# IS2500 RFID Systems 7.5 credits

RFID System

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for IS2500 valid from Autumn 2010

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

Second cycle

## Main field of study

Electrical Engineering

## Specific prerequisites

**Previous coursework in areas of electronic circuits, logic design, embedded system design and programming.  II2302, Sensor Based Systems, is strongly advised.**

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

**Students completing this course should have an understanding of the physics that underlie the most common RFID technologies, and to combine with the theory the ability to appropriately apply RFID as a solution in ICT system design. This includes matching the physical, electromagnetic and spatial properties of RFID systems to satisfy application needs. An appreciation for the social and personal aspects of RFID use is part of this. Specific areas of applied knowledge are:**

- **To know the physical phenomena that governs the operation of near and far field RFID systems at the electro-magnetic and RF spectrum levels.**
- **To understand how these physical phenomena dictate the characteristics of RFID components, especially readers and tags, and how these characteristics will have impact on the intended use of these components.**
- **To know the industry standard algorithms used to discover, disambiguate, and encode data on RFID tokens.**
- **To be able to select RFID system components based on physical measurement requirements and application specifications.**
- **To be able to implement RFID technology in ICT systems to satisfy application needs in the areas of ID management, tracking, sensing, electronic payment, and industrial automation.**
- **To know how security can be protected with respect to the RFID tokens, and the data they contain and exchange. Also to know the limitations of security methods used with respect to user privacy, robustness, application requirements and cost.**

## Course contents

**This course is on RFID tagging technologies and systems. The goal of the course is to familiarize students with all aspects of technology used in modern RFID systems, including near and far field varieties. The physics, design, data structures and control mechanisms for RFID systems are covered. Students will also be familiarized with associated standards, emerging business process models, applications, and social issues arising from the use of RFID.**

- **Electro-magnetic resonance and magnetic curve based methods**
- **Near field load modulated passive RFID methods**
- **Semi-passive RFID methods**
- **Full active transponders**
- **Spectrum use and performance limitations**
- **Data formats, encoding methods and standards**
- **Data integrity and security for RFID**
- **Multi-tag arbitration and addressing algorithms**
- **Complex tag architectures for extra functions**

- **Business models and systems for RFID use, and competing technologies**
- **Social considerations arising from the use of RFID**
- **The work process of the course will include homework assignments, a midterm, and a course project.**

## Disposition

**Language of instruction:** English

## Course literature

Daniel M. Dobkin, The RF in RFID, Passive UHF RFID in Practice, Elsevier Newnes, 2007

## Examination

- PRO1 - Project, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

**Grading scale:** A/B/C/D/E/Fx/F

## Other requirements for final grade

**To get an "A" a student needs to achieve an aggregate score of at least 90% on all homework assignments and the course midterm. In addition, the student must complete the project component of the course and to write an outstanding or excellent paper and give an outstanding or excellent oral presentation. At least one of these needs to be excellent. To get a "B" a student needs to achieve an aggregate score of at least 80% on all homework assignments and the course midterm. In addition, the student must complete the project component of the course and to write a very good paper, for example it should be a very good review and present sound experimental data and or other results; and the student needs to give a very good oral presentation. To get a "C" a student needs to achieve an aggregate score of at least 70% on all homework assignments and the course midterm. In addition, the student must complete the project component of the course and to write a paper which shows understanding of the basic ideas underlying the IT topic being studied and applied. In addition, the student must be able to present the results of the project paper in a clear, concise, and professional manner. To get a "D" a student needs to achieve an aggregate score of at least 60% on all homework assignments and the course midterm. In addition, the student must have completed the project component of the course to at least a level sufficient to demonstrate an understanding of the basic**

**ideas underlying the IT topic being studied, however, the depth of knowledge shown is shallow and the student is unable to orally answer questions on the topic of the project in depth. A grade of "F" will be given to students who only achieve an aggregate score of less than 60% on all homework assignments and the course midterm. In addition, the student must have failed to complete the project component of the course and cannot demonstrate any understanding of the basic ideas underlying the IT topic being studied. The written report is incomplete or has serious errors, and the student is unable answer basic questions on the topic the project.**

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.