course had to include more basic introduction, particularly in circuit theory. The course requires prior knowledge of circuit theory basics, but this appeared to be not the case for most of students. While the lecturer assumed that introductory part was repetition of materials already studied by students in prior course (presumably at Electricity and Magnetism course), students cited that they never had any circuit theory in previous courses. Several students cited that the basic introduction of circuit theory at lectures was too rapid for their understanding and had to include more detailed explanation with easier examples.
Several students expressed criticism related to lectures presented in a form of computer presentations made using power point. They would rather prefer more tradition lectures shows with pen and desk. Some student wrote it was better to make lectures on distance zoom, presumably due to Covid19 situation.
Critical points of view were also expressed about style and content of some power point lectures. In particular, one lecture with too many slides for 2 hours lessons was pointed out as too difficult for understanding. Slower presentation pace with lower amount of information was advised by several reviewers. Other critical points: too much text in some slides, different fonts, some formulas presented as images with quality not sufficient for big screen, some other style advises.
Several students also expressed point of view that problem solving lessons better to be done without using computer slides using handwriting. The question when to provide problem solutions become a debated issue. Following previous occasions of this course, the problem solutions were provide to students in 3 parts, roughly once per week, after considering certain problems on lessons. This practise was opposed by dedicated student during the course with suggestion to give problem solutions on the same day as relevant lecture. This decision is criticised in the feedback and given as a example of insufficient listening to students suggestions.
Criticism is also related to the scheme. Several students took parallel courses. However, the scheme is not correlated with courses e.g. in medical physics, also some exam dates overlapped.
Several critical points of view were related to exam performed with physical presence. The first exam was indeed performed at the moment of high spreading of Covid19 and communications with students showed that at least several of them suggested to make exam on distance. Some students expressed point of view that too much of supporting literature was allowed on exam, especially for allowing to print lecture slides. Other students considered it as a positive point. Two students suggested not to make any written exam at all. It is also cited that evaluation done after exam would be preferential for this part.
Critical points of view were expressed about course literature. A mismatch between Swedish and English web pages was cited as confusing. English web page cited Bentley book as a main literature, another book in Swedish was cited on Swedish web page. This become the main point of criticism in this part. Single opinions about poor quality of both Swedish and English books were presented, one opinion that the book is good. Overall the literature scored at 2.5
Several critical feedback points were related to information provided on Cambro. Cambro had too many files (lecture files, additional supporting literature, problems to solve and problem solutions) according to some opinions and not well structured. Some of these points were corrected during the course, for example file embedded on web page were complicating the view and replaced by simple links. Some advises to move specific files to different folders for more easy search were expressed. Overall score of 2.6 was given to the course. Several students cited that evaluation is better to perform after exam but not before as it was done on this course occasion (similarly to previous occasions by the same lecturer).

Lärarnas synpunkter på kursens innehåll och genomförande

The lecturer had given the same course to international students in 2014-2020 adapting the content and teaching methods to that group by following provided feedback. This occasion in 2021 was first with the group of Swedish students, mostly from technical physics. The lecturer found that specific demands of new group and prior knowledge are rather different and in some points to unexpected ddegree. That was especially clear in the part about circuit theory. The circuit theory was given in 4 hours lectures in 2014 providing 2 hours of basic introduction to electrical circuits, moving from simplest to more complex circuits. The feedback received from international group suggested that many students considered this part as trivial and on several occasions advised to omit it completely. Therefore, this part was shortened in two previous course occasions by 1 hour without negative feedback. Surprisingly for lecturer, the prior knowledge of new group appeared to be rather different. The part about circuit theory was considered as too rapid and completely novel for many students. As verified, indeed the previous course on electricity and magnetism given to this group did not included basic introduction to circuit theory, which is listed as required prior knowledge in syllabus. Some students suggested that this should be included into some other course as a subject not directly related to measurement course. In other part, some students considered introduction to complex numbers as unnecessary and trivial, which was never the case in previous years. In other hand some students cited using complex algebra method as “difficult” during the course.
The difference in group demands is also very strong about the presentation form. International groups highly appreciated lectures made as computer presentations, very positive feedback was given to multimedia demonstrations, video, computer simulations. Therefore, moving from year to year the number of power point lectures was increasing keeping only 1/3 of lectures in handwritten style in 2019. In 2020 all lectures were converted into power points to enable distance education in covid pandemic situation, all with positive feedback. Therefore, these computer presentations were used also in 2021. However, this time the group expressed opinion that handwritten style of lectures needs to be used in some lectures. International students often had a bit of difficulty with English and appreciated adding more text to slides. The possibility of reading the text in process and after lectures was considered as assistance, especially in some lectures which are not sufficiently well described in the book. Students also repeatedly asked to use selected printed lecture slides on exam. The new group in contrary thinks that amount of text should be reduced significantly, some lectures given in handwriting, printed lecture files should not be allowed on exams. These points need to be taken into account on next occasion. The quality of computer presentations was criticised and needs to be improved following provided feedback. Once again, higher demands by national group of student requires adaptation of content and presentation methods.
The lecturer made effort to adapt to new group demands during the course and responded to several requests, e.g. to re-arrange files at Cambro (reflected as positive in evaluation feedback) , to provide pdf files with lecture slides not after but shortly before lectures, to provide summary of most important points for each lecture in the final day. One of requests received during the course was not granted, about giving problem solutions directly after the lecture with specific problems. The problem solutions were provided once per week as planned and as it was done in all previous course occasions. This decline to student demand is critically reflected in evaluation. This decision was possibly not well explained and communicated to the whole group. Lecturer has opinion that it is pedagogically not beneficial to provide problem solutions together with assignment. At least some students will check solutions immediately without giving sufficient effort. It is a common practice in education to provide solutions with some delay and that how it was done on that course since 2014 following example of previous, now retired professor.
The Covid19 situation continued to affect the course in 2021-2022. The lectures were given in class but some students had to study at home due to sickness and requested additional support which was provided in reasonable limits. Lecturer performed lessons in face mask which seem to be well accepted by students (no negative feedback about that) and that is appreciated. Using mask reduced a personal contact with audience somewhat but felt like needed due to some chronical personal health issues of lecturer. The main effect of Covid was related to physical presence at exam. This was hardly questioned by students prior to first exam in e-mail requests. As verified by lecturer, the general policy of University did not allowed exam on distance at the moment. This point was critically reflected in evaluation feedback.

Förslag till nästa kurstillfälle - ange vem som ansvarar för förändringen

Overall, most of the learning outcomes were achieved according to evaluation. There is one on correlation methods which got less % and need to be addressed. This part is very scarcely presented in the book, more examples need to be added. Overall, the course content needs to be adapted to prior knowledge of the specific student group. In particular, the part about circuit theory needs to be expanded and supplied with more examples. There is a lecture which needs to be shortened and some lecture slides revised to improve quality of presentation. Students also expressed interest in having some lectures not as computer presentations but as desk and pen lessons. About 1/3 of lectures and all problem solving lessons were done like that prior to pandemic and this can easily be returned back in 2022 if pandemic situation allows. The web pages of course will be moved to Canvas for next course occasion, criticism related to the web content needs to be taken into account and provide more structured content. Previously students requested to have printed lecture slides as a supporting material on exams. Following experience of 2021 this does not look as good idea. The amount of supporting information available on exam will be reduced by removing printed lecture slides and limiting it to Bentley book. However, the book is too advanced in some parts and completely lacks some other, that is
why the book is complimented by some other literature for the course, e.g. for circuit theory and transmission lines. Possibly, some compendium on correlation methods needs also to be added.

Bör kursplanen ändras till nästa kurstillfälle - vem ansvarar i så fall för att förändringen görs?

no

Granskn.

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Eventuella kommentarer på granskningsprocessen