



RADAR REMOTE SENSING	
Anno immatricolazione	2020/2021
Anno offerta	2021/2022
Normativa	DM270
SSD	ING-INF/02 (CAMPI ELETTROMAGNETICI)
Dipartimento	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
Corso di studio	ELECTRONIC ENGINEERING
Curriculum	Microelectronics
Anno di corso	2°
Periodo didattico	Secondo Semestre (07/03/2022 - 17/06/2022)
Crediti	6
Ore	45 ore di attività frontale
Lingua insegnamento	English
Tipo esame	ORALE
Docente	DELL'ACQUA FABIO (titolare) - 6 CFU
Prerequisiti	First-level knowledge of: physics, chemistry, mathematical analysis, electromagnetic fields, signal processing. Previous attendance to the "Satellite Data Analysis" course helps, but this course is designed so that it can also be taken alone.
Obiettivi formativi	Basic knowledge of data produced by remote sensing and information that can be extracted from them. Capability to evaluate the usefulness of different types of data to solve a given problem of detection, tracking, classification or even more complex ones. Basic skills in processing remotely sensed images through dedicated - and also general - software. Radar remote sensing is emphasized, although not treated exclusively, and industry-related applications are stressed. At the end of the course, the student will be able to understand the contents of radar datasets, and to formulate possible uses in real-world applications.

Introduction to remote sensing

- Physical phenomena
- Remotely sensed data
- Basics of processing

Introduction to radar

- What is radar
- Some history
- Types of radar

Radar Basics

- Coherent Radar
- Matched filter
- Point spread function
- The Doppler effect

Earth Observation radar

- Features of Earth Observation radars
- Synthetic Aperture Radar (SAR)
- Statistical and spatial analysis of data
- Polarimetric data and decompositions

Radar interferometry

- Interferometry and interferometric processing
- Interferometric coherence
- Differential interferometry
- Risk-related applications

The course is based on classroom lectures, possibly integrated with seminars. Whenever possible, hands-on sessions will be organized on processing of spaceborne radar datasets.

Mark A. Richards (Editor), James A. Scheer (Editor), William A. Holm (Editor) . Principles of Modern Radar: Basic Principles. Scitech Publishing - Raleigh, NC.

Various authors. Land Applications of Radar Remote Sensing. InTech. Edited by Francesco Holecz, Paolo Pasquali, Nada Milisavljevic and Damien Closson, ISBN 978-953-51-1589-2, 318 pages. Chapters published June 11, 2014 under CC BY 3.0 license. DOI: 10.5772/55833

The exam consists of an oral discussion on at least three different topics in the course, aimed at assessing the candidate's level of knowledge and understanding of the subject. The mark is expressed with a number between 18 (barely sufficient) and 30 with honours (excellent).

The course is designed for graduate students of the masters course in electronics engineering but can also be useful to computer engineering students. During the course, various chances for additional insights are offered, among which the courses of the European Space Agency (ESA).

