230251 - RAD - Radar

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications
Academic year: 2017
Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING (Syllabus 2010).
BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015).
BACHELOR'S DEGREE IN TELECOMMUNICATIONS SCIENCE AND TECHNOLOGY (Syllabus 2010).
ECTS credits: 6
Teaching languages: Catalan, Spanish, English

Teaching staff
Coordinator: ANTONI BROQUETAS
Others: Broquetas Ibars, Antoni

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>Total learning time: 150h</th>
<th>Hours large group: 52h</th>
<th>34.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study:</td>
<td>98h</td>
<td>65.33%</td>
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</table>


# Content

<table>
<thead>
<tr>
<th>1. Introduction: Radar and Telecommunications</th>
<th>Learning time: 16h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td></td>
<td>Self study: 8h</td>
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**Description:**
Radar: A case of telecommunication system. Historical milestones in the development of radar. Types and examples of radar.

<table>
<thead>
<tr>
<th>2. Pulsed Radars</th>
<th>Learning time: 48h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 24h</td>
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<tr>
<td></td>
<td>Self study: 24h</td>
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</tbody>
</table>

**Description:**

<table>
<thead>
<tr>
<th>3. Continuous Wave Radars</th>
<th>Learning time: 16h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 8h</td>
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<tr>
<td></td>
<td>Self study: 8h</td>
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**Description:**

<table>
<thead>
<tr>
<th>4. Pulse compression</th>
<th>Learning time: 24h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 12h</td>
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<tr>
<td></td>
<td>Self study: 12h</td>
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</tbody>
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**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.).
5. Moving Target Detection

<table>
<thead>
<tr>
<th>Description:</th>
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Learning time: 23h
- Theory classes: 6h
- Practical classes: 2h
- Self study: 15h

Planning of activities

<table>
<thead>
<tr>
<th>EXERCISES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours: 26h</td>
</tr>
<tr>
<td>Theory classes: 26h</td>
</tr>
<tr>
<td>Description:</td>
</tr>
<tr>
<td>Collection of problems (with solutions)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTROL based on problem solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours: 1h 30m</td>
</tr>
<tr>
<td>Theory classes: 1h 30m</td>
</tr>
<tr>
<td>Description:</td>
</tr>
<tr>
<td>Short mid-term test at the end of Chap.2</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>EXTENDED ANSWER TEST (FINAL EXAMINATION)</th>
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</thead>
<tbody>
<tr>
<td>Hours: 2h 30m</td>
</tr>
<tr>
<td>Theory classes: 2h 30m</td>
</tr>
<tr>
<td>Description:</td>
</tr>
<tr>
<td>Final Exam. Based on problems solution.</td>
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Qualification system

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

**Basic:**


**Complementary:**
