



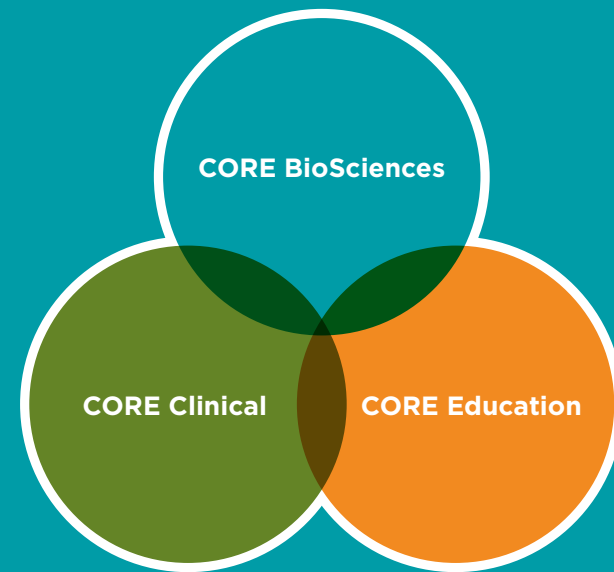
CORE

Centre for Ocular
Research & Education



Our mission is to improve global eye health and vision through advanced bioscience, clinical research and education.

Our work is driven by a passion for research and scientific rigor, a commitment to objectivity and an appreciation for inter-disciplinary collaboration.



Contents

1. A Tradition of Forward Momentum.....	05
2. An Evolution of Scope.....	07
3. CORE BioSciences.....	09
4. CORE Clinical.....	11
5. CORE Education.....	13

The University of Waterloo is well known for its exceptional innovation and world class research, offering a wealth of expertise that both enhances CORE research and offers a strong foundation for its enterprising spirit.

The School of Optometry & Vision Science at the University of Waterloo offers the only English language Doctor of Optometry degree in Canada, and has a thriving graduate program in vision science and optometry. CORE has strong roots in the School, which features research faculty specializing in a wide variety of vision science topics.



1. A Tradition of Forward Momentum

The Centre for Ocular Research & Education (CORE) has a rich history as a leader in the field of ocular research.

Established in 1988 at the University of Waterloo's School of Optometry & Vision Science, it was known as the Centre for Contact Lens Research (CCLR) for three decades. The organization was designed to meet a need for objective and independent clinical trials and fundamental basic research to support the development and testing of contact lens materials, designs and care systems.

The CCLR was involved in some of the most meaningful advancements in the history of contact lenses, including the evolution of silicone hydrogel lenses and extended wear, the development of the disposable lens modality, and understanding dissatisfaction and dropout with lens wear.

While our applied research has always been supplemented by basic research exploring the ocular effects of contact lens wear, our interests and capabilities expanded over time to include a much wider reach.

Many of the contact lens and dry eye products on the market have undergone preliminary testing at CORE prior to their regulatory approval, and many more undergo Phase IV testing once on the market.

The Evolution of CORE: A Decade by Decade Snapshot

1980s >>

- The Centre for Contact Lens Research (CCLR) is established by founding director, Desmond Fonn.

1990s >>

- Clinical research capacity continues to develop and basic research expands to include contact lens materials, corneal sensitivity & the corneal swelling response to hypoxic conditions.

2000s >>

- Clinical and basic research continue to expand
- Lyndon Jones is appointed Director, merging the CCLR with his biomaterials lab.

2010s >>

- Expanded interest and capabilities acknowledged through rebranding.
- **The Centre for Ocular Research & Education (CORE)** is launched.

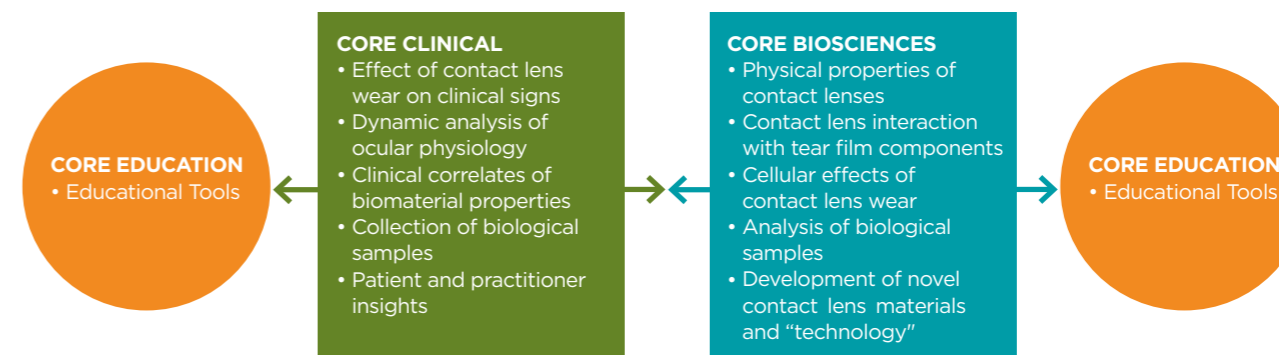
CORE RESEARCH EXPERTISE

	CORE BioSciences	CORE Clinical
Biochemistry	<ul style="list-style-type: none"> • Protein & lipid quantification • Protein activity • Oxidized lipids • Analysis of inflammatory markers 	<ul style="list-style-type: none"> • Clinical correlates of biochemical properties, with respect to the ocular surface
Biomaterials	<ul style="list-style-type: none"> • Development of model contact lens materials • Incorporation of novel substrates to enhance properties of contact lens materials 	<ul style="list-style-type: none"> • Clinical trials <ul style="list-style-type: none"> • Approved & investigational products • Human & animal
Contact lens materials & lens care systems	<ul style="list-style-type: none"> • Quantification, characterization & distribution of tear film deposits on & within contact lens materials • Efficacy of UV ocular protection • Adherence of allergens, pollutants & cosmetics on lens materials • Antimicrobial & cleaning efficacy • Cytotoxicity • Physical properties of contact lenses & care systems • Uptake & release of biocides 	<ul style="list-style-type: none"> • Clinical correlates of biomaterial properties • Efficacy of rewetting drops • Contact lens user experience • Patient compliance • Contact lens comfort • Clinical trials
Corneal and conjunctival physiology	<ul style="list-style-type: none"> • Development of <i>in vitro</i> models designed to investigate tear flow, blink, human corneal epithelial cells • Live imaging of cell morphology • Physical & chemical characterization of the tear film 	<ul style="list-style-type: none"> • Dry eye disease • Ocular response to contact lens wear • Tissue assessment
Drug delivery	<ul style="list-style-type: none"> • Molecular imprinting • Nanoparticles • Biomaterials 	<ul style="list-style-type: none"> • Clinical trials <ul style="list-style-type: none"> • Approved & investigational products • Human & animal
Microbiology	<ul style="list-style-type: none"> • Bacterial binding to contact lenses & lens cases • Biofilm formation on lens cases & contact lenses • Ocular microbiome 	<ul style="list-style-type: none"> • Clinical correlates of bacterial binding & biofilm formation, with respect to the ocular surface
Refractive error correction & control	<ul style="list-style-type: none"> • Animal models of myopia control 	<ul style="list-style-type: none"> • Prevalence of myopia & uncorrected refractive error • Myopia progression in children • Lasik evaluations • Spectacle performance
Tear film & dry eye	<ul style="list-style-type: none"> • <i>In vitro</i> models • Live imaging of cell morphology • Inflammatory markers & other biomarker analyses 	<ul style="list-style-type: none"> • Dry eye disease • Ocular response to contact lens wear • Tear film characterization • Meibomian gland dysfunction • Dry eye treatment • Tissue assessment
Toxicology	<ul style="list-style-type: none"> • Efficacy of biomaterials in blocking UV radiation • Ocular surface cell response to adverse conditions 	Not applicable
Visual performance	Not applicable	<ul style="list-style-type: none"> • Monovision, multifocal & toric contact lenses • Spectacle lenses • Predicting subjective satisfaction via objective vision assessments

2. An Evolution of Scope

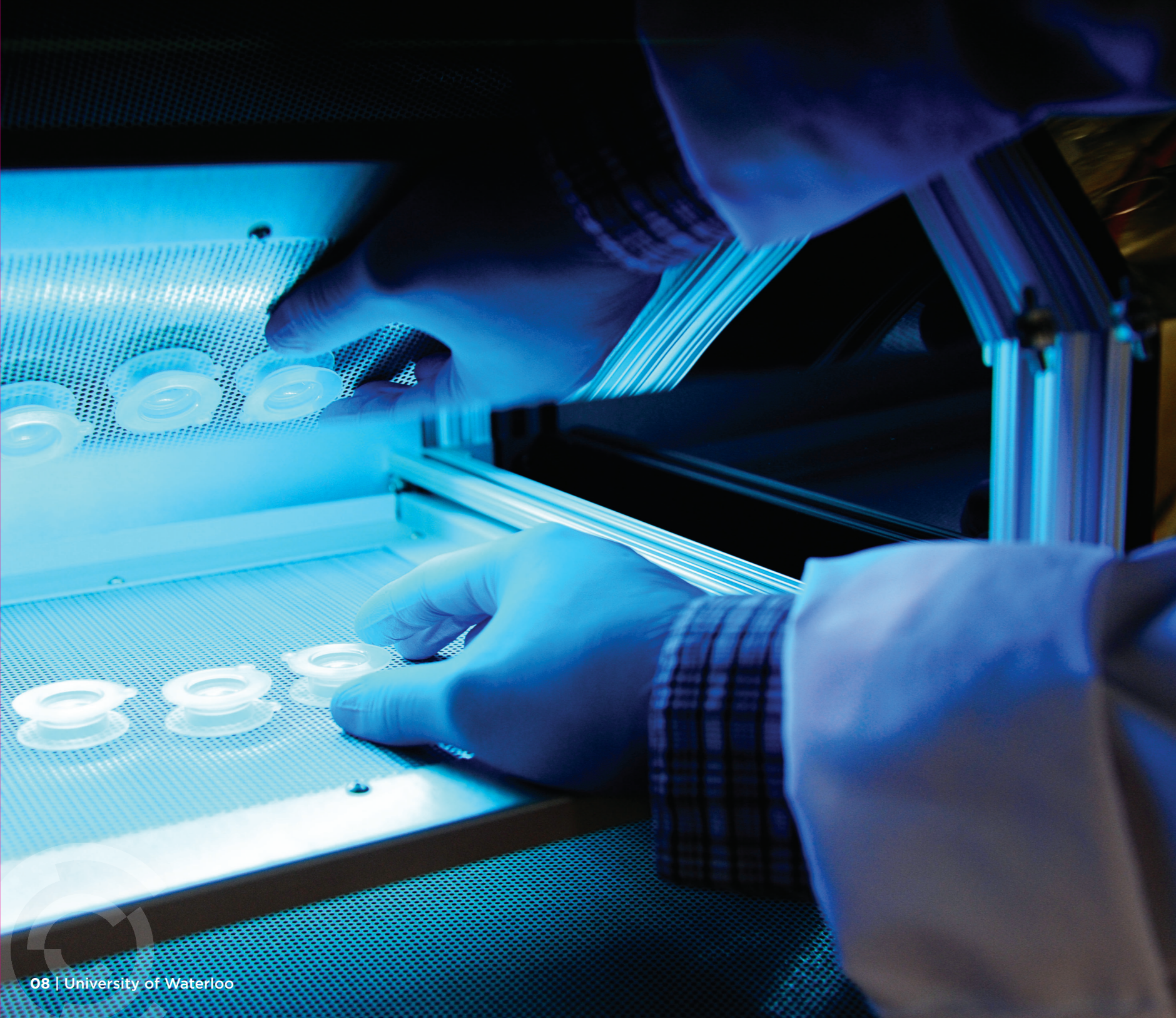
Today, **CORE Clinical** and **CORE BioSciences** seamlessly integrate clinical observations with insights grounded in basic biosciences.

Our interdisciplinary team has the expertise and the drive to investigate multiple angles of a research question, building on insights to design multifaceted solutions and facilitate the development of new biomaterials and technology.



In addition to sharing research results, training graduate students and post-doctoral fellows, and offering continuing education, CORE Education leverages the intellectual capital of the CORE research team to pinpoint research findings of interest to clinical practitioners and develop effective and engaging educational tools designed to keep them up to date and facilitate patient communication.

The CORE team has the expertise, technology and regulatory framework to support fundamental and clinical research focusing on pharmaceuticals, biomaterials (including contact lenses), ocular physiology and imaging.



3. CORE BioSciences

CORE's multidisciplinary biosciences team works together to investigate fundamental research questions relating to the ocular surface and biomaterials, particularly contact lenses.

SEAMLESS ACCESS TO INSIGHTS FROM CORE CLINICAL

Questions that arise during our clinical research can often be explored *in vitro*, and vice versa.

CERTIFICATION

BSC biohazard safety level 2, radioactive tracer, GLP, GCP.

CUSTOM-DESIGNED TECHNOLOGY

- *In vitro* blink simulator
- *In vitro* platform simulating the interaction between the tear film and contact lenses
- Simulation of a pollen-laden atmosphere

KEY EXPERTISE

- **Biomaterials**
 - Drug uptake and release
 - Engineering
 - Molecular imprinting
- **Cell analysis**
 - Phenotype
 - Morphology
 - Cytotoxicity
 - Inflammatory markers
- **Contact lens materials**
 - Tear film deposits
 - Lens surface and bulk characteristics
 - Water content
 - Metrology
 - DNA extraction
- **Lens care systems**
 - Physical characteristics
 - Cleaning and antimicrobial efficacy
 - Cytotoxicity

- **Meibum analysis**

- **Microbiology**

- Antimicrobial efficacy
- Bacterial adhesion and growth
- Biofilm evaluation
- Contamination
- Endotoxins
- Microbial identification
- Microbiome studies

- **Tear film analysis**

- Cytokines
- Ferning
- Lipids
- Proteins
- Osmolality
- Neuropeptides

- **Toxicology**

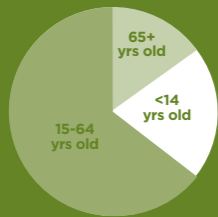
DIVERSE POOL OF CLINICAL PARTICIPANTS

While access to two universities facilitates the recruitment of young adults, CORE's clinical research participants are also drawn from the surrounding community of Waterloo Region, often referred to as the Silicon Valley of the North due to its thriving technology sector. It is located in southwestern Ontario, Canada – an hour's drive from Toronto.

Our large participant database reflects the wide diversity of this community, including a range of ages, ethnicities and visual needs.



Population: 600,000



Average Age: 40



4. CORE Clinical

CORE's team of highly trained clinical scientists has the capacity to execute all stages of study development, from protocol design through recruitment, data collection and analysis, and report generation, for Phase II, III and IV clinical trials.

SEAMLESS ACCESS TO INSIGHTS FROM CORE BIOSCIENCES

Our clinical and biosciences teams interact regularly to design complementary activities directed at uncovering insights into ocular health and contact lens wear. CORE BioSciences has the capacity to collect and analyze biological samples from clinical research participants for further insights into physiological responses.

IN-HOUSE REGULATORY OVERSIGHT

Our regulatory team oversees our clinical studies to ensure compliance with ethical guidelines, good clinical practice and Health Canada and United States Food and Drug Administration regulations.

DEDICATED DATA MANAGEMENT TEAM

We perform in-house database construction for source data transcription, off-site subjective data collection via smartphone, in-house data analysis and report writing.

FRAMEWORK FOR MULTI-SITE CLINICAL TRIALS

Our team has the capacity to coordinate multi-site clinical trials in North America and overseas.

RECRUITMENT SPECIALISTS

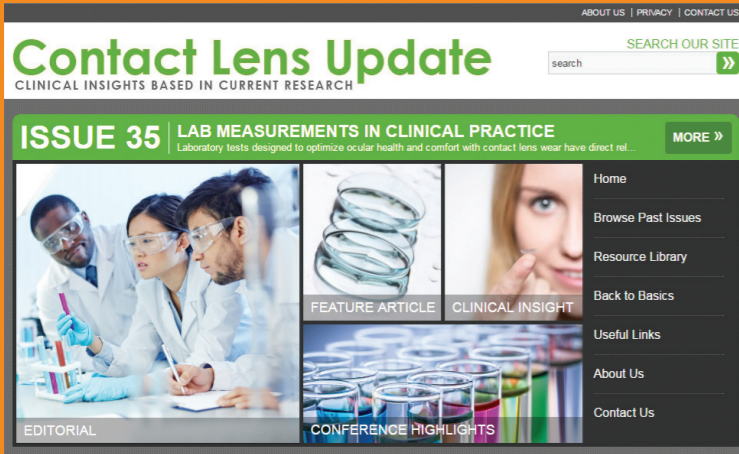
We have a database of 5,000+ active study participants, which can be refined by demographics, lens wear and custom visual needs to expedite study enrolment.

KEY EXPERTISE

- Standard ocular health assessments
- Specialized imaging and image analysis
- Tear film assessment
- Meibomian gland assessment, including meibography
- Corneal cell imaging
- Corneal thickness
- Focus groups, interviews and web-based surveys

CUSTOM-DESIGNED TECHNOLOGY

- Optical pachometer with custom-built digital measurement system and custom software.
- Ocular surface cell collection apparatus
- High-speed video slit lamp



Clinical insights grounded in current research: ContactLensUpdate.com



Searchable database of contact lenses and solutions: ContactLensCompendium.com



Clinical contact lens management guide: ContactLensManagement.com



Tools for patient communication



Tools for clinicians

5. CORE Education

CORE Education is dedicated to providing eye care professionals and their patients with information and educational tools in a variety of accessible formats.

MULTIDISCIPLINARY TEAM

Our team of scientists, educators, knowledge translation specialists, writers, programmers and designers collaborate to come up with the most effective means of communicating key concepts to target audiences.

A BALANCED, EVIDENCE-BASED PERSPECTIVE

Our team has its finger on the pulse of current research—in our labs, shared by our colleagues around the globe, developing through discussion with our peers—and we understand the limitations of practice, because we have been there. We weigh anecdotes and feedback with data to present the most balanced perspective.

CLEAR AND CONCISE EDUCATIONAL PRODUCTS

We cut through scientific jargon to present simple, precise information with clinical impact.

CONSULTATION

Our team can develop an educational strategy with minimal effort on your part. Let us know what message you want to share; we will develop a plan of action and check in with you along the way.

BROAD EXPERIENCE WITH A VARIETY OF MEDIA

We will find the right fit for your educational message, and have experience developing:

- Web-based resources
- Conventional print articles in both peer-reviewed and professional journals
- Educational posters
- Continuing education seminars
- Conference reporting
- Research summaries and review articles
- White papers
- Information sheets
- Instructional videos
- Illustrations and photography
- User manuals and fitting guides

TRAINING FOR CURRENT AND FUTURE LEADERS

- Graduate students and post-doctoral fellows
- Interprofessional collaboration
- Industry teams



UNIVERSITY OF WATERLOO
FACULTY OF SCIENCE
School of Optometry & Vision Science

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