OPT-1411: BASIC SPECTACLE FABRICATION

Cuyahoga Community College

Viewing: OPT-1411 : Basic Spectacle Fabrication

Board of Trustees:
May 2024

Academic Term:
Fall 2024

Subject Code
OPT - Optical Technology

Course Number:
1411

Title:
Basic Spectacle Fabrication

Catalog Description:
Introduction to ophthalmic laboratory procedures. Basic laboratory concepts and manipulative skills required to make a pair of single-vision eyewear. Topics include the importance of laboratory safety, personal safety, and maintenance of ophthalmic machines and ophthalmic instruments.

Credit Hour(s):
1

Lecture Hour(s):
.5

Lab Hour(s):
1.5

Requisites

Prerequisite and Corequisite
OPT-1400 Introduction to Fabrication Principles or concurrent enrollment.

Outcomes

Course Outcome(s):
Calculate measurements necessary for the fabrication of single vision spectacles.

Essential Learning Outcome Mapping:
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Discuss American National Standards Institute\Occupational Health and Safety Administration (ANSI\OSHA) standards for operating and maintaining optical machinery and instruments.
2. Perform lens preparation.
3. Demonstrate knowledge basic edging techniques.
4. Discuss properties of impact resistant lens materials

Course Outcome(s):
Spot a single vision ophthalmic lenses thereby distinguishing lens characteristics necessary for spectacle fabrication.

Essential Learning Outcome Mapping:
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Construct single vision eyewear.
2. Perform lens preparation.
3. Demonstrate correct operation of optical machinery.
4. Demonstrate knowledge of edging lenses.

Course Outcome(s):

Align single vision ophthalmic lenses so that all specifications of the prescription are within the standards put forth by the American National Standards Institute.

Essential Learning Outcome Mapping:

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Perform lens preparation.
2. Demonstrate correct operation of optical machinery.
3. Perform final inspection of single vision eyewear.

Course Outcome(s):

Fabricate aesthetically pleasing single vision spectacles that meet American National Standards Institute (ANSI) standards.

Essential Learning Outcome Mapping:

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Construct single vision eyewear.
2. Use proper safety equipment when working in the laboratory.
3. Demonstrate correct operation of optical machinery.
4. Demonstrate knowledge of edging lenses.
5. Perform edging using appropriate automatic equipment.
6. Perform edging using appropriate manual equipment.

Course Outcome(s):

Inspect single vision spectacles to verify that they are fabricated within the standards put forth by the American National Standards Institute.

Essential Learning Outcome Mapping:

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Construct single vision eyewear.
2. Perform final inspection of single vision eyewear.
3. Demonstrate correct operation of optical machinery.
4. Perform edging using appropriate automatic equipment.
5. Demonstrate knowledge of impact resistant lenses.

Course Outcome(s):

Maintain and operate instruments and optical machines in accordance with industry safety regulations.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Information Literacy: Acquire, evaluate, and use information from credible sources in order to meet information needs for a specific research purpose.

Objective(s):

1. Discuss ANSI and OSHA standards for operating and maintaining optical machinery and instruments.
2. Use proper safety equipment when working in the laboratory.
3. Demonstrate correct operation of optical machinery.
4. Perform edging using appropriate equipment.

Methods of Evaluation:

1. Exams
2. Laboratory projects
3. Homework
4. Participation

Course Content Outline:

1. CONCEPTS:
    a. Understanding spectacle prescriptions
        i. Sphere power
        ii. Cylinder power
        iii. Axis
    b. Transposition of spectacle prescriptions
    c. Lensometry
        i. Determine sphere power
        ii. Determine cylinder power
        iii. Determine axis
    d. Fabrication formulae
        i. Boxing system
            1. A Measurement
            2. B Measurement
            3. Distance between lenses
            4. Effective diameter
        ii. Geometric center
        iii. Geometric center distance
        iv. Horizontal lens centration
        v. Minimum blank size
    e. Blocking of single vision lenses
    f. Finishing lens layout for single vision lens
    g. Edging of single vision lenses
        i. Using automated equipment
            1. Edgers with patterns
            2. Patternless edgers
        ii. Manual edging
    h. Verification of single vision lenses
    i. Enforcement of ANSI by OSHA
    j. Optical service cycle
    k. Safety procedures and practices
    l. Drop ball testing
2. SKILLS:
    a. Perform finishing calculations
    b. Apply finishing calculations to produce the proper lens design
    c. Preparing lens
    d. Edging lens with automated equipment

e. Edging lens with hand equipment
f. Perform final inspection of optical device

3. ISSUES:
   a. Safety
   b. Refractive errors
   c. Lab rejects and spoilage
   d. Apply knowledge of lens fabrication
   e. Lens materials, aspheric lenses
   f. Enforcement of ANSI standards by OSHA

Resources

Bhootra, Ajay Kumar. (2018) *Optician's Guide: A manual for opticians*, Jaypee Brothers Medical Publishers.

Brooks, Clifford W. (2003) *Essentials of ophthalmic lens finishing*, St. Louis, MO: Butterworth/Heinmann.

Brooks, C., O.D. (1992) *Understanding lens surfacing*, Butterworth-Heinemann.

Brooks, Clifford W. *System for ophthalmic dispensing*. 4th. St. Louis, MO:, 2023.

Stoner, E. et al. (2005) *Optical formulas tutorial*, Elsevier.

Resources Other

1. 20/20 https://www.2020mag.com/
2. American Optometric Association. https://www.aoa.org/patients-and-public/caring-for-your-vision/contact-lenses?sso=y (https://www.aoa.org/patients-and-public/caring-for-your-vision/contact-lenses/?sso=y)
3. Centers for Disease Control and Prevention. "Healthy Contact Lens Wear and Care."https://www.cdc.gov/contactlenses/index.html (https://www.cdc.gov/contactlenses/)
4. Eyecare Business https://www.eyecarebusiness.com/
5. Invision https://invisionmag.com/
6. Khan Acadamy. https://www.khanacademy.org/
7. Ophthobook https://timroot.com/ophthobook/
8. OptiBoard Forums. http://www.optiboard.com/forums/
9. Quantum Optical. http://www.quantumoptical.com/ (https://www.2020mag.com/)
10. Review of Optometry. https://www.reviewofoptometry.com/
11. Vision Professionals Board https://vision.ohio.gov/vision-professionals/optician/3-optician (https://vision.ohio.gov/vision-professionals/optician/3-optician/)

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