230629 - WAS - Waves and Systems

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications
Academic year: 2015
Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)
ECTS credits: 5
Teaching languages: English

Teaching staff

Coordinator: Cardama Aznar, Angel; Jofre Roca, Luis
Others: Cardama Aznar, Angel; Jofre Roca, Luis

Learning objectives of the subject

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group:</th>
<th>39h</th>
<th>31.20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time: 125h</td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Total learning time: 125h</td>
<td>Hours small group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Total learning time: 125h</td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Total learning time: 125h</td>
<td>Self study:</td>
<td>86h</td>
<td>68.80%</td>
</tr>
</tbody>
</table>
## Content

| (ENG) 1. The EM spectrum. Communications and sensing. System and channel models | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 2. Radiation theory: retarded field and moving charges                      | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 3. Radiometry and radioastronomy: brightness models and laws, radiotelescopes | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 4. Wave solutions in time and frequency domains: wave equations, modes and fields | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 5. Wave polarization and polarimetry: Poincaré sphere, polarization scattering matrix | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 6. Waves in matter. Conductors, superconductors, dielectrics, ferroelectric | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 7. Interaction of the EM waves with the human body: Energy and human metabolism. | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 8. Fourier wave fields.: Propagation and imaging, Diffraction theorem consequences | Learning time: 3h  
|                                                                                   | Theory classes: 3h |
| (ENG) 9. Wave propagation: Reflexion, diffraction, scattering, 2-way model | Learning time: 3h  
Theory classes: 3h |
| --- | --- |
| (ENG) 10. Time and frequency-variant radio channels: narrow and broadband models | Learning time: 3h  
Theory classes: 3h |
| (ENG) 11. Transmitting and receiving antennas: circuital and radiation parameters, feeding | Learning time: 3h  
Theory classes: 3h |
| (ENG) 12. Arrays and multi-antenna geometries: antenna and channel models | Learning time: 3h  
Theory classes: 3h |
| (ENG) 13. Ultra wideband antennas: standards, antenna and channel models, impulse response | Learning time: 3h  
Theory classes: 3h |
| (ENG) 14. Free space optical systems: ray optics, Gaussian beams, laser applications | Learning time: 3h  
Theory classes: 3h |


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Bibliography

Basic:


Complementary:

