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: 2023  
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>Hours large group</td>
<td>52,0</td>
<td>34.67</td>
</tr>
<tr>
<td>Self study</td>
<td>98,0</td>
<td>65.33</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
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
**ACTIVITIES**

**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:**