

مختصر توصيف المقرر

(Course Information)

معلومات المقرر *

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| اسم المقرر: | البصريات |
| رقم المقرر: | فيز 3322 |
| اسم ورقم المتطلب السابق: | فيز 2312 |
| اسم ورقم المتطلب المرافق: | -- |
| مستوى المقرر: | الخامس |
| الساعات المعتمدة: | 3 (0+0+3) |
| Module Title: | Optics |
| Module ID: | PHYS 3322 |
| Prerequisite: | PHYS 2312 |
| Co-requisite: | -- |
| Course Level: | Fifth |
| Credit Hours: | 3 (3+0+0) |

Module Description

وصف المقرر :

The nature of light, The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers (Young, Fresnel's bi-prism, loyed mirror, Fresnel's double mirrors, wedge interferometer, Newton rings, Michelson interferometer, Jamin & Mach-Zehnder refractometers), Interference of multiple beams, Fabry-Perot interferometer, Applications of interferometry. Diffraction, Fraunhofer diffraction (single slit, two slits, multiple slits) - diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle). Polarization - polarization by absorption, reflection, refraction & double refraction - Optical active materials & polarimeter. Interference of polarized light, Analysis of polarized light, Electro-optics (Kerr effect & Pockels effect), Magneto-optics (Faraday effect)

Module Aims

اهداف المقرر :

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| 1 | To give students an understanding of geometrical, physical and basic wave optics | 1 |
| 2 | To familiarize students with applications of optics and optical systems, interferometers and spectrometers | 2 |
| 3 | Understand what is meant by dispersion | 3 |

Learning Outcomes:

مخرجات التعليم:

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| 1 | Understand the concepts of rays and wave fronts; understand Huygens' principle Be able to analyze reflection and refraction at a boundary between different media using Fermat's principle | 1 |
| 2 | Understand what is meant by polarization and the effect of filters and birefringent crystals on linearly, circularly and elliptically polarized light Know Malus' law Understand constructive and destructive interference Understand the principles of antireflection coatings | 2 |

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| 3 | Be able to use the theory of secondary sources to calculate the diffraction pattern from a single slit Understand qualitatively the diffraction pattern from a circular aperture Be able to use the theory of secondary sources to calculate the interference pattern from a double slit and a diffraction grating | 3 |
| 4 | Be able to apply the ideas of Fourier theory to diffraction in optics, including Young's slits, the diffraction gating, and propagation through two dimensional apertures Understand the consequences of diffraction for instrumental resolution and be able to apply it to real situations to calculate the resolving power of a diffraction grating | 4 |
| 5 | Be able to use the convolution theorem as an aid to understanding diffraction patterns such as that arising from a double slit and diffraction grating Have an introductory understanding of lasers and holography | 5 |

Course Contents:

محتوى المقرر:

| ساعات التدريس (Hours) | عدد الأسابيع (Weeks) | قائمة الموضوعات (Subjects) |
|--------------------------|-------------------------|---|
| 9 | 3 | CHAPTER 1: The nature of light. The superposition of waves |
| 9 | 3 | CHAPTER 2: Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers (Young, Fresnel's bi-prism, Loyal's mirror, Fresnel's double mirrors, wedge interferometer, Newton rings, Michelson interferometer, Jamin & Mach – Zehnderre fractometers), Interference of multiple beams, Fabry- Perot interferometer, Applications of interferometry. |
| 9 | 3 | CHAPTER 3: Diffraction, Fraunhofer diffraction (single slit, two slits, multiple slits) - diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle). |
| 12 | 4 | CHAPTER 4: Polarization - polarization by absorption, reflection, refraction & double refraction - Optical active materials & polarometer. |
| 9 | 3 | CHAPTER 5: Interference of polarized light, Analysis of polarized light, Electro-optics (Kerr effect & Pockels effect), Magneto - optics (Faraday effect) |

Textbook and References:

الكتاب المقرر والمراجع المساندة:

| سنة النشر Publishing Year | اسم الناشر Publisher | اسم المؤلف (رئيسي) Author's Name | اسم الكتاب المقرر Textbook title |
|------------------------------|---|-------------------------------------|-------------------------------------|
| 1976 | McGraw-Hill Science/Engineering/Math | Jenkins F. A. and H. E. | Fundamentals of optics |
| سنة النشر Publishing Year | اسم الناشر Publisher | اسم المؤلف (رئيسي) Author's Name | اسم المرجع Reference |
| 2008 | Discovery Publishing House | R. K. Verma | Wave Optics |