**Jordan University of Science and Technology**
**Faculty of Applied Medical Sciences**
**Department of Allied Medical Sciences**
**Optometry**
**First Semester 2020-2021**
**Course Syllabus**

| Course Information | |
|---|---|
| Course Title | Visual Optics Practicle |
| Course Code | OPT 205 |
| Prerequisites | OPT 112 |
| Course Credits | 1 |
| Course Website | |

| Course Description, Aims and Objectives |
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| This course includes the practical experiments in visual optics that should be introduced to optometry students to give them a background in optics in relation to the eye and ocular examination. The subject matter of this course comprises the application of geometric optics (that covered in the last semester) to the specific case of ophthalmic lenses, prisms and the eye. While the basic fact of clinical practice requires the diagnosis and treatment of different ocular pathology, the vast majority of patients you might see has no pathology indeed and is seeking vision care for refractive or binocular problems. Managing these two important practices (refraction and binocular vision) require the understanding and application of ophthalmic optics in basis of geometrical optics. The goal of this course is to teach the important properties of lenses and prisms as they affect the performance of the eye and eyeglass prescription. |

| Textbook/s | |
|---|---|
| Title | Geometrical and Visual Optics: A Clinical introduction |
| Author(s) | Steven H. Schwartz |
| Publisher | Mc Graw Hill Education |
| Year | 2013 |
| Edition | Second Edition |
| Book Website | |

| Assessment | | |
|---|---|---|
| **Assessment** | **Expected Due Date** | **Percentage** |
| **Practicle work and quizzes** | **Throughout the semester** | **20%** |
| **Midterm Exam** | **7th week** | **40%** |
| **Final Exam** | **At the end of the semester** | **40%** |
| **TOTAL** | | **100%** |

| Teaching and Learning Methods |
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| **Tutorial teaching method might be applied during the semester.**<br>**Clinical based exercises are at the end of each lecture for students to study for the next week.**<br>**Discussion and feedback are given at the beginning of each lecture.** |

**Learning Objectives:**

**After studying the material covered in lectures, practical sessions, clinical seminars and case presentations of this course, the student is expected to achieve the following learning objectives:**

| Learning objectives | Weight |
|---|---|
| **1. Application of law of refraction in spherical and cylindrical lenses and formation of image.** | **20%** |
| **2. Snell's law and its application in the image formation by refraction. The total internal reflection in the optically dense materials.** | **20%** |
| **3. Thin and thick lenses in optical instruments. Understanding the practical concept and application of spherical aberration.** | **20%** |
| **4. Understanding the practical aspect of formation and focusing of image in the eye. Understanding common vision defects using the defocus observation (near sight, and far sight defects), correction vision.** | **30%** |
| **5. Understanding the optical cross system and how to write a prescription.** | **10%** |

**Learning outcomes:**

**After studying the material covered in lectures, practical sessions, clinical seminars and case presentations of this course, the student is expected to achieve the following learning outcomes:**

| | Learning outcome | References |
|---|---|---|
| **1.** | **Problem-based learning approach to knowledge underpinning of optics in relation to the ocular system and instrumentation** | **Recommended text book/s and handouts** |
| **2.** | **Applying practical knowledge of image formation and focusing by different types of lenses.** | **Recommended text book/s and handouts** |
| **3.** | **Understanding refractive errors of the eye (Myopia, Hyperopia) and applying optics in correction of such visual defects.** | **Recommended text book/s and handouts** |

**Lectures/topics:**

| Weeks | Lecture Topic | Specific learning objectives | References |
|---|---|---|---|
| **1** | **Introduction to the course/ vergence of light** | **1** | **handout** |
| **2** | **Image formed by Refraction and concepts of spherical aberration** | **2** | **handout** |

| | | | |
|---|---|---|---|
| **3** | **Image formation by convex and concave lenses** | **1,2** | **handout** |
| **4** | **Combination of two lenses.** | **3** | **handout** |
| **5** | **Critical angle and Total internal reflection** | **2, 3** | **handout** |
| **6** | **Prisms** | **4** | **handout** |
| **7** | **Prisms induce by lens displacement and prove of prentice rule** | **4** | **handout** |
| **8** | **Image formation the eye** | **3, 4** | **handout** |
| **9** | **The effect of defocus in image formation in the eye and the effect of correction** | **4,5** | **handout** |
| **10** | **The effect of defocus in image formation in the eye and the pin hole effect** | **4, 5** | **handout** |
| **11** | **Visual Acuity** | **5** | **handout** |
| **12** | **Optical Cross and writing a prescription** | **5** | **handout** |

| **Additional Notes** | |
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| **Statement on Professionalism** | **Professional behavior is expected of students at all times. Attitude and professional behavior are a minimum criterion for passing this class. Examples of unprofessional behavior include but are not limited to: missing classes, tardiness, lack of attention for a speaker, talking to others during lecture, leaving a lecture prior to its completion without prior authorization of the instructor, working on other class material during class, and sleeping during class.** |
| **Cheating** | **University regulations will be applied on cases of cheating and/or plagiarism** |
| **Cell phone:** | **The use of cellular phone is prohibited in class rooms and during exams. The cellular phone must be switched off in class rooms and during exams.** |
| **Attendance** | **No points will be count for points attendance of this class, however attending the lectures will greatly enhance your grade. The student is responsible for any information discussed in lecture sessions. It is imperative to attend all classes!** |
| **Absences:** | **University regulations will be applied. Students are not allowed to be absent for more than 20% of lectures for any reason or excuse. If a student exceeds the absence limit, he or she will not be allowed to sit for future course exams. (Please review university regulation for more details)** |
| **Make-up Exam** | **Make-up exams is entitled for students who miss the exam with accepted legal or medical excuse endorsed by the instructor within 24 hours after the scheduled exam (Please review university regulation for more details)** |
| **Feedback** | **Concerns, complaints, questions, and/or feedback are appreciated and will be important for the instructor. You can contact your instructor using the e-mail or during office hours** |

**Kindest Regards**

Optics has three major branches: Geometrical, Physical and Quantum optics. The book introduces all the three areas of optics at undergraduate level. There are 9 chapters, and there are 15 to 25 problems at the end of each chapter for students to practice the concepts covers in the chapter. 195pp. Discover the world's research. 17+ million members. 135+ million publications. With years of clinical, academic, and research experience, Dr. Steven Schwartz has crafted an essential optics text for optometry interns and ophthalmology residents alike: Geometrical and Visual Optics, A Clinical Introduction, 2nd ed. Not a fan of countless equations, Dr. Schwartz emphasizes the vergence relationship (L + F = Lâ€²), along with other key formulae to solve the vast majority of clinical optical problems. This utilitarian approach is the premise for his concise, thoroughly readable text. Understand basic concepts, retain key formulae, and apply them clinically. Text is to the poin FIGURE 20.1 (left) Geometrical optics through a cloud: sunâ€™s rays travel in straight lines. (right) Geometric optics by laser light. in a relation similar to that defining the speed of light in vacuum c. Because, in general, â§ Õ† â§0 and â® Õ† â®0 we have that the speed of light in a material medium is always less than c. For most materials â® is very close to â®0, and it is the permittivity â§ that really determines the speed of light. We introduce the index of refraction of the medium n to be. Geometrical optics. Textbook: Born and Wolf (chapters 3-5). Overview: Electromagnetic plane waves (from maxwell's equations). The Eikonal equation and its derivation (optics at zero wavelength). Refraction ; Snell's law (reflection) ; Total internal reflection ; The prism ; Dispersion ; The thin lens Imaging as a projective transformation. Optical systems and the ABCD matrix.