**Föreläsningar och Demonstrationsövningar,** lp 4 – 2021

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| **Kal-**  **ender**  **vecka** | **Läsv** | **Lek** | **Tid Datum** | **Innehåll / Content** | **Hänvisning**  K: Kursbok (6th Int Ed)  F: Fält komp. |  |
| **12** | **1** | **1** | Mån 8-10  22/3 | Introduction. Current, voltage, Kirchhoff's laws, circuit elements.  Introduktion. Ström, spänning, Kirchhoffs lagar, kretselement. | 1.1 1.2 1.4-1.7 | K.1 |
| **2** | Tis 10-12  23/3 | Power, energy. DC circuits (DC), calculation methods.  Effekt, energi. Likströmskretsar (DC), beräkningsmetoder. | 1.3 2.1-2.3 | K.2 |
|  | Fre 8-10  26/3 | *Demo övn 1* |  | K.3 |
| **13** | **2** | **3** | Mån 8-10  29/3 | Node-voltage analysis, equivalent circuits (Norton, Thevenin). Superposition  Nodanalys och maskanalys. Ekvivalenta kretsar (Norton, Thevenin). Superposition | 2.4 - 2.7 | K.4 |
| **4** | Tis 10-12  30/3 | Capacitance, Inductance, diff. equations. Time-varying currents and voltages.  Kapacitans, Induktans, diff.ekvationer. Tidsvarierande strömmar och spänningar. | 3.1 3.2 3.4 3.5  4.1 – 4.4 | K.5 |
| Easter | | | | | | |
| **15** | **3** |  | Mån 8-10  12/4 | *Demo övn 2* |  | K.6 |
| **5** | Thur 10-12  15/4 | Electric fields  Elektriska fält | 1a: 1,2,4,(6)  1c: 1,2  1d: 1,2, 5;  1e: 2 | F.1 |
| **6** | Fre 8-10  16/4 | Work, Voltage, Capacitance  Arbete, Potential, Kapacitans | 2a:1,3  2b: 1,2,4  2d: p-1,p-2,p-3,p-4 | F.2 |
| **16** | **3** |  | Mån 8-10  20/4 | *Demo övn 3* | 1c: 3, 1d: 3, 1e: 4  2a: 6; 2b: 5 | F.3 |
| **7** | Tis 10-12  21/4 | Current, Resistance, Magnetic fields  Ström, Resistans, Magnetfält | 3a: A-1, C-1,C-3,C4, D-1,  3b: C-1,C-2,C-3,  3c: 1 | F.4 |
| **8** | Fre 8-10  24/4 | Magnetic force, Inductance  Magnetisk kraftverkan, Induktans | 4c: C-1, C-2  4d: C-1 | F.5 |
| **17** | **4** |  | Mån 8-10  26/4 | Demo övn 4 | 3a: C-2; 3b: C-4  3c: 2,6  4a: 1 | F.6 |
| **9** | Tis 10-12  27/4 | Electromagnetic waves and some their applications  Elektromagnetiska vågor och några (medicinska) tillämpningar | 4e: | F.7 |
| Break | | | | | | |
| **18** | **6** | **10** | Mån 8-10  3/5 | Steady-state sinusoidal analysis (AC)  Stationära växelströmskretsar (AC) - metoden. | 5.1 – 5.3 | K.7 |
| **11** | Tis 10-12  4/5 | Calculation methods for AC-circuits. Impedance and Resonance.  Beräkningsmetoder för AC-kretsar. Impedanser. Resonans. | 5.4 5.6 6.6 6.7 | K.8 |
|  | Fre 08-10  7/5 | *Demo övn 5* |  | K.9 |
| **19** | **7** | **12** | Mån 8-10  10/5 | Power in AC circuits.  Effekt i växelströmskretsar. | 5.5 | K.10 |
| **13** | Tis 10-12  11/5 | Amplifiers and Operational Amplifiers (Op-Amps)  Förstärkaregenskaper, operationsförstärkare | 11.1  14.1 – 14.6 | K.11 |
| **20** | **8** | **14** | Mon 8-10  17/5 | Op-Amps, differential amplifiers, instrumentational amplifiers, and active filtering.    Operationsförstärkare forts., Frekvensberoende förstärkning | 6.3 – 6.5  14.8 – 14.10 | K.13 |
|  | Tis 10-12  18/5 | *Demo övn 6* | 6.3 – 6.5  14.8 – 14.10 | K.12 |
|  | Fre 8-10  21/5 | *Demo övn 7* | 6.3 – 6.5  14.8 – 14.10 | K.14 |
| **21** | **9** |  | Mån 8-10  24/5 | *Reserv* |  |  |
|  | Tis 10-12  25/5 | *Reserv* |  |  |

**Ordinarie tentamen:** Tis 1-6-2021, 08:30, Johanneberg

**Omtentamen 1:** Mån 16-8-2021, 14:00 Johanneberg

**Omtentamen 2:** Sön 10-10-2021, 14:00 Johanneberg

Föreläsare, kursansvarig: Eric Earley, [earley@chalmers.se](mailto:earley@chalmers.se)

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The lectures and demo exercises are taught in English / Föreläsningarna och demoövningar ges på engelska.

Räknestuga and laboratory are taught in English / Räknestuga och laborationer ger på engelska .

# Electric fields literature:

The textbook for this course is:

Electrical Engineering: Principles and Applications 6th Edition, by Allan R. Hambley

The textbook can be viewed at VLeBooks:

<https://www.vlebooks.com/vleweb/Product/Index/436552>

The textbook is also available at Cremona: <https://www.chalmersstore.se/en/foreign-literature/electrical-engineering-principlesapplications-global-edition.html>

The following materials from Physnet are also suggested:

<http://www.physnet.org>.

**Lecture 1: Electric field**

1a) Point charge: field and force

<http://www.physnet.org/modules/pdf_modules/m115.pdf>

1b) Coulomb's law

<http://www.physnet.org/modules/pdf_modules/m114.pdf>

1c) Dipole

<http://www.physnet.org/modules/pdf_modules/m120.pdf>

1d) Gauss law: sphere:

<http://www.physnet.org/modules/pdf_modules/m132.pdf>

1e) Gauss law: cylinder:

<http://www.physnet.org/modules/pdf_modules/m133.pdf>

*Additional material to L1:*

Electric force on charged particle

<http://www.physnet.org/modules/pdf_modules/m411.pdf>

E-field:

<http://www.physnet.org/modules/pdf_modules/m419.pdf>

**Lecture 2: Potential**

2a) Potential

<http://www.physnet.org/modules/pdf_modules/m116.pdf>

2b) Energy in E-field

<http://www.physnet.org/modules/pdf_modules/m117.pdf>

2c) El. properties of materials

<http://www.physnet.org/modules/pdf_modules/m421.pdf>

2d) Capacitance

<http://www.physnet.org/modules/pdf_modules/m422.pdf>

2e) Current

<http://www.physnet.org/modules/pdf_modules/m423.pdf>

2f) Resistivity

<http://www.physnet.org/modules/pdf_modules/m424.pdf>

*additional material to L2:*

Electric potential

<http://www.physnet.org/modules/pdf_modules/m420.pdf>

Capacitance & capacitors

<http://www.physnet.org/modules/pdf_modules/m135.pdf>

**Lecture 3: Magnetic field**

3a) Magnetic field

<http://www.physnet.org/modules/pdf_modules/m426.pdf>

3b) Magnets

<http://www.physnet.org/modules/pdf_modules/m366.pdf>

3c) Ampere's law

<http://www.physnet.org/modules/pdf_modules/m138.pdf>

**Lecture 4: Induction & EM waves**

4a) Faraday's law

<http://www.physnet.org/modules/pdf_modules/m142.pdf>

4b) Self-inductance and inductors

<http://www.physnet.org/modules/pdf_modules/m144.pdf>

4c) EM waves & Maxwell

<http://www.physnet.org/modules/pdf_modules/m429.pdf>

4d) Waves: basic properties

<http://www.physnet.org/modules/pdf_modules/m430.pdf>

4e) Wave equation

<http://www.physnet.org/modules/pdf_modules/m201.pdf>