Course guide
230251 - RAD - Radar

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.
Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject).

Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: Consultar aquí / See here:
https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura

Others: Consultar aquí / See here:
https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat idioma

PRIOR SKILLS

Radiation and Propagation, Signals and Systems, Probability and Stochastic Processes

TEACHING METHODOLOGY

- Lectures
- Application classes
- Exercises

LEARNING OBJECTIVES OF THE SUBJECT

We present the fundamentals and techniques of radio detection, location and estimation of parameters of distant bodies. The course has a telecom. system orientation combining a wide range of technical disciplines seen in previous courses applied to aerospace, navigation and industrial needs.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>98,0</td>
<td>65.33</td>
</tr>
<tr>
<td>Hours large group</td>
<td>52,0</td>
<td>34.67</td>
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</tbody>
</table>

Total learning time: 150 h
## CONTENTS

### 1. Introduction: Radar and Telecommunications

**Description:**
Radar: A case of telecommunication system. Historical milestones in the development of radar. Types and examples of radar.

**Full-or-part-time:** 16h  
Theory classes: 8h  
Self study : 8h

### 2. Pulsed Radars

**Description:**

**Full-or-part-time:** 48h  
Theory classes: 24h  
Self study : 24h

### 3. Continuous Wave Radars

**Description:**

**Full-or-part-time:** 16h  
Theory classes: 8h  
Self study : 8h

### 4. Pulse compression

**Description:**
The Dilemma of Energy and Resolution. Passive techniques and active compression pulses. Equation power radar pulse compression. The radar ambiguity function and properties. Resolution and precision in the estimates of distance and speed. Xirp signal analysis and coded pulses (Barker, Frank, etc.).

**Full-or-part-time:** 24h  
Theory classes: 12h  
Self study : 12h

### 5. Moving Target Detection

**Description:**

**Full-or-part-time:** 23h  
Theory classes: 6h  
Practical classes: 2h  
Self study : 15h
EXERCISES

**Description:**
Collection of problems (with solutions)

**Full-or-part-time:** 26h
Theory classes: 26h

CONTROL based on problem solutions

**Description:**
Short mid-term test at the end of Chap.2

**Full-or-part-time:** 1h 30m
Theory classes: 1h 30m

EXTENDED ANSWER TEST (FINAL EXAMINATION)

**Description:**
Final Exam. Based on problems solution.

**Full-or-part-time:** 2h 30m
Theory classes: 2h 30m

GRADING SYSTEM

Final examination: 60%
Partial (Control) examination: 40%

BIBLIOGRAPHY

**Basic:**

**Complementary:**