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| COURSE: ADVANCED PHYSICS | | |
| DEGREE: TELECOMMUNICATIONS TECHNOLOGIES ENGINEERING | YEAR: 3rd | TERM: 2ND |

La asignatura tiene 29 sesiones que se distribuyen a lo largo de 14 semanas. Los laboratorios pueden situarse en cualquiera de ellas. Semanalmente el alumnos tendrá dos sesiones, excepto en un caso que serán tres

| WEEKLY PLANNING | | | | | | | | | |
|-----------------|---------|--|-----------------|----------|---|---|---|-------------|--------------------------------|
| WEEK | SESSION | DESCRIPTION | GROUPS (mark X) | | SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room) | Indicate YES/NO If the session needs 2 teachers | WEEKLY PROGRAMMING FOR STUDENT | | |
| | | | LECTURES | SEMINARS | | | DESCRIPTION | CLASS HOURS | HOME WORK HOURS (Max. 7h week) |
| 1 | 1 | 1.1 Introduction to wave optics - Nature of light. Electromagnetic spectrum - Wave parameters. Energy and Intensity. Poynting's vector - Wave Equation of EM Field. Solutions - Light Propagation in free media - Introduction to wave phenomena | X | | | | -Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 | 4 |

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|---|---|---|--|---|--|--|--|------|---|
| 1 | 2 | | | X | | | <ul style="list-style-type: none"> - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,66 | |
| 2 | 3 | 1.2 Superposition of light waves <ul style="list-style-type: none"> - Same and Different Frequency. - Phase and group velocity. Beats - Stationary Waves - Pulses, wave packets and trains. - Coherence in wave optics. Spatial and Temporal - Extended Sources | | X | | | <ul style="list-style-type: none"> - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 | |
| 2 | 4 | | | X | | | <ul style="list-style-type: none"> - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,66 | 4 |
| 3 | 5 | 1.3 Interference and interferometers <ul style="list-style-type: none"> - Constructive and Destructive Interference - Contrast, Visibility. - Interference by Wavefront Division. Young`s slit - Interference by Division of Amplitude. Thin Films - Interferometers. Michelson | | X | | | <ul style="list-style-type: none"> - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 | |
| 3 | 6 | | | X | | | <ul style="list-style-type: none"> - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,66 | |
| 4 | 7 | 1.4 Diffraction <ul style="list-style-type: none"> - The Principle of Huygens-Fresnel - Fraunhofer and Fresnel diffraction - Diffraction by single and multiple slits - Optical instruments resolving power. Rayleigh criterion. Airy Disk | | X | | | <ul style="list-style-type: none"> - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 | |
| 4 | 8 | | | X | | | <ul style="list-style-type: none"> - Proposed exercises solving - Test, project delivery for evaluation of Part 1. Wave Optics | 1,66 | |

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| 5 | 9 | 2.1 Introduction to Geometrical Optics - Wave propagation: wavefront and Huygens' principle. - Wave propagation: rays - Optical systems and imaging - Imaging by reflection and refraction - Real and virtual images - Total Internal Reflection - Fermat's principle | X | | | | - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 |
| 5 | 10 | | | X | | | - Proposed exercises solving - Exposition of projects and problem solving (groups) -Participation in discussions and debates | 1,66 |
| 6 | 11 | 2.2 Mirrors - Imaging by reflection: mirrors. - Flat Mirrors. Equation of distances. Lateral magnification equation - Multiple plane mirrors. - Spherical Mirrors: concave mirror. - Paraxial approximation. Equation of distances. Lateral magnification equation. - Focus of a spherical mirror. - Spherical aberration. - Convex spherical mirrors. - Chief ray tracing. - Applications. | X | | | | - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 |
| 6 | 12 | | | X | | | - Proposed exercises solving (groups). - Exposition of projects and problem solving -Participation in discussions and debates | 1,66 |
| 7 | 13 | 2.3 Lenses and prisms - Imaging by refraction. - Refraction at a spherical surface. Paraxial approximation. Distances and lateral magnification equations. - Thin converging lenses. - Paraxial approximation. Distances and lateral magnification equations - Lens foci. Focal length. | X | | | | - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 |

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| | | <ul style="list-style-type: none"> - LensmakerB4s equation. - Diverging thin lenses. - Principal ray tracing - Aberrations. Aberration correction. - Fresnel Lens. - Prisms. - Applications | | | | | | | |
| 7 | 14 | | | X | | | | <ul style="list-style-type: none"> - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,66 |
| 8 | 15 | 2.4 Simple optical systems. <ul style="list-style-type: none"> - The human eye: optical properties, - Imaging: The process of accommodation. - Vision defects: myopia and hyperopia. - Correction by lenses. - Correction by laser surgery. - Photographic camera: optical elements: objective, sensor array, aperture, shutter and prism. - Depth of field. | X | | | | <ul style="list-style-type: none"> - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 | |
| 8 | 16 | | | X | | | <ul style="list-style-type: none"> - Proposed exercises solving - Test, project submission for evaluation of Part2. GEOMETRICAL OPTICS | 1,66 | |
| 9 | 17 | 3.1 Light-Matter Interaction. Basic phenomena Emission, absorption, reflection, refraction, scattering, luminescence. <ul style="list-style-type: none"> - Electron as oscillator. - The Lorentz model. | X | | | | <ul style="list-style-type: none"> - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 | |
| 9 | 18 | | | X | | | <ul style="list-style-type: none"> - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,6 | |
| 10 | 19 | 3.2 Emission Scattering and Absorption <ul style="list-style-type: none"> - Emission by a thermal source. - Scattering and absorption cross sections. - Origin of the refractive index. - Optical materials. | X | | | | <ul style="list-style-type: none"> - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,6 | |

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| 10 | 20 | | | X | | | | - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,6 | |
| 11 | 21 | 3.3 The Black Body - Black Body Radiation. Planck's law. - Radiometric and photometric magnitudes. - Radiometry. | | X | | | | - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,6 | |
| 11 | 22 | | | X | | | | - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,66 | |
| 12 | 23 | 3.4 Radiation sources and detectors - Photodetection. Sources of radiation - Electro-Optical Systems - Example: The infrared camera | | X | | | | - Reading of the corresponding chapters in the proposed literature - Study and personal work on the lecture, including proposed bibliography. | 1,66 | |
| 12 | 24 | | | | | | | - Proposed exercises solving - Exposition of projects and problem solving -Participation in discussions and debates | 1,6 | |
| 13 | 25 | | | | | | | Evaluation of Part 3. Interaction Light - Matter | 1,66 | |
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| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| Subtotal 1 | | | | | | | | | 41,66 | 58 |
| Total 1 (Hours of class plus student homework hours between weeks 1-14) | | | | | | | | | 99.66 | |

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| 15 | | Tutorials, handing in, etc | | | | | | | 2.33 | 2 |
| 16 | | Assessment | | | | | | | 3 | 10 |
| 17 | | | | | | | | | | |
| 18 | | | | | | | | | | |

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| | Subtotal 2 | 5.33 | 12 |
| Total 2 (<i>Hours of class plus student homework hours between weeks 15-18</i>) | | 17.33 | |
| TOTAL (<i>Total 1 + Total 2. Maximum 180 hours</i>) | | 117 | |