# Course memo, spring 2023
# EI2410 Field Theory for Guided Waves (7,5 credits)

## 1 Administrative

### 1.1 General course information

https://www.kth.se/student/kurser/kurs/EI2410/

### 1.2 Canvas-room for this course offering

https://canvas.kth.se/courses/39006

### 1.3 Zoom-room (in case of going on-line)

https://kth-se.zoom.us/j/69612279287

### 1.4 Department

Electrical Engineering, Teknikringen 29-33

### 1.5 Course responsible, lecturer and examiner

Martin Norgren, 08-790 7410, mnorgren@kth.se

### 1.6 Course material

Reading and practice:

- M. Norgren, Guided Electromagnetic Waves
  (course compendium TRITA-EECS-RP-2020:1). Available at Kårbokhandeln.
- Additional material in the Canvas room.

Examples of text books for additional reading:

- J. Van Bladel, Electromagnetic Fields, 2:nd ed
- R. E. Collin, Foundations for Microwave engineering, 2:nd ed
- D. M. Pozar, Microwave Engineering, 4:th ed

# 2  Examination moments and grading criteria

## 2.1  Mandatory part

### 2.1.1  Project work (PROA; 1.5 credits; grades A, C, E, Fx, F)

- Carried out in groups of 2-3 students.
- Project topics will be presented in end of April. Students may also propose topics.
- For passing grades, all group members must take active part in the presentation.

Grading criteria for the project work:

**F** Insufficient attempt or failed completion from Fx.

**Fx** Minor flaws that make the grade E impossible.

**E** The main subtask carried out correctly and properly reported.

**C** The gross part of the subtasks carried out correctly and properly reported.

**A** All subtasks carried out correctly and properly reported.

### 2.1.2  Written exam (TENA; 6 credits; grades A-F)

Consists of four tasks, each centered around a certain topic from the course content, and divided into an (a)-part and a (b)-part:

(a) To demonstrate conceptual understanding and prove general principles of electromagnetic fields in waveguides. Marked with $\{a_i = 0 - 5\}_{i=1}^{4}$ points. Generates exam points according to

$$P_\mathrm{a} = \mathrm{ceil}\left\{ 2 \left[ \frac{1}{4} \sum_{i=1}^{4} (a_i - 1) + \sqrt[4]{\prod_{i=1}^{4} (a_i + 1)} \right] \right\}$$

| Exam points ($P_\mathrm{a}$) | 0-12 | 13-14 | 15-20 |
|---|---|---|---|
| Grade (TENA) | F | Fx | E |

**Table 1:** Grading criteria for passing the written exam.

(b) To demonstrate skills in quantitatively solving specific guided wave problems. Marked with $\{b_i = 0 - 5\}_{i=1}^{4}$ points. Generates exam points according to

$$P_\mathrm{b} = \mathrm{ceil}\left\{ 2 \left[ \frac{1}{4} \sum_{i=1}^{4} (b_i - 1) + \sqrt[4]{\prod_{i=1}^{4} (b_i + 1)} \right] \right\}$$

| Total exam points ($P_\mathrm{a} + P_\mathrm{b}$) | 15-20 | 21-25 | 26-30 | 31-35 | 36-40 |
|---|---|---|---|---|---|
| Grade (TENA) | E | D | C | B | A |

**Table 2:** Criteria for higher grades, awarded if grade E has been obtained in Table 1.

Allowed aids at the written exam:

- Råde & Westergren, Beta Mathematics Handbook and/or Spiegel, Mathematical Handbook of Formulas and Tables.
  Other handbooks may be used if approved by the examiner before the writing date.

- Compilation of formulas in electromagnetic theory (from the course home-page).

- The course compendium *Guided Electromagnetic Waves* TRITA-EECS-RP-2020:1

### 2.1.3 Students with disability

Information under `https://www.kth.se/student/stod/studier/funktionsnedsattning/`

### 2.1.4 Completion task

The grade Fx permits one attempt on a completion task to reach the grade E.

- For PROA, the completion task is in the feedback on the report.

- For TENA, the completion task is communicated via email.

### 2.1.5 Course grade

|  |  | TENA | | | | |
|---|---|---|---|---|---|---|
|  |  | **E** | **D** | **C** | **B** | **A** |
|  | **E** | E | D | C | B | A |
| **PROA** | **C** | D | C | C | B | A |
|  | **A** | D | C | B | A | A |

**Table 3:** The course grade determined from the grades of PROA and TENA.

## 2.2 Optional part: homeworks

During the course offering there will be four homeworks, handled via Canvas according to the schedule therein.

- By topic area, each homework is related to an exam problem, but wider in scope.

- Marked with $\{h_i = 0 - 5\}_{i=1}^{4}$ points.

- On the written exam, each $a_i$-point is replaceable with the corresponding $h_i$-point.