BROWARD COLLEGE
COURSE OUTLINE

LAST REVIEW: **2009-2010** **NEXT REVIEW:** **2014-2015** **STATUS:** **A**

COURSE TITLE: PHYSICAL AND GEOMETRICAL OPTICS LAB

COMMON COURSE NUMBER: OPT 1110L

CREDIT HOURS: 1 **CONTACT HOUR BREAKDOWN 32**

CLOCK HOURS: Lecture: Lab: **32**

Clinic: Other:

PREREQUISITE(S):
COREQUISITE(S):
PRE or COREQISITE: OPT 1330, OPT1210 and OPT 1110

COURSE DESCRIPTION:
This course provides the opportunity for students to demonstrate, measure and explore the behavior of light energy as it passes through prisms and curved lens surfaces. Students will demonstrate the principles of ophthalmic devices and how they correct the errors of human vision.

UNIT TITLES

1 LENSOMETER -- SINGLE VISION SPHERICAL LENSES
2 LENSOMETRY -- SINGLE VISION SPHEROCYLINDER LENSES
3 LENSOMETRY --- BIFOCAL LENSES
4 SURFACE POWER AND THIN LENSES
5 PRIMARY AND SECONDARY FOCAL LENGTHS
6 LENSES THAT CORRECT FOR MYOPIA
7 LENSES THAT CORRECT FOR HYPEROPIA
8 LENSES THAT CORRECT FOR ASTIGMATISM
9 HAND NEUTRALIZATION
10 PRISM POWER AND DEVIATION
11 SNELL'S LAW

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Unit 1: LENSOMETER -- SINGLE VISION SPHERICAL LENSES

General Outcome:

1.0 The student shall be able to list the parts of a lensometer and to be able to naturalize and record single vision spherical lenses.

Specific Measurable Learning Outcomes:
To successfully complete this module the student will:

1.1 List the parts of a standard manual lensometer.
1.2 Explain each part of the standard manual lensometer and how it is used.
1.3 List the steps in neutralizing a single vision spherical lens.
1.4 Neutralize single vision spherical plus lenses.
1.5 Neutralize single vision spherical minus lenses.
1.6 Properly record neutralization of single vision spherical lenses.

Unit 2: LENSOMETRY -- SINGLE VISION SPHEROCYLINDER LENSES

General Outcome:

2.0 The student shall be able to naturalize and record single vision spherocyliner lenses.

Specific Measurable Learning Outcomes:
To successfully complete this module the student will:

2.1 Review the parts of a standard manual lensometer.
2.2 List the steps in neutralizing a single vision spherocyliner lens.
2.3 Neutralize single vision spherocyliner plus lenses.
2.4 Neutralize single vision spherocyliner minus lenses.
2.5 Properly record neutralization of single vision spherocyliner lenses in both plus and minus cylinder forms.

Unit 3: LENSOMETRY --- BIFOCAL LENSES

General Outcome:

3.0 The student shall be able to naturalize and record multi-focal lenses.

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Unit 3: LENSOMETRY --- BIFOCAL LENSES continued

Specific Measurable Learning Outcomes:
To successfully complete this module the student will:

3.1 Explain the concept of a near addition
3.2 Determine which patients would need a trifocal intermediate
3.3 Calculate the amount of image jump if the power of the bifocal and the segment type is given.
3.4 Discuss the prismatic effect of lens pairs
3.5 Define vertical imbalance
3.6 Calculate the amount of bicentric grinding needed to correct for vertical imbalance
3.7 Explain how to check the amount of slab off in a given lens.
3.8 Differentiate between different types of segments to compensate for vertical imbalance.
3.9 Determine how much vertical imbalance should be corrected.
3.10 Calculate the imbalance for spheres, cylinders, and spherocylinders
3.11 Explain the purpose of lateral decentration of near segs.

Unit 4: SURFACE POWER AND THIN LENSES

General Outcome:

4.0 The student will be able to demonstrate the relationship between surface power and total lens power.

Specific Measurable Learning Outcomes:
To successfully complete this module the student will:

4.1 Demonstrate the use of a Lens Measure.
4.2 Calculate the power of a lens using a Lens Measure.
4.3 Calculate the power of a lens using the optical bench.
4.4 Demonstrate the difference in refractive power between lenses of the same surface power and different indexes of refraction.
4.5 Demonstrate the difference in refractive power between thin and thick lenses of the same index of refraction and surface powers.

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Unit 5: PRIMARY AND SECONDARY FOCAL LENGTHS

General Outcome:

5.0 The student will be able to diagram and demonstrate with an optical bench the theory of refraction through a lens.

Specific Measurable Learning Outcomes:
To successfully complete this module the student will:

5.1 Diagram the focal power of a given lens.
5.2 Draw a ray diagram for a plus and minus lens.
5.3 Differentiate between real and virtual objects and images
5.4 Demonstrate the focal lengths, focal points and powers of concave, convex, and flat lenses.
5.5 Show the relationship between power and distance from the object.
5.6 Demonstrate the effect on multiple light rays with changes in the power of a len

Unit 6: LENSES THAT CORRECT FOR MYOPIA

General Outcome:

6.0 The student shall be able to demonstrate knowledge of how a concave lens will correct for myopia.

Specific Measurable Learning Outcomes:
To successfully complete this module the student will:

6.1 Demonstrate the difference in minus refractive power between lenses of the same surface power and different indexes of refraction.
6.2 Demonstrate the difference in minus refractive power between thin and thick lenses of the same index of refraction and surface powers.
6.3 Explain graphically how a concave lens corrects myopia.
6.4 Demonstrate how a minus lens creates a virtual image.
6.5 Show how the primary and secondary focal points interact with lens power.
6.6 Demonstrate the effects of vertex distance on effective power.

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Unit 7: LENSES THAT CORRECT FOR HYPEROPIA

General Outcome:

7.0 The student will be able to demonstrate a knowledge of how a convex lens will correct for hyperopia.

Specific Measurable Learning Outcomes:
To successfully complete this module the student will:

7.1 Demonstrate the difference in plus refractive power between thin and thick lenses of the same index of refraction and surface powers.
7.2 Explain graphically how a convex lens corrects hyperopia.
7.3 Demonstrate how a plus lens creates a real image.
7.4 Show how the primary and secondary focal points interact with lens power.
7.5 Demonstrate the effect vertex distance has on effective power.

Unit 8 LENSES THAT CORRECT FOR ASTIGMATISM

General Outcome:

8.0 The student will be able to demonstrate knowledge of how a toric lens will correct for astigmatism.

Specific Measurable Learning Outcomes
To successfully complete this module the student will:

8.1 Demonstrate the difference in toric refractive power between lenses of the same surface power and different indexes of refraction.
8.2 Demonstrate the difference in toric refractive power between thin and thick lenses of the same index of refraction and surface powers.
8.3 Explain graphically how a toric lens corrects astigmatism.
8.4 Show how the primary and secondary focal points interact with lens power.
8.5 Demonstrate the effect vertex distance has on effective power.
8.6 Explain graphically and by demonstration the difference between plus and minus cylinder lenses.
8.7 Explain graphically and by demonstration how a cross cylinder lens works.

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Unit 9 HAND NEUTRALIZATION

General Outcome:

9.0 The student will be able to demonstrate knowledge of the properties of lenses, refractive power and neutralization of movement.

Specific Measurable Learning Outcomes
To successfully complete this module the student will:

9.1	Demonstrate the movement of an object through a plus, minus, and flat lens.
9.2	Explain the phenomena of "scissors movement"
9.3	Neutralize plus lenses using minus lenses of equal power.
9.4	Neutralize minus lenses using plus lenses of equal power.
9.5	Resolve a spherocylinder into cross cylinders
9.6	Neutralize spherocylinder lenses by resolving each major meridian.
9.7	Correctly record the prescribtion of spherocylinder lenses in both plus and minus

Unit 10 PRISM POWER AND DEVIATION

General Outcome:

10.0 The student will be able to demonstrate how a prism works, how a prism deviates light, and how to measure the amount of deviation.

Specific Measurable Learning Outcomes
To successfully complete this module the student will:

10.1	Demonstrate deviation of a single ray of light by a prism.
10.2	Explore the aberrations that can be caused by light striking a lens off-center.
10.3	Determine by demonstration Prentice's Law.
10.4	Measure the deviation of a single ray of light using prisms of different powers.
10.5	Determine the effect that distance has on deviation through a prism.
10.6	Demonstate the effect that two prisms, base to base, have on multiple light rays.
10.7	Demonstrate the effect that two prisms, apex to apex have on multiple light rays.

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Unit 11 SNELL'S LAW

General Outcome:

11.0 The student will be able to demonstrate knowledge of Snell's Law of Refraction

Specific Measurable Learning Outcomes
To successfully complete this module the student will:

11.1 Explain the rules and regulations of the course.
11.2 Set up and operate an optical bench.
11.3 Demonstrate how a single ray of light is affected by an ophthalmic lens.
11.4 Calculate the angle of reflection and refraction using an optical bench.