UNIVERSITY OF WATERLOO
SENATE GRADUATE & RESEARCH COUNCIL
NOTICE OF MEETING

DATE: Monday 8 March 2021 — Chair – J. Casello
TIME: 10:30 a.m. – 12:00 noon
PLACE: Microsoft Teams
Reminder: *chat function to be used to register your vote ("nay", "abstain") or to indicate your wish to speak ("comment", "question"*

AGENDA

Item	Action
1. Declarations of Conflict of Interest	
a. Excerpt from Bylaw 1, section 8*	Information
2. Minutes of 8 February 2021* and Business Arising	Decision (SGRC)
3. Co-chairs' Remarks	Information
4. Research Centres and Institutes	
a. Renewal Guidelines*	Information
b. Renewal Checklist*	Information
c. Renewal: Games Institute (GI)* (Director: Neil Randall)	Decision (SGRC)
5. New GDip in Data Analytics – direct entry (Faculty of Engineering; Sivoththaman)*	SEN-Regular
6. Graduate Studies and Postdoctoral Affairs - Academic Calendar Changes*	
a. Updates to University jurisdiction and disclaimer content (Marianne Simm)	SEN-Regular
7. Clinical Research Ethics Board – membership change* (Joza)	Decision (SGRC)
8. Curricular Submissions	
a. Conrad Grebel* (Nathan Funk)	Decision (SGRC)
b. Engineering* (Siva Sivoththaman)	Decision (SGRC)
c. Environment* (Peter Deadman)	SEN-Regular
9. Graduate Awards* (Marianne Simm)	
a. Graduate Scholarship in Clinical Psychology - trust	Decision (SGRC)
b. Professor James A.A. Field Graduate Scholarship in Electrical & Computer Engineering - trust	Decision (SGRC)
c. Ping Yang Memorial Graduate Scholarship - trust	Information
d. Economic Development Program Graduate Scholarship - endowment	Information
10. Other Business	Information
11. Next Meeting: 12 April 2021 from 10:30 a.m. - 12 noon; Microsoft Teams	Information

*material attached
** to be distributed separately
"Decision SGRC" to be approved on behalf of Senate
"SEN-Regula" to be recommended to Senate for approval

1 March 2021

Kathy Winter, PhD, CPsych
Assistant University Secretary

Excerpt from Senate Bylaw 1

8. Declarations of conflict of interest

8.01	At the beginning of each meeting of Senate or any of Senate's committees or councils, the chair will call for members to declare any conflicts of interest with regard to any agenda item. For agenda items to be discussed in closed session, the chair will call for declarations of conflict of interest at the beginning of the closed portion of the meeting. Members may nonetheless declare conflicts at any time during a meeting.
8.02	A member shall be considered to have an actual, perceived or potential conflict of interest, when the opportunity exists for the member to use confidential information gained as a member of Senate, or any of Senate's committees or councils, for the personal profit or advantage of any person, or use the authority, knowledge or influence of the Senate, or a committee or council thereof, to further her/his personal, familial or corporate interests or the interests of an employee of the university with whom the member has a marital, familial or sexual relationship.
8.03	Members who declare conflicts of interest shall not enter into debate nor vote upon the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).
8.04	Where Senate or a committee or council of Senate is of the opinion that a conflict of interest exists that has not been declared, the body may declare by a resolution carried by two-thirds of its members present at the meeting that a conflict of interest exists and a member thus found to be in conflict shall not enter into debate on the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Minutes of the 8 February 2021 Meeting
[in agenda order]
Microsoft Teams Meeting Videoconference

Present: David Billedeau, Jeff Casello, Neil Craik, Peter Deadman, Charmaine Dean, Bernard Duncker, Anna Esselment, Ana Ferrer, Nathan Funk, Adam Kolkiewicz, Brian Laird, Anita Layton, Dmitri Marin, Daniel Martel, Bruce Muirhead, Liz Nilsen, Martin Ross, Max Salman, Jerika Sanderson, Sophia Sanniti, Marianne Simm, Siva Sivoththaman, Richard Staines, Mike Szarka, Shirley Tang, Kareem Tarek Mostafa, Shawn Wettig, Kathy Winter (secretary)

Resources: Trevor Clews, Carrie MacKinnon, Amanda McKenzie, Alyssa Voigt.

Guests: Jennifer Coghlin

Regrets: David Clausi*, Julie Joza*, Alison Hitchens*; *regrets.

Organization of Meeting: Charmaine Dean, co-chair of the council, took the chair, and Kathy Winter acted as secretary. The secretary advised that due notice of the meeting had been given, a quorum was present, and the meeting was properly constituted.

1. DECLARATIONS OF CONFLICT OF INTEREST

No conflicts of interest were declared.

2. MINUTES OF 14 DECEMBER 2020 AND BUSINESS ARISING

By consensus, the minutes were approved as distributed.

3. CO-CHAIRS' REMARKS

Casello updated members: (a) Applications for Enrolment: significant increase (20%) in application numbers over prior years; (b) AMTD Waterloo Global Talent Postdoctoral Fellowship: applications now open (AMTD Waterloo supervisor endorsement form due 19 February 2021; completed applications due 12 March 2021).

Dean updated members: (a) Provincial Intellectual Property Policy: new provincial IP policy forthcoming with emphasis on benefits from provincially funded research being retained by the province and Canada, in addition to the Institution and researcher; (b) Research Security: meetings and discussions regarding strategies for safeguarding research (including COVID-19 research) continue to be prioritized; updates to follow.

4. GRADUATE STUDIES AND POSTDOCTORAL AFFAIRS – ACADEMIC CALENDAR CHANGES

a. Guidelines for determining academic calendar dates – temporary exception to rule 15. On behalf of Senate, council received for information revised grade submission deadlines from the Registrar's Office (Jennifer Coghlin) for spring 2021, as a result of the revised dates for the spring term. This is a temporary exception to grade submission rules for spring 2021, as presented.

5. ACADEMIC PROGRAM REVIEWS

a. Council received for information a revised process for approving final assessment reports and two-year progress reports. The revised process, as presented, has fewer and some different steps and is expected to reduce overall approval time from 12 months to 3-4 months.

6. CURRICULAR SUBMISSIONS

a. Engineering. On behalf of Senate, council heard an omnibus motion to approve items a-h from the Nanotechnology collaborative program, as presented. Sivoththaman and Nilsen. Carried.

b. Science. On behalf of Senate, council heard an omnibus motion to approve items i-v for Physics, as presented and noting the stated friendly amendment to change the effective dates from winter 2021 to spring 2021. Ross and Duncker. Carried.

7. GRADUATE AWARDS

On behalf of Senate, council approved items a-c, as presented. It was noted that item a is currently a pilot in which the Faculty of Engineering and Faculty of Mathematics are participating—though pilot is available to all faculties. Simm and Sivoththaman. Carried. Council received item d for information, as presented.

8. OTHER BUSINESS

There was no other business.

9. NEXT MEETING

The next meeting will be held Monday 8 March 2021 from 10:30 a.m. to 12 noon; Microsoft Teams.

12 February 2021

Kathy Winter, PhD, CPsych,
Assistant University Secretary

University of Waterloo

Guidelines for the Review of Centres/Institutes

A. All Centres/Institutes will be reviewed at least once during the five-year period of existence. Notice of the review will be communicated to the Director of the Centre/Institute by the Vice-President, University Research at least nine months prior to the end of the mandate of the Centre/Institute. In the first instance and at the discretion of the Vice-President, University Research, an initial evaluation of each Centre/Institute shall be conducted.

B. As a Centre/Institute comes up for review, its Director will be asked to prepare a report along the guidelines outlined in C.2. below; the report is to also include a reflection of the opinions of the members of the respective Centre/Institute concerning its operation. In addition, reports should include a summary of: (a) faculty involved in the Centre's activities; (b) numbers of graduate students involved in the Centre's activities (over the duration of the Centre and since the last review); (c) a list of publications from the Centre's activities (or other, appropriate, academic measures of research activity). The report is then to be submitted to the Senate Graduate Research Council, by a date established by the Vice-President, University Research, for consideration and determination as to whether a formal, independent review committee should be struck to conduct a full review of the Centre/Institute.

C. In the event that a more thorough examination is required, the following process will be observed:

1. The Review Committee will be appointed by the Vice-President, University Research in consultation with the Senate Graduate Research Council at least six months prior to the end of the mandate of the Centre/Institute; the membership of the Committee will include:

   - A senior researcher with administrative experience and no direct involvement in the Centre/Institute (preferably a former Dean or Department Chair), who shall chair the Committee;
   - The Director of another Centre/Institute;
   - An academic who is not a member of the Centre/Institute but is knowledgeable in the field of its research activity;
   - The Vice-President, University Research or her/his delegate to assess financial and corporate concerns;
   - Other appointments as may be deemed appropriate.

2. The Director of the Centre/Institute is required to provide the Chair of the Review Committee with the following information:

   - A progress report which includes a statement describing how and why the Centre/Institute has achieved or revised its original objectives; a detailed listing of research accomplishments, a current membership list and a detailed financial statement;
   - A five-year plan which identifies future research directions and development strategies;

- Statements from appropriate Department Chairs and Faculty Deans indicating continued support for the Centre/Institute;

- Names of individuals who could provide external assessments of the Centre/Institute.

3. The mechanism by which the Review Committee elects to conduct the review shall be at the discretion of the Committee in consultation with the Vice-President, University Research. It is recommended that the primary thrust of the review process involve meetings with the Director and members, and an assessment of activities, achievements and progress that has been made towards the fostering and promotion of the given field. In addition, it is suggested that the review process include solicitation of external assessments and discussion with non-members of the Centre/Institute from related departments.

4. The Review Committee is required to submit a written report to the Vice-President, University Research, normally within four months of being established. Before submission to the Vice-President, the Chair of the Review Committee will have provided a copy of the report to the Director of the Centre/Institute under review to ensure that the report contains no factual errors. The Director may submit a written commentary on the report to the Vice-President, University Research.

5. The Senate Graduate Research Council will consider the report of the Review Committee, consulting with the Committee and Director of the Centre/Institute as necessary before making a recommendation to Senate concerning the future of the Centre/Institute. The recommendation may be:

   - Continuation with review in 5 years

   - Continuation with review in 1, 2 or 3 years

   - Termination

Approved by the Senate Research Council 890914.
Revised by the Senate Research Council 920228.

Centres and Institutes Renewal Checklist

As per Policy 44, all centres and institutes will be reviewed at least once during the five-year period of existence. In order to renew your centre/institute, you must prepare a package with all of the below information by the deadline issued by the Office of Research. Please prepare the documentation in the order indicated, and submit the completed checklist as the first document.

Your Completed Report is due at the Office of Research by: **[insert date]**

☐ Cover Letter Indicating Request for Renewal
☐ Progress Report that covers: 1) Statement describing how and why the Centre/Institute has achieved or revised its original objectives 2) Detailed listing of Research Accomplishments 3) Current membership list 4) Reflection of opinions of the members of the respective Institute concerning its operation 5) Summary of: a) Faculty Involved in the Centre's Activities b) Numbers of Graduate Students Involved in the Centre's activities (over the duration of the Centre and since the last review) c) A list of publications from the Centre's activities (or other appropriate, academic measures of research activity)
☐ Organizational Chart
☐ Detailed Financial Statement with an Itemized Budget (2 pages)
☐ 5 year plan that includes: 1) Projected Budget 2) Future Research Directions and Development Strategies
☐ Support Letters from appropriate Department Chairs and Faculty Deans indicating continued support for the Centre/institute
☐ Presentation File on Centre/Institute – **[insert date]**

You will then present at the Research Leader's Council. Once Research Leaders Council approves your centre, the Vice-President of Research and International will send a support letter with your centre to Senate Graduate and Research Council (SGRC) for approval. If it passes SGRC, it will go on to Senate. After Senate, you will receive a memo from the Office of Research indicating official renewal of your centre.

Your Research Leaders Council Date is: **[insert date]**

Your Senate Graduate and Research Date is: **[insert date]**

Your Senate Date is: **[insert date]**

UNIVERSITY OF WATERLOO

MEMORANDUM

TO: Senate Graduate and Research Council

CC: Kathy Winter, University Secretary and Privacy Officer
Neil Randall, Executive Director, Games Institute (GI)
Bernard Duncker, Associate Vice-President, Interdisciplinary Research
Sheila Ager, Dean of Arts
Jean Andrey, Dean of Environment
Mark Giesbrecht, Dean of Math
Bob Lemieux, Dean of Science
Mary Wells, Dean of Engineering
Lili Liu, Dean of Health

FROM: Charmaine B. Dean
Vice-President, Research and International

DATE: Tuesday February 2, 2021

SUBJECT: Support for the Games Institute (GI) for 5-Year Renewal

- For information -

I am pleased to inform you that the Research Leaders Council has recommended to me that the Games Institute, a university-level institute, be renewed for another five year-term. I have accepted this recommendation and am pleased to bring forward to Senate Graduate and Research Council a consideration of renewal of the Games Institute.

January 20, 2021

Bernard P. Duncker
Associate Vice-President, Interdisciplinary Research
University of Waterloo

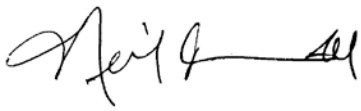
Dear Dr. Duncker:

The Games Institute requests a five-year renewal, from 2021-2025, of its mandate as a Senate-approved centre/institute.

The attached renewal document highlights the Games Institute's achievements over the past five years and its plans for the next five.

If you need any further information, please contact me.

Sincerely,



Neil Randall

Executive Director, The Games Institute

GAMES INSTITUTE

2015-2020 FIVE-YEAR REVIEW

UNIVERSITY OF WATERLOO

THE GAMES INSTITUTE

DECEMBER 3, 2020

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Introduction

The Games Institute conducts research across the broad field of interactive immersive technologies and experiences. This field includes games, but it has expanded to incorporate virtual and augmented reality, large interactive and collaborative displays, smartphones and tablets, and any other device where game-like interactions drive the user experience. The field is constantly looking to the future, to emerging technologies and their resultant applications and experiences, and the Games Institute is dedicated to exploring, critiquing, and designing the forward trajectory of the field.

The Games Institute (Games Institute) was initially approved by Senate in 2010 and operated under the Faculty of Arts. It was renewed by Senate in 2015 and, in late 2017, became a University Institute, operating under Policy 44 and the purview of the Vice-President, Research and International.

Games, Interactive and Immersive

From its beginnings, the Games Institute viewed the exploration of games as expansive and multimodal. Videogames are created and produced by companies ranging from the large (Ubisoft, Electronic Arts, Blizzard) to the very small (too numerous to mention). The best-known games feature rich, sophisticated graphics, themselves the subject of research in the humanities and computer science alike. The lesser-known games capture the attention of scholars around the globe in attempts to tell rich stories, to convey complex social and political issues, and to use a medium typically based solely in entertainment to deal with issues in physical and mental health, activism and social justice, climate impact and artificial intelligence. This is the study of games as forms of art, as guides for understanding, and as immersive computer programs with demanding interfaces and strong human-computer interaction.

While games remain a major focus in its research, the interests of Games Institute researchers span many types and purposes of interactive immersive technologies and experiences. Affordable virtual reality (VR) headsets brought a new focus, as did the appearance of augmented reality (AR) games and applications. Both of these technologies place the viewer removed from the physical world--VR replacing the physical world completely and AR creating an interactive layer on top. For Games Institute researchers, these technologies brought new light to the study of both all-virtual and hybrid real-virtual settings and interactions. Applications ranging from games with empathy-inspiring experiences to innovative means to understand complex issues, from ways to conduct and enhance health-care to first-person immersive views of travel destinations. Games Institute research explores the technology, the interfaces, and the human responses to these experiences.

Interest among Games Institute researchers also includes both small and large screens and their experiences. Small screens include smartwatches, smartphones, and interactive interfaces embedded in any number of technologies; the computer screen, beyond games, websites and other information displays, all of them interactive and many immersive; large public touch-screen displays, display walls, and more – Games Institute researchers care about how these technologies work, but even more about how people use them, respond to them, and experience them.

Research Process and Research Merit

As a university research institute governed by Policy 44, the Games Institute has as its primary goal the exploration, process, production, and dissemination of top-quality research. The Games Institute has consistently and continually delivered on this goal. Yet the manner in which the Games Institute carries out its research program is every bit as important as the research and its dissemination and recognition. The Games Institute has been built and implemented as a place where the researchers themselves – students and faculty alike – conduct their research in a setting where their ideas, their creativity, their personalities, and their identities are empowered, valued, and rewarded.

The Games Institute is concerned with the entire research process as a continuum with publication only one stage along the line. All stages in the process are conducted by human beings doing their work in the contexts of all aspects of their jobs, their lives, their collaborators and teams, and the societies and cultures in which they live and their research will impact. The Games Institute is about the researcher, with a holistic view of how research works and how researchers make it happen. To this end, traditional outputs of university research – conference talks, journal articles, scholarly books, etc. – are valued and yet equally valued are the implementation of collaborative projects, the management of research teams, the applications for funding whether or not the funding is granted, and the following through of research results to determine how they might affect audiences both inside and outside the academy.

The focus is on the full research process and, with it, the stories that emerge from this process—valuing innovation and thinking outside the box in both research and its dissemination. The Games Institute places major importance on the well-being of its members with the ultimate goal that they feel welcome, they are treated well, and as an Institute learn from them and their experiences. Researchers guide the Games Institute, and it's the Institute's goal to provide the best possible environment – physically, socially, and culturally – for their work.

None of this is to suggest, of course, that Games Institute researchers are not evaluated according to the guidelines of their departments, Faculties, and disciplines. Indeed, the goal is to enhance the merit process of the researcher doing the work, not to claim credit for academic output. We understand that that the role of the centres and institutes in this system is to support the researchers in achieving the results that the academic rewards system demands. The Games Institute intends to work with the Faculties over the next five years to make this merit process fully transparent and fully beneficial to the Faculty and Institute alike.

Research Ecosystem

The Games Institute supports its researchers through its infrastructure and administration.

Space

The Games Institute occupies 9000 square feet in East Campus 1. In this space are fifty cubicles, four offices, four lab spaces, a maker space, a 30-person presentation space, and a large collaboration area. Cubicles are used almost exclusively by graduate students and postdoctoral fellows as a supplemental space for collaborations and independent work. Since 2018 all fifty cubicles have been in regular use. The presentation space is used for talks, team meetings, and research requiring larger spaces. The collaboration space holds fifty or more people for talks and is used for design sessions, collaboration meetings, and meetings with researchers and extra-academic partners from off campus.

Interdisciplinarity

The Games Institute was founded and designed to support research that crosses disciplinary boundaries. Single-disciplinary work is most certainly welcome, yet the Institute most strongly encourages interdisciplinary and, ideally, transdisciplinary intersections. This document captures and explains this principle and its achievements.

Equity, Diversity, and Inclusion

The Games Institute was established under one simple principle: if you are a graduate student, postdoctoral fellow, or faculty member focusing on games or other game-like interactions and media, you are welcome. That principle still holds ten years later and the overarching "welcome" embraces the principles of equity, diversity, and inclusion, in all its manifestations, that the University of Waterloo espouses. The Games Institute worked to establish a safe space for women game-players back in the days (starting in 2014) of harassment and threats during the controversy known as GamerGate, and continues to do so for the purposes of racial equity, cultural acceptance, and equity across all genders. To address these issues as they exist and as they evolve, the Games Institute Working Group on Anti-Racism, Decolonization, and Equity, Diversity, and Inclusion was established.

Labs and Connected Research Environments

The Games Institute hosts three research networks, eight research communities, and lab areas for six CFI-funded equip grants:

- **Research Networks:** IMMERSe (The Interactive and Multimodal Experience Research) was created through a SSHRC Partnership Grant, while SWaGUR (The Saskatchewan-Waterloo Games User Research program) came into being through an NSERC CREATE grant. The CanHaptics Network began in 2019 to act as a home for haptics researchers and practitioners. The Feminist Thinktank, the Games and Narrative Group, the Game Studies Research Group, the HCI Games Group, the Human-Computer Interaction Research Group, the Human-Computer Interaction and Health Lab, qCollaborative, the TouchLab, and the Virtual Reality Working Group all operate in the Games Institute space through workspaces, meetings, and events.
- **CFI Labs:** the 3D Printing Facility, the Haptics Computing Lab, the HCI+ Health Lab, the Storyboard Lab, the Waterloo Games Analysis and Monitoring Environment (WatGAME), and the Waterloo Virtual Reality Storytelling Lab (WatVRStory). In all cases, the infrastructure brought into the space has been made available by grant applicants to all Games Institute residents. These labs provide the backbone for the majority of the research conducted in the Games Institute. The labs to date focus on, respectively, game-capable computers and software, along with biometric measuring equipment; 3D printing for design and testing of interactive media materials; a large interactive touchscreen for testing of uses in public locations; virtual reality and augmented reality equipment; a maker space for designing haptic interfaces; a set of large collaboration screens for designing and testing large multiuser simulation games and experiences.

The Games Institute is also connected strongly with the following Waterloo organizations: the Multisensory Brain and Cognition Lab, HCI Waterloo, the DRAGEN Lab, the Critical Media Lab, and the Stratford School of Interaction Design and Business. Outside Waterloo, ongoing connections have been established with the Milieux Institute at Concordia, particularly its Technoculture, Art and Games (TAG) Lab; the Game Design and Development program at Wilfrid Laurier University; the UC Davis Digital Humanities Laboratory (ModLab); the Collaborative Human Immersive Interaction Laboratory at the

Ontario Tech University; the Innovations in Visualizations Laboratory at Simon Fraser University; the EQUIS Lab at Queen's University; and the Interaction Lab at the University of Saskatchewan. Members of the Games Institute have collaborated with these external research environments and in some cases spent time there.

Staff

From its inception, the Games Institute has maintained a staff team whose role is effective management of the Games Institute space for all purposes. They ensure the research can be carried out and completed, and they complement the research through administrative activities such as research communication, project management, financial management, event planning and implementation, inventory management, grant preparation, and strategic planning. They also act as a liaison between Games Institute researchers and their home departments and faculties for purposes of account management and transfers, and for graduate student and postdoc agreements and payments.

Research Communications and Knowledge Mobilization

The Games Institute considers the traditional academic means of research dissemination – conferences, papers, books, etc. – to be extremely important. But we realize that relatively few people have access to these means and yet might be highly interested in what they have to say and what they mean for the world. Research matters to the world outside academe, and to help spread the research beyond its traditional venues, the Games Institute has initiated two significant processes:

- A research communication practice that focuses on research stories and on dissemination that uses language suited to a broader audience but that is nonetheless accurate in its depiction of the research and its applications and implications.
- Methods of disseminating research through innovative knowledge mobilization that uses the principles of games and other interactive media. We have implemented these methods both inside the Games Institute and with external partners (all such projects explained in this document), and we plan to enhance this capability substantially over the next five year.

The Next Five Years

The Games Institute is poised to grow in size, membership, reputation, and impact over the next five years.

In 2021, the Games Institute will launch the Network for the Virtual Future, a pan-faculty (and beyond) initiative in which academic researchers and partners in industry, government, and the non-profit sector will join forces to understand, predict, and guide the development of our involvement with remote, interactive, and virtual technologies over the next decades. This initiative will begin as part of the Games Institute and represents a major expansion of the institute.

The Network for the Virtual Future is one of the ways the Games Institute will grow over its next five years. But it is not the only way. In addition, the Games Institute will develop research relationships with more and more faculty members and centres and groups at Waterloo, adding to the research clusters and the research ecosystem in the process. An additional goal is the development of an increasing number of international partners and industry and non-profit partners. The research communities currently in place will attract increasing numbers of high-quality students, and new faculty and new partners will add strongly to this list.

Also beginning in 2021, the Games Institute will explore the possibility of launching one or more interdisciplinary academic programs in cooperation with Waterloo Faculties and departments and, where feasible, other academic institutions. There is no academic program in Game Studies in Canada as yet, let alone Game and Interactive Media Studies or Game and Interaction Science. Given the growth in the field, this is a lack that Waterloo, through the Games Institute, is exceptionally capable of addressing.

Institutional Background

The rise of immersive experiences—digital games, Virtual Reality (VR), Augmented Reality (AR) and now Extended Reality (XR)—has created a global industry aimed to surpass $390 Billion by 2025[1]. Immersive technologies have grown from simple games and simulations of the 50s and 60s, to the home consoles of the 70s and 80s, to today's fully immersive and realistic environments. More than novel entertainment, immersive experiences drive medicine, military, retail, education and many other applications.

The Games Institute was established in 2010 with a focus on establishing Waterloo as a national hub for game-related and game-driven design and development research in Canada. While there are numerous digital media centres around the country, and the work in these centres sometimes includes games, the Games Institute remains the only Canadian university research centre with an exclusive focus on the vast world of games, game-driven interactions, immersive technologies and the play and study of games.

Initially constituted as a Faculty-based research centre with Dr. Neil Randall (English) as its inaugural Executive Director, along with by Drs. Karen Collins (Communication Arts), Chrysanne Di Marco (Computer Science), and Stacey Scott (Engineering), its inaugural Associate Director. In 2017, the Institute became the first, and currently only, University-level research institute led from the Faculty of Arts.

Games are inherently multidisciplinary and the Games Institute uniquely draws in researchers from all disciplines to provide an inter- and transdisciplinary environment where innovative modes of knowledge can thrive to conduct expansive, multimodal and *creative* research. Members include faculty, graduate students, post-doctoral fellows, and undergraduate students from all Faculties, as well as industry and not-for-profit collaborators with interest in research, research creation, teaching and outreach.

The Games Institute is a research centre, yet its definition of research extends well beyond academic norms. Research for the Games Institute includes ubiquitous innovation, rich and varied student experience in a fully collaborative student and faculty environment, inventive knowledge mobilization, and extensive community outreach. It is about mastering the academic demands of research while simultaneously demonstrating that academic research has its very real constraints. These modes of thinking take place, on a daily basis, within an environment that leads through multi-disciplinarity, inclusivity, diversity, and responsibility.

[1] https://www.marketwatch.com/press-release/digital-gaming-market-worth-usd-39142-billion-by-2025-statistics-size-share-business-stats-growth-perspective-and-forecast-2025-2020-09-07#:~:text=Digital%20Gaming%20Market%20is%20valued,%25%20over%20the%20forecast%20period.%E2%80%9D

Today, the Games Institute is recognized as a centre of excellence and is home to a diverse list of partners from Waterloo and other campuses as well as industry and non-profit organizations. Membership boasts 48 faculty, 7 post-doctoral fellows, 85 graduate students (including alumni), and 12 undergraduate students and is the largest centre of its kind worldwide. Since its last review in 2015, Games Institute members have garnered $5,435,977 in game-specific research funding, they continue to create and build national and international networks and the Institute is home to an internationally renowned publication on game studies.

Vision, Mission and Goals

The Games Institute seeks to advance the study, design, and purpose of immersive technologies and experiences through an interdisciplinary and transdisciplinary approach to research.

Vision:	To be the leading centre on games, interactive immersive technologies and experiences research.
Mission:	To foster an inclusive ecosystem of research, education, knowledge dissemination, outreach and collaboration on interactive immersive technologies and experiences.
Research Goals:	To be the central hub for games-related research in Canada by establishing strong academic and industry research projects.
Education Goals:	To support and promote innovative, cross-disciplinary graduate training and mentorship in all aspects of game and immersive technology development, understanding and impact.
Outreach Goals:	To encourage public engagement and understanding of the importance and impact of games and interactive immersive technologies through faculty and student outreach activities.
Equity, Diversity and Inclusion Goals:	To continually improve, engage in and actively participate in the continued awareness and expansion of understanding of issues of equity, diversity, and inclusion across the Institute itself and the broader industry.

Governance

The Games Institute is governed by Policy 44 – Research Centres and Institutes as a University Research Institute (approved in 2017). As such, the Institute's governance structure aligns with policy and is highlighted in the chart below.

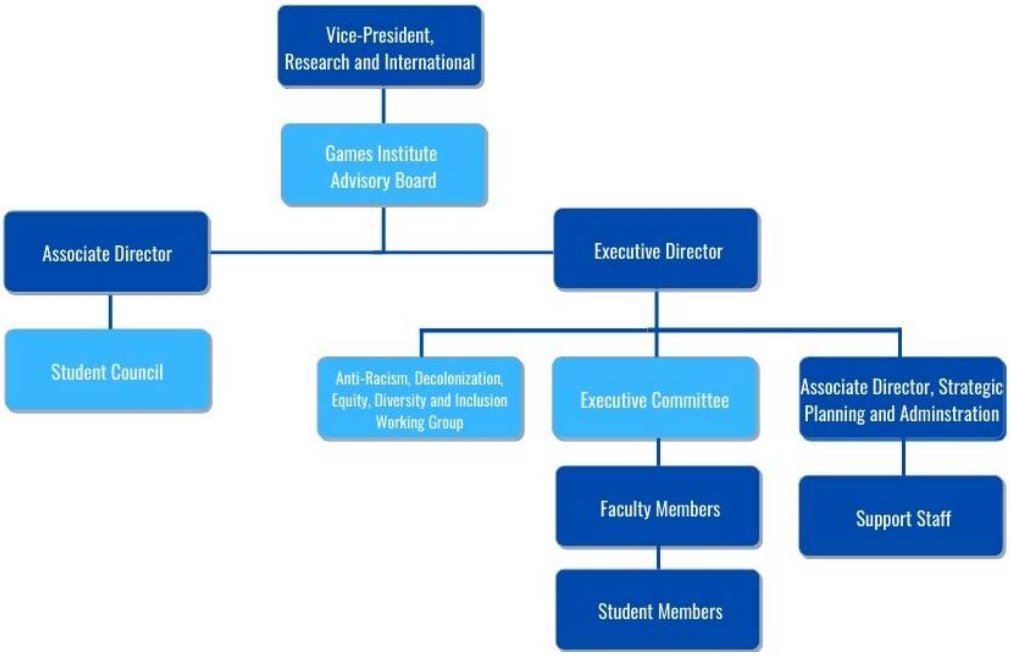


Figure 1: Games Institute Governance Structure

The Games Institute is committed to the active engagement of individuals identifying as women, non-binary, LGBTQTS+, Indigenous, First Nations, Métis and Innu, as well as people of colour and people with various abilities. While achieving true equity in representation of the lived experience of individuals stemming from these different groups is a work for generations and requires a major shift in society and culture, the Games Institute has been successful in achieving, as a first step, gender and disciplinary equity in its formal governance bodies and overall membership.

Advisory Board

The Games Institute's Advisory Board acts as its Governing Body as defined in Policy 44 with the Vice-President, Research and International as its Responsible Officer. The primary responsibility of the Advisory Board is to ensure the appropriate governance of the institute, the fulfillment of its goals and vision, provide direction and advice on the development of strategic directions for the Institute, and – last but not least – the promotion of deeply collaborative inter- and transdisciplinary research. The Advisory Board's membership includes the Games Institute Executive and Associate Directors, three Waterloo Deans, Games Institute researchers, and representatives of the Games Institute's industry and academic partners. Excluding ex-officio members, the Advisory Board includes: six (6) people who

identify as women and five (5) who identify as men, five (5) members from Arts disciplines and four (4) from STEM fields, one non-Turtle Island[2] Indigenous person, and one individual who identifies as Black.

As of November 2020, the Games Institute Advisory Board is composed of (*denotes ex-officio members):

University of Waterloo Leadership:

Charmaine Dean*, Vice-President, Research and International, Chair
Sheila Ager*, Dean of Arts
Lili Liu*, Dean of Applied Health Sciences
Mary Wells*, Dean of Engineering

Games Institute:

Neil Randall* (English Language and Literature), Executive Director
Mark Hancock* (Management Sciences), Associate Director
Michael Barnett-Cowan (Kinesiology)
Aynur Kadir (Communication Arts)
Kristina Llewellyn (Social Development Studies, Renison University College)
Lennart Nacke (Stratford School of Interaction Design and Business)
Jennifer Roberts-Smith (Communication Arts)
Oliver Schneider (Management Sciences)

External:

Kishonna Gray, Assistant Professor, University of Illinois
Evan Jones, President/CEO, Stitch Media Inc.
Andrea Kerswill, Director of Innovation, Scotiabank
Stacey Scott, Associate Professor, University of Guelph, former Games Institute Associate Director (2010-2015)
Bart Simon, Director, Milieux Institute, Concordia University

Anti-Racism, Decolonization, Equity, Diversity and Inclusion Working Group

In order to ensure the continued awareness and expansion of understanding of issues of equity, diversity, and inclusion, the Games Institute formed the Anti-Racism, Decolonization, Equity, Diversity and Inclusion Working Group in 2020. The mandate of the Working Group is to establish policies, practices, and education for Games Institute members, associates, partners, and colleagues. The Working Group is composed of faculty and student members of the Games Institute and is supported by Games Institute Executive and Associate Directors and Games Institute Administration.

Its goal is to create, strengthen and implement policies, procedures and culture aimed at ensuring Games Institute's activities, member composition, administrative and research processes withstand scrutiny in the areas of representation, equity, inclusion, and diversity. It is the ambition of the Working Group that, in time, it will be able to advise project teams on how to make their work reflect these principles, assist faculty supervisors with engaging mentors and co-supervisors for their students to ensure as diverse training as possible, and develop a plan for systematic and ongoing assessment of Games Institute's progress in this realm.

[2] From outside of North America.

Student Council

A goal of the Games Institute has been to support and promote innovative, cross-disciplinary graduate training and mentorship for our HQP membership. To more readily respond to the needs and interests of the Games Institute's largest demographic – our students – and to provide them with opportunities for direct involvement in Games Institute activities, the Institute is in the process of launching its Student Council. The Student Council is accountable to the Games Institute Associate Director and to the Anti-Racism, Decolonization, Equity, Diversity, and Inclusion Working Group. It aims to actively participate in Games Institute culture to promote a supportive, diverse, and inclusive environment, strengthen student participation in the Games Institute community and its activities, contribute to the overall wellbeing of the community and keep an open line of communication with Games Institute Leadership and Administration to ensure student voices are represented in day-to-day operations.

Executive Committee

Originally including only the Executive and Associate Directors along with the Games Institute support staff manager, the Games Institute Executive Committee has been expanded to consist of the Executive and Associate Directors, Associate Director, Strategic Planning and Administration (acting as Managing Director), the Chair of the Anti-Racism, Decolonization, Equity, Diversity and Inclusion Working Group, two representatives from the Student Council and two representatives from the Games Institute faculty membership. The student and faculty members of the Executive Committee must represent different Faculties. The Executive Committee will make recommendations to the Games Institute leadership pertaining to the planning of the annual budget, research directions and programs, outreach and expansion of membership, day-to-day operations, etc.

Administration

The Games Institute considers a strong administrative team to be of crucial importance to its success. The Games Institute Administration is overseen by the Associate Director, Strategic Planning and Administration (acting as Managing Director) and includes project management, research communications, operations, community curation and technical support staff. The Executive Director works closely and continually with the Administration staff to guarantee a tight, effective implementation of all Games Institute activities. Administrative presence throughout the Institute's governing bodies supports a comprehensive information flow and responsiveness of the overall Games Institute governance structure.

From time to time, the Games Institute may constitute other working groups or committees to respond to the ever-changing needs of its membership and ensure continued innovation in research, training, outreach and communication efforts.

Membership

The Games Institute membership philosophy has always been open and inclusive: any faculty (regular, adjunct or research faculty), post-doctoral fellow or graduate student who engages in game- or immersive technology-related research or teaching may become a Games Institute member at any time. The Games Institute membership strategy has never been based on a targeted recruitment campaign to increase membership numbers; rather, it has relied on active and engaged membership. Over the last five years, membership has grown organically by individuals' interest, introduction by another member of the community, or invitation by Games Institute leadership.

Members are generally accepted or declined by the Executive Committee and membership terms last as long as the member wishes to remain a member, or until membership revocation via procedures outlined in the original 2010 Games Institute Constitution. Membership benefits include access to the Institute's facilities and equipment, access to shared funding opportunities and research collaborations, participation in seminars, public lectures, workshops and conferences held by or supported by the Institute, and participation in the governance of the Institute, among others. It is expected that members are actively engaged in and contribute to Games Institute activities, including events, interdisciplinary work, knowledge mobilization and translation, mentorship, community building, etc.

Currently, the Games Institute active membership includes over 150 members (student and faculty) from all six Faculties and 20 departments (see Table 1: Games Institute faculty membership by department below). The overall Games Institute membership doubled since its change of status from Arts-based to a University-level research institute (early 2017) and the full listing of Games Institute members is noted in Membership.

Faculty Membership

The Games Institute faculty membership includes representation from all six Faculties and twenty (20) departments/Schools.

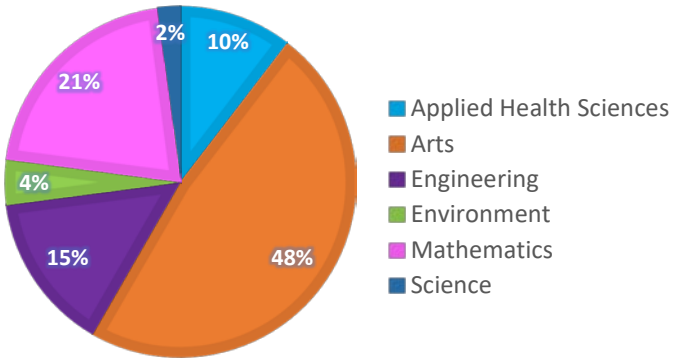


Figure 2: Games Institute Faculty Membership by UW Faculty

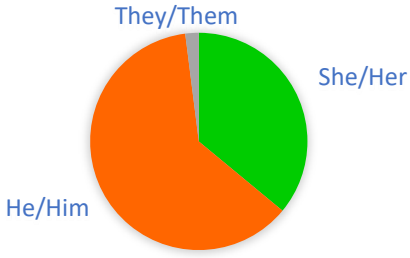


Figure 3: Games Institute Faculty Membership by Identity

Faculty	Departments	# of Members
Applied Health Sciences	Public Health and Health Systems Kinesiology Recreation and Leisure Studies	5
Arts	English Language and Literature Communication Arts Psychology Classical Studies Drama and Speech Communication History Fine Arts Sociology and Legal Studies Social Development Studies Stratford School of Interaction Design and Business	23
Engineering	Management Sciences Mechanical and Mechatronic Engineering Systems Design Engineering	7
Environment	Geography and Environmental Management	2
Mathematics	Statistics and Actuarial Science David R. Cheriton School of Computer Science	10
Science	Optometry and Vision Science	1

Table 1: Games Institute faculty membership by department

Applied Health Science is projected to become the third-largest membership group for the Games Institute over the next five years following the strong trend of games and immersive technologies in health applications.

Over the past five years, Games Institute's interdisciplinary ecosystem has played a noteworthy part in the recruitment of faculty members to three Waterloo Faculties: Applied Health Sciences, Arts, and Engineering, including:

- Jennifer Boger (Systems Design Engineering),
- Kerstin Dautenhaun (Electrical and Computer Engineering),
- Lai-Tze Fan (English),
- Aynur Kadir (Communication Arts),
- Ashley Kelly-Mehlenbacher (English),
- Brad Mehlenbacher (English),
- Lennart Nacke (Stratford School of Interaction Design and Business),
- Oliver Schneider (Management Sciences),
- Jim Wallace (School of Public Health).

In the period of this report, Games Institute members have garnered $5,435,977 in games-related research and project funding. Over the five-year period, continuous growth in research funding has driven the membership to lead national and internationally recognized projects, networks and industry-led initiatives.

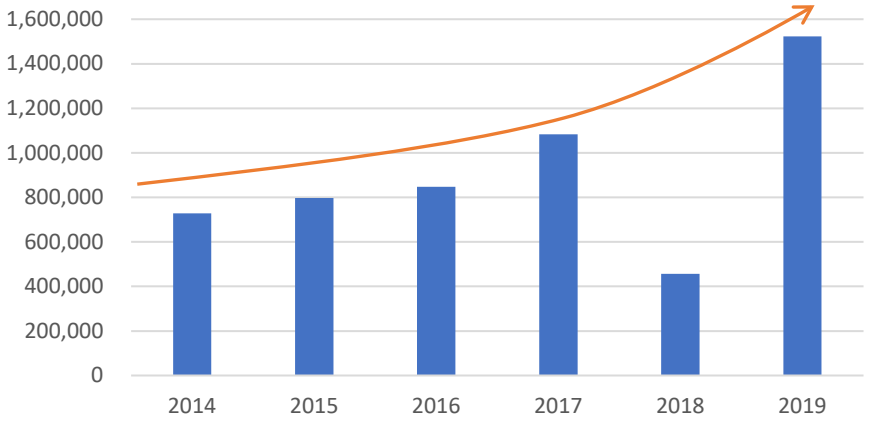


Figure 4: Games Institute Funding Awarded 2015-2019

Members of the Games Institute actively seek research and industry sponsored research grants. Over the past five years, funding for games-related research has seen an upward trajectory and is expected to continue as more industries recognize and begin to implement interactive immersive technologies in their business. The chart below outlines the breakdown of research grant funding held by members of the Games Institute.

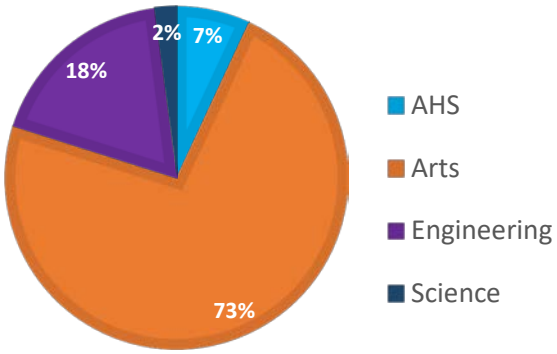


Figure 5: Games Institute Funding by Faculty 2015-2019

Student Membership

Students and post-doctoral fellows are an important cohort within the Games Institute. With 85 graduate student members and seven (7) post-doctoral fellows and 12 undergraduate students, the Games Institute has a robust student cohort from a variety of departments. Figure 6 below represents the Games Institute student membership growth over the last five years. For a full listing of Games Institute student members, see Student Members on page 61.

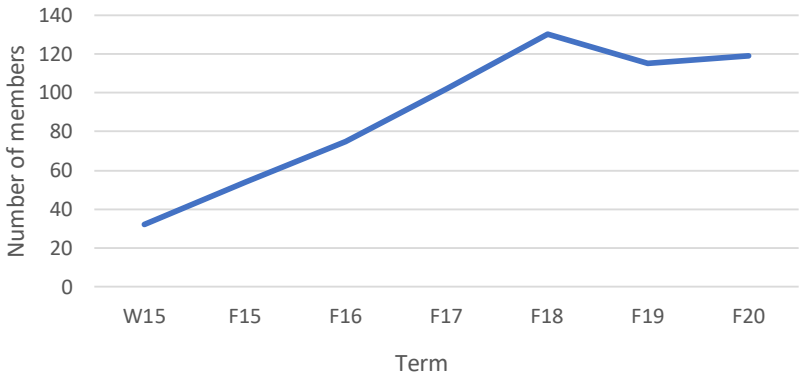


Figure 4. Games Institute student membership growth

The Faculty affiliation of Games Institute student population varies from semester to semester with approximately 50% from the Faculty of Arts and the remaining 50% from other Waterloo Faculties. See Figure 7: Games Institute student membership by Faculty below for a breakdown of Games Institute student membership.

The Games Institute proudly welcomes all interested students as members and aim to provide a welcoming and inclusive environment for all. Figure 8. Games Institute Student/PDF membership by identity outlines the identity breakdown of Games Institute student/PDF members. Similar to the Games Institute faculty membership, student membership from Applied Health Studies is expected to see significant increases over the next five years.

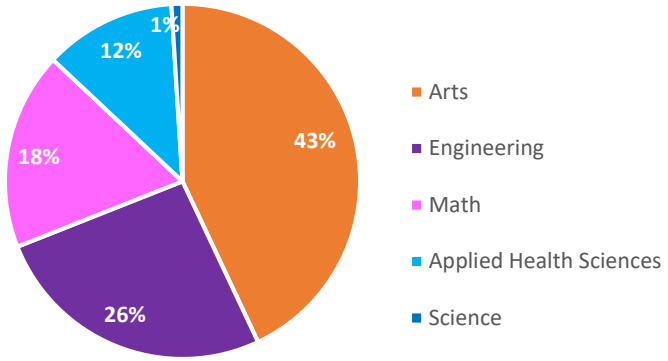


Figure 5: Games Institute student membership by Faculty

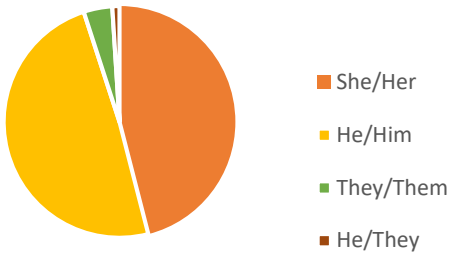


Figure 6. Games Institute Student/PDF membership by identity

Administration

The Games Institute Administration is a small and effective support team, consisting of two faculty positions, the Games Institute Executive and Associate Directors, and 4-7 support staff members (depending on the need and number of co-op placements each semester). The administration team supports the Games Institute membership from a functional perspective in terms of coordination, logistics, management of equipment and labs, facilitation of access to space, project management, research communications, community curation, event coordination, as well as coordination with various university units and external groups to help fulfill the research needs of our community.

Games Institute staff also play an important role in the professionalization and mentorship of student members. In particular, Games Institute staff provide workshops on knowledge translation, inclusive communications, grant writing, game design/development and maker support, interdisciplinary collaborations and – crucially – actively creates opportunities for Games Institute members to explore, discuss and consider matters surrounding equity, diversity and inclusion. The latter includes, among others, a thorough onboarding and introduction of new members to Games Institute's interdisciplinary nature and how inclusivity and diversity bring value to our activities.

All Games Institute staff are required to complete training pertaining to EDI (OHD's Principles of Inclusivity Series, HREI's courses on unconscious biases and Indigenization, Equity Office's Making Spaces program, etc.) as well as courses on excellence in service and support (responding to sexual violence disclosures, suicide prevention, mental health resources and awareness, accessibility in communications, etc.). Whenever a need for short-term or part-time support positions arises, the Institute often recruits from within the Games Institute graduate student population, thus contributing to the professionalization of HQP.

The Games Institute's Associate Director, Strategic Planning and Administration, is also heavily involved in staff-driven activities on campus, currently serving on the Board of Directors of the Staff Association, a number of university-level committees, such as the Provost Advisory Committee on Staff Compensation and Staff Relations Committee, and co-chairs the UW Sexual Violence Task Force mandated by the Province of Ontario.

As of November 2020, Games Institute's support team includes:

- Associate Director, Strategic Planning and Administration acting as Games Institute's Managing Director (1 FTE);
- Research Project Facilitator acting as project manager for collaborative initiatives (1 FTE);
- Research Communications Officer (1 FTE) responsible for knowledge translation, mobilization and other research communications initiatives centred around Games Institute research activities;
- Operations Coordinator (1 FTE, staffed by co-op employees) accountable for day-to-day operations, events and resource management;
- Community Experience Curator (0.3 FTE, staffed by Games Institute graduate students) responsible for community activities, online collaboration platforms management, events;
- IT support staff (0.5 FTE, duties performed by Arts Computing Office and Computer Science Computing Facility staff) accountable for lab and computer equipment oversight; and
- others, as needed.

Research Facilities

The Games Institute research space in East Campus 1 encompasses 9000sq ft, four enclosed labs, 50 student cubicles, four shared faculty offices, two administrative offices, one enclosed large presentation room (30 person capacity) and a large open-concept collaboration/event area (80 person capacity). The facility was opened in 2015 and has quickly become a major draw for faculty, students, and the public.

The space currently houses six CFI-funded labs from researchers based in Arts, Engineering and Applied Health Sciences and hosts eight collaborative research groups and one internationally renowned publication. Given the need for larger spaces for projects involving motion research and games, robotics and games, and other forms of games-driven research, there are clear signs that the need for space will soon outpace our capacity. Prior to the COVID-19 pandemic, some of our student members were sharing cubicle space, research studies would take place in meeting rooms when labs were not available, and a growing number of Games Institute members use the open collaboration space as a drop-in space for ongoing work, meetings and collaborations.

The potential for innovative and transformative games research is enormous with new forms of games and immersive, interactive technologies research and experiences emerging rapidly. Couple these opportunities with projected membership growth and additional physical space will become a priority within the next five years. It is expected that Games Institute faculty members will support any such new space with CFI and other infrastructure grants.

Research Direction

The Games Institute promotes and supports interdisciplinary, transdisciplinary and collaborative research to understand, design, enhance and solve global problems through games, game-driven technologies, interactive immersive technologies and experiences. As an unconventional research centre, the Games Institute expands its activities beyond traditional academic norms in a broad, inclusive approach. Its inclusive, interdisciplinary environment promotes collaboration, brings together diverse perspectives, and sets the stage for a wide scope of questions on the impacts, applications and innovations of games and immersive technologies.

The Games Institute is open to any field of research that explores interactive immersive technologies and experiences. This has been its mantra from its inception. Over the past five years, research has coalesced around three broad clusters: Game and Interactive Media Studies; Game and Interaction Science; and Interactive Media for Understanding. The Games Institute's researchers work within these major clusters. While these clusters, on the surface, focus on either the Social Sciences and Humanities (SSH) or the Science, Technology, Engineering, and Mathematics (STEM) clusters, the interdisciplinary basis of the Games Institute has seen each cluster welcome members from any discipline as their research interests coincide.

Game and Interactive Media Studies

Game and Interactive Media Studies covers a range of sub-disciplines which in themselves have developed as constellations of disciplinary focuses largely in the humanities and social sciences. This cluster incorporates game studies, primarily a humanities-based exploration of games and game culture, with digital media studies, a set of linked areas driven primarily by the humanities and social sciences.

The Games Institute has been instrumental in building the game studies field at Waterloo and has helped attract both professors and students to the Waterloo community. The Games Institute disseminates its work in the major game conferences, journals, and books, and has led game studies work in three kinds of knowledge dissemination. First, the *Games in Context* academic book series, begun in 2017, boasts seven books on games research and has three more in preparation. *Games in Context* is published by Palgrave with series co-editors from the Games Institute. Second, the Games Institute staffs and hosts an online middle-state publication (semi-academic, semi-journalistic) called First Person Scholar, which has risen steadily in significance and reputation. Third, the Games Institute plans to host annual conferences during the next five years: the first of these, scheduled for June 2021, is the International Conference on Games and Narrative, covering a continually important and controversial topic in game studies.

Game and Interaction Science

Game and Interaction Science covers research largely in STEM disciplines, but often complemented by the social sciences and the humanities. This cluster studies the multimodal and multisensory means players use to interact with their games and how viewers of virtual reality, augmented reality, and other interactive immersive media engage with their virtual experiences. The cluster includes the fields of computer science, psychology, health science, kinesiology, systems design engineering, and human factors engineering.

The HCI Games Group explores gamification, games user research, and games for human health, wellbeing, and fitness, as well as the fields of human-computer interaction principles for games and related technologies. The Touchlab examines human-computer interaction, information visualization, and digital surfaces ranging from the very small to the very large. The Human-Computer Interaction and Health Lab studies the use of technology and interactive media and applications to prevent disease, prolong life, and promote human health. The Haptic Computing Lab examines the role of touch interfaces and haptic feedback in interactive applications. Directors of these various labs, along with their students, meet and collaborate regularly in the Games Institute space. This cluster focuses its work on dissemination at conferences, and Games Institute faculty members have not only organized and led prestigious Computer-Human Interaction (CHI) conferences, they have also created the annual conference known as CHI Play.

Interactive Media for Understanding

Interactive Media for Understanding is derived from the concept of serious games and expanded to include game-driven simulations in any immersive media. The Games Institute was created in part because of the belief among the founders that games can teach. Games designed as concise yet accurate simulations of a process or event can, through the game's interaction mechanics, help the players understand the issues being represented. This principle holds true of other forms of interactive immersive media as well: in an interactive structure known as choice-and-consequence, the player or viewer acts on the virtual environment through resource management, dialogue choice, or other designed systems, and by seeing the consequences of their choices, the player or viewer can understand something of the event or process being simulated.

This cluster requires strong interdisciplinary collaboration, and, in a very real sense, draws together the two clusters described above. An international conference covering this work is in the planning stages

for 2022. Meanwhile, the Games Institute has joined forces with the Research Equity, Diversity, and Inclusion (REDI) council, along with the Council for Responsible Innovation and Technology (CRIT), to launch a game design showcase in which designers are challenged to create cooperative boardgame simulations that demonstrate issues surrounding racial equity and racial violence. This showcase will be followed in 2021 with an event for which designers will create games that highlight indigenous issues in Canada.

Researchers at the Games Institute have made use of simulated representations regularly as a means to engage player understanding. For a general public open house, the Institute for Quantum Computing engaged the Games Institute to create a simple game to help visitors of all ages and backgrounds begin to understand a few core concepts in quantum physics. For an audience of medical professionals, the VEGA (Violence, Evidence, Guidance, and Action) Project worked with the Games Institute to design a game to help service workers take the recommended steps when encountering an individual who shows signs of having experienced or witnessed intimate partner violence. For an audience of policy-makers in the provincial government, the Games Institute designed a cooperative boardgame that was played at a large professional development meeting, with each player representing a stakeholder in the management of the St. Lawrence River basin. For Correctional Service Canada, the Games Institute is designing a gamified process by which newly released offenders engage with elements of society that have changed significantly during their incarceration. For an audience of high school students and teachers, the Games Institute has designed a virtual reality simulation of the Nova Scotia Home for Colored Children in which visitors to the simulation environment to hear stories from former residents of the Home.

In all these cases, and other such projects, the Games Institute works closely in collaboration with experts in the knowledge areas represented in the game or media artifact. Indeed, this form of creating understanding will be central to numerous projects over the next five-year period of the Games Institute, as researchers from multiple disciplines explore the power of interactive immersive media to teach through participatory simulation.

Achievements and Results

The collective knowledge and research conducted by Games Institute members has resulted in the establishment of national networks, significant academic contributions and publications as well as societal impact through industry and non-profit partnerships. Highlights of these contributions are listed below.

Academic Networks

Research generated by Games Institute members contribute to the body of knowledge in the gaming research field, grow Waterloo's reputation as a national hub, and connect broader research networks in the area of games and immersive, interactive technologies. With support of Tri-Agency funding, the Games Institute has successfully created two major research networks and laid the foundations for a third.

Interactive and Multi-Modal Experience Research Syndicate (IMMERSe)

SSHRC PG, $2.5million cash; PI: Neil Randall (English); Games Institute faculty co-investigators: Karen Collins (Communication Arts), Chrysanne DiMarco (Computer Science), Mark Hancock (Management Sciences), Stacey Scott (Systems Design Engineering), Fue-Sang Lien (Mechanical and Mechatronics Engineering)

Based at the Games Institute, IMMERSe represents a fully multidisciplinary (across computer science, engineering, social sciences, and humanities), multimodal, multi-thematic, multi-institutional network with academic, industry and non-profit partners in Canada and the US. IMMERSe was the Games Institute's first large collaborative network and the Institute's interdisciplinary ecosystem helped the network partners ground their activities. Indeed, the existence of the Games Institute can be credited – in large part – with the grant being awarded to Dr. Randall.

The IMMERSe network was Waterloo's first SSHRC Partnership Grant (2012-2020) and includes 28 faculty contributors and close to 100 students from the University of Waterloo, Carleton University, Concordia University, McMaster University, Ontario Tech University, and University of California-Davis. IMMERSe researchers conceptualized the "world of games" through a series of six "themes": a lens through which researchers focus on specific aspects of games research. The network reflects the comprehensive nature of the games world, which encompasses everything from story, to character, to cultural studies, all the way to art, user analysis, technology design, psychology, and health studies.

The corpus of innovative interdisciplinary research published throughout the eight-year span of the network includes over 2,000 entries. IMMERSe contributors completed research in the areas of mobile games, virtual worlds, gambling games, simulation games, augmented reality games, and the full rich panoply of entertainment gaming. Results of the network have ranged from published work in journals, anthologies, and books; to physical game development; to the exploration of research findings in presentations, workshops and conferences.

IMMERSe and Mitacs

An important initiative originating from IMMERSe has been the establishment of its strong relationship with Mitacs to provide the IMMERSe network with new potential avenues for HQP internships with both for-profit and non-profit organizations. Dr. Randall's (PI) activities in this regard helped initiate conversations that, subsequently, led to the Mitacs-SSHRC partnership, by which all approved SSHRC

Partnership Grants automatically gain access to a streamlined approval process for Mitacs Accelerate research proposals. Joint projects with non-profit organizations undertaken by IMMERSe researchers have also helped to catalyze the inclusion of non-profit organizations as eligible Mitacs partner institutions.

IMMERSe was the first network to benefit from the Mitacs-SSHRC partnership and, since 2015, was able to secure a dozen Mitacs-funded awards with industry and non-profit partners that provided funding for close to 30 graduate and undergraduate students across the network.

SWaGUR: The Saskatchewan-Waterloo Games User Research

NSERC CREATE, $1.65million cash; PI: Regan Mandryk, University of Saskatchewan; Games Institute Faculty co-investigators: Mark Hancock (Management Sciences), Stacey S. Scott (Systems Design Engineering), Lennart Nacke (Stratford School of Interactive Design and Business), Neil Randall (English)

The Saskatchewan-Waterloo Games User Research (SWaGUR) program is the first of its kind in Canada. Based at the Games Institute, SWaGUR brought together a multidisciplinary team at the Universities of Saskatchewan and Waterloo with the long-term goal of training 85 HQP in Games User Research in an interdisciplinary environment (across science, engineering, social science, and humanities) and in collaboration with industrial partners to apply academic and experiential learning in an industrially-relevant context. Addressing human-computer interaction, digital information, and communications technologies, this initiative generates technologies and provides training in the development of technologies that change how people interact with digital information. Similar to IMMERSe, the existence of the Games Institute at Waterloo can be credited – in large part – with the program receiving funding from NSERC.

Thanks to its full integration with the Games Institute ecosystem, SWaGUR offers students a multi- and interdisciplinary environment where they are taught five critical components of games research: read and critique research on player experience, game motivation, gamification, and game design; learn various evaluations methods for creating research questions; practice creating controlled experiments to measure game quality; evaluate player experience through techniques that do not involved the user; and practice skills related to survey design and deployment, interview and focus group facilitation, and player observation.

SWaGUR also educates students about the gaming industry within a global and Canadian context. One of the main required courses for all SWaGUR students covers five critical components of games research: read and critique research on player experience, game motivation, gamification, and game design; learn various evaluations methods for creating research questions; practice creating controlled experiments to measure game quality; evaluate player experience through techniques that do not involved the user; and practice skills related to survey design and deployment, interview and focus group facilitation, and player observation.

CanHaptics Network

The CanHaptics network is a new initiative launched in 2019 and led by Games Institute member, Dr. Oliver Schneider (MSCI) and is a collective of researchers, industry practitioners, and community stakeholders across Canada. The goal of the network is to make technology more human by making it physical - pushing out from the screen to be graspable, holdable, and engage with all of human senses - and do so by putting people, not technology, first. Driven by researchers from five universities across

Canada (with membership expected to grow in the coming years), HCI researchers and technologists dedicate their efforts to helping people through physical interactive technology like haptics, virtual reality, wearables, and more. CanHaptics network aims to:

- Accelerate research and innovation in haptics, further entrenching Canada as a leader in interactive physical technology and attract and retain top technology and design talent and companies to Canada.
- Provide companies with a pipeline for talent and connect industry practitioners to cutting-edge research to enhance their technology and designs, by grounding research with real needs of real people.
- Connect community partners with researchers and industry partners to tackle real social problems that matter to people. This ensures that our research projects translate into action; impacting communities and building positive relationships. , build relationships between these communities, and help translate research projects into impact for their communities.
- Establish a tighter research community in Canada, streamlining collaboration across space (connecting researchers at different institutions), time (improving institutional knowledge and training across generations of students), and communities (connecting researchers with industry and community partners).

The Games Institute serves as the central node of this new network and is already supporting the network with administrative/project management assistance and minor funding support for events. In a late 2020, CanHaptics is launching a collaborative, multi-institution, online course for HCI students at the collaborating institutions.

Other Initiatives

Over the past five years, the Games Institute has expanded its external partnerships significantly and aimed to created two new major research networks.

First, submitted for consideration to the now defunct NCE program in 2017, the **AVENIR** network was aimed at creating critically informed digital applications to help Canadians interpret and assimilate the avalanche of information in the rapidly changing world of science, technology, health and society. The AVENIR network involved academic and industry partners focused on developments in virtual reality, augmented reality, serious games and interactive simulations. Along with 53 academic partners in Canada and 10 internationally, the proposed AVENIR partnership included committed industry partners included entities from the multimedia and banking to games development corporations.

Second, a smaller subset of partners from the AVENIR network, came together in 2019 to propose the **Consortium for Augmented, Virtual, and Extended Reality Narrative Studies (CAVERNS)**. The interdisciplinary team of researchers from 12 universities in Canada and five internationally working with 20 companies and non-profit organizations in the Extended Reality (XR) – which includes Virtual and Augmented Reality technologies – and videogame sectors aimed at exploring the potential of XR storytelling to address the issues underlying the understanding and creation of rich narratives in these emerging media and to develop a series of best practices and tools for creating and analyzing XR media for the industry.

While these initiatives have not, as yet, received funding for their operations, the work put forth by Games Institute researchers and staff involved in these initiatives provides exciting opportunities for

further collaborations across Canada and internationally. The Games Institute continues to actively seek funding structures to fully launch and support these networks.

Research Groups

One of the primary goals for the Games Institute is to foster interdisciplinary collaboration between its members. Over the last five years, the Games Institute has seen the formation of a number of research groups which not only support discipline-specific work but are also open to all Games Institute members who are interested in expanding their knowledge base. Such structures encourage collaboration, cross-disciplinary pollination of ideas and concepts and provide peer groups where researchers can discuss, present and critique each other's works from a variety of vantage points. All groups are supported by Games Institute administrative staff, including the Research Communications Officer who offers direct support for Knowledge Mobilization/Translation initiatives, media engagements, publication submissions review and grant-writing, among others. The key research groups based at the Games Institute are described below.

Feminist ThinkTank

The Feminist ThinkTank is hosted by research directors of the qCollaborative (see page 26 for details) and based at the Games Institute. The purpose of the ThinkTank is to advance research thinking towards intersectional feminist design by creating space for interdisciplinary crossovers and idea sharing. Dr. Shana MacDonald (Communication Arts) and PhD researcher Brianna Wiens (York University) established the ThinkTank after touring the Games Institute and observing the success of the other affiliated research groups. Recognizing the potential to bring a similar interdisciplinary approach to their intersectional feminist design research, they worked with the Games Institute's administrative team to develop an engagement strategy for the ThinkTank.

The Feminist ThinkTank has provided students with opportunities to advance their knowledge through participating in critical reading groups, brainstorming sessions, research review, and research creation opportunities. For example, in 2019, the ThinkTank hosted a research creation workshop to develop artifacts that articulate embodied feminisms. Games Institute graduate researchers have learned to integrate complex seminal theories from disciplines such as film studies, gender studies, psychology, rhetorical theory, and critical race studies.

Games and Narrative Group

Led by Drs. Ken Hirschkop and Neil Randall (English Language and Literature), the Games and Narrative Group is a humanities-driven research group focusing on exploring the intersections between game studies, narrative, and rhetorical theory. The group was founded in 2019 in order to provide a way for Games Institute researchers to collaborate on literature analysis directed toward generating research outcomes that articulate how classic rhetorical and narrative theory relate to contemporary game studies research. Almost since their inception, videogames have used narrative. Sometimes the narrative element has been implicit, other times open, but games have exploited narrative techniques, employed narrative suspense, and relied on narrative characters with ever greater sophistication. There is, however, debate over the role narrative plays in videogames. This is what the Games and Narrative Group aims to address through their collective research.

Following COVID-19 restrictions, the group's weekly meetings moved to an online collaboration platform. Each meeting is dedicated to analyzing a particular reading and object text, determined by the group.

The Games and Narrative Group is in the process of launching a new international conference series to take place virtually in 2021. The inaugural International Conference on Games and Narrative will provide an opportunity to examine the intersection between videogames and narrative through a variety of online formats: live lectures, speaker panels, video essays, workshops, and live streaming gameplay with commentary and discussion. See page 29 for details on the conference.

Game Studies Research Group

There are significant differences in how varying disciplinary environments understand, among others, supervision and funding of students which, consequently, creates differences in how students are supervised and how they interact with their colleagues. For example, STEM disciplines favour lab-like structures where students working with the same supervisor form close-knit groups working together, often participating in weekly meetings to report on their progress. In Arts, supervisors oversee the work of their students on a more individual basis, lab-like structures are not common, and students usually conduct their work much more independently than their colleagues in technical disciplines with much less frequent collaboration with their peers.

Recognizing the need and value for humanities students to participate in collaborative, generative, and consistent graduate research sessions, Dr. Neil Randall (English, Games Institute Executive Director) founded the Games Studies Research Group. The group offers a wide array of graduate students from various backgrounds within the humanities the opportunity to discuss their research on a biweekly basis in order to share feedback on research projects, brainstorm new and developing ideas, and generally provide support for Arts-driven game studies initiatives. Members are given a platform to share and explore various research topics, while also participating in multimodal ways of engaging with the material—including live streams, multiplayer critical game sessions, and more traditional deconstruction of shared readings or games.

Despite the hurdles of COVID-19, this group has continued to prosper, migrating their meetings online and offering a haven to these graduate students who may otherwise felt isolated. In many ways, the group has thrived in this online environment, which has offered more ways of connecting research goals, projects, and members together. In addition to their theoretical reflections, the group is also actively working towards a myriad of deliverables to reflect the knowledges, skillsets, and strengths of its members in a tangible way, simultaneously providing CV opportunities and moral support in these uncertain times.

HCI Games Group

The HCI Games Group conducts research in information and communication technologies, design, psychology, and human-computer interaction related to games and gamification. Led by Dr. Lennart Nacke (Stratford School of Interactive Design and Business) and based at the Games Institute, the group's current research areas include:

- Gamification: Involves the use of game design principles in systems that primarily support non-game tasks, with the goal of increasing fun, engagement and motivation;
- Games user research: Developing new methods and tools for improving player testing and user research in games and entertainment systems;
- Games for human health, wellbeing, and fitness: Focusing on making sports, physiological exercise, health, and wellbeing applications more playful, especially in light of the recent increase in sensor use and the quantified self movement;
- HCI for games: Finding novel sensors and interaction paradigms that drive the manner in which we interact with computers in a meaningful and engaging way;
- Affective gaming: Research using psychophysiological analysis and physiological sensors to track player sentiments when gauging engagement, cognition and player emotions;
- Social relationship-building games: Developing games and installations that can be used in public spaces to build relationships and foster social interaction in groups.

Human-Computer Interaction Research Group

Led by a multi-disciplinary group of Games Institute faculty members (including, Engineering, Math-Computer Science, Arts and AHS), the Human-Computer Interaction (HCI) Research Group is a central collaboration initiative for Games Institute members involved in HCI research. Members of this research group stem from individual faculty-led labs; for example: HCI Touch Lab (Mark Hancock, MSCI), Haptic Computing Lab (Oliver Schneider, MSCI), Multisensory Brain and Cognition Lab (Michael Barnett-Cowan, Kinesiology), HCI+Health Lab (Jim Wallace, School of Public Health), HCI Games Group (Lennart Nacke, Stratford School of Interaction Design and Business), among others.

This large group of faculty and graduate students meets once per week in the Games Institute's Presentation Room and/or via Games Institute-supported Slack (post-COVID) to provide ongoing knowledge exchange, present and critique current research, discuss new initiatives, serve as an informal peer-review space for student conference presentations/publications, form collaborations for studies and articles, and create social interactions between the various labs and research groups. Meetings of the group are open to visitors from the Games Institute, other Waterloo departments and centres, and other universities who wish to explore new topics.

In May 2020, following the restrictions brought forward by the COVID-19 pandemic and the subsequent cancellation of many discipline-specific conferences/workshops (including CHI 2020), members of the HCI Research Group organized a virtual conference for HCI researchers at Waterloo to ensure that – despite the cancellations – students had an opportunity to present their research and to engage in conversations about cutting-edge research spanning haptic user experiences, food literacy games, player behaviour on large displays, VR in the workplace, and other areas. Leveraging the Games Institute's support, a digital record of the presentations is publicly accessible to provide HCI graduate researchers with a platform to present a year's worth of CHI 2020 research that would have otherwise remained unpublished.

The Human-Computer Interaction (HCI) community at the Games Institute has grown considerably due in part to the connections the researchers were able to make with other Games Institute members. For example, when new faculty members Drs. Oliver Schneider (MSCI), Daniel Harley (Stratford School), and Leah Zhang-Kennedy (Stratford School) joined the Games Institute, they were introduced to faculty members leading the HCI labs. Through this connection, they joined the weekly lab meetings, which led to them to becoming permanent faculty members in the Games Institute HCI community. Subsequently, they brought in their own students to the lab meetings so that those students could connect with Games Institute members. As the Games Institute attracts more researchers to join the HCI community, more interdisciplinary perspectives are added, which strengthens the overall support available to each individual. Consequentially, researchers are exposed to more ideas, receive more robust feedback for their publication submissions, and gain access to more opportunities for collaborations with other scholars and industry partners.

Human-Computer Interaction and Health Lab (HCI+Health Lab)

Founded by Games Institute member Dr. Jim Wallace (School of Public Health and Health Systems) and based at the Games Institute, HCI+Health Lab researchers study how technology can be used to prevent disease, prolong life, and promote human health. The work in the lab is based on the use of theoretical perspectives and research methodologies from the Human-Computer Interaction (HCI) and Computer-Supported Cooperative Work (CSCW) research communities to design and implement new technologies, and deploy those technologies to understand their impact. Areas of interest include: the impact and potential disruption of mobile and wearable devices on the healthcare system; their use in augmenting and betterment of personal health management; the role of computer games in motivating health and well-being; and the role of peer support on social networking platforms like Facebook or Reddit for people with chronic illnesses. Such a wide variety of research questions requires the group to bridge many disciplines from health science, computer science, psychology, to human factors engineering.

qCollaborative

qCollaborative is a joint initiative of researchers from the Games Institute: Drs. Jennifer Roberts-Smith and Shana MacDonald (Communication Arts), along with Dr. Milena Radzikowska (Mount Royal University), and Dr. Stan Ruecker (University of Illinois) and Brianna Wiens (PhD candidate, York University). qCollaborative members work with universities, private industry, government, and not-for-profit organizations in the Americas and Europe. The qCollaborative undertakes design research projects and its work can be described as critical feminist research. Projects are typically collaborative, paced to encourage reflection, and fall into one of four research areas: (1) feminist placemaking, (2) materializing the digital, (3) remediating experience, and (4) design for social justice. Members seek to create safer, more inclusive public spaces for marginalized and targeted communities and are committed to challenging and changing unjust behaviours such as racism, colonialism, (cis)sexism, homophobia, transphobia, ablism, classism, and xenophobia wherever they occur, including in academia, in social justice movements, and in researchers themselves.

Virtual Reality Working Group

Led by Drs. Michael Barnett-Cowan (KIN) and Neil Randall (English), the VR Working Group is a Games Institute collaboration initiative for researchers interested in exploring the opportunities VR technology affords. The Working Group meets, on an alternating schedule, at the Games Institute facilities (EC1) and at Barnett-Cowan's Multisensory Brain and Cognition Lab (TJB), once per week to discuss topics of interest. The group's membership includes graduate students from Applied Health Sciences, Arts, Math-Computer Science and Engineering. Scholars in the humanities and social sciences working in areas such as literature, history, anthropology, and psychology, recognized long ago the capacity for language and narrative to increase engagement with a story or topic and thus to enhance the flow of information between communities and cultures. At the same time researchers in the sciences, such as HCI specialists, health experts, engineers, and game designers, have developed various technically sophisticated tools for crafting rich, visually-arresting experiences. However, to date there has been little scholarly attention given to what these two groups have to gain through collaboration.

Over the past two years, the beginnings of such collaborations have developed between students from very disparate disciplines who participate in the VR Working Group meetings. Along with research discussions, the group is also tackling the vastly different expectations of various scholarly disciplines and how to ensure that the VR Working Group student members can fully reap the benefits of interdisciplinary collaboration while satisfying the requirements of their specific programs and finding innovative ways of reporting on their activities that would fully project the benefits of such an integrated, multi- and inter-disciplinary scholarship.

Specifically, outcomes from the VR working group have contributed to publications that exemplify the benefits of bringing scholars together from disparate disciplines. For example, kinesiology researcher Dr. Séamas Weech and psychology researcher Dr. Sophie Kenny published a study with findings linking gaming experience with narrative immersion and reduced cybersickness. Furthermore, an English postdoctoral fellow, Dr. Judy Ehrentraut, is applying insights she gained from working with Systems Design Engineering graduate researcher Marco Moran-Ledesma in her current collaboration with industry partner, Stitch Media, about VR embodiment and player experience in the game *Flow Weaver*.

The Human-Computer Interaction (HCI) Touchlab

Led by Mark Hancock (MSCI) and based at the Games Institute, the Human-Computer Interaction (HCI) Touchlab is connected with the broader University of Waterloo Touchlab network housed at the Cheriton School of Computer Science. The researchers of the HCI Touchlab employ user research methods and systems design engineering thinking to study technological design and generate knowledge about using technology to improve facets of the human condition. The HCI Touchlab conducts the majority of their research at the Games Institute thanks to its collaborative lab infrastructure. Technologies of interest include VR, 3D printing, videogames, smart devices, large interactive displays, and motion capture.

Research produced by HCI Touchlab members has made significant contributions to the international field of HCI research and has generated knowledge about improving VR experiences by integrating 3D printed objects, addressing gender equity in VR hardware designs, designing videogames that address self-control, designing technology-enabled systems for vulnerable groups, and improving user understanding with data displays.

CFI lab infrastructure

A key part of the Games Institute's interdisciplinary research ecosystem are co-located research labs. Students and faculty researchers benefit from ongoing collaboration, exchange of knowledge and ideas as they take advantage of the co-located labs and other research infrastructure. Access to all labs is centrally managed by Games Institute administrative staff with support from the Arts Computing Office and the Computer Science Computing Facility and is fully open to the entire membership of the Institute.

Currently, the list of CFI-funded labs fully integrated into the Games Institute premises includes:

3D Printing Facility Lab, PI: Mark Hancock (MSCI)
Dr. Mark Hancock's 3D printing facility enables Games Institute researchers to investigate opportunities to elevate human computer interaction and immersion for a variety of applications, including integrating 3D printed objects to improve the realism of virtual reality experiences as well as creating material experiences to enhance cultural heritage preservation projects.

Haptics Computing Lab (in construction), PI: Oliver Schneider (MSCI);
The infrastructure of Dr. Oliver Schneider's Haptics Computing Lab provides haptic researchers at the Games Institute and the Canada Haptics Network with opportunities to develop multisensory touch experiences for research through design projects dedicated to extending the applications of haptic technology to the realms of accessible design, science teaching, games user experiences, and user research, more broadly.

HCI+ Health Lab, frm. Interactive Data Exploration and Analysis System, PI: Jim Wallace (SPHHS)
Dr. Jim Wallace's HCI and Health Lab is comprised of a large multi-touch display, a table-top smartboard, and design software that allows Games Institute members to work in the intersection of games and Public Health research through designing applications such as programs for shared decision making between doctors and patients, gameful systems for medical knowledge translation, and a game for mental health support.

StoryBoard Lab (in construction), PI: Neil Randall (English)
The StoryBoard Lab infrastructure will allow Dr. Neil Randall and other Humanities and human-computer interaction researchers to explore best practices for storytelling on large interactive displays and developing research creation experiences that demonstrate how to design narratives for this technology for purposes such as Public Health, travel, performance, education, and training.

Waterloo Games Analysis and Monitoring Environment (WatGame), CoPIs: Neil Randall (English), Chrysanne DiMarco (CS) and Stacey Scott (SYDE)
As the original Canada Foundation for Innovation Lab connected with the Games Institute's IMMERSe Social Sciences and Humanities Research Council (SSHRC) grant, WatGame Lab allowed Drs. Neil Randall, Chrysanne DiMarco, and Stacey Scott to create two dedicated lab spaces with a suite of design software and hardware, video game equipment, board games, and furniture, curated to advance research into the exploration of serious games, player immersion, games for health, game mechanics and narratives, and cultural interactions.

WatVRStory Lab, coPIs: Neil Randall and Ashley Mehlenbacher (English)
The WatVRStory Lab provides infrastructure for Humanities-driven research, or STEM research with integrated Humanities approaches, about virtual reality (VR), exploring storytelling best practices for enhancing immersion as well as research creation productions that demonstrate a breadth of innovative applications such as VR experiences about restorative justice, education, accessibility for senior adults, and workplace wellness.

Conferences

CHI PLAY Conference

CHI PLAY is the international and interdisciplinary conference (by ACM Special Interest Group for Computer-Human Interaction) for researchers and professionals across all areas of play, games and human-computer interaction (HCI), or "player-computer interaction." The goal of CHI PLAY is to highlight and foster discussion of current high-quality research in games and HCI as foundation for the future of digital play. To this end, the conference features streams that blend academic research papers, masterclasses, interactive play demos, student game design competition, poster session and industry insights. CHI PLAY grew out of the increasing work around games and play emerging from the ACM annual conference on Human Factors in Computing Systems (CHI) as well as smaller conferences such as Fun and Games and Gamification. While CHI PLAY is not based out of the Games Institute, Dr. Lennart Nacke (Stratford School for Interactive Design and Business and Games Institute member), is considered one of the founders of the CHI PLAY conference series and has served as the chair of its steering committee since 2014. Numerous Games Institute faculty and student members regularly present their games research at CHI PLAY.

International Conference on Games and Narrative

The Games Institute is in the process of launching a new international conference series to start in 2021. The inaugural International Conference on Games and Narrative will provide an opportunity to examine the intersection between videogames and narrative through a variety of online formats: live lectures, speaker panels, video essays, workshops, and live streaming gameplay with commentary and discussion. Almost since their inception, videogames have used narrative. Sometimes the narrative element has been implicit, other times open, but games have exploited narrative techniques, employed narrative suspense, and relied on narrative characters with ever greater sophistication. There is, however, debate over the role narrative plays in videogames. Is gameplay fundamentally distinct from narrative? Does game narrative rely on the techniques of filmic and literary narrative? Does its creation of storyworlds make its narrative form distinctive and original? How do the narratives employed in videogames reflect and shape our sense of gender, race, sexuality and national identity?

The 2021 edition of the conference will be available online, in formats designed for maximum accessibility. The conference will be a forum for analysis and discussion, but also a place to meet others with an interest in games and narrative, to learn about how game creators think about narrative design, and to enjoy, in the company of peers, the narrative pleasures and perils of the games themselves. The conference will cover gaming from the mainstream to the avant-garde, from the commercial to the political, and talk about the various ways in which narrative experiences and daily lives intersect. Keynote speakers will include Clara Fernández-Vara - New York University, United States; Kishonna Gray - University of Illinois, United States; Elizabeth La Pensée - Michigan State University, United States; Souvik Mukherjee – University of Kolkata, India; Jan-Noël Thon - University of Nottingham, United Kingdom; Astrid Ensselin - University of Alberta, Canada.

Knowledge Dissemination Productions

Palgrave Games in Context Book Series

Games are pervasive in contemporary life, intersecting with leisure, work, health, culture, history, technology, politics, industry, and beyond. These contexts span topics, cross disciplines, and bridge professions. Palgrave Games in Context situates games and play within such interdisciplinary and interprofessional contexts, resulting in accessible, applicable, and practical scholarship for students, researchers, game designers, and industry professionals. What does it mean to study, critique, and create games in context? This series eschews conventional classifications—such as academic discipline or game genre—and instead looks to practical, real-world situations to shape analysis and ground discussion. A single text might bring together professionals working in the field, critics, scholars, researchers, and designers. The result is a broad range of voices from a variety of disciplinary and professional backgrounds contributing to an accessible, practical series on the various and varied roles of games and play. The series is co-edited by Games Institute Executive Director, Dr. Neil Randall (English) and Games Institute alum Dr. Steve Wilcox (Game Design and Development, Laurier University). *Note: * denotes Games Institute scholars who co-edited books in the series.*

Game History and the Local **by Swalwell, M. (Ed) (2021, forthcoming)**

Game history did not unfold uniformly and the particularities of space and place matter. Yet, many digital game and software histories are silent with respect to geography. The orthodoxy that the U.S. and Japan – and to a lesser extent the U.K. – constituted the 'centres' at the outset of the industry has enjoyed such legitimacy that many accounts do not even bother to mention the 'where' that their material or statistics pertain to. That many histories have been written by journalists and 'insiders' – comprising what Huhtamo calls the "chronicle era" of game history – largely accepting the game industry's 'global' rhetoric has no doubt contributed to this situation. However, it means that locality has largely been left out of game history (with some notable exceptions), at least until recently. Given the great historic diversity of games and contexts for their play, an appreciation of socio-cultural and geographic specificity is important to develop, particularly if other histories are to be told, for instance, from the 'periphery' rather than the 'centre'. There is a burgeoning interest in discussing locality with respect to game history. Whilst this degree of interest is welcome, the local needs to be critically-situated if it is not to simply become a new orthodoxy, celebrated for its own sake. This anthology is intended to bring together scholarship which addresses the critical potential of the local for game history, asking how this might encourage a maturation of historical work on and around games.

Exploring Minecraft **by Hjorth, L., Richardson, I., Davies, H., Balmford, W. (2020)**

This book directs critical attention to one of the most ubiquitous and yet under-analyzed games, Minecraft. Drawing on three years of ethnographic fieldwork into mobile games in Australian homes, the authors seek to take Minecraft seriously as a cultural practice. The book examines how Minecraft players engage in a form of gameplay that is uniquely intergenerational, creative, and playful, and which moves ambivalently throughout everyday life. At the intersection of digital media, quotidian literacy, and ethnography, the book situates interdisciplinary debates around mundane play through the lens of Minecraft. Ultimately, Exploring Minecraft seeks to coalesce the discussion between formal and informal learning, fostering new forms of digital media creativity and ethnographic innovation around the analysis of games in everyday life.

***Tabletop RPG Design in Theory and Practice at the Forge*, 2001–2012 by White, W. J. (2020)**
This book provides an introduction to the Forge, an online discussion site for tabletop role-playing game (TRPG) design, play, and publication that was active during the first years of the twenty-first century and which served as an important locus for experimentation in game design and production during that time. Aimed at game studies scholars, for whom the ideas formulated at or popularized by the Forge are of key interest, the book also attempts to provide an accessible account of the growth and development of the Forge as a site of participatory culture. It situates the Forge within the broader context of TRPG discourse, and connects "Forge theory" to the academic investigation of role-playing.

***Tabletop Role-Playing Games and the Experience of Imagined Worlds* by Mizer, N. J. (2019)**
In 1974, the release of Dungeons & Dragons forever changed the way that we experience imagined worlds. No longer limited to simply reading books or watching movies, gamers came together to collaboratively and interactively build and explore new realms. Based on four years of interviews and game recordings from locations spanning the United States, this book offers a journey that explores how role-playing games use a combination of free-form imagination and tightly constrained rules to experience those realms. By developing our understanding of the fantastic worlds of role-playing games, this book also offers insight into how humans come together and collaboratively imagine the world around us.

***Queerness in Play* by Harper, T. (Ed), Adams, M. B. (Ed), Taylor, N. (Ed) (2018)**
Queerness in Play examines the many ways queerness of all kinds—from queer as 'LGBT' to other, less well-covered aspects of the queer spectrum—intersects with games and the social contexts of play. The current unprecedented visibility of queer creators and content comes at a high tide of resistance to the inclusion of those outside a long-imagined cisgender, heterosexual, white male norm. By critically engaging the ways games—as a culture, an industry, and a medium—help reproduce limiting binary formations of gender and sexuality, Queerness in Play contributes to the growing body of scholarship promoting more inclusive understandings of identity, sexuality, and games.

***Masculinities in Play* by Taylor, N. (Ed), *Voorhees, G. (Ed) (2018)**
This volume addresses the persistent and frequently toxic associations between masculinity and games. It explores many of the critical issues in contemporary studies of masculinity—including issues of fatherhood, homoeroticism, eSports, fan cultures, and militarism—and their intersections with digital games, the contexts of their play, and the social futures associated with sustained involvement in gaming cultures. Unlike much of the research and public discourse that put the onus of "fixing" games and gaming cultures on those at its margins—women, LGBTQ, and people of color—this volume turns attention to men and masculinities, offering vital and productive avenues for both practical and theoretical intervention.

***Feminism in Play* by Gray, K. L. (Ed), *Voorhees, G. (Ed), *Vossen, E. (Ed) (2018)**
Feminism in Play focuses on women as they are depicted in video games, as participants in games culture, and as contributors to the games industry. This volume showcases women's resistance to the norms of games culture, as well as women's play and creative practices both in and around the games industry. Contributors analyze the interconnections between games and the broader societal and structural issues impeding the successful inclusion of women in games and games culture. In

offering this framework, this volume provides a platform to the silenced and marginalized, offering counter-narratives to the post-racial and post-gendered fantasies that so often obscure the violent context of production and consumption of games culture.

First Person Scholar (FPS)

First Person Scholar (FPS) is a middle-state publication (semi-academic, semi-journalistic) that has become a major force in the field of game studies. Its sheer volume of material is itself impressive – FPS has published new material every Wednesday since its launch in 2013, amounting to approx. 50 articles per year – but its quality is undisputed. The FPS editorial team is composed entirely of Games Institute graduate students and their commitment to publishing rigorous, accessible, and inclusive research was recently recognized by the Ivy Plus Libraries Confederation. FPS is part of the Digital Gaming Communities Web Archive, which sees the work included in the library collections at Brown, the University of Chicago, Columbia, Cornell, Dartmouth, Duke, Harvard, Johns Hopkins, MIT, the University of Pennsylvania, Princeton, Stanford, and Yale. FPS also appears as recommended reading on numerous games studies course syllabi around the world. FPS commands a stable readership of roughly 5000 unique monthly visitors and growing, with large international followings outside of North America and Europe; specifically, in India, Brazil, China, countries in the Middle East, and more. FPS enjoys 1,000 active readers in 27 different countries, and readerships in the hundreds growing in more than 50 other countries.

FPS has proven to be an organization that provides mentorship to graduate students on multiple levels. First, students have access to an international community of scholars through FPS; the site is known the world over for its inclusive, quality, and accessible content that pushes and expands the boundaries of the field. Second, students who have the opportunity to serve as an editor gain professional-level experience in the digital publishing industry. But perhaps most importantly, many graduate students have written pieces for the publication, thus presenting Games Institute's game studies research to scholars across the discipline. The chance for students to not only publish their work, but also gain experience and comfort with academic editorial practices and expectations is invaluable to students striving to mobilize their knowledge and skills. In addition, FPS assists graduate and undergraduate students with multiple professionalization practices, including networking within scholarly spaces, gaining editorial experience with scholars in many fields and disciplines, and making their first forays into academic publishing, which can otherwise be a perilous and exclusionary experience.

The publication was formed in response to large-scale problems in the study of games. Despite the increasing ubiquity of both video games and game players, games and their wider culture face serious problems of inclusion and representation. Mainstream journalists and publishers have remained largely silent in the face of bigotry, unwilling to alienate a perceived white-male player base. This status quo is unsustainable and harmful, as evidenced by 2014's emergence of antifeminist, antiacademic hate group GamerGate, which explicitly targets women and their allies in game development, journalism, and academia for harassment. The misinformation GamerGate capitalizes upon is exacerbated by a lack of open access to game scholarship produced within academia.

FPS responds proactively to an ongoing lack of diverse representation in games culture generally and games academia in particular. Over the years, FPS has been involved in the organization and publication of several series of special issues bringing together the work of specific underrepresented communities, including collaborations with the Different Games Collective and disability scholars. A recent series of

three special issues, funded through a SSHRC Connections Grant (PI: Jennifer Whitson, Sociology and Legal Studies) as well as by the Games Institute, consists of an issue on queer game design published in Spring 2019, an issue on Indigenous survivance published in Fall 2020, and an issue bringing together queer and transgender authors of colour to be published in 2021.

Games Institute Podcast

The Games Institute Podcast is a unique research communications channel featuring interviews with Games Institute members that emphasize their individual approaches to research and research processes. Professional academic publications are driven by knowledge but are not concerned with the story of its pursuit. While traditional academic publishing venues capture the integrity of research, standard organizational and news communication channels articulate research stories, but often don't do justice to the rigor of work. The Games Institute Podcast bridges this gap and provides an accessible mode of translating knowledge to the general public.

Since its launch in May 2019, along with First Person Scholar, the podcast has become a critical part of the Games Institute's global outreach strategy. As one of the few university-based research institutes in North America using podcasts as a strategic form of research communications, the podcast has attracted a diverse listener-base of over 3,000 individuals across 4 continents and 26 countries with 27 episodes, representing 10 academic disciplines from four Waterloo Faculties (Engineering, Math, Applied Health Sciences, and Arts). The podcast has attracted listeners from China, Canada, USA, and Germany with a growing listenership in France, Belgium, Japan, Norway, Ecuador, and Slovakia, and a burgeoning presence in Brazil, Colombia, Russia, Estonia, Ukraine, Sweden, UK, Spain, Netherlands, UAE, India, Thailand, Indonesia, Japan, Hungary, Iran, and Argentina. Figure 9. Geographical reach of Games Institute Podcast shows the reach of the podcast as of November 2020.

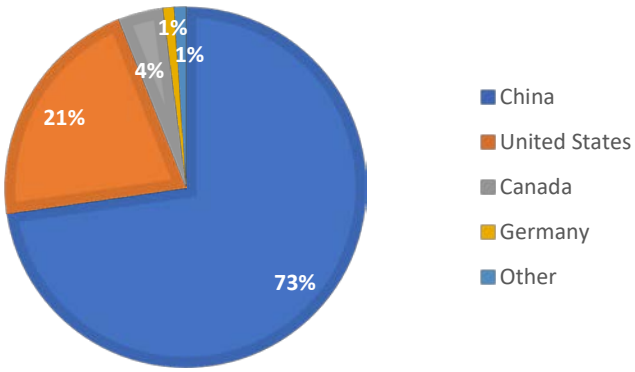


Figure 7. Geographical reach of Games Institute Podcast

The goals of the Games Institute Podcast are to provide a way for our researchers to gain knowledge translation experience and addresses the Games Institute's public mission to mobilize, translate, and implement accessible knowledge dissemination. The podcast producers are Games Institute staff Marisa Benjamin, Research Communication Officer (MA alumna, English) and Games Institute student member Toben Racicot, PhD candidate (English). The podcast is a vital component of the Games Institute's research communications and international growth strategy; it is also key to the continual enrichment of the ecosystem for our researchers.

The podcast has become critical to unlocking the insights into the lives of researchers and the research process itself with its fast turnaround, non-expert accessible language, and fidelity to the research process and research outcomes. The podcast not only strengthens the interdisciplinary nature of interactions within the Games Institute, but is also expected to generate new avenues for research that may not otherwise have been possible. Mastering the demands of rigorous representation of academic work while simultaneously demonstrating that academic outreach can be inclusive, diverse, and accessible is one of the Games Institute's leading long-term goals: to tell stories about our researchers and their work to make the Games Institute the global hub of games research.

The podcast episodes are distributed via Liberated Syndication, which allows them to be available through main podcast streaming services such as Apple Podcasts and Spotify. Recently, video recordings of the interviews are also published on YouTube. The podcast allows the Games Institute to establish a presence in this very popular medium, while also providing an accessible alternative for our non-visual audiences. The podcast structure involves 70% research discussion and 30% autobiography to provide a balanced story, while maintaining conversations at a grade 10 level and avoiding expert vocabulary and scientific jargon to ensure accessibility for the general audience. Having said this, the diversity in topics covered by the podcast and its accessible form make it an interesting source of information for an academic audience across all disciplines whose research intersects games, interactive design, and technology.

The episodes are published in a purposefully prearranged order to ensure a wide variety of research being presented and a balanced gender ratio of the podcast guests (see Figure 10). The growing portfolio of guests from diverse disciplines allows the producers to share examples from previous episodes and make connections with other disciplines as well as different scientific and academic research methods. This results in not only a well-rounded experience for the podcast listeners, but also helps Games Institute researchers explore their work from a new perspective leading to new collaborations and better knowledge translation in their own writings.

Inspired by the Games Institute podcast's approach to knowledge translation and following consultations with Games Institute Podcast producers, six other UW podcasts have or are in the process of launching as spin-offs. Topics will include human-computer interaction and games, intersectional feminist research design, digital humanities archival work, deconstructing white-cis-hetero-patriarchy through technology, explainable quantum physics, and student start-up stories.

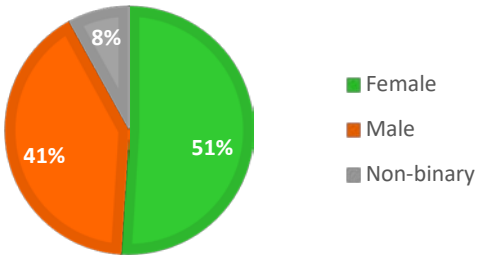


Figure 8: Gender ratio of Games Institute Podcast guests

Selected Projects

The work produced by the Games Institute extends beyond traditional academic norms. The following projects highlight the potential reach of research focused on games and immersive, interactive technologies, as well as use of the insights garnered as vehicles for innovative knowledge mobilization or translation even in the most sensitive of subject matter.

Above Water

Funded by Games Institute and NSERC; PI: Lennart Nacke (Stratford School of Interaction Design and Business), created by Rina Wehbe, PhD candidate (Computers Science)

Above Water, designed by a computer science PhD candidate, is a digital/physical hybrid game to educate non-institutionalized individuals on the available strategies to cope with two types of Anxiety Disorders - Generalized Anxiety Disorder and Panic Disorder; it also teaches players about existing treatments, intervention information and ways to support those with mental health disorders. *Above Water* focuses on using the physical world (physical space, physical and tangible cards) and the digital world (accessible by any phone or tablet with a modern web browser) as part of its gameplay and is designed to inspire players to share their experiences and develop their own personal narrative.

Potential players could have clinical diagnoses, be seeking information about a suspected problem, or playing a supportive role in another individual's journey to health. *Above Water* is not designed to be a treatment itself, but instead provides information that may empower individuals to seek treatment by creating awareness about different options and encourage conversation between players. The game acknowledges that the effectiveness of treatments is personal to each individual and focuses on treatments as pieces of a treatment plan that contribute to better overall health and wellness.

Allergies and Allegories

Funded by Games Institute and Canadian Institutes of Health Research (CIHR); PI: Bruce Mazer (McGill University); Games Institute Faculty Members co-investigators: Susan Elliot (Geography and Environmental Management), Neil Randall (English), created by Steve Wilcox, PhD alum (English), supervised by Aimée Morrison (English)

Allergies & Allegories, created in collaboration with GET-FACTS (Genetics, Environment and Therapies: Food Allergy Clinical Tolerance Studies), is an online game with an goal of working towards lowering the social and cultural difficulty individuals living with severe food allergies face by engaging children, adults, students, and teachers with various representations of day-to-day life with food allergies. *Allergies and Allegories* is an example of how a game can serve as a knowledge translation tool, transforming the insights of academic publications from medical experts into an accessible vehicle aimed at increasing public awareness in this area. This game has players working with Mia, a child who has a severe peanut allergy and has recently moved to a new school. The objective of the game is to improve Mia's well-being, which is a composite of various factors identified in the research conducted by GET-FACTS medical experts on children with food allergies in schools across Ontario.

In addition to being a powerful knowledge mobilization medium, games afford players a degree of agency that enhances their capacity to represent experiences in a persuasive, personal, and practical manner, which fosters the retention and deployment of those experiences in everyday interactions. The author of the game, Games Institute alum Steve Wilcox (now professor of Game Design and Development, Laurier University), explored this notion not only in terms of its artistic implications, but in its potential application to scholarly publishing, or what can be referred to as playable publishing. This

concept represents a kind of interactive form of conveying scholarship that enhances the reader/player's understanding of the material by affording a degree of play into the process. Consequently, Dr. Wilcox, argued his PhD dissertation in part through the *Allergies and Allegories* game, a first at Waterloo.

DOHR: The Digital Oral Histories for Reconciliation
Funded by SSHRC Partnership Development Grant; PI: Kristina Llewellyn (Social Development Studies); Games Institute Faculty Member co-investigators: Jennifer Roberts-Smith (Communication Arts), Lennart Nacke (Stratford School of Interaction Design and Business), Gerald Voorhees (Communication Arts)

The Digital Oral Histories for Reconciliation (DOHR) is a restorative justice project, featuring a Virtual Reality (VR) experience that takes students into a digitally rendered representation of the Nova Scotia Home for Colored Children as a part of a grade 11 Canadian History unit. DOHR's interdisciplinary, Waterloo-based VR design team worked with former residents of the home, Tony Smith, Gerry Morrison and Tracy Dorrington-Skinner, as well as with academic and community partners across Canada to ensure that the VR experience and the accompanying two-week history curriculum unit worked towards restorative justice for the former residents. Throughout the development of the project, victims of Institutional Child Exploitation Society, the Nova Scotia Home for Colored Children Restorative Inquiry, educators, historians, and legal experts worked collaboratively worked collaboratively with the interdisciplinary team of researchers and students from Waterloo, Dalhousie, UBC, Alberta, McGill, Laurier, Ottawa, Toronto and UNB.

The digitally rendered representation of the home allows participants to hear stories in the voices of former residents Smith, Morrison, and Dorrington-Skinner, while standing in renderings of the spaces where the stories occurred. Through this process, students are immersed in learning to gain an understanding of the 80-year history of the home and the harms of institutional racism.

Energize - Play for Reality: Conveying Sustainability Challenges Through Game Mechanics
Funded by Mitacs and Waterloo Global Science Initiative; PI: Neil Randall (English), created by AC Atienza, MA alum (English)

Several Ontario regions have agreed to reduce their carbon emissions by 80% by 2050. However, many of these cities do not actually have a plan for how they will reach this noble but challenging goal. In response, the Waterloo Global Science Initiative (WGSI) in partnership with the Games Institute has created a board game called *Energize*. Based on the rich body of research on rhetoric, game studies, design, and hermeneutics, which considers how people interpret media and how they draw meaning from an object, *Energize* is designed as a co-operative game where every player has their own role (like managing money or projects) as well as their own talents (like being charismatic, efficient or resourceful). It was created as an educational tool for understanding how to plan and implement sustainable energy solutions and its goal is to draw attention to the challenges and the solutions of how a city can reduce carbon emissions. It represents the potential that games have for teaching people complex ideas, like environmental realities, by demonstrating the obstacles, considerations, and possibilities involved.

Incorporating Social Justice into Haptic VR Storytelling
Submitted for consideration to the Tri-Agency New Frontiers in Research Fund; PI: Oliver Schneider (Management Sciences); Games Institute member co-investigators: Michael Barnett-Cowan (Kinesiology), Kristina Llewellyn (Social Development Studies), Jennifer Roberts-Smith (Communication Arts)

Incorporating Social Justice into Haptic VR Storytelling proposal was developed by Games Institute researchers and their collaborators from Dalhousie University and a non-profit organization VOICES. The project focuses on Virtual Reality (VR) technology which offers profound opportunities to improve the creation, generation, and sharing of stories, a key component of human culture. In most cases, the development of VR environments and delivery systems has been driven by hardware development in the commercial gaming market. With VR headsets entering classrooms and living rooms, a need has arisen for content development outside of the commercial sphere.

This project will utilize a VR environment to bring the stories of marginalized communities to broad audiences. The aim is to design a new haptic, or touch sensitive, VR story driven by community partners to develop guidelines for incorporating social justice into haptic VR experiences, explore ways to deploy this experience in an accessible format (e.g., with commodity or low-cost devices), and produce tools by which marginalized communities can continue to tell and experience VR stories. The result will be a guiding example of how to design future VR experiences to be accessible for users with visual and hearing disabilities, marginalized creators and audiences, and initial infrastructure to enable other communities to tell their stories.

Merlynne
Funded by NSERC; PI: Jim Wallace (School of Public Health and Health Systems), created by Tina Chan, MSc alumna (School of Public Health and Health Systems)

Merlynne is a single player role-playing game that asks the player to advance the narrative by offering support, advice, and encouragement to non-player characters by using techniques from cognitive behavioural therapy (CBT). In the narrative, the player acts as a foreign advisor to the heroic knights, wizards, and kings of Khamelot, as a mysterious plague of negativity starts to hinder their daily lives. *Merlynne* is designed to explore how gamification with narratives and avatars can influence motivation in online peer to peer (P2P) support platforms. The goal is to identify innovative ways to increase engagement in P2P cognitive behavioural therapy platforms and explore whether presenting mental health tools with creative mediums can attract diverse individuals to the mental health conversation.

Orbit
Created by Karina Arrambide, PhD candidate (SYDE); Lisa Freiman Cormier, MA student (Stratford School of Interaction Design and Business); Rina R. Wehbe, PhD candidate (Computer Science), supervised by Lennart Nacke (Stratford School of Interaction Design and Business)

Children with Attention Deficit (Hyperactivity) Disorder or AD(H)D can require treatment for which they need to experience long-lasting neurofeedback sessions. Children might not adhere to at-home treatment activities because of the nature of these sessions; thus, not getting the benefits of the program. *Orbit* – a first multiplayer prototype that was evaluated in a pilot study with five neuropsychologists –tested the hypothesis that by playing a collaborative neurofeedback game, children will be more adherent to their treatment and therefore derive a stronger benefit. It was found that collaborative multiplayer games are suitable from a therapeutic standpoint and long-term use because of its higher social motivation and collaboration between children with AD(H)D; albeit there are some

drawbacks including unreliability of electroencephalography (EEG) input and the risk for the collaborative environment to be distracting for the player.

Rebuild – Addressing Community Corrections: Applying Gameful Design and Simulation to Support Offender Reintegration

Funded by Correctional Services Canada; PI: Neil Randall (English), created by post-doctoral fellow Kevin Barton (Psychology/English) and PhD candidates: Rebecca Anderson (English), Alexander Fleck (English), Sabrina Sgandurra (English)

Correctional Services Canada (CSC) initially approached the Games Institute in 2016 to investigate how games and interactive technologies could help facilitate reintegration into society for released offenders. The resulting multi-year project aimed to create a gamified app to help offenders successfully assimilate back into society after release and avoid recidivism. Providing $500,000 in funding, Correctional Services Canada is an example of a large public-sector organization that recognizes the Games Institute's success in bringing the right people together to imagine new solutions to some of the nation's most difficult challenges.

CSC officers and Games Institute researchers are jointly developing a game, *Rebuild,* that will be used after offenders have served their custodial sentences. The game is targeted at increasing players' capacities for obtaining and keeping employment. This initiative is part of a five-year agreement with the CSC to research, design, and build games that will address each risk factor for reoffending (beginning with the risk of unemployment). The project is based on an extensive a literature review of recidivism in Canada, the impact of simulation games, world-building, and community resources. The project also includes applications of gameful design research and gamification mechanics to be incorporated to an app/website tool.

Responding to Disclosure – VEGA: Violence Evidence Guidance Action

Funded by Public Health Agency of Canada; PI: Harriet MacMillan (McMaster University); Games Institute members co-investigators: Neil Randall (English), Steve Wilcox, PhD alum (Game Design and Development, Laurier University)

The Violence Evidence Guidance Action (VEGA) project led by McMaster University created pan-Canadian, evidence-based guidance and education resources to assist healthcare and social service providers in recognizing and responding safely to family violence. The VEGA team, developed resources in collaboration with expert consultants and organizations, 22 national organizations and other stakeholders. The project, with funding from the Public Health Agency of Canada, focused on three main types of family violence, including child maltreatment, intimate partner violence, and children's exposure to intimate partner violence. The online resources included evidence-based learning modules, care pathways, scripts and how-to videos, along with interactive educational scenarios and a handbook.

Games Institute researchers collaborated with VEGA's experts to develop the *Responding to Disclosure* serious game which has since become the central part of the VEGA online curriculum base. The simulated interactions allow service providers to discover the signs of family violence for themselves and to explore various responses, the outcomes of which align with evidence and best practices. The game aims to improve the knowledge, skills, attitudes and behaviours of the thousands of providers involved in recognizing the signs of family violence and providing a safe and effective response to survivors.

Scotiabank Partnership
Funded by Scotiabank; PI: Neil Randall (English), Games Institute member co-investigators: Mark Hancock (MSCI), Lennart Nacke (Stratford School of Interactive Design and Business), Ben Feng (Statistics and Actuarial Science), with post-doctoral fellow Michael Hancock (English), PhD candidates: Alessandra Luz Ferreira (Computer Science), Marco Moran-Ledesma (Systems Design Engineering)

Scotiabank approached the Games Institute as a research partner for a project relating to how games and game technologies can be used for educational purposes and how to impact user behaviour through deeper understanding of the consequences of financial decisions. Scotiabank chose the Games Institute because of its interdisciplinary ecosystem and an ability to engage expertise from multiple disciplines. As is the case with most research projects sponsored by major industry partners, activities under the Games Institute-Scotiabank partnership agreement are governed by non-disclosure agreements.

Terrorarium
Funded by Mitacs and Stitch Media Inc.; PI: Neil Randall (English), created by Games Institute post-doctoral fellows: Adam Bradley (English), Michael Hancock (English), and Games Institute PhD candidate Judy Ehrentraut (English)

In collaboration with Stitch Media and co-funded by Mitacs, post-doctoral fellows from English and Systems Design Engineering participated in the development of *Terrorarium*, a personal computer (PC) game about "wanton destruction and adorable gore in playermade murder gardens". The researchers used the design and development process of creating a commercial game as a case study to further research surrounding narratology, interactive narratives, cultural analysis of games, and innovative gameplay interactions. The development of *Terrorarium* helped the researchers understand how the rhetoric of video games and procedurally-generated visuals in multimodal environments influence young audiences. Using a variety literary, folkloric, and mythology theories, they established how specific actions allow players to engage with the game world, drawing on their real-life experiences with institutions and plants. They expanded the applicability of rhetoric to the study and game design of *Terrorarium* by examining how the game creates roles for its players. To help understand how environments influence players, the researchers also used *Terrorarium* to understand how to build dynamic, virtual worlds by writing interactive storylines and character backstories.

Terrorarium was selected for the IndieCade Festival at the Electronics Entertainment Expo (E3) 2019 – the largest trade event for the video game industry – and is currently under consideration as an acquisition by one of the top three largest game companies in the world. Games Institute researchers were credited as part of the development team for the game.

Campus Collaborations

As an active and collaborative member of the Waterloo Campus, the Games Institute actively pursues opportunities to contribute to and partner on cross campus initiatives.

Council for Responsible Innovation and Technology and Research Equity, Diversity, and Inclusion

To ensure an equitable future, Waterloo graduates will need to know how to pursue research and innovations that are beneficial to all, and the Games Institute aims to enhance this inclusive approach by collaborating with other units on campus whose mandate it is to consider matters of responsible, equitable, diverse and inclusive innovation. With that in mind, the Games Institute initiated ongoing

partnerships with the Research Equity, Diversity and Inclusion Council (REDI) and the Council for Responsible Innovation and Technology (CRIT), on which Dr. Neil Randall co-chairs, on projects and events related to racial equity and responsible innovation.

In November 2020 and in partnership with REDI and CRIT, the Games Institute launched a first-of-its-kind Racial Equity Boardgame Design Showcase, inviting the Waterloo community to design board games to contribute to anti-racism action on campus with a focus on addressing anti-Black racism in Canada. The event is hosted on the Games Institute's Discord server, a communication platform that connects researchers in fields like games design and racial equity to exchange research expertise across a range of disciplines.

Building from the enthusiasm in the Waterloo community for the event, the Games Institute and REDI will run the games showcase in 2021 with a focus on anti-Indigenous racism and again seek to build an inclusive network of researchers and knowledge practitioners. The Games Institute will continue to strengthen sustainable and diverse communities at Waterloo by further collaborating with REDI on advancing Equity, Diversity, and Inclusion (EDI) initiatives, including the launch of an art showcase in 2021 that invites contributions from students, researchers, artists and designers across the community.

Quantum Cats with the Institute for Quantum Computing

PI: Dr. James Wallace, SPHHS with PhD student Victor Cheung, SYDE and IQC scientific team

Quantum Cats is a mobile game that allows players to learn and engage with concepts of quantum physics. A project in collaboration with the Institute for Quantum Computing (IQC), the game introduces the properties of quantum physics concepts through game play. Quantum Cats asks players to rescue kittens by sending cats to their rescue, but the catch is that the cats are affected by different properties from quantum physics: quantum mechanics, superposition, the uncertainty principle, and quantum tunnelling. Through observing and adapting to how the cats behave under different quantum principles, players gain an understanding of complex quantum principles.

The Games Institute and IQC developed the game as an educational tool to help people become familiar with the science behind quantum technologies. The game was featured as part of IQC's Canada 150 Signature Initiative, "Quantum: The Exhibition" that toured across Canada and internationally. The game was publicly released on both Android and iOS platforms and has been downloaded more than 10,000 times and was presented at the ACM Conference of Interactive Surfaces and Spaces (ISS 2016).

Alice and Schroedinger's Excellent Adventure with the Institute for Quantum Computing

PI: Dr. Neil Randall, English Language and Literature with PhD students Elise Vist and Lauren Burr, English and IQC scientific team

Alice and Schrödinger Excellent Adventure is a playful exploration of the Mike and Ophelia Lazaridis Quatum-Nano Centre prepared for an IQC Open House. Using a combination of near-field communication chips (which users access in specific locations,) and an engaging narrative, *Alice and Schrödinger* encourages visitors to wander around the building, seeking out snippets of conversation between Alice, an IQC graduate student, and Schrödinger, her curious and excitable cat.

Typically, tours, even self-guided ones, require visitors to follow a clear, linear path from one point to another, restricting the tour to the path or a pre-determined route. With *Alice and Schrödinger*, the

visitor can choose the information they are interested in as they are guided by the architecture of the building and their own curiosity draws them to different locations.

Explaining Nanotechnology to the General Public with Waterloo Institute for Nanotechnology

PI: Dr. Lennart Nacke, Stratford School of Interaction Design and Business with Master's student Ekaterina Durmanova, SYDE, undergraduate students: Alice (Yiyang) Peng, Ally Suarez, Arnold Dian Abistado and WIN scientific team

What is nanotechnology and how does it help us everyday? Answers to these questions can be described using augmented reality and digital visualization tools. The Waterloo Institute for Nanotechnology and the Games Institute are collaborating to create such a digital platform online. The first featured "story" will describe how nanotechnology can help fight Covid-19 based on the research on DNA vaccine delivery conducted by WIN members Roderick Slavcev and Emmanuel Ho from the School of Pharmacy and Marc Aucoin from Chemical Engineering. WIN and the Games Institute students participated in the joint development of this interactive, educational platform, and hope to continue with other educational interest pieces in the future.

Illuminate with the Interdisciplinary Centre on Climate Change

PI: Dr. Neil Randall (English Language and Literature); Lillian Black, PhD student and Pamela Maria Schmidt, Master's alumna (English) and IC3 scientific team

The Interdisciplinary Centre for Climate Change (IC3) and the Games Institute partnered for a knowledge mobilization and translation project originally designed as part of "Alarm" an exhibit at Kitchener's THEMUSEUM. Focused on key climate change risk management concepts, adaptation and mitigation, the project created an interactive artefact that articulates the seriousness of climate change, without using alarmist rhetoric or jeopardizing the science, to create a hopeful, yet educational, experience for THEMUSEUM visitors. *Illuminate was* designed for touch-interfaces that could also be projected on a large screen so that those who did not actively participate in the artefact, could still engage with the story as it unfolds. The narrative of the artefact was also constructed as a choice and consequence simulation, that avoided a failure mechanic, so that participants could experiment with all adaptation and mitigation options and see which combination would be most effective to reach the Paris Climate Agreement's goal of avoiding a global temperature rise of 2 degrees Celsius. Given the disruptions caused by the COVID-19 pandemic, *Illuminate* will be launched by IC3's outreach partner, Protect Our Winters Canada (POW). POW helps to educate elementary and high school students on climate change, *Illuminate* will be a central tool in the new teachers' portal supporting their class curricula.

Knowledge Mobilization Consulting

In 2019, the Games Institute began providing Knowledge Mobilization (KM) and Knowledge Translation (KT) support and mentorship services to various Waterloo units. The most recent examples include: a Knowledge Translation workshop for graduate students participating in Velocity's Graduate Student Startup Fund; and the Games Institute – along 5G Sportsnet and Rogers – provided mentorship for Concept by Velocity's Hockeyhack competition. Similar mentorship was provided to the Stratford School of Interaction Design and Business students during the intensive educational event, StoryCamp.

Elsewhere, following the international success of the Games Institute Podcast, the Institute for Quantum Computing and the Faculty of Environment requested consultations with the podcast producers to discuss the potential for launching their own respective KM podcast initiatives.

Student Experience

The Games Institute is heavily invested in creating an exceptional student experience that provides our members with an interdisciplinary network and the skills necessary for future success. Specifically, the Institute fosters and emphasizes opportunities to explore different perspectives by providing an environment where knowledge from different fields is valued and links across disciplines are nurtured allowing for true interdisciplinary work. It is because of the nature of the Games Institute ecosystem that students from disparate disciplines are able to extend their respective spheres of knowledge to incorporate diverse perspectives. For example, students from engineering disciplines and the humanities often connect to discuss how specific concepts and methodologies work separately within their disciplines and, consequently, discover critical linkages. Having observed such interactions happen organically, the Games Institute now purposefully fosters these conversations through organized brown bag talks, panels and other events focused on sharing disciplinary knowledge to an interdisciplinary audience.

A key part of Games Institute's student experience is the opportunity to participate in research projects conducted in collaboration with industry, non-profit and government partners, as well as with other research centres on campus and externally. Games Institute faculty members have led several such collaborations for students in various programs and disciplines, which allows each student to extend their mentorship network.

Although the Games Institute does not have entrepreneurship in its mandate, the Institute is proud of two start-ups established by former Games Institute student members. John Harris (PhD, Computer Science) won a Velocity start-up award for work conducted at the Games Institute; the award allowed him to launch *Playful Pixel*, a company looking to deliver on innovative large-scale in-person social play experiences that combine mechanics of board games, video games and face-to-face role-playing games. AC Atienza (MA, English) co-founded *Cloudfall Studios*, a game development studio, whose first game has seen a successful Kickstarter campaign exceeding its funding goal by $10,000. Both start-ups benefited from Games Institute facilities and community for playtesting and launch events.

Games Institute Jams

Most of the Games Institute's student population is composed of graduate students. However, the Institute hosts the Waterloo Undergrad Game Dev Club. Meeting twice a week, the Proto/Play Nights are an opportunity for undergraduate students to interact with each other, the Games Institute community, and local game developers in a casual atmosphere. Students work on their projects, give and receive valuable play-testing feedback, learn new tools and techniques, discuss the state of the industry, and network with potential collaborators.

The meet-ups also serve as an excellent way to introduce students to Game Jam events: thrice-annual (one per semester), multi-day events hosted by the Games Institute on campus. Games Institute Jams participants gather to create original games over a weekend and include game-making hobbyists, Waterloo students and faculty, professionals from different a variety of fields (programming, art, music, design, writing, etc.), and the general public. These events are attended by 50-100 participants and

produce 10-30 games at each event. The events usually follow a LEARN-MAKE model where the first two days offers tutorials on a variety of game design and development topics, and the next two days are spent on the design process itself.

Games Institute Jams are organized by student members who take this opportunity to grow their skills in project and event management, community organization, fundraising and public speaking. They also serve as mentors for the Jam participants, and – often – find collaborators for their own research projects. On the other hand, students who participate in the Jams, can build their professional portfolios and network with representatives of game development companies who attend as sponsors and mentors.

Due to the COVID-19 pandemic, the S20 Games Institute Jam was the first to be run fully online. Spanning four days, 95 registered participants ranging in age from 10 to 50, and attending from around the world, created 25 new games. The event was run via online infrastructure built on the Games Institute's Discord server allowing participants to form teams and interact using the built-in audio, video and streaming functions. The S20 Jam brought together a more diverse audience of people who normally would not be able to attend due to reasons related to health, finances, distance, or unwillingness to participate in an in-person event.

Games Institute Janes

The Games Institute Janes (Games Institute Janes) is a community devoted to supporting people who identify as women, queer or non-binary, as well as their allies, who are interested in talking about, playing, and making games. Through social gaming nights, as well as workshops and discussion groups, this initiative was designed to raise the profile of women in gaming and to create a space that women feel a sense of ownership over and feel comfortable when playing and talking about games.

Selected Student Projects

Beam Me 'Round, Scotty!

Created by John Harris, PhD alum (Computer Science), supervised by Mark Hancock (MSCI) and Stacey Scott (SYDE)

To better study asymmetric co-operative play, PhD student John Harris developed a research prototype game called "Beam Me 'Round, Scotty!" that was awarded both the People's Choice and Judges' Choice awards at the CHI PLAY 2015 Student Game Design Competition. In the game, one player uses a dual-joystick gamepad to play the action-oriented role of the courageous space captain, Joanna T. Kirk, who must battle dangerous creatures while attempting to escape a hostile alien world. Simultaneously, a second player assumes the role of plucky engineer, Scotty, using a mouse and keyboard to play a more planning-focused strategy role. Still safe in orbit, Scotty players must use the ship's various special abilities such as heal beams, force fields, torpedoes, and teleportation to help Kirk reach safety. By designing specific challenges that deliberately tilt the direction and degree of interdependence between Kirk and Scotty players, the custom-built prototype game was used as a fine-grained, experimental tool to better understand how asymmetry and interdependence brings players together. A subsequent paper regarding studies performed on this game received an honourable mention (Top 5%) award at CHI 2019.

CHI PLAYGUE

Created by Gustavo F. Tondello, PhD alum (Computer Science) and Rina R. Wehbe, PhD candidate (Computer Sciences), supervised by Lennart Nacke (Stratford School of Interaction Design and Business)

Modern professional networking relies on social media. *CHI PLAYGUE*, a conference game, was designed to facilitate interaction among strangers and encourage social networking to create a community on social media platforms. The game integrates digital technology (mobile devices and large displays) within the space of a conference venue, combined with a mixed-reality narrative and people's social interactions to facilitate the emergence of social dynamics. By providing a platform for large-scale, playful interaction, the game creates an experience that fosters the development of mutually beneficial, personal, and professional relationships among players.

Gendered or neutral? Considering the language of HCI

Created by Cayley MacArthur, PhD candidate (MSCI), supervised by Mark Hancock (MSCI)

A lack of diversity in STEM fields has been a challenge in terms of recruitment, engagement, opportunity and equality spanning decades. It is not well understood how new technologies created by the human-computer interaction (HCI) community affect aspects such as empowerment, diversity, identity and equity in minority groups. Feminist theory suggests that the abstract, gender-neutral language used to talk about people in HCI would elicit imagery perceived to be male. Research suggests that the "people" words in HCI publications (user, participant, person, designer, researcher) all have a tendency to be perceived as male among a male audience, but females have a more balanced perception of "designer," "person," and "participant." Greater awareness and sensitivity are needed regarding potential bias implied by these terms that are not representative of the diverse community within and outside of HCI.

Hustle and Flow

Created by Steve Wilcox, PhD alum (English), Alexander Fleck, PhD candidate (English), supervised by Neil Randall (English)

Hustle and Flow is a multi-game project that models the simulation and negotiation of transboundary water governance of the St. Lawrence River Basin. The game is a simulation of the elements at play in the Basin aimed at policy development. The players take on the perspective of a stakeholder group and work together or against others to negotiate what policy decisions are best for the St. Lawrence Basin as a whole, while also balancing those wider needs against their (individual) stakeholder needs. *Hustle and Flow* was presented at the Institute of Public Administration of Canada (IPAC) conference in Toronto in June 2016 and was invited to the European Conference on Games-Based Learning in Paisley, Scotland in October 2016.

Kitchen Table

Created by Ryan Clement, PhD alum (English), supervised by Neil Randall (English)

Kitchen Table was designed as part of a larger allergy-related project to find new and innovative ways to increase overall empathy towards people with food allergies. A co-operative game built around family meal planning and dietary restrictions, the game challenges its players to work together to ensure there is enough food on the table for everyone to eat, while dealing with issues like cross-contamination and hidden allergens. With an estimated 2.5% of adults affected by food allergies—and 6-8% of children under the age of 31—there exists a substantial generational disconnect over the issue of food allergies and anaphylaxis. *Kitchen Table* aims to bring diverse groups of people together from within families, workplaces, schools, and other organizations—so that everyone can gain a better understanding of what life is like for a person with anaphylactic food allergies.

Places, Please!: Hamlet Edition

Created by Shawn DeSouza-Coehlo, Games Institute MA alum (English) and Jonathan Rodriguez Games Institute PhD alum (Computer Science), supervised by Neil Randall (English)

Places, Please!: Hamlet Edition is a 4-player cooperative, mobile game designed to simulate the acts of putting a theatrical production at the Stratford Festival of Canada. This game finds its foundations in the 2015 production of William Shakespeare's Hamlet, presented at the Stratford Festival. Within the framework of this production, four players take on the roles each of the four production departments (Acting, Crew, Stage Management, and Tech). All departments must work together to perform simulated versions of the real life, individual, and collaborative duties required of them to ensure the smooth running of the show. The game is unique in that the focus is not on these tasks, but on the complex modes of interaction required between departments in their completion. The game was aimed at increasing existing and potential audience engagement for the Stratford Festival through a game that teaches specific elements of theatre literacy. The game was presented at the 2015 Waterloo Innovation Summit.

Pirate Bri's Grocery Adventure

Funded by NSERC; PI: Jim Wallace (School of Public Health and Health Systems), created by Marcela Bonfim, PhD candidate (School of Public Health and Health Systems)

Pirate Bri's Grocery Adventure (PBGA) is a gameful mobile app designed to improve student's Food Literacy through a situated learning approach to grocery shopping. It combines in-game experiences with the real-life activities of planning at home and selecting foods at the grocery store. PBGA is grounded in Self-Determination Theory (SDT), supporting the psychological needs of competence, autonomy, and relatedness to motivate self-efficacy for long-term healthy behaviour change. Brigitte, the pirate nutritionist, encourages players to fill their shopping cart with foods that bring balance, variety, and moderation. She provides meaningful information about foods to support informed decision-making. Unlike many apps, PBGA accounts for important nutrients as well as food group proportions (instead of a simple calorie-based count), based on each player's health needs.

Reading Garden

Created by Diane Watson, PhD candidate (Computer Science), supervised by Mark Hancock (MSCI)

Reading Garden is a causal game designed to motivate university students through the long-term motivational problem of reading a course textbook over a semester. In *Reading Garden*, players grow gardens to level up. Advanced gameplay mechanics are unlocked with a special in-game currency. Players earn this currency by answering a short comprehension quiz based on the assigned readings from the textbook. Results from two semester-long studies show that participating in simple cooperative social play in the games motivated players to personally read more of the textbook, while competing using the leaderboards did not. Hence, cooperation may be more motivating than competition when applied to long-term motivational problems.

Rival Books of Aster

Created by Adam Bradley, postdoctoral fellow (English); Jonathan Rodriguez, PhD alum (Computer Science), Kent Aardse, PhD alum (English), supervised by Chrysanne DiMarco (Computer Science) and Neil Randall (English)

Rival Books of Aster is a one or two-player mobile collectible-card strategy game that draws on theories of story and myth creation, as well as artificial intelligence research. Players collect cards to create hexes while contributing to the ongoing unveiling of the mythology in the game. There are over 140 hand

illustrated spells that players can use to build custom decks and go head to head against other players. Each spell is also a page in a living story book that translates itself and reveals its secrets as the game is played. Story arcs and plot points are decided by player actions in-game. In essence, players of the game are dynamically being written into the mythology of the game as they play. The game was commercially developed by Stitch Media Inc. and was released on the iOS App Store and online gaming platform Steam.

The Pantheon of Dream

Created by Amber O'Brien, MA alumna (English), supervised by Neil Randall (English)

The Pantheon of Dream is a digital/physical hybrid role-playing board game that encourages 2-4 players to work collaboratively to craft their own heroic stories each time they play the game. It consists of both a 3D printed game board that the players build as they play the game as well as a digital component that influences how they construct it. The goal of the game is to complete one of many quests by laying paths to certain locations. As they carry out these quests, players cross paths with creatures, delve into dungeons, and pick up items that will affect their journeys. *The Pantheon of Dream* was developed to explore the relationship between two types of narrative: embedded narrative and emergent narrative, in order to explore if doing so increases player immersion.

The PoeTree

Created by Shawn DeSouza-Coehlo, MA alum (English), supervised by Neil Randall (English)

The PoeTree is built on the principle that community is the answer. First planted in Trinity Bellwoods Park in Toronto in 2017, *The PoeTree* is the first step in a multi-year plan to foster community engagement. The interactive installation consists of a large plastic and metallic tree possessing 130 branches made of steel wire. At the end of each branch is an alligator clip, and within the jaws of each clip is a single slip of paper containing a poem. Passers-by are able to take a poem from the tree at any time they wish; a nearby sign invites community members to interact with the tree and leave their own poems for others to take. This simple exchange between strangers, anonymous if they wish to be, is a way to know and understand one another through written word.

Future Directions

Looking forward to the next five years for the Games Institute, this section outlines the ways in which the Games Institute evaluates the work of its members throughout the research process—valuing quite equally all stages of the research process from idea generation through the workings of the research group through the writing of grant applications through research outputs both academic and non-academic. This is how research that spans disciplines needs to be conducted, especially disciplines with very different systems of recognition and reward. No part of this process denies traditional academic outputs; instead, it places these outputs in the context of all other process stages.

The Network for the Virtual Future

The Network for the Virtual Future is a major expansion of the Games Institute set to begin officially in early 2021. COVID-19 has demanded a rethinking of how we live and work and tirtual and remote technologies are now, and will be well into the future, cenrol to a wide range of new modes of engagement. We are already experiencing the first several of these engagements, ranging from virtual meetings and virtual offices to remote classes and virtual consultations with medical professionals. These are merely starting points and they have immediately demonstrated both the strengths and the limitations of current technologies and how we use them. It is very clear that current technologies need to improve and that new technologies need to come into play, and that these must be designed and implemented according to the needs of the human activities that they will support. Virtual experiences can succeed, but only if they are first and foremost human experiences.

This new network gathers expertise from across the University of Waterloo, Canada, and around the globe to understand, conceptualize, and create the virtual and remote technologies and experiences that will permeate our lives from this year forward. The Network for the Virtual Future exists to initiate the extensive conversations surrounding existing and anticipated virtual experiences and the technological innovations and advancements necessary to render these experiences successful.

The Network for the Virtual Future requires ongoing and sustained input from all fields of research that impact the design, use, and effects of virtual technologies on human experience. Indeed, the central concept is that all related technologies must be understood culturally, psychologically, sociologically, and philosophically, in addition to the scientific and technological understanding needed for them to exist. The Network will launch as part of the Games Institute because of the focus of researchers within the Games Institute on virtual technologies, media, and experiences, across the disciplines and encompassing numerous activities.

Network for the Virtual Future Mandate and Partnership Requirements

The Network for the Virtual Future is a research and innovation ecosystem: numerous fields of focus combining in a collaborative, transdisciplinary environment to solve problems and initiate ideas. It draws together academic, industry, government, and community leaders to engage with the issues at hand and provide the multiple perspectives necessary to achieve effective and positive societal impact. To this end, the ecosystem is committed to critical thinking and assessment, as well as responsible innovation and design.

The overarching mission of the Network for the Virtual Future is to explore, assess, anticipate, and create the virtual technologies and experiences that we will experience over the next decades. Its initial mandate is to:

- Gain a full understanding of current and emerging technologies/experiences;
- Envision and articulate what the virtual future will entail and how it will affect us;
- Establish the structures under which research, design, implementation, and assessment of emerging and new virtual technologies can most usefully occur.

This mandate requires the establishment of the following key components:

- Partnerships with industry, non-profit, government, and community organizations
- Research across multiple focus areas
- Research across multiple technologies
- Courses and programs for university and lifelong learning purposes
- Entrepreneurial and innovation system to implement and expand the work of the ecosystem
- Funding system consisting of multiple sources and mechanisms for financial sustainability

Network for the Virtual Future Focus Areas

The Network for the Virtual Future must be constantly open to welcoming new ideas and new fields of expertise. Research into the remotely experienced virtual world has been ongoing for years, but the COVID-19 situation has brought into focus the need for a vision for this world and how it will and can impact numerous sectors. The Network for the Virtual Future will cover the following focus areas:

- Virtual health
- Virtual work
- Virtual learning
- Virtual business/commerce
- Virtual travel/tourism
- Virtual politics
- Virtual entertainment
- Virtual assemblies

Within each of these areas lies a large array of associated topics for which research and innovation are needed. For example, virtual health ranges from remote and virtual consultations with doctors and mental health professionals through virtual reality training for surgeons, rehabilitation programs, and personally directed behaviour for health improvement. Virtual education includes both formal education and self-directed exploration of complex topics in all fields.

Games Institute Research Clusters in the Next Five Years

Game and Interactive Media Studies

This cluster looks to examine an increasing range of issues surrounding art, culture, and human behaviour. Game studies has developed a strong and continuing interest in the design and study of games according to the changing perspectives about gender identity, racial equity, indigenous cultures, and more such issues: the field will see an increase in these concerns, as well as the methods of studying them and designing them. Game studies has also developed rich connections with narrative, rhetoric, philosophy, and history, as well as, especially in the study of human behaviour, psychology and sociology. These interests are also permeating other fields of interactive immersive media, as the artifacts and experiences are increasingly studied in conjunction with other forms of artistic and cultural artifacts.

The next five years will see an increase in these kinds of studies, particularly as the design of games and experiences, especially as the game and VR/AR industries, where games takes years to make, catches up to the sociocultural issues now under the game studies microscope. Masters and PhD theses are already fully engaged with these ideas, usually in the form of (often harsh) critique, and as games and media appear that embrace or reject the issues under discussion, the field will grow to accommodate. It's also anticipated that a strong increase in interest from the fields of sociology and psychology: sociology as it studies the constantly growing fields of online communities and psychology as it explores the impact of game issues on human behaviour and the cognitive processes of experiencing simulations, etc.

Game and Interaction Science

The HCI group at the Games Institute has undetaken a wide variety of research projects with the Games Institute's interdisciplinary orientation and the opportunities afforded for collaboration. The group has published in top HCI venues including CHI, CHIPLAY, and CSCW. This year, because of the lower cost of attendance due to its remote format, the Games Institute was able to offer sponsored registrations to the CHIPLAY conference for students outside of HCI to encourage further exposure and cross-pollination.

The arrival of new students and faculty brings new perspectives and ideas, paired with ongoing active participation in the wider research community—the combination of these things informs the vision for upcoming research directions. HCI researchers in the Games Institute are working on topics such as:

- Accessibility, in all its forms. *For example*... In order to make games more accessible for everyone, games user researchers need to be able to playtest with disabled players. However, coming into a game studio to playtest is in itself not an accessible experience. To address this, we need to understand how to conduct remote playtests that balance the rigour and depth of an in-person experience, the ecological validity of someone playing where they are most comfortable (in their home), and that both are respectful and ethical in making sure that each player gets to meaningfully contribute from their own unique standpoint.
- Supporting the future of work *and* play. *For example*... Increasing numbers of people are adopting a nomadic lifestyle as a choice rather than as a result of hardship. Searching for #vanlife on YouTube returns thousands of results of people across the world sharing a sneak peek inside their converted vans and trailers. A shift in attitudes towards remote work has allowed this movement to take off, and it is accelerating. Still, the technologies built today are heavily biased towards traditional ideas of what a "home" is, even though that very definition is evolving. In particular, while laptops are more portable than ever and wifi is pervasive, this only supports one part of a vanlifer's lifestyle: work. Fieldwork done by Games Institute researchers across North America has shown that such a focus on productivity has come at the expense of the other technologies that we take for granted in our daily lives which support social, and playful, experiences. This disadvantages these remote workers by denying them the same opportunities for making connections in their own communities that are available to people in traditional static housing situations. Researchers on this project are exploring play experiences as well as pushing the boundaries of hardware with their investigation of what it would look like to, for example, take your shelf full of board games on the road using only one modular device.
- Weeding out the bias built into new gaming technologies. *For example*... Modern virtual reality (VR) technology is built using data that is not representative of the people who will use it. This data has become baked into design standards, such as the assumptions we make about interpupillary distance (based on army data), the dimensions of someone's head (many Black women cannot wear the "adjustable" headsets because they do not accommodate their hair), or what we think we know

about cybersickness, the pervasive affliction causing nausea and disorientation disproportionately among women, and even moreso among women of colour (the instrument we use to measure cybersickness was developed on an entirely male, mostly white population). Games Institute researchers found during a systematic review that these "standards" are often used without question in VR projects, some studies even recruiting all white male participants *because* they knew that not all people would be affected in the same way. By exposing this pattern of systematic exclusion, many concepts at the foundation of what we think we know about VR are shown to not actually be generalizable. Games Institute researchers are working towards raising awareness within the HCI community about this issue to ensure that the continued erasure of diverse experiences comes to an end and that VR technologies can be built for everyone.

Interactive Media for Understanding

The central question underlying this research cluster is: Do games teach? And, if they do, do they teach well? Anecdotal responses to this question affirm that teaching does indeed occur, and often, according to the people responding, very well. But actual evidence suggests significant uncertainty about the issue, and the next years of work in this cluster will focus more directly on determining the value of games from this perspective. The same holds for interactive immersive media of other kinds. While we know that non-interactive media such as art and film can teach, if designed to so, it is unclear what the interactive elements of VR and AR, for example, bring to the table.

Research at the Games Institute, drawing in experts from the fields of learning, will explore this topic. But the research cluster itself as a design cluster will most definitely increase in activity because emerging technologies offer increasing opportunities for innovations in helping people understand. As the topics we encounter in our daily lives, from politics to science to health, become increasingly complex, people need multiple ways of engaging with the issues under examination. Furthermore, as the generations of screen users continues to become dominant, using the screens for purposes beyond entertainment will become a desire of parents, teachers, and policymakers. This research cluster exists to tackle such issues.

Interactive Media for Health

This new cluster has begun forming and is already part of all of the other three clusters. However, a focus on games and interactive immersive media for the purposes of understanding and ameliorating issues of physical and mental health will become, in the next five years, a significant focus for the Games Institute. This is especially true for the Games Institute as its collaborations with researchers in the Faculty of Health.

Interdisciplinarity and Transdisciplinarity

The Games Institute's focus on strong interdisciplinarity will intensify over the next five years. The principle is that games and interactive immersive media and technologies not only benefit from, but also requires active and sustained input from researchers across disciplines, faculties, funding bodies, and even economic sectors. The richness of an experience in a game or a virtual reality interaction comes from the interplay between the technology, the medium, and the artform, and understanding that interaction demands contributions from disciplines as varied as engineering, the humanities, computer science, the social sciences, and more. These technologies and experiences succeed through strong user engagement, and this engagement is only now becoming understood in the academy and in industry. The Games Institute aims to help guide this future.

The Games Institute's interdisciplinarity mandate operates from the following points:

- Interdisciplinarity lies at the heart of Waterloo's Strategic Plan and the Games Institute's concentration on interdisciplinarity acknowledges and supports this goal;
- Tri-Agency funding has moved substantially in the direction of interdisciplinary and inter-agency support. Games Institute faculty members have proposed multiple NFRF and Waterloo Trailblazer grants, and a proposal for a Transformation grant is expected in 2021 or 2022. In addition, Games Institute faculty members look to NSERC Alliance and SSHRC Partnership grants as a way to fund strong interdisciplinarity;
- The Games Institute was founded by an interdisciplinary, interfaculty team and set as its initial mandate the fostering and rewarding of interdisciplinary and interfaculty research from faculty, students and partners (academic, industry, government, non-profit). The Games Institute acquired space on campus primarily to achieve this stated goal, with students working together in the space on the basis of "day-to-day interdisciplinarity."
- The post-COVID world demands solutions to broad societal questions and these can only happen through interdisciplinary and intersectoral research. The Network for the Virtual Future recognizes this need and exists to foster it in order to find such solutions. So, too, does research and design within all aspects of interactive immersive technologies and media within the Games Institute.
- As a University Research Institute, the Games Institute is already committed to interdisciplinarity, and as the centres and institutes increase their levels of collaboration, the Games Institute will commit even further.

The Games Institute membership understands the importance of disciplinary excellence and the weight departments and Faculties give to traditional means of measuring academic success. But, given the importance of the contributions of multiple traditional disciplines to the research fields of interactive immersive media, many of members see transdisciplinarity as a major goal for the future of games-related research and for the training of students. It's recognized that increasing numbers of students will not set as their goal the acquisition of a career as a professor, either because of the lack of academic jobs or, in most cases, because more interesting and fulfilling opportunities exist outside academe. Transdisciplinary training will suit these HQP well, and the Games Institute seeks to provide such training. Furthermore, the future of interactive immersive media, lies in convergence, in technical, academic, and professional ways, and convergence relies on transdisciplinary thinking and collaborations to create innovation and invention.

Assessing Research Excellence in an Interdisciplinary Ecosystem

The interdisciplinary nature of the Games Institute research ecosystem presents numerous opportunities for innovative and unique activities. However, it also creates challenges pertaining to the presentation of a significant portion of Games Institute's activities in a way that gives them justice given the vastly different expectations of various scholarly disciplines.

First, humanities-driven research does not rely on bibliometrics. Hence, any citation-based system of academic distinction is not relevant to half of what the Games Institute does. We have a number of researchers who have received awards of recognition in their respective fields or are, indeed, leaders in their fields. However, there is not a catch-all term that can capture what Games Institute's interdisciplinary research ecosystem does; 'game studies' is a very specific field in the humanities, 'game science' does not exist as a recognized academic discipline, and games and interactive media are often seen as tools rather than the subject of study. Hence, citing any official rankings that are focused on

narrowly-defined domain-specific distinctions to show Games Institute's successes is less than ideal. That is, as anyone who has ever engaged in interdisciplinary research realizes, a significant challenge to how our work may be viewed and evaluated. Standard numerical/ranking systems cannot be directly applied to a majority of Games Institute's activities.

Second, authorship of publications differs significantly between disciplines: in the humanities, solo-authorship is preferred, supervisors are not credited for their mentorship with their name being added to publications, and graduate students are often discouraged from publishing during their programs to ensure only original research is included in their dissertations. On the other hand, in engineering or health sciences, publications always denote multiple co-authors, supervisors are always listed on publications, and graduate students usually publish their research over the course of their programs and their dissertations often include previously-published research as chapters or parts thereof. Moreover, conference proceedings count as refereed publications in engineering or computer science whereas only journals and book chapters are counted as peer-reviewed publications for scholars in the humanities and conference presentations bear little consequence.

Research creation is another case in point about the challenges of rewarding interdisciplinary work. Research creation specifically allows for the creation of works of art to be counted as valid academic research output. What this means in practice is that researchers heavily engaged in participatory research creation, may be less involved in areas conducive to traditional bibliometric assessment. Misinterpretation of what is and isn't valid research output led to instances where Games Institute humanities scholars were removed from project teams because their work expressed via research creation artefacts did not satisfy the assumed value of a formal refereed publication.

Elsewhere, research and collaboration with external partners is quite common in disciplines where industry-sponsored research is actively sought by faculty members. In contrast, most research in the humanities is either un-funded or relies on funding from government programs and students may not ever have an opportunity to work with partners from outside of the academy which limits the opportunities for training and professional networking.

Vast differences also exist in how different disciplinary environments understand supervision of students, funding of students, publication credits, etc. For example, Arts students are normally funded by their departments from Provincial funding whereas supervisors of students in STEM-driven disciplines are obligated to secure the majority of their students' funding. (Not to mention that standard Arts funding for graduate students is prorated to 14 weeks per semester as compared to students in STEM disciplines whose funding is based on 16 weeks.) This, consequently, creates differences in how students are supervised and how they interact with their colleagues. STEM disciplines favour lab-like structures where students working with the same supervisor form close-knit groups working very closely together, often participating in weekly meetings to report on their progress. In Arts, supervisors oversee the work of their students on a more individual basis, lab-like structures are not very common, and students usually conduct their work much more independently than their colleagues in technical disciplines with much less frequent collaboration with their peers.

Exchange of knowledge between disparate fields is also problematic due to misunderstandings of research methods or lack of appreciation of non-applied research. For example, the Games Institute has seen conversations where humanities students were made to defend their research methods because those did not follow the scientific method in STEM fields. Indeed, creating a truly interdisciplinary

research environment requires a tremendous amount of work to create a commonality of language to bring together researchers whose experience with working outside their immediate domain is limited. As is common in interdisciplinary settings, joint work on projects running across disciplines also requires very deliberate planning to ensure that research team members contribute to their fullest capacity and are not relegated to low-level support tasks, such as editing of documents for English students or website programming for computer scientists. Similarly, members of interdisciplinary teams must often find a balance between short-term efficiencies and long-term collaboration, such as, carving out specific tasks to individuals based on their immediate expertise vs. creating an environment where everyone involved is continually expanding their field of expertise based on contributions from others.

In some cases, the subject matter of the project itself requires a more deliberately interdisciplinary project design. A case in point here is the Digital Oral Histories for Reconciliation (DOHR) Project. Funded by SSHRC and supported by the Games Institute, DOHR is a restorative justice project led by Principal Investigator Dr. Kristina Llewellyn (Social Development Studies) featuring a Virtual Reality (VR) experience that takes students into a digitally rendered representation of the Nova Scotia Home for Colored Children as a part of a grade 11 Canadian History unit as they learn the history of the Nova Scotia Home for Colored Children, including the harms of institutional racism for the Home's former residents over its 80s years of operations. Considering the supremely important and sensitive subject matter undertaken by this project, DOHR's multidisciplinary, UW-based VR design team worked with former residents of the home, Tony Smith, Gerry Morrison and Tracy Dorrington-Skinner, as well as with community partners and other academics across Canada to ensure that the VR experience and accompanying 2-week history curriculum unit worked towards restorative justice for the former residents. Victims of Institutional Child Exploitation Society, the Nova Scotia Home for Colored Children Restorative Inquiry, educators, software developers, theater experts, HCI scholars, historians, and legal experts worked collaboratively throughout the development of DOHR. In this case, it would have been highly inappropriate to situate DOHR's project work in the research context based on the methodologies and assumptions of the dominant, white culture which created the environment of oppression the former residents of the home had to endure. Instead, the team needed to find a different approach bridging the disparate disciplines and thus allowing for a far richer experience for everyone involved and a successful pilot product which garnered the attention of national and international media. The DOHR team is currently working on the next phase of the project and are in the process of drafting a book on interdisciplinary collaboration.

The aforementioned examples of differences in approaches and systems of academic rewards across disciplines show how much complexity and flexibility is required in an interdisciplinary research ecosystem. It is often exceedingly difficult to ensure that members of interdisciplinary research groups or projects can fully reap the benefits of collaboration across disciplinary boundaries while satisfying the requirements of their specific programs/disciplines.

From its very inception, the Games Institute's goal was to offer a different value in scholarship where academic knowledge is intertwined with life experiences and wisdom. In contrast but – importantly – not in opposition to the more traditional metric-based approach present in disciplinary scholarship, the Games Institute exists to foster researchers and research processes and to enhance researchers' lived experiences. The Institute provides an environment where people want to be and where they are constantly encouraged to expand their understanding of research and engage in collaborations beyond traditional areas of academic specialization. Therefore, finding innovative ways of reporting on their

activities that would fully project the benefits of such an integrated, multi- and interdisciplinary scholarship is key and must go beyond traditional KPIs based on bibliometrics.

In consultation with Office of Research, and drawing from the principles and practices of various organizations, the Games Institute is developing a holistic approach to its research. For this purpose, "holistic" refers to the entire research process, from the earliest discovery of the idea(s) through various forms of making the research known, having it applied, and understanding its professional, social, and/or cultural impact. This approach values the different stages of the research process, with each stage carrying a process and outcome of its own. For example, the Games Institute places high value in idea collaboration, especially but not exclusively for interdisciplinary projects, in which the researchers' efforts to incorporate each other's methods and comprehensions – and in fact their often different intended modes of dissemination – become intertwined to create new combined knowledge.

In this way, the Games Institute can encourage its members to not only to bring multiple academic perspectives to bear on a project or research question – the usual goal of *multidisciplinary* research – and not only to connect those multiple perspectives in what is known as *interdisciplinary* research – but, where appropriate for the idea in question, to strive for *transdisciplinary* understanding, in which the disparate research perspectives – including extra-academic perspectives – are blended into new knowledge.

The challenge for a research institute in fostering transdisciplinary research processes is to ensure that the results are rewarded. This cannot be done by the institute alone; it requires collaboration and negotiation with the university faculties and departments, and with the established disciplines that are being combined. The potential for this holistic approach exists in the current research funding climate, particularly with the New Frontiers in Research Fund but also, to a degree, within the individual Tri-Agency programs and with funding bodies such as Mitacs.

None of this, it must be stated, is to diminish the value of single-disciplinary research, at which many Games Institute researchers thrive. But the Games Institute has carefully and consistently developed as a place for thinking outside the box for the sake of understanding, developing, and designing technologies and media that are by their very nature transdisciplinary, and over the next five years we will work to ensure that these disruptive and innovative perspectives are rewarded at all stages.

Over the next five years, the Games Institute aims to achieve the following:

1. Accurately capture the interdisciplinary and transdisciplinary processes of Games Institute collaborations, experimentations, and innovations. Capturing this data means determining milestones of the research, collecting research reflections on the stages, outlining the student experiences throughout the process, highlighting the funding inputs, and chronicling the various research outputs, from conference talks and journal articles through news stories, interviews, writings in middle-stage publications, and more.
2. Demonstrate how the Games Institute advances co-production of knowledges that are interdisciplinary, transdisciplinary, and multi-institutional in nature, and which create impact in the academy and beyond. Demonstrating this means understanding the various forms that impact takes and articulating this information so that it can be tied to the specific research projects and programs. It also means working with academic and extra-university collaborators and partners to understand how the Games Institute's research has changed the understanding of the topic(s) under discussion.

3. Establish and support research networks, small and large, which the Games Institute initiates or in which the Gi participates, with the goal of having these networks foster inter- and transdisciplinary research and become sources of knowledge-making and research funding, and which will become sources of academic and extra-academic employment for our students.

Equity, Diversity, and Inclusion

Since acquiring its physical space in 2014, the Games Institute has focused the attention of its students, staff, and faculty on issues surrounding equity, diversity, and inclusion. The goal from the beginning was to create a safe, diverse and inclusive space for all, especially the disenfranchised, treating with respect and support the cultures and life experiences the members of the Games Institute community represented.

From 2014-17, much of this support was initiated in order to combat the toxic masculinity and blatant misogyny of the games-specific phenomenon known as GamerGate, and during this time policies, procedures, and practices were developed to help keep our members safe and to educate those who needed context and awareness. In practice, this included designated women/non-binary-only events at the Games Institute, onboarding of new members with a particular focus on an inter-disciplinary nature of the Games Institute and how inclusivity and diversity bring new value to our activities, providing feminine care products in washrooms, mandatory training for all administrative Games Institute staff within the realm of EDI matters (OHD's Principles of Inclusivity Series, HREI's courses on unconscious biases, Equity Office's Making Spaces program, etc.), as well as education related to excellence in service and support (responding to sexual violence disclosures, suicide prevention, mental health resources and awareness, accessibility in communications, etc.).

Since that time, an even stronger focus on issues surrounding EDI, de-colonization, and racial equity, encouraging research, events, and other forms of participation has developed in these highly important areas. This includes: additional support for research activities in these areas (First Person Scholar Special Issues), additional staff training regarding decolonization and reconciliation processes, active cross-promotion of events/activities focused on these matters from elsewhere on campus, amplification of resources, experiences and knowledge coming from marginalized communities. The Games Institute's public events, research communications, and other activities are always considered from the point of view of representation and have been honoured to be able to welcome speakers and experts with very diverse backgrounds.

In 2020, a new committee was formed in the Games Institute, called the Anti-Racism, Decolonization, Equity, Diversity, and Inclusion Working Group whose mandate is to establish policies, practices, and education for Games Institute members, associates, partners, and colleagues. It has become immediately apparent that – as far as these matters are concerned – a deeper engagement and more meaningful, nuanced approach is needed and that the Games Institute is not immune to the constraints caused by the recognized poor performance of the University as a whole.

The Working Group is currently in discussions on how to address these constraints going forward. For example, while Games Institute's student representatives in the Working Group are a diverse group encompassing individuals with different racial and cultural backgrounds, gender identities, etc., there is a severe over-representation of white, cis-gendered and male perspectives at the faculty level. Naturally, those with academic seniority and access to important University administrative structures

bring unquestionable value to the work of the Group, however, the Working Group intends to have its voting process be structured so that no majority vote can be carried without the support of a majority of racialized members to prioritize the knowledge, experiences, and needs of the marginalized voices. Similarly, Games Institute administrative leadership (two white, cis-gendered, men and one white, cis-gendered woman, all from Settler communities) participates in the Working Group only as non-voting, ex-officio members. The Working Group is also currently considering the development of a meaningful action plan with short-, medium-, and long-term actions along with an assessment rubric of their impacts in terms of representation, resource distribution, and Games Institute culture. The expectation is that that the Games Institute community as a whole will participate in the implementation and assessment of any future actions.

The Working Group is Games Institute's major initiative in the areas of EDI, anti-racism and decolonization; however, the Games Institute administration has also committed to making changes to our space in East Campus 1 to make it ever more welcoming. The Games Institute facility has been designed to be a friendly, collaborative and engaging space allowing for free interactions between members. However, we recognize that individuals from racialized and Indigenous communities have additional needs where physical work and collaboration environment is considered. In particular, the Games Institute is planning to undergo a space audit to enable Indigenous smudging ceremonies to take place in our facility as well as to further augment the Games Institute space to more wholesomely support the well-being of our members and guests who have children, who live with disabilities, or whose needs our current facility design does not take into account.

Financials

Games Institute Income and Expenses 2015/16 to 2019/20

Established in 2010 as an Arts-based institute, the Games Institute became a University-level institute in 2017. The designation change included an initial two-year financial commitment from the Provost of $250,000/year in operating budget (fiscal years 2017-18 and 2018-19). That budget allocation was then increased in the 2019-2020 fiscal year to $350,000/year to bring the Games Institute into alignment with other University Research Centres' funding.

The Games Institute takes a conservative approach to its financial standing as significant growth was projected post securing University Research Centre status. As such, the Games Institute is currently carrying a carry-forward totalling $251,690 at the end of April 2020. It is expected that the carry-forward will be fully expended in the next three years with projected faculty membership growth and other initiatives.

Category	2015-16	2016-17	2017-2018	2018-2019	2019-2020
Base Funding	$ -	$ -	$ 245,456	$ 250,000	$ 350,000
Salary Expenses	$ -	$ -	$ 75,761	$ 164,369	$ 250,061
Office Expenses	$ -	$ -	$ 4,713	$ 10,096	$ 37,506
Program Expenses	$ -	$ -	$ 2,994	$ 21,711	$ 28,318
Total Expenses	**$ -**	**$ -**	**$ 83,468**	**$ 196,176**	**$ 315,885**
Carry-forward	*$ -*	*$ -*		*$ 161,988*	*$ 215,812**

Figure 9: Games Institute Financial Overview FY2015-2016 to FY2019-2020

**actual carry forward figures provided by Finance.*

The Games Institute expenditures fall under three main categories: staff salaries; office expenses; and program expenses (including travel).

- **Staff salaries** include the Associate Director, Strategic Planning and Administration (1 FTE, acting as Managing Director), staff contract positions (such as the Research Communications Officer and Research Projects Facilitator), part-time or casual employees, and co-op placements. Neither the Executive nor the Associate Director receive research stipends, however, the Games Institute funds one course buyout per year for the Executive Director ($10,000) from its operating budget.

  In response to the growth of the Institute and the increased need for administrative support, the Games Institute team has steadily grown to now include: Research Project Facilitator/Project Coordinator and Research Communications Officer. Other staff roles include IT and lab support funded via a shared services model and charged to a combination of research grants held by Games Institute faculty members. Additionally, the Games Institute has employed at least three co-op students per year since 2015 in positions ranging from operations, events and communications assistance to additional research support for joint interdisciplinary activities.

- **Office expenses** include a diverse range of charges that are directly related to Games Institute operations, including supplies, telephone, printing, promotion and advertising, subscriptions to online services and office equipment purchases. Included in this category is the continual improvement of the Games Institute space in East Campus 1. Effective and collaborative space is critical in the ongoing support of our interdisciplinary ecosystem, including fulfilling any space needs related to matters of equity, diversity, and inclusion. With COVID-19 health and safety regulations brought forth by the pandemic, further changes to the space were necessary to ensure any hinderance of the cooperative nature of the Games Institute environment is as limited as possible.

- **Program expenses** include editorial and administrative support for First Person Scholar (FPS), contributor honouraria and travel and hospitality costs for meetings, guest lecturers and members.

Five-Year Financial Forecast

Over the next five years, the Games Institute plans to see significant growth in membership, research endeavours and impact. The five-year financial forecast is outlined below with consistent base funding over the next five years.

Category	2020-21	2021-22	2022-23	2023-24	2024-25
Base Funding	$350,000	$350,000	$350,000	$350,000	$350,000
Salary Expenses	$295,000	$315,650	$325,120	$334,873	$344,919
Office Expenses	$25,000	$25,000	$25,000	$25,000	$25,000
Program Expenses	$100,000	$70,000	$30,000	$30,000	$30,000
Total Expenses	**$420,000**	**$410,650**	**$380,120**	**$389,873**	**$399,919**
Carry-forward	$251,690	$181,690	$121,040	$90,921	$51,048
Total Income	$601,690	$531,690	$471,040	$440,921	$401,048
Income less Expenses	**$181,690**	**$121,040**	**$90,921**	**$51,048**	**$1,129**

Figure 10: Games Institute Funding Projections FY2020-2021 to FY2020-2025

As detailed earlier, the carry-forward that has been accumulated over the last three years will be expended into our program funding. Specifically, the Games Institutes plans to start a seed-funding program for interdisciplinary projects led by current (and potential) Games Institute members. This seed-funding program will run in 2020-21 and 2021-22 fiscals at $70,000 and $35,000, respectively. A seed-funding program is a worthwhile investment to support recruitment of new Games Institute faculty members, provide additional training of HQP, increase the number of publications and other research outputs, encourage more leveraging of funding and assist Games Institute researchers in exploring innovative research directions prior to putting forward grant proposal to external funding institutions and their established funding programs. Importantly, the seed program will also provide an opportunity to support and strengthen Games Institute-led initiatives related to matters surrounding equity, diversity and inclusion on research processes and academia more generally.

With increases in membership and partnership activity, it is projected that staff salaries will increase by 26% in 2021-22 fiscal with the addition of a Managing Director position and additional course buy-outs for the Executive Director. Following that, salary growth is projected at 3% to accommodate staff salary increases year-over-year and any additional casual labour.

The Games Institute does not receive a correction to its base funding pertaining to the accumulative value of annual staff increases. Hence, assuming that other expenses remain at a comparable level to those in 2019-20 – which will, necessarily, limit the growth of services provided to our membership – the rest of the carry-forward will cover an anticipated structural deficit caused by increase in staff salaries.

Additionally, the Games Institute's supplementary funding has thus far remained limited due to a relatively low number of industry-sponsored research contracts received and the fact that most members' grants are held under individual PI's names their home departments instead of, centrally, under a Games Institute org unit. Hence, the corresponding overhead is kept in the respective Faculties. Given the growing interdisciplinary research activities supported by the Games Institute, as well as sponsored projects currently underway or in negotiation, it is expected that the Institute will be able to secure supplementary income from member grants/contracts to cover a portion of the administrative support costs.

Games Institute leadership is also reassessing its current system of service provision with the goal of offsetting a portion of staff salary cost via a shared services model. This will include funding salaries of Games Institute administrative staff through research projects led by Games Institute faculty members. This could not only partially support the salaries of both our existing Research Project Facilitator and Research Communications Officer, but it would also enable the Games Institute to hire a knowledge mobilization specialist to respond to the ever-more important knowledge mobilization component now routinely required in most project proposals. The Games Institute has also seen a high demand for additional project coordination and management services; supplementary staff hired and overseen by the Games Institute would help alleviate a significant administrative burden our faculty members often shoulder when engaged in interdisciplinary projects with complex funding and reporting structures.

In 2019-20 fiscal, the Games Institute was able to engage, on a temporary, part-time basis, a research engineer who provided much needed mentorship and training to Games Institute student members whose work requires designing and building of game and interactive media prototypes. The preliminary results of having such support available on the Games Institute premises were very promising and pointed to shorter development times for research prototypes and, hence, faster progress of associated research projects. We have also noticed an increased interest in students considering the pursuit of entrepreneurial goals.

The growing appetite for more centralized support and further expansion of support services is an indication of how much value Games Institute's interdisciplinary ecosystem provides to our membership.

APPENDICES

SGRC Secretary Note 1 March 2021: Appendix 1-6 found at this link

Appendix 7. Support Letters

November 23, 2020

Professor Charmaine Dean
Vice-President Research and International
Co-Chair, Senate Graduate and Research Council

Dear Professor Dean,

On behalf of the Faculty of Arts, I am writing to express my strongest support for the renewal of the Games Institute (GI) funding for an additional five-year period. The Institute is a glowing example of Arts-led interdisciplinarity, bringing together researchers from Arts, Engineering, Health, Math. The scholarly pursuits of the Institute resonate with the 2020-25 Strategic Plan in several dimensions, specifically creating "opportunities for cross-Faculty, interdisciplinary research teams that use disciplinary strengths to address problems of societal importance". A favourite highlight is the *Human Computer Interaction + Health Lab*, an outstanding initiative addressing the role of games in education and in the promotion of healthy living, successfully developing games with impact at the "*interface of society, health and technology*". Furthermore, the GI has a strong commitment to anti-discrimination attitudes in the academy, often lending its voice to equity seeking groups. The recent addition of the *qCollaborative* group specifically creates an inclusive space for marginalized and targeted communities to create and disseminate research relevant to their groups, thus "*improv[ing] the representation, participation and engagement of equity-seeking groups within our community*" (2020-25 Strategic Plan).

Within the GI, there are twenty Arts-faculty members representing a variety of disciplines, such as English (home department of the Director of the Institute, Professor Randall), Communication Arts, Sociology and Legal Studies, Psychology, and a strong connection to the Stratford School of Interaction Design and Business. Hence, the Faculty of Arts has been a significant beneficiary of GI research activities and initiatives, most directly in the form of Tri-Agency grants in support of Arts members' research projects and grants from the Canada Foundation for Innovation funding the Institute's infrastructure. The Director of the Centre is the PI in a multimillion SSHRC Partnership grant and three CFI grants, and is a co-applicant in two additional Tri-Council grants. Professor Randall is also the PI in ten grants in partnership with public and private institutions, including seven Mitacs grants. Additional Tri-Council support through other members of the GI over the past five years, as PI or Collaborator, include three

NSERC grants, two SSHRC Connection grants, two SSHRC IDG, and one SSHRC Partnership grant. Members of the Institute have also attracted funding thorough partnerships with private and financial institutions through Mitacs grant programs, as well as one further CFI grant to support supplementary infrastructure at the GI. The GI engages with a number of government and industrial partners, from game developers and commercial banks, to Correctional Services Canada or the Public Health Agency of Canada, that benefit from the multidisciplinary lens offered by the institute. These partnerships in turn have offered excellent opportunities for experiential learning to Arts students.

The GI supports the training of HQP through direct mentorship of graduate students and post-doctoral fellows (115 of them in 2019-2020 alone!) and supervision of thesis work. Arts graduate students in particular are regularly supported through a variety of members' grants and work opportunities at the institute, allowing them to develop broad sets of skills that are valuable within and beyond academia. Over the past five years, a combination of 55 graduate students, post-doctoral fellows, and research associates have been in residence at the GI space in East Campus 1 (this means they have been provided cubicle space to assist with the progress of their research). The GI is currently home to four post-doctoral research fellows, three of them from the Faculty of Arts. Recent applications to various post-doctoral programs, including the prestigious Banting, reveal that newly-minted ARTS PhDs from other universities are eager to conduct their post-doctoral studies as fellows associated with the GI.

The GI further supports the work of their affiliated graduate students through facilitating travel to the Canadian Games Studies Association meetings that are held annually as part of the Congress for the Social Science and Humanities. Over the past five years, more than 20 students have had the opportunity to attend the primary academic game studies organization conference in Canada, present their work, network with fellow students and scholars, and spark even more ideas and potential collaborations. The GI has been fundamental in encouraging these experiential opportunities that are core to graduate student training.

It is also noteworthy that the GI is supportive of undergraduate students in ARTS. Since 2013, the GI has hired one co-op student a term (three a year), with the majority of them from the Faculty of Arts. One of GI's undergraduate co-op students, Emily West (Psychology) received the Arts Faculty Co-op Student of the Year Award in 2016, and another – Kaitlin O'Brien – was hired post-graduation as a full time Graduate Recruitment Officer in the Faculty of Arts.

The GI impact is enhanced by an excellent strategy for knowledge dissemination, through the digital publication *First Person Scholar* and the *GI podcasts*. These platforms regularly showcase the contribution of Arts members and students in adherence to the goal of the Strategic Plan to *"understand and enhance human experiences and address the human dimensions of global challenges and examine ways to translate knowledge for governance and policy*". These platforms have a substantial national and international following. In particular, *First Person Scholar* has recently been recognized by the Ivy Plus Libraries Confederation and it appears as recommended reading in games studies syllabi around the world. Hence, the research undertaken within the Institute contributes to raising the international profile of the University of Waterloo in advanced research and learning.

The GI provides an excellent space for scholars from Arts and other Faculties to engage in truly innovative collaborative research and teaching. The continued support for the GI will provide greater and more diverse opportunities for our faculty and students. The Faculty of Arts fully supports the renewal of funding for the Institute.

Sincerely,

Sheila L. Ager
Dean, Faculty of Arts

November 26, 2020

Professor Charmaine Dean
Vice-President Research and International
Co-Chair, Senate Graduate and Research Council

Dear Dr. Dean,

I am writing to express my strong support for the renewal of the Games Institute (GI) for an additional five-year period.

As a university research institute, the Games Institute has as its primary goal the exploration, process, production, and dissemination of top-quality research. Focusing on games studies, games-related research, and interactive technologies, the GI uniquely draws in researchers from all disciplines and provides an inter- and transdisciplinary environment where innovative modes of knowledge can thrive.

From its inception in 2010, the Faculty of Engineering has been closely involved in the leadership of the Games Institute with our faculty members Dr. Stacey Scott (Systems Design Engineering) and Dr. Mark Hancock (Management Sciences) serving as GI's inaugural and current Associate Directors, respectively. Indeed, the Games Institute was co-founded by Dr. Scott alongside Drs. Karen Collins (Communication Arts), Chrysanne DiMarco (Computer Science), and Neil Randall (English), the inaugural and current GI Executive Director.

The Games Institute actively supports the work of ten Engineering faculty members and over 30 graduate students and post-doctoral fellows who, drawn by the GI's interdisciplinary research ecosystem, have chosen to work in the GI facilities in East Campus 1 as a supplement to their spaces in their home departments. This includes collaborative work and research space where individuals are exposed to a variety of research methodologies and knowledge from disciplines they would not otherwise easily interact with in the normal course of their programs. In fact, two of Engineering faculty, Drs. Mark Hancock and Oliver Schneider, have integrated their CFI-ORF funded research infrastructure into the GI to extend their multidisciplinary collaborations and offer additional resources to the GI membership at large – indeed, all six CFI-funded infrastructure projects in the GI are shared by the entire ecosystem, another significant draw for researchers. We are also aware that this collaborative ecosystem played an important role in attracting a number of junior faculty members (including in Engineering) who have now joined the University.

The Faculty of Engineering has also benefited from a number of grants as well as sponsored research where the existence of the Games Institute played a key role in the award. Most notably, this includes the NSERC-CREATE *Saskatchewan-Waterloo Games User Research* training program which is based at the GI and includes a multi-disciplinary team of researchers from five departments (Management Sciences, Systems Design Engineering, Computer Science, Communication Arts and English) and three Faculties (Engineering, Math and Arts) at UW. Other examples of excellence in training and mentorship of HQP come from the movement

of GI students and graduates: Cayley MacArthur who chose to enter a PhD program in Management Sciences following a Master's degree in English or Deltcho Valtchanov who was hired as a post-doctoral fellow (PDF) in Engineering following the completion of his PhD in Psychology. In fact, Dr. Valtchanov's PDF appointment was funded by a Mitacs grant with Axonify Inc. where he – since becoming Axonify's full-time employee – now supervises the work of yet another Engineering Master's student via a new Mitacs internship.

Certainly, these examples show how closely GI's activities are aligned with UW's Strategic Plan Impact Theme of developing talent for a complex future by: "remov(ing) barriers to collaboration, interdisciplinarity and the integration of knowledge" and "foster(ing) an interdisciplinary environment for graduate students and post–doctoral scholars to increase the impact of their work."

It is noteworthy that inter- and transdisciplinary initiatives are not restricted to student training and mentorship. A new initiative stemming from the GI's impressively unique research ecosystem, led by Engineering faculty Dr. Oliver Schneider, has been formulated and submitted for consideration to the New Frontiers in Research Fund by a team of GI researchers from Management Sciences, Kinesiology, Communication Arts and Social Development Studies. The proposed project aims to address an important societal issue of amplifying the voices from marginalized communities through VR and haptic technology to promote social justice actions. Dr. Schneider noted in his support statement for the Games Institute that "… without the GI, I would never have engaged with Profs. Barnett-Cowan, Roberts-Smith, and Llewlleyn to submit our Interdisciplinary Trailblazers grant … and our $250,000 NFRF Exploration application..."

The Games Institute is also keenly aware of the importance of network building with other academic institutions, industry, non-profit and public sector institutions. The most recent example of such an endeavour is the CanHaptics network, a collective of researchers, industry practitioners, and community stakeholders across Canada supported by the Games Institute. The goal of the network is to make technology more human by making it physical - pushing out from the screen to be graspable, holdable, and engage with all human senses - and do so by putting people, not technology, first.

These two initiatives clearly respond to UW's strategic goals of using "its disciplinary and interdisciplinary strengths to solve increasingly complex, real–world problems" by "explor(ing) opportunities to create cross-Faculty, interdisciplinary research teams that use disciplinary strengths to address problems of societal importance".

In summary, the Games Institute is a unique and innovative research centre which, in my opinion, has proven its value to the Faculty of Engineering and to the University community as a whole and – as it expands and reaches its full potential – promises to deliver more innovative support for University research and training activities. On behalf of the Faculty of Engineering, I fully support the renewal of Games Institute's mandate for another five years.

Sincerely,

Mary Wells

Mary Wells
Dean, Faculty of Engineering

December 7, 2020

Dr. Charmaine Dean
Vice-President of Research and International

Re: Games Institute, University Research Centre, 5-Year Review

I am writing to provide my strong support for the continuation of the Games Institute as a University Research Centre for the period 2020-2025. My support is based on its delivery of unique, high-impact, interdisciplinary and inter-Faculty activities.

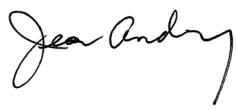
The uniqueness comes from its focus – the study of games, gamification, interactive technologies and immersive environments—something that spans the breadth of disciples and has importance for virtually all aspects of contemporary life, from education, training and employment to recreation, travel, and art.

Its impact comes from its collaborative approach and the ways in which the Institute has supported research and educational opportunities across campus. Several examples from the Faculty of Environment are outlined below:

1. Susan Elliott's GET-FACTS CIHR knowledge mobilization grant, in which Games Institute PhD students created two games designed to help educate people about issues surrounding food allergies in children.
2. Illuminate – ICCC project in which the Games Institute contributed the design of a game, called Illuminate (https://ic3uwaterlooca.itch.io/illuminate) designed to help a general public (this will be a museum exhibit) understand the complexities of climate change.
3. Aviation cluster – working with Suzanne Kearns and others on research into the design of game-driven simulation training for pilots.
4. WISE – The Games Institute was part of the McArthur Foundation proposal submitted by Jatin Nathwani of WISE to work on serious games to help African refugee communities develop training for sustainable energy.
5. VR lab development – support for Michelle Rutty's CFI application related to tourism.

I look forward to working with and supporting the Games Institute as they continue to evolve over the next five years. It is a true jewel in working across disciplinary boundaries that sometimes divide us.

Sincerely,



Dean, Faculty of Environment

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December 4, 2020

Dr. Charmaine Dean
VP Research and International

RE: Letter of Support for Games Institute

Dear Dr. Dean:

On behalf of the Faculty of Applied Health Sciences, I am providing a letter in support of a 5-year Senate renewal of the Games Institute (GI)at the University of Waterloo. The Games Institute is an important organization to researchers in the Faculty of Applied Health Sciences (to become Faculty of Health in January 2021).

I anticipate that the Games Institute and the Faculty of Applied Health Sciences (AHS) will increase collaboration in the next several years. This is in part because of the vast interest in the role of games, virtual reality, augmented reality, and virtual reality applied to health. It is also because the Games Institute will be the home of the Network for the Virtual Future, with a major focus on virtual and digital health. I foresee extensive synergies.

Initially approved by Senate in 2010, the Games Institute was founded by faculty members from Arts, Engineering, and Math. The institute was renewed by Senate in 2015, and in 2017, became one of the University Centres and Institutes. I understand that the Games Institute is seeking renewal for another five years.

With respect to impact, nine students and post-doctoral fellows in AHS have engaged with the Games Institute, including four Master's students, three PhD students, and 2 post-doctoral fellows. Five researchers representing all three academic units in our Faculty, are engaged with the Games Institute: Michael Barnett-Cowan (Kinesiology or KIN) and Jim Wallace (School of Public Health and Health Systems or SPHHS) have strong and established collaborations in the Games Institute. Luke Potwarka (Rec & Leisure) and Kaylena Martens (KIN) have begun their relationships with the Institute. For my own research program in the SPHHS, two of my post-doctoral fellows are collaborating with GI Executive Director Neil Randall, and others to create knowledge mobilization online tools using games theory. The Games Institute offers an interdisciplinary ecosystem that attracts researchers and their students.

The Games Institute has facilitated research funding to faculty members in the Faculty of Applied Health Sciences. Below is a list of selected grants awarded (wholly or in part) to our faculty where their co-applicants stem from the Games Institute in other faculties:

- **UW Trailblazer:** $80k cash; PI: **Michael Barnett-Cowan (KIN)**, *GI co-PI: Shi Cao (SYDE)*; Designing adaptive virtual reality exergames for people living with dementia

- **Network in Aging Research Catalyst:** $20K cash; PI: **Michael Barnett-Cowan (KIN)**, *GI co-PIs: Jennifer Boger (SYDE), Shi Cao (SYDE)*; Virtual Reality Exergames to Improve Access to Strength Grant and Range of Motion Exercise among People Living with Dementia
- **MITACS: StressWelliQ**, $240K cash; Co-PI: **Jim Wallace (SPHHS)**, *GI co-PIs: Lennart Nacke (CommArts), Mark Hancock (MSCI)*; StressWelliQ – platform for gamified technology solutions for stress management
- **NSERC CREATE: Saskatchewan-Waterloo Games User Research (SWaGUR**) –$1.65 M cash; Collaborator: **Jim Wallace (SPHHS)**, *GI Co-applicants: Mark Hancock (MSCI), Lennart Nacke (CommArts), Neil Randall (English), Stacey Scott (SYDE)*. Based at the Games Institute, SWaGUR brought together a multidisciplinary team at the Universities of Saskatchewan and Waterloo with the long-term goal of training 85 HQP in Games User Research. Addressing human-computer interaction, digital information, and communications technologies, this initiative generates technologies and provides training to develop technologies that change how people interact with digital information.
- **AGE-WELL NCE**: Alberta Rating Index for Apps (ARIA) - $10K; **Lili Liu (PI)**, *GI Collaborators: Neil Randall;* ARIA's online website helps the general public and health care providers rate the quality of the health care apps. It is a collaboration between a postdoctoral researcher in Rehab Sciences (University of Alberta) and a PhD candidate in Rhetorical Theory (Waterloo).
- **AGE-WELL NCE**: $20K**; Lili Liu (PI)**; Knowledge mobilization of a strategy guideline to reduce risks associated with getting lost among persons living with dementia. It is study conducted by post-doctoral fellow in collaboration with GI member Leah Zhang-Kennedy (Stratford campus) and co-op student.
- **CFI JELF/ORF grants:** $140K**; PI: Jim Wallace; HCI+ Health Lab;** Awarded to AHS faculty and located at GI, PI: Jim Wallace; HCI+ Health Lab (originally, Interactive Data Exploration and Analysis System), 2017. Dr. Wallace's HCI+ Health Lab and other CFI funded infrastructure/labs form GI's collaborative and inter-disciplinary research ecosystem. Additional labs available to Engineering students and faculty and located at the GI include: *Haptics Computing Lab* (in construction), *Waterloo Games Analysis and Monitoring Environment*, *WatVRStory Lab*, and the *StoryBoard Lab* (in construction). Students and faculty researchers benefit from ongoing collaboration, exchange of knowledge and ideas as they take advantage of the co-located labs and other research infrastructure.

Other Research Outputs: Games

The following is a selection of games or interactive media produced by students or faculty in the Faculty of Applied Health Sciences:

- **Merlynne, created by graduate student Tina Chan (SPHHS), supervised by Dr. Jim Wallace (SPHHS).** Merlynne is a single player role-playing game that asks the player to advance the narrative by offering support, advice, and encouragement to non-player characters by using techniques from cognitive behavioural therapy (CBT).
- **Pirate Bri's Grocery Adventure, created by graduate student Marcela Bomfim (SPHHS) supervised by Dr. Jim Wallace (SPHHS).** Pirate Bri's Grocery Adventure (PBGA) is a gameful mobile app designed to improve student's food literacy through a situated learning approach to grocery shopping. PBGA combines in-game experiences with the real-life activities of

planning at home and selecting foods at the grocery store. PBGA is grounded in Self-Determination Theory (SDT), supporting the psychological needs of competence, autonomy, and relatedness to motivate self-efficacy for long-term healthy behaviour change.

- **Quantum Cats**, created by **Dr. Jim Wallace (SPHHS)** and graduate student Victor Cheung (SYDE), **supervised by Dr. Jim Wallace (SPHHS).** Quantum Cats is a mobile game that allows players to learn and engage with concepts from quantum physics. It was created by a team of researchers from the Institute for Quantum Computing (IQC) and the Games Institute. **Dr. James Wallace (SPHHS)** and graduate student Victor Cheung (SYDE) are credited for the conceptualization and design, *Mike Brown (GI)* and *Jagger Nast (GI)* are credited for the programming, and *Keith McLean (independent)* is credited for the art. Quantum Cats was featured in an exhibit at the Ontario Science Centre exhibit "Quantum: The Exhibition" and the MUSEUM in Kitchener. The game was publicly released on both Android and iOS platforms and has been downloaded more than 10,000 times and was presented at the ACM Conference of Interactive Surfaces and Spaces (ISS 2016).

Other Initiatives

- **Incorporating Social Justice into Haptic VR Storytellin**g

  Submitted for consideration to NFRF Exploration program, PI: Oliver Schneider; co-applicants: **Michael Barnett-Cowan (KIN)**, Jennifer Roberts-Smith, and Kristina Llewlleyn. This inter-disciplinary proposal boasts a collaboration between GI faculty from MSCI, **Kinesiology**, Communication Arts and Social Development Studies. As per the statement from the PI:

  > "Without the GI, I would never have engaged with Profs. Barnett-Cowan, Roberts-Smith, and Llewlleyn to submit our Interdisciplinary Trailblazers grant … and our $250,000 NFRF Exploration application..."

  The project proposes to retarget development of VR environments and their interfaces to be guided by social justice so that voices from marginalized communities can tell their stories to broad audiences.

- **Virtual Reality Working Group**

  Led by **Michael Barnett-Cowan (KIN)** and Neil Randall (English), the VR Working Group is a Games Institute collaboration initiative for researchers interested in exploring the opportunities VR technology affords. The Working Group meets, on an alternating schedule, at the GI facilities (EC1) and at **Barnett-Cowan's** Multisensory Brain and Cognition Lab (TJB) once per week to discuss topics of interest. The group's membership includes graduate students from **AHS**, Arts, Math-Computer Science and Engineering. Scholars in the humanities and social sciences working in areas such as literature, history, anthropology, and psychology, recognized long ago the capacity for language and narrative to increase engagement with a story or topic and thus to enhance the flow of information between communities and cultures.

- **Human-Computer Interaction Research Group**

  Led by a multi-disciplinary group of GI faculty members (including, Engineering, Math-Computer Science, Arts and AHS), Human-Computer Interaction (HCI) Group is a central collaboration initiative for GI members involved in HCI research. Members of this research group stem from individual faculty-led labs; for example: HCI Touch Lab (Mark Hancock, MSCI), Haptic Computing Lab (Oliver Schneider, MSCI), **Multisensory Brain and Cognition Lab (Michael Barnett-Cowan, KIN)**, **HCI+Health Lab (Jim Wallace, SPHHS)**, HCI Games Group (Lennart Nacke, Communication Arts/Stratford School), among others.

Clearly, the funding, outcomes and outputs generated by members of the Faculty of Applied Health Sciences through interdisciplinary opportunities provided through the Games Institute have been significant. I look forward to leveraging and expanding the Faculty of Applied Health Sciences contributions and engagement with the Games Institute over the next five years.

Sincerely,

Lili Liu, Dean

UNIVERSITY OF WATERLOO

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Dr. Mark Giesbrecht
Dean, Faculty of Mathematics
University of Waterloo
Email: deanmath@uwaterloo.ca

Professor Charmaine Dean
Vice-President Research and International
Co-Chair, Senate Graduate and Research Council

December 4, 2020

Dear Dr. Dean,

I am writing today on behalf of the Faculty of Mathematics to express my support for the Games Institute on its institutional renewal for the next five years.

Math faculty have been integral to the Games Institute since its inception. Notably, Dr. Chrysanne DiMarco, alongside Dr. Neil Randall, co-founded the Institute in 2010. Even in those early days, Drs. DiMarco and Randall understood the importance of a multidisciplinary approach to the study of immersive and interactive environments. They brought together faculty and students from various disciplines to apply for, and ultimately receive, a $2.54M SSHRC Partnership Grant to establish IMMERSe – a network of academic and industry partners to examine the rapidly growing field of games research. Dr. DiMarco again partnered with Dr. Randall on WatGAME, the Institute's first CFI grant.

Over the next 10 years the Games Institute would welcome more Math faculty members and numerous Computer Science graduate students and postdoctoral fellows. Math representation in the Games Institute includes faculty from Computer Science and Statistics and Actuarial Science, specifically Dan Vogel, Ed Lank, Craig Kaplan, Ben Feng, Edith Law, Pascal Poupart, Chrysanne Di Marco (ret.), Vic DiCiccio (ICR, ret.), and Adjunct Professor Morgan McGuire. Additionally, a number of faculty members cross-appointed with the Cheriton School of Computer Science engage heavily with the institute – these include Mark Hancock (Associate Director of the GI), Lennart Nacke, Oliver Schneider, and James Wallace. The Games Institute has also been a workplace and collaboration space for six CS Masters students, twelve CS PhD students, and five CS postdoctoral fellows. Further, the GI's technical support team has been led by CSCF since 2013, in particular CS staff members Lawrence Folland and Lori Paniak.

Perhaps the strongest connection between Math and the Games Institute is through the Waterloo Human-Computer Interaction (HCI) consortium. This multidisciplinary group of researchers focus on the interrelationship between human behaviour and activity and the connected world. With research spanning gesture-based interaction

to affective computing, from virtual reality to intelligent software systems, the collaboration between Waterloo HCI and the Games Institute has resulted in significant contributions to the academy through publications and conference presentations, but also in the understanding and development of impactful immersive technologies.

Looking to the next phase of the Games Institute, the interconnection between computer science, statistics, analytics and game-related research will only grow stronger as industries continue to recognize the benefits and impacts of interactive immersive technologies. As the institute builds its next major initiative, the Network for the Virtual Future, collaborations and intersections with the Faculty of Mathematics are expected to increase significantly. The Games Institute will invite these faculty and students into its growing community of diverse, inter- and multi-disciplinary researchers who will have impact in the academy, industry, and policy.
Dr. Dean, I strongly recommend the Games Institute for renewal for an additional 5-year term and congratulate Dr. Randall and all the Games Institute membership on their continued success.

Yours truly,

Mark Giesbrecht
Professor and Dean
Faculty of Mathematics

UNIVERSITY OF WATERLOO

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November 28, 2020

Dr. Charmaine Dean
Vice-President University Research
University of Waterloo

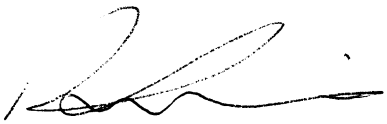
Re: Games Institute renewal

Dear Charmaine:

On behalf of the Faculty of Science, I write to express my strong support for the 5-year renewal of the Games Institute (GI) as a University Institute. Thus far, our involvement with GI has been limited to one researcher, Prof Ben Thompson of the School of Optometry & Vision Science, but I am confident that the next five years will see more Science faculty engage with the Games Institute as it expands the use of games for innovative knowledge mobilization, including the enhancement of science communication; one such project with IQC has led to the production of interactive media for public outreach of elements of quantum research. Another area of future collaboration will focus on an upcoming initiative called the Network for the Virtual Future. It is expected that Science faculty will contribute to the research needed to understand the role of virtual technologies in the post-COVID world.

I look forward to working with the GI leadership in broadening the scope of Science faculty engagement with the Games Institute, and I support its 5-year renewal with enthusiasm.

Sincerely,



Robert P. Lemieux, PhD
Dean of Science and Professor of Chemistry

UNIVERSITY OF WATERLOO
FACULTY OF ENGINEERING

M E M O

TO: Amanda McKenzie, Director, Quality Assurance (Academic Programs) and Academic Integrity

FROM: S. Sivoththaman, Associate Dean, Graduate Studies
Faculty of Engineering

RE: Senate Graduate and Research Council Agenda

DATE: February 22, 2021

Please see the following motion which we would like submitted to the next SGRC. These changes were approved in the EFC meeting on February 23, 2021.

Items for Approval:

1. The department of **Management Sciences** would like to make the following change:
    a. New GDip in Data Analytics (Direct Entry)

    Rationale for Request:

    a. Since 2017, the Department of Management Sciences has offered the popular Type 2 Graduate Diploma in Data Analytics to students registered in the course-based MMSc program. Now, to expand on the success of the Type 2 Diploma, the Department of Management Sciences would like to launch a Type 3 Graduate Diploma in Data Analytics. This program would essentially be the same as the existing Type 2 Diploma but will be available on a direct-entry basis to non-degree students who wish to complete only this diploma, rather than a full graduate degree.

Your attention to these matters is kindly appreciated.

Siva Sivoththaman

SS/em

Graduate Studies
New Program Template

Prior to form submission, review the new graduate program instructions. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs.

Faculty: Engineering

Program: Graduate Diploma (GDip) in Data Analytics (direct entry)

Program contact name(s): Rob Duimering, Hossein Abouee Mehrizi

Form completed by: Rob Duimering, Hossein Abouee Mehrizi

Proposed effective date: Term: Fall Year: 2021

Graduate Studies Academic Calendar (GSAC) section (include the link to the section (web page) where the new program will be located):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences

Proposed Graduate Studies Academic Calendar content:

GRADUATE DIPLOMA (GDIP) IN DATA ANALYTICS (DIRECT ENTRY)

Program information

- **Admit term(s)**
  - Fall
  - Winter
  - Spring
- **Delivery mode**
  - On-campus
  - Online
- **Length of program**
  - 2 terms/8 months
- **Program type**
  - Diploma
- **Registration option(s)**
  - Full-time
  - Part-time
- **Study option(s)**
  - Coursework

Admission requirements

- **Minimum requirements**

Proposed Graduate Studies Academic Calendar content:

- The Department of Management Sciences requires either (i) a 75% overall standing in the last two years, or equivalent, in a relevant four year Honours Bachelor's degree or equivalent; or (ii) a 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent, as the minimum requirement for admission to the Graduate Diploma (GDip) in Data Analytics (direct entry) program for applicants educated at a Canadian institution. A 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent is the minimum requirement for admission to the GDip in Data Analytics (direct entry) program for applicants educated outside of Canada.
- All applicants must submit a "Statement of Purpose" - a one-page statement addressing their academic background and future goals.

- **Application materials**
  - Supplementary information form
  - Transcript(s)
  - Résumé/Curriculum vitae

- **References**
  - Number of references: 2
  - Type of references: academic (preferred) or professional

- **English language proficiency (ELP) (if applicable)**

Degree requirements

Coursework option:

- **Graduate Academic Integrity Module (Graduate AIM)**

- **Courses**
  - Students must successfully complete the following 4 courses:
    - MSCI 623 Big Data Analytics
    - MSCI 718 Statistical Methods for Data Analytics
    - MSCI 719 Operations Analytics
    - 1 pre-approved elective course from the following list:
      - MSCI 603 Principles of Operations Research
      - MSCI 605 Organizational Behaviour
      - MSCI 607 Applied Economics for Management
      - MSCI 609 Quantitative Data Analysis for Management Sciences
      - MSCI 641 Text Analytics
      - An alternate elective course pre-approved by the Associate Chair for Graduate Studies
  - Students must maintain an overall average of at least 73% at the end of each term, with no more than 2 failed courses overall.

- **Link(s) to courses**
  - Management Sciences (MSCI) courses
  - Graduate course search

Departmental approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

UNIVERSITY OF WATERLOO

GRADUATE EXPEDITED PROPOSAL

OF

GRADUATE DIPLOMA (TYPE 3)

IN

DATA ANALYTICS

Submitted to the
Ontario Universities Council on Quality Assurance

VOLUME I - PROPOSED BRIEF

JUNE, 2020

TABLE OF CONTENTS

1. Introduction

The rapid developments in information and computer technologies have enabled the generation, storage and processing of large amounts data that was out of reach a few years back. Data is believed to be key to the next wave of management innovation, productivity, and growth. The use of data analytics is no longer limited to large companies with substantial revenue streams. It's now widespread, with 59% of enterprises using analytics in some capacity by the end of 2018[1]. Also, 71% of enterprises globally predict their investments in data and analytics will accelerate in the next two years and beyond[1]. According to a survey conducted by Deloitte, about 50% of respondents believe that analytics contribute to better decision making, 16% say that analytics enable key strategic initiatives in a better and more comprehensive way, and 10% say that they help them improve relationships with both customers and business partners.[2]

However, there is a shortage of professionals who can glean meaningful insights from data to make effective decisions and help companies to take advantage of such profitable tool. According to a survey recently published in MIT Sloan Management Review, 40% of the companies surveyed were struggling to find and retain the data analytics talent.[3]. Canada's Big Data Consortium (2015) reports that the gap for professionals with solid data and analytical literacy to make better decisions is estimated at 150,000, such as those required for roles like Business Manager and Business Analyst.[4] However, after all these years, the demand for such talents has not been met yet. Big data and analytics is the number one place of need, according to a 2019 KPMG CIO Survey. Nearly half (46%) of CIOs who participated in the survey said they suffered from a lack of skilled analytics specialists[5].

The Type 3 Graduate Diploma in Data Analytics (GDDA) is designed to provide students with rich learning outcomes that include deep quantitative skills and technical expertise. These competencies will position students to achieve a variety of professional opportunities, including supporting organizations in the effective utilization of data. Moreover, students possessing the Learning Outcomes of this proposed Diploma will, in part, address the talent shortfall for Canadian companies.

[1] Columbus,L. (2018, August). Global State of Enterprise Analytics, 2018, *Forbes,* Retrieved from https://www.forbes.com/sites/louiscolumbus/2018/08/08/global-state-of-enterprise-analytics-2018/#4f7dfa106361

[2] https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Deloitte-Analytics/dttl-analytics-analytics-advantage-report-061913.pdf

[3] https://sloanreview.mit.edu/issue/2015-fall/,https://www.cio.com/article/3025869/6-analytics-trends-that-will-shape-business-in-2016.html

[4] https://www.ryerson.ca/content/dam/provost/PDFs/Big_Data_Talent_Gap.pdf

[5] https://assets.kpmg/content/dam/kpmg/ca/pdf/2019/07/harvey-nash-kpmg-cio-survey-2019.pdf

Specifically, the GDDA: i) offers graduate-level, course-work based, professional education in the emerging area of data analytics, and ii) provides a preliminary foundation for students who plan to do applied research in data analytics and or pursue further graduate studies leading to a Masters or a PhD.

The Type 2 GDDA was established in January of 2017. It is currently only available to Master of Management Sciences (MMSc) students in the Department of Management Sciences at the University of Waterloo (UW). The successful experience of Type 2 GDDA which trained talents who have become valuable assets for top-notch companies such as Amazon lead the University of Waterloo, a pioneer university in terms of innovation and technology, to offer a stand-alone Type 3 GDDA, with direct admission from all students and professionals outside of the Department of Management Sciences. A similar program in Data Analytics has been established in many prestigious universities of Canada such as University of Toronto[6], McMaster University[7], McGill University[8], and University of Calgary[9]. The Type 3 GDDA will build off the strength of the existing Type 2 that has had substantial uptake from existing UW students and makes courses and resources available to those that are not currently enrolled at UW, but with interest in enhancing their skills and knowledge in the area of data analytics. This will enable many talented professionals to have access to the diploma, and consequently, help them to take advantage of analytics in their own concentration and lead their relevant companies to exert the power of analytics in a more efficient way. For this, the Department of Management Sciences is seeking approval for a Type 3 Graduate Diploma (GDip) in Data Analytics.

Brief Listing of the Program

The Type 3 GDDA is a course-based diploma which is available to students outside of Management Sciences and seeks to target working professionals and post-graduates. The curriculum emphasizes collaboration, experiential learning and team building to solve data-driven challenges. Students will learn interdisciplinary data collection and examination techniques, data visualization, statistical and computational analytics, presentation skills, and how to apply the fundamental core concepts, and tools of data thinking to their work in any industry or sector. Both part-time and full-time options are available for the applicants. The Department of Management Sciences ensures that the scheduling of courses would accommodate all students (e.g., professionals and non-professionals).

[6] https://www.rotman.utoronto.ca/Degrees/MastersPrograms/MMA

[7] https://www.mcmastercce.ca/data-analytics

[8] https://www.mcgill.ca/continuingstudies/program/professional-development-certificate-data-analytics-business

[9] https://grad.ucalgary.ca/future-students/explore-programs/data-science-and-analytics-diploma

Method Used for Preparation of the Brief

The Department of Management Sciences consulted and coordinated with the Faculty of Engineering and other campus stakeholders to assess the demand for, and design of the proposed program. The consultations and development were expedited due to the presence of the existing Type 2 GDDA, offered in the Department since 2017.

2. Objectives of the Program (QAF 2.1.1)

Data and its role in today's world have always been a priority for University of Waterloo. The Southwestern Ontario Research Data Centre (SWORDC)[10] and Big Data Research Lab[11], are examples of the importance of data management and its application to the University of Waterloo. According to the Management Sciences Vision 2015 Plan, "introducing MMSc specializations" was identified as a significant factor to achieve a world-class reputation for excellence in research, teaching, and student experience for graduate studies [12]. The Type 2 GDDA was one step to achieve this objective and it will be complemented by the Type 3 GDDA which aims to train post-graduates and working professionals with deep data analytics skills that modern organizations need. Given the structure of the diploma, the Type 3 GDDA will have the same broad academic and institutional objectives as the existing Type 2 GDDA. Furthermore, it is tailored to the wider audience to whom the Type 3 GDDA is available. These objectives are as follows:

- to attract professionals and managers at all levels of organizations and across different industries, as well as students who are eager to learn and build skills in data analytics,
- to provide students and working professionals with a graduate-level, course-based education in the field of data analytics,
- to enhance the preparatory skills for students who are interested in pursuing applied research in data analytics. The program provides an overview of the main techniques and tools used in data analytics. Interested students may seek deeper training through a research master's program or a PhD program. Skills they learn through this diploma help them have a higher chance for admission and prosperity compared to other students.

[10] https://uwaterloo.ca/southwestern-ontario-research-data-centre/

[11] https://uwaterloo.ca/big-data-research-lab/

[12] https://uwaterloo.ca/engineering/sites/ca.engineering/files/uploads/files/Vision_2015_Plan_May_2012.pdf

We have also mapped the learning outcomes of Type 3 GDDA to the Graduate Degree-level Expectations (GDLE)[13] which is available in Appendix A.

3. Admission Requirements (QAF 2.1.2)

The admission requirements of the Type 3 GDDA are as follows:

- **Minimum Requirements**
  - The Department of Management Sciences requires either (i) a 75% overall standing in the last two years, or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent; or (ii) a 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent, as the minimum requirement for admission to the Type 3 GDDA for applicants educated at a Canadian institution. A 75% overall standing or equivalent, in a relevant four-year Honours Bachelor's degree or equivalent is the minimum requirement for admission to the Type 3 GDDA for applicants educated outside of Canada.
  - All applicants must submit a "Statement of Purpose" - a one-page statement addressing their academic background and future goals.
- **Application materials**
  - Supplementary information form
  - Transcript(s)
  - Résumé/Curriculum vitae
- **References**
  - Number of references: 2
  - Type of references: Academic (preferred) or professional
- **English language proficiency (ELP) (if applicable)**
  - The requirements for ELP for Type 3 GDDA is the same as those for MMSc program (Department of Management Sciences) .[14]

[13] https://uwaterloo.ca/academic-program-reviews/degree-level-expectations/graduate-degree-level-expectations

[14] https://uwaterloo.ca/graduate-studies-academic-calendar/general-information-and-regulations/english-language-proficiency

4. Structure (QAF 2.1.3)

The Type 3 GDDA could be completed within two terms and students can start in any term (Fall, Winter, or Spring). Both online and on-campus options are available for offered courses based on students' preferences. Furthermore, evening class sessions will be held since it is probably a more suitable option for professional learners. The courses required are:

- MSCI 719 (Operations Analytics)
- MSCI 623 (Big Data Analytics)
- MSCI 718 (Statistical Methods for Data Analytics)
- A pre-approved elective course which could be from regular in Management Sciences courses, e.g., MSCI 641 (Text Analytics), MSCI 709 (Logistics and Supply Chain Management), etc. It could also be a new course which is pre-approved by the Associate Chair for Graduate Studies upon a student's request.

The department is committing to offer the core courses (MSCI 719, MSCI 623, and MSCI 718) every year. Course descriptions are provided in Appendix B. According to current course schedules, a possible plan is

- First term: MSCI 719, elective course
- Second term: MSCI 623, MSCI 718

5. Program Content (QAF 2.1.4)

Data analytics enable organizations to enhance traditional *descriptive analytics* of explaining what has happened with *predictive analytics* to foresee what will happen under various future scenarios, and with *prescriptive analytics* to design best policies and actions under different circumstances. Predictive and prescriptive analytics enable organizations to transform insight into foresight and most importantly make transformative decisions to significantly improve business performance.

Management Sciences is a multidisciplinary Department with expertise in Information Systems, Applied Operations Research, and Management of Technology. Information Systems faculty have expertise in data warehousing and management, data visualization, as well as information retrieval. Operations Research faculty have expertise in statistical modeling and simulation, forecasting, and optimization. Management of Technology faculty have expertise in behavioral aspects of social media and human-generated data. The Department leverages the strengths of its pillar graduate research fields to offer comprehensive data analytics courses:

- **Operations research and analytics**: MSCI 603 (Principles of Operations Research) and MSCI 719 (Operations Analytics)
- **Information systems**: MSCI 623 (Big Data Analytics) and an elective course such as MSCI 641 Text Analytics

- **Statistics**: MSCI 609 (Quantitative Data Analysis for Management Sciences) and MSCI 718 (Statistical Methods for Data Analytics)
- **Management of Technology**: MSCI 605 (Organizational Theory & Behaviour) and MSCI 607 (Applied Economics for Management)

Three of these courses (MSCI 623, MSCI 718, and MSCI 719) are core to the GDDA, others (MSCI 603, MSCI 605, MSCI 607, MSCI 609, and MSCI 641) are available as electives.

6. Mode of Delivery (QAF 2.1.5)

All courses for the GDDA, both online and on-campus, use a wide variety of teaching and learning methodologies (e.g., cases, lectures, student presentations, in-class group discussion) designed to provide students with deep quantitative skills and technical expertise to analyze big data and to improve the performance of organizations using evidence based decision-making.

7. Assessment of Teaching and Learning (QAF 2.1.6)

Assessment of Teaching

At the end of each course, students evaluate both the course material and the instructor through Course Critiques. The course evaluation forms are distributed to the students for completion at a time when the instructor is not present, to provide students with anonymity. Completed evaluation forms are handed in and then processed by the Registrar's Office. Instructors receive the original completed questionnaires containing student comments and a summary of the scores for each question, and they routinely consider this feedback when preparing for their next course offering. Teaching and other course-related issues are addressed by the Department Chair with the faculty member. In addition, if there are issues during the term, students are invited to bring them to the attention of the Associate Chair for Graduate Studies, who will assist the students in resolving them with the faculty member.

Assessment of Learning

Throughout our graduate programs, a variety of assessment methods are used to assess each student's achievement of program learning outcomes and degree level expectations. Detailed graduate degree-level expectations are provided in Appendix A.

- *Class Participation*: A student's advance preparation and level of in-class engagement comprise the student's grade for this component of a course. Class

participation requires the student to demonstrate initiative and competence and to orally communicate effectively and efficiently.

- *Class Presentations*: Presentations are designed to develop a student's ability to present and discuss a topic in front of a group. They allow students to critically analyze ideas and then to think about the best ways to orally communicate them.
- *Written Assignments*: Written assignments provide a student with the opportunity to identify issues, gather and analyze information, develop ideas, solve problems and make decisions. They must then concisely and clearly communicate their analysis and recommendations in writing
- *Examinations*: Examinations require students to apply what they have learned in a course to identify and analyze issues, solve problems, and make decisions, then to clearly and concisely present their analysis in writing, often under time constraints.

At the end of the diploma, students will know the main technical and practical aspects of data analytics, build capacity to apply data analytics to a variety of problems, be able to make data-driven decisions in complex and uncertain situations, to recognize the limits of data analytics tools, and to develop the ability to clearly communicate findings. This is mainly indicated/measured by the hands-on-experience in real case studies solved in the analytics courses such as MSCI 719 Operations Analytics, the helpful projects carried out in courses such as MSCI 623 Big Data Analytics, and the exams written for the courses taken. Through these case studies and projects, students face real-world problems and need to address them using the tools and approaches they learned in their courses. They need to effectively use available datasets and develop data-driven solutions. Students who would be able to provide sound recommendations for the real-world problems have achieved the learning objectives.

In order to ensure that the program is working with the level of success we expected, we developed a cohesive plan to assess the achievement of the learning outcomes. The graduate studies committee will assess the trend of students' grades on an annual basis for the core courses of the GDDA. Considering the course evaluations and assessments, there will be an annual meeting with the instructors to discuss the opportunities to improve the quality of teaching and create a more effective learning environment. The committee is also responsible to monitor the ongoing situation in courses by collecting feedback from students. In their feedback, students would be able to express their concerns and comments about the topics covered in the courses. These anonymous comments will be shared and discussed with the instructors to make sure that the current students gain more relevant learning experience.

The department will maintain contacts with the previous graduates of the GDDA. There will be alumni surveys to get feedbacks on different aspects of the graduates' experience for the GDDA. Alumni of the GDDA will also be invited as a guest speaker to share their experience with the students and instructors.

8. Resources for All Programs (QAF 2.1.7)

Being a stand-alone version of an existing diploma, the Type 3 GDDA will require minimal additional resources. We expect an additional intake of about 20 students per year (13 Canadians and permanent residents and 7 international), which could be easily accommodated within our on-campus and online courses. We expect 50% of the 20 students to take online courses in each term. Specifically, the additional intake will have access to

- Space: the department of Management Sciences has a graduate study room and lounge dedicated to course-work students with study space, computers, and meeting space.
- Student support: students will be parts of the Management Sciences Student Association (MSSA). The MSSA organizes and actively promotes student involvement and interaction, both socially and academically[15].

The students will also have access to the library. The library includes subscriptions to the ACM digital library and the IEEE electronic library, which cover the main publication venues in data analytics. Due to the variety of the courses that are offered in the Department and the huge demand for teaching assistants, these students can be hired as teaching assistants similar to all other course-based and thesis-based graduate students in Management Sciences. Students can also be involved in the analytics related industry projects in the department and there would be opportunities to work as a research assistant with faculty who are working on data-driven projects. Through the Department guest speakers, they will also have opportunity to learn the challenges in different industries that potentially could be tackled using analytics tools.

9. Resources for Graduate Programs (QAF 2.1.8)

Our faculty have demonstrated expertise in offering the courses constituting the diploma. The Department has prominent professors in the area of data science and data analytics. Some holding Canada Research Chairs and have an active research agenda in the domain. See next section.

Based on our experience with the Type 2 version, we already have a well-established academic environment that would accommodate the extra 20 students/year. Note that our MMSc program (both online and on-campus programs) runs at about 90 students per year. Based on course enrollments, we expect between 20 and 30 students to graduate with the Type 2 diploma in the Fall 2020 convocation.

10. Quality and Other Indicators (QAF 2.1.10)

Below is a list of faculty members and their qualifications, who have taught/will teach the diploma core courses:

[15] https://uwaterloo.ca/management-sciences/graduate-studies/management-sciences-student-association

Name	Degrees	Title	Teaching responsibilities
Hossein Abouee Mehrizi	Ph.D.	Associate professor, Canada Research Chair in Healthcare Analytics	MSCI 719 (Operations Analytics)
Samir Elhedhli	Ph.D.	Professor	
Lukasz Golab	Ph.D.	Associate professor, Canada Research Chair in Information Systems	MSCI 623 (Big Data Analytics)
Olga Vechtomova	Ph.D.	Associate professor	
Oliver Schneider	Ph.D.	Assistant professor	MSCI 718 (Statistical Methods for Data Analytics)
Brian Cozzarin	Ph.D.	Professor	

Students within the program will enjoy a rich blend of courses covering the main tools and application domains of data analytics. They will work on real cases, interact with researchers active in the area, and will have opportunities to discuss the challenges faced in different industries with industry speakers who are invited to the courses.

11. Financial Addendum – For Internal Waterloo Use Only

Financial Viability Details

Human Resources

No new faculty will be hired.

Teaching Resources

No new teaching resources.

Physical Resources

No new physical resources are needed. We can easily accommodate the additional 20 students within our existing physical space.

Other Resource Requirements

None that we anticipate.

Tuition & Fees

The tuition will be set equal to our online MMSc online program. The Spring 2020 tuition rate for the online MMSc is currently at CAD 3,947.00 (for Canadians and permanent residents) per course. i.e. CAD 15,788 for the 4 courses.[16]

Other Revenue

[16] https://uwaterloo.ca/finance/fee-schedule-graduate-students-spring-2020

None that we anticipate.

12. Appendix A: Mapping of Learning Outcomes to Graduate-level Expectations, Courses and Assessment Methods

	1. Depth and breadth of knowledge	2. Research and scholarship	3. Level of application of knowledge	4. Professional capacity/ autonomy	5. Level of communication skills	6. Awareness of limits of knowledge
To develop greater breadth and depth of knowledge related to both the technical and practical aspects of data analytics	✓	✓	✓		✓	
To have a clear understanding of knowledge and awareness of current business and societal problems and issues in the areas of data analytics.	✓					✓
To develop the capacity to apply existing body of knowledge and insights through critical and hands-on analysis of specific problems and issues in data analytics	✓		✓	✓		
To conduct critical analysis of novel issues or new applications related to data analytics by demonstrating the ability to synthesize and apply existing literature and information.	✓	✓	✓	✓		
To make data-driven decisions in complex and uncertain situations with appreciation of the broader implications of applying knowledge to particular contexts.	✓		✓		✓	
To recognize the limits of personal competence and appreciate the potential contributions of other interpretations, methodologies, and disciplines				✓		✓
To develop the ability to clearly communicate specific ideas, analyses and conclusions, both orally and in writing, to a range of audiences including relevant decision makers in data analytics.					✓	✓
To exercise personal responsibility and accountability, displaying ethical behavior with integrity and responsibility.				✓		

	1. Depth and breadth of knowledge	2. Research and scholarship	3. Level of application of knowledge	4. Professional capacity/ autonomy	5. Level of communication skills	6. Awareness of limits of knowledge
MSCI 623-Big Data Analytics	✓	✓	✓		✓	✓
MSCI 718-Statistical Methods for Data Analytics	✓	✓	✓		✓	✓
MSCI 719-Operations Analytics	✓	✓	✓		✓	✓
MSCI 641-Text Analytics (Ex. of an elective)	✓	✓	✓		✓	✓
Multi-part assignments	✓	✓	✓	✓		
Quizzes/Tests	✓	✓	✓	✓		✓
Written assignments/ arguments/policy briefs	✓	✓	✓	✓	✓	✓
Data interpretation, synthesis, visualization	✓	✓	✓	✓	✓	✓
Technical reports/plans	✓	✓	✓	✓	✓	✓

Slide decks/presentations				✓	✓	✓

13. Appendix B: Detailed course outlines

MSCI 718: Statistical Methods for Data Analytics

Objectives: Our increasingly connected world, combined with low-cost sensors and distributed intelligence, will have a transformative impact on industry, producing more data than humans will be able to process. This course provides an introduction to statistical analytics methods which refers to a vast set of tools for understanding and analyzing data. Broadly speaking, statistical analytics involves building a statistical model for predicting, or estimating, an output based on one or more inputs. Problems of this nature occur in fields as diverse as economics, energy, mobility among others.

Topics:

1. Introduction to times series (applications, objectives of time series analysis, stationarity, autocorrelation functions, models with trends and seasonality, estimation and elimination of trend and seasonal components)
2. Forecasting techniques (exponential smoothing, Holt-Winters algorithm)
3. Regression (linear models, non-linear models, forecasting from regression)
4. Models of stationary processes (moving average models, ARMA processes)
5. Models of non-stationary processes (non-seasonal ARIMA models, seasonal ARIMA models).
6. Advanced learning methods (machine learning for prediction, neural networks and deep learning, parametric and structural identification, model selection, feature selection)

Textbook:

1. "Introduction to Time Series Analysis and Forecasting" by Montgomery, Jennings, and Kulahci (2nd edition)
2. "Introduction to Time Series and Forecasting" by Brockwell and Davis (3rd edition)

References:

1. "Introductory Time Series with R" by Cowpertwait and Metcalfe.
2. "Time Series Analysis and Its Applications with R Examples" by Shumway and Stoffer.

Software: We will mainly use R for statistical analysis (python is also another alternative). R can be freely downloaded from http://www.r-project.org/. For help with R, check http://www.cyclismo.org/tutorial/R/#introductory-materials. More material will be provided on learn.

Evaluation:

Assignments – 20%.
Exams – 40% (TBA).

Project – 35% Done in groups of 3.
Attendance and participation – 5%.

MSCI 719: Operations Analytics

Course Scope and Mission: Analytics is not a new invention, but rather a coming together of several technologies and fields of science including data warehousing and management, data mining, statistical modeling, forecasting, optimization, and most importantly management decision making under uncertainty.
In this course we first discuss predictive analytics that provides techniques to model the relationships between inputs and outcomes, and construct predictions about future outcomes. Then, we cover the prescriptive analytics that provides tools to optimize actions against a complex set of objectives to find best practices and design best policies under all circumstances. We also look at practical problems, solution techniques, and algorithms. Specifically, we look at examples in supply chains, service industries, healthcare systems, revenue management, inventory management, and sports. Finally, we apply our knowledge to investigate several case studies concerning real world problems and learn from a couple of guest speakers who discusses interesting challenges and opportunities that data analytics has presented.

Required Reading:
1. "Business Analytics: Data Analysis & Decision Making", S. C. Albright & W. L. Winston, 5th Edition
2. "Business Analytics", J. R. Evans, 2nd Edition

Course Package, including papers and case studies related to the topics of the course:
Jennie Maze Limited: Enhancing Call Center Performance Using Predictive Analytics
Managing with Analytics at Procter & Gamble
Screening for Chronic Kidney Disease
Know What Your Customers Want before They Do
Service Engineering: Data-Based Course Development and Teaching

Evaluation:
Assignments and case studies – 30%
Final exam – 30%
Data challenge and project – 40%

Topics:
1. Descriptive Analytics (1 week):
   a. Data modeling, measurement and validation
2. Predictive Analytics (1 week):
   a. Regression analysis, clustering, and forecasting
3. Prescriptive Analytics (9 weeks):
   a. Robust and data-driven optimization (2 weeks)
   b. Trace-driven simulation and risk analysis (1 week)
   c. Data-driven and evidence-based decision making (2 weeks)
   d. Complex stochastic systems and non-parametric queueing models (2 weeks)
   e. Bayesian optimization (2 weeks)

4. Applications of operations analytics in healthcare, retailing, supply chain, sport, and service industries (1 week)

MSCI 623: Big Data Analytics

Objectives:

1) to understand how data mining algorithms work
2) to gain hands-on experience in using data mining to solve real-world problems
3) to understand the state of the art in big data systems

Description: This course will cover the following topics:

- What is data mining; what is not data mining; data mining applications
- Data profiling and pre-processing: scatter plots, box plots, data cleaning
- Classification and prediction algorithms: Bayesian inference, decision trees, linear and logistic regression, nearest-neighbor search, support vector machines (SVM)
- Association rule mining algorithms: Apriori
- Clustering algorithms: k-means
- Other topics in data mining: outliers, recommender systems, social media, graph mining
- Review of relational database systems: relational algebra, SQL, query processing and optimization, transaction processing
- Big data systems: cloud computing, distributed systems, Hadoop/MapReduce, noSQL, newSQL

Textbook: Tan, P., Steinbach, M. and Kumar, V., Introduction to data mining. 2006, Pearson.

Evaluation:

Midterm – 30%
Final exam – 40%
Project – 30%
Note: you must pass the fraction of the grade corresponding to the midterm and final exam in order to pass the course

Tentative weekly schedule:

Week 1: Introduction to data mining
Week 2: Data profiling and pre-processing
Week 3-4: Classification algorithms
Week 5: Association rule mining
Week 6: Clustering
Week 7-8: Applications and other topics in data mining
Week 9: Review of relational database systems
Week 10-12: Big data systems

February 23, 2021

TO: Kathy Winter, Privacy Officer and Assistant University Secretary,
Senate Graduate and Research Council

FROM: Jeff Casello, Associate Vice-President, Graduate Studies and Postdoctoral Affairs

RE: Graduate Studies Academic Calendar changes

Item for approval:

Updates to University jurisdiction and disclaimer content.

Description and rationale for proposed changes:

In light of the COVID-19 pandemic, Legal and Immigration Services (LIS) has recommended the inclusion of text into Waterloo's academic calendars that limit Waterloo's liability (while avoiding exclusionary language that might not be enforceable) and preserve maximum flexibility for the coming year. For the Graduate Studies Academic Calendar (GSAC), the text is being integrated with similar pre-existing notices about University jurisdiction and authority. The intent is that once the COVID-19 pandemic has concluded, the "COVID-19 Pandemic" section of the text will be removed as it will no longer be applicable.

Additional content and revisions are being proposed to the University jurisdiction and disclaimer sections of the GSAC in order to support the inclusion (and contextualization) of this new LIS text, and to better align with the Undergraduate Studies Academic Calendar.

Proposed effective date: Term: Winter Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/

https://uwaterloo.ca/graduate-studies-academic-calendar/general-information-and-regulations/important-notices

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Graduate Studies Academic Calendar This is the homepage for the University of Waterloo Graduate Studies Academic Calendar. The Graduate Studies Academic Calendar is the main contractual document between the student and the University. Material provided by a department/Faculty, which is additional to that contained in the Graduate Studies Academic	**Graduate Studies Academic Calendar** This is the homepage for the University of Waterloo Graduate Studies Academic Calendar. The Graduate Studies Academic Calendar is the main contractual document between the student and the University. Material provided by a department/Faculty, which is additional to that contained in the Graduate Studies Academic Calendar, is also deemed to be a university/student contract. Additional

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Calendar, is also deemed to be a university/student contract. ## Important notices **Disclaimer** The course listings and academic programs described in the Calendar represent Senate-approved requirements for the completion of graduate degrees. Circumstances beyond the control of the University may result in restrictions in the number and range of course and program choices, or other resources available to students as compared with those listed herein. Prospective students or new registrants should consult the most current ~~printed or electronic~~ information available from Graduate Studies and Postdoctoral Affairs (GSPA) or the various academic departments. ~~Department Graduate Officers should be consulted by applicants prior to submission of their application to graduate studies, and by currently registered students prior to course selection.~~ **University jurisdiction** The University exercises its statutory jurisdiction and authority with respect to the operations, protection and control of its property and plant and the regulation of persons on campus insofar as is necessary to ensure the orderly performance of the University's functions. All members of the University community, as members of society at large, are subject to the law (federal, provincial, municipal) with respect to their actions, whether those actions occur on or off campus. ~~By registering and paying fees, students assume responsibility for knowing the regulations and pertinent procedures as set forth in this calendar.~~ The University reserves the right to require a student to withdraw from a program for academic reasons.	information about the University's jurisdiction is available in the Important notices section of this Calendar. ## Important notices **Disclaimer** The Graduate Studies Academic Calendar provides official information about courses, academic programs, related policies, and regulations for both students and applicants, as well as general information about the University. By the act of registration each student becomes bound by the policies of the University of Waterloo. Students are responsible for familiarizing themselves with the policies and regulations, general information, and specific requirements contained in the Calendar. The University reserves the right to change without notice any information contained in this Calendar, including but not limited to that related to tuition and other fees, standards of admission, course delivery or format, continuation of study, and the offering or requirements for the granting of degrees, diplomas, or certificates in any or all of its programs. The course listings and academic programs described in the Calendar represent Senate-approved requirements for the completion of graduate degrees. Circumstances beyond the control of the University may result in restrictions in the number and range of course and program choices, or other resources available to students as compared with those listed herein. Prospective students or new registrants should consult the most current information available from Graduate Studies and Postdoctoral Affairs (GSPA) or the various academic departments. The Senate and Board of Governors of the University of Waterloo reserve the right to invoke changes in this Calendar at any time without prior notice. GSPA has the authority to make editorial changes. Changes made after publication are noted on the applicable pages.

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
~~The Senate and Board of Governors of the University of Waterloo reserve the right to invoke changes in this Calendar, in either its printed or electronic form, at any time without prior notice.~~	**University jurisdiction** The University exercises its statutory jurisdiction and authority with respect to the operations, protection and control of its property and plant and the regulation of persons on campus insofar as is necessary to ensure the orderly performance of the University's functions. All members of the University community, as members of society at large, are subject to the law (federal, provincial, municipal) with respect to their actions, whether those actions occur on or off campus. The University reserves the right to refuse admission or readmission to any candidate or to require a student to withdraw when, in the opinion of University officials, a student poses a danger to the University community. The University also reserves the right to require a student to withdraw from a program or course(s) for academic or other reasons. **Access to Programs and Courses** The publication of this Calendar does not bind the University to the provision of courses, programs, schedules of study, or facilities as listed herein. Practical circumstances, such as significant budget shortfalls or the unavailability of qualified personnel, may restrict the actual choices available to students when compared with those listed in the Calendar or in other University publications. • The University reserves the right to limit access to, or to withdraw, courses or programs. • In the event that existing resources make it necessary to limit admission to a program, the admission process will be based on competition for the spaces available. • In such circumstances the University will endeavour, to the best of its ability, to enable students to complete their degree requirements in a satisfactory manner.

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
	Disruptive Events The University may face disruptive events beyond its reasonable control, such as (without limitation) strikes, lock-outs, floods, severe weather, disease or health emergencies, and malicious acts including through the Internet. In the event that the University takes decisions in the face of such disruptive events, it will do so having reasonable regard to, among other things, the direction of medical or other authorities, as appropriate, and will use its reasonable efforts to minimize the academic consequences to its students. • Tuition and mandatory fees continue to be set regardless of the method of instruction, and will not be refunded in the event instruction is interrupted and/or occurs by an alternative delivery model for all or any part of the academic year. • The University may revise, at any time, the format of course offerings or academic milestones such that courses or milestones are offered in whole or in part on an alternate delivery model to in-person classes. **COVID-19 Pandemic** Members of the University community, including students and employees, are asked to and expected to abide by the guidelines and recommendations of the local public health authorities, as well as any guidelines or rules that the University implements in an effort to reduce the public health risk posed by the COVID-19 pandemic. The circumstances of the pandemic continue to be unpredictable and evolving. The University community must recognize that risks exist, including the risk of contracting COVID-19, and that such risks cannot be eliminated.

Memorandum

To: **Members**
Senate Graduate and Research Council (SGRC)

From: **Julie Joza**
Director, Research Ethics

Date: **February 22, 2021**

Subject: **Membership on the Clinical Research Ethics Board**

This memo outlines a membership update that will be taking place on the Clinical Research Ethics Board (CREB). This update is for consideration and approval by the Senate Graduate and Research Council.

Membership renewal on CREB

Derek Macdonald, OD, FAAO, is renewing his term for an additional one year in the role of a member with expertise in optometry and vision science. Derek's additional one-year term will continue through to January 31, 2022. Dr. MacDonald is a community-based optometrist and began his first 3 year-term in 2018.

Biography: Dr. MacDonald operates an independent optometric practice, Ilex Eye Associates in Waterloo, since graduating from the University of Waterloo School of Optometry and Vision Science in 1992. Derek was a clinical instructor in the Ocular Health Clinic at the School for 6 years before becoming active with the Ontario Association of Optometrists and the Board of Directors from 1999-2007, including a 2-year term as President of the Association. Dr. MacDonald spent six years on Council with the College of Optometrists of Ontario and continues as Chair of the Inquiries, Complaints and Reports Committee. Derek has authored several peer-reviewed publications and delivered numerous invited lectures, the majority focusing on his expertise in glaucoma pathophysiology, diagnosis and management; ophthalmic imaging, ocular disease and ocular manifestations of systemic disease; and intra- and inter-professional and -organizational collaboration.

Reminder: A biography will be shared with SGRC members of all new and renewing members of the REBs going forward. This information will then become part of the public meeting minutes. SGRC members who wish to learn more about the qualifications or academic background and interests of the individual being nominated to the REB are encouraged to contact Julie Joza, Director, Research Ethics at jajoza@uwaterloo.ca. Julie will be pleased to discuss with SGRC members in advance of the meeting the information they may need to help support their decision to recommend the nomination of the individual in becoming a member of the REB. On behalf of the SGRC, the research ethics office retains a copy of each member's CV and expression of interest in being a REB member.

Prior to form submission, review the content revision instructions. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Theology

Effective date: Term: Fall Year: 2021

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New: Choose an item.

☐ Inactivate: Choose an item.

☐ Revise: from Choose an item. to Choose an item.

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Updating the Course title and Course description. Adding department Course consent and removing the TS 679 Prerequisite.

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: TS

Course number: 783

Course ID: 012839

Course title (max. 100 characters including spaces):

Current title: Integration Seminar
Revised title: Theology and Practice of Leadership

Course short title (max. 30 characters including spaces): Theol & Practice of Leadership

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Department

Course description:

Current description: This seminar provides a setting for understanding leadership through theology, biblical reflection, and practical experiences in ministry. The tasks of ministry will be reviewed in the context of power relations, boundaries, and self-care. Assignments include a case study research project and a final summative paper on personal call and vocation.

Revised description: What does Christian leadership look like? Students will compare and contrast leadership models, and integrate their experiences working in churches and Christian organizations. The course may explore topics such as missional purpose, visioning, conflict transformation, interculturality, the importance of boundaries and self-care. Students will discern vocation and callings to salaried and volunteer ministry through personal reflection and dialogue.

Meet type(s): Seminar Choose an item. Choose an item. Choose an item.

Primary meet type: Seminar

Delivery mode: On-campus

Requisites:

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

TS 783 has occasionally been under-enrolled. Because the course is the required capstone for those in the Applied Studies option (about 40% of students in the program), it must be offered every year. But for this reason, there are occasionally too few students to reach the critical mass necessary for productive seminar discussion. By expanding the scope and removing pre-requisites, the course is re-designed to appeal to students in the Coursework option (about 45% of students in the program) who may take it as an elective. Some students select the Coursework option rather than Applied Studies because they have extensive practical experience and may not feel that TS 678/679 Supervised Experience in Ministry is necessary for them. The focus is now on leadership and professionalization beyond formal study, rather than the completion of an academic program. The course will remain one in which students reflect on practical experience, whether from TS 678/679 Supervised Experience in Ministry, or from other settings. Department permission will be required. This will ensure that students in Coursework have practical experience, and that those in the Applied Studies option take the course near the end of their program.

Form completed by: Bekah Smoot-Enns
Department/School approval date (mm/dd/yy): Department: 12/04/2020
Conrad Grebel University College: 1/8/2021
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 01/06/2021
Faculty approval date (mm/dd/yy): ARTS GAG (for consultation): 1/21/21
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Graduate Studies
Program Revision Template

Prior to form submission, review the content revision instructions and information regarding major/minor modifications. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Theology

Program: Master of Theological Studies (MTS)

Program contact name(s): Jeremy Bergen, Bekah Smoot-Enns

Form completed by: Bekah Smoot-Enns

Description of proposed changes:
Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

Changing the title of a required course in the Applied Studies option of the Master of Theological Studies program.

Is this a major modification to the program? No

Rationale for change(s):

TS 783 has occasionally been under-enrolled. Because the course is the required capstone for those in the Applied Studies option (about 40% of students in the program), it must be offered every year. But for this reason, there are occasionally too few students to reach the critical mass necessary for productive seminar discussion. By expanding the scope and removing pre-requisites, the course is re-designed to appeal to students in the Coursework option (about 45% of students in the program) who may take it as an elective. Some students select the Coursework option rather than Applied Studies because they have extensive practical experience and may not feel that TS 678/679 Supervised Experience in Ministry is necessary for them. The focus is now on leadership and professionalization beyond formal study, rather than the completion of an academic program. The course will remain one in which students reflect on practical experience, whether from TS 678/679 Supervised Experience in Ministry, or from other settings. Department permission will be required. This will ensure that students in Coursework have practical experience, and that those in the Applied Studies option take the course near the end of their program.

Proposed effective date: Term: Fall Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/theology/theological-studies/master-theological-studies-mts

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements **Applied Studies option:**	**Degree requirements** **Applied Studies option:**

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:

Courses
 	
• Students must complete 16 graduate-level one-term courses (0.50 unit weight) including 4 core courses and the 4 Applied Studies required courses.
• Students must maintain a 75% average.
• Core courses (must be taken at CGUC):
  ○ TS 600 Thinking Theologically
  ○ TS 610 Studying the Old Testament
  ○ TS 611 Studying the New Testament
  ○ TS 640 The Mennonite Tradition in Historical Context
• Applied Studies required courses (must be taken at CGUC):
  ○ TS 677 Church and Ministry
  ○ TS 678 Supervised Experience in Ministry I
  ○ TS 679 Supervised Experience in Ministry II
  ○ TS 783 ~~Integration Seminar~~
	Courses
	
	• Students must complete 16 graduate-level one-term courses (0.50 unit weight) including 4 core courses and the 4 Applied Studies required courses.
	• Students must maintain a 75% average.
	• Core courses (must be taken at CGUC):
	  ○ TS 600 Thinking Theologically
	  ○ TS 610 Studying the Old Testament
	  ○ TS 611 Studying the New Testament
	  ○ TS 640 The Mennonite Tradition in Historical Context
	• Applied Studies required courses (must be taken at CGUC):
	  ○ TS 677 Church and Ministry
	  ○ TS 678 Supervised Experience in Ministry I
	  ○ TS 679 Supervised Experience in Ministry II
	  ○ TS 783 <u>Theology and Practice of Leadership</u>

How will students currently registered in the program be impacted by these changes?

Current students in the Applied Studies option <u>that have not previously taken TS 783 Integration Seminar</u> will now be required to take the course under the new title and description. Students who have previously taken TS 783 Integration will not be required to take the course under the new title and description.

Department/School approval date (mm/dd/yy): Department: 12/04/2020
Conrad Grebel University College: 1/8/2021

Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 01/06/2021

Faculty approval date (mm/dd/yy): ARTS GAG (for consultation): 1/21/21

Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Senate approval date (mm/dd/yy) (if applicable):

UNIVERSITY OF WATERLOO
FACULTY OF ENGINEERING

M E M O

TO: Kathy Winter, Assistant University Secretary & Privacy Officer Secretariat

FROM: S. Sivoththaman, Associate Dean, Graduate Studies
Faculty of Engineering

RE: Senate Graduate and Research Council Agenda

DATE: February 24, 2021

Please place the following motions forward for approval at the next meeting of SGRC. These changes were approved in the EFC meeting on February 23, 2021.

Items for Approval:

1. The department of **Management Sciences** would like to make the following calendar changes

   a. Remove instructor consent and updating prerequisites for MSCI 719
   b. Updating the course title and course description for MSCI 605
   c. Updating the course descriptions and prerequisites for MSCI 703
   d. Updating the course title, course description, and antirequisites for MSCI 724
   e. Updating prerequisites for MSCI 734
   f. Updating the course requirements listed in the GSAC for GDDA
   g. Updating the course requirements listed in the GSAC for MOT
   h. Updating the course requirements listed in the GSAC for MASc and MASc co-op
   i. Updating the course requirements listed in the GASC for PhD, MASc, MASc co-op

   Rationale for Request:

   a. Updating prerequisites. This course has MSCI 603 as prerequisite, but since 2017 our MASc/PhD students have been required to take MSCI 634 instead of MSCI 603 (which is offered for coursework MMSc students). Instructor consent not required.
   b. Updating the course description and title to be more consistent with how the course is currently taught. In the past MSCI 605 covered topics in both organizational behaviour and organizational theory, creating overlap with MSCI 620 Organizations and Technical Systems, which also covers organizational theory. This change reflects recent practice where MSCI 605 focuses only on organizational behaviour.
   c. Updating the course description to be more consistent with how the course is currently taught. Updating prerequisites. This course has MSCI 603 as a prerequisite, but since 2017 our MASc/PhD students have been required to take MSCI 634 instead of MSCI 603 (which is offered for coursework MMSc students).
   d. Updating the course description and title to be more consistent with how the course is currently taught. Originally the course was intended as an advanced applications course that assumed prior background in game theory. However, few students had the relevant background, so in practice the course has covered introductory topics in game theory as well as applications to various problems in Management Sciences.

e. Updating prerequisites. This course has MSCI 603 as a prerequisite, but since 2017 our MASc/PhD students have been required to take MSCI 634 instead of MSCI 603 (which is offered for coursework MMSc students).
f. The course requirements section incorrectly lists MSCI 723 as a required course instead of MSCI 623. MSCI 723 was inactivated in Fall 2017. The title of MSCI 605 is being revised to better reflect the course material that is currently taught.
g. The title of MSCI 605 is being revised to better reflect the course material that is currently taught. The titles of MSCI 602 and 607 are being revised in the GSAC to match the titles that appear in the course catalog.
h. The title of MSCI 605 is being revised to better reflect the course material that is currently taught. The title of MSCI 607 is being revised in the GSAC to match the title that appears in the course catalog.
i. The title of MSCI 605 is being revised to better reflect the course material that is currently taught.

2. The department of Electrical and Computer Engineering would like to make the following calendar changes:
   a. Remove anti-requisite ECE 765 from ECE 668

   Rationale for Request:

   Many years back, ECE 765 was the course number for Distribution Systems, this course was later given the new course number ECE 668. Therefore, ECE 765 and ECE 668 were made anti-requisites. Now, we want to use the course number ECE 765 for the new course Power System Protection. Hence the anti-requisite of ECE 765 with ECE 668 should be removed.

Your attention to these matters is kindly appreciated.

SS/em

Siva Sivoththaman

Prior to form submission, review the content revision instructions. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Effective date: Term: Spring Year: 2021

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New:

☐ Inactivate:

☐ Revise: from to

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Removing Instructor Consent and updating Prerequisites

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: MSCI

Course number: 719

Course ID: 001970

Course title (max. 100 characters including spaces): Operations Analytics

Course short title (max. 30 characters including spaces): Operations Analytics

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description:

This course covers predictive analytics that provides techniques to model the relationships between inputs and outcomes, and construct predictions about future outcomes, and prescriptive analytics that provides tools to

optimize actions against a complex set of objectives to find best practices and design best policies under all circumstances. The theoretical techniques will be applied to such chains, service industries, healthcare systems, revenue management, inventory management, and sports.

Meet type(s): Lecture Reading

Primary meet type: Lecture

Delivery mode: On-campus

Requisites:

Current prerequisite: MSCI 603
Revised prerequisites: MSCI 603 or MSCI 634

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

Updating prerequisites. This course has MSCI 603 as prerequisite, but since 2017 our MASc/PhD students have been required to take MSCI 634 instead of MSCI 603 (which is offered for coursework MMSc students). Instructor consent not required.

Form completed by: Erin Ackersviller
Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Prior to form submission, review the content revision instructions. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Effective date: Term: Spring Year: 2021

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New:

☐ Inactivate:

☐ Revise: from to

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Updating the Course title and Course description

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: MSCI

Course number: 605

Course ID: 001929

Course title (max. 100 characters including spaces):

Current title: Organizational Theory & Behaviour
Revised title: Organizational Behaviour

Course short title (max. 30 characters including spaces): Organizational Behaviour

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description:

Current description: Individuals in organizations; including personality perceptions, learning, and motivation; group processes, including work groups, leadership, communication, decision making, and the management of organizational change. Organizational theory, research and design; including overview of theories such as bureaucracy, open systems, organizational ecology. Issues of departmentation, differentiation, integration, power and politics; governance structures including agency and stakeholder theories. Interorganizational networks and organizational sets. Priority may be given to Management Sciences students.

Revised description: Introduction to the concepts of learning, person perception, attitudes, and motivation in an organization. Consideration of communication, roles, norms, and decision making within a group. Discussion of power, control, leadership, and management in light of the above concepts. Priority may be given to Management Sciences students.

Meet type(s): Lecture

Primary meet type: Lecture

Delivery mode: On-campus and also offered online

Requisites:

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

Updating the course description and title to be more consistent with how the course is currently taught. In the past MSCI 605 covered topics in both organizational behaviour and organizational theory, creating overlap with MSCI 620 Organizations and Technical Systems, which also covers organizational theory. This change reflects recent practice where MSCI 605 focuses only on organizational behaviour.

Form completed by: Erin Ackersviller
Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Prior to form submission, review the content revision instructions. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Effective date: Term: Spring Year: 2021

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New:

☐ Inactivate:

☐ Revise: from to

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Updating the Course description and Prerequisites

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: MSCI

Course number: 703

Course ID: 001958

Course title (max. 100 characters including spaces): Applied Optimization

Course short title (max. 30 characters including spaces): Applied Optimization

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description:

Current description: Nonlinear and combinatorial optimization problems with roughly equal emphasis on model formulation and solution techniques. Modelling emphasis is primarily on deterministic formulation of

management problems such as: inventory problems, equipment replacement, capital budgeting and production-inventory optimization. Selected techniques for each problem type are discussed. Priority may be given to Management Sciences students.

Revised description: The course focuses on the modeling and solution of practical optimization problems. It covers formulations based on integer and nonlinear optimization, solution approaches based on large-scale optimization, and algorithmic design and implementation. Topics include set covering formulations, Lagrangean relaxation, Benders decomposition, column generation, branch-and-price, nonlinear programming, and metaheuristics. Possible applications areas include bin packing, routing, scheduling, and logistics planning. Priority may be given to Management Sciences students.

Meet type(s): Lecture

Primary meet type: Lecture

Delivery mode: On-campus

Requisites:

Current prerequisite: MSCI 603
Revised prerequisites: MSCI 603 or MSCI 634

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

Updating the course description to be more consistent with how the course is currently taught.
Updating prerequisites. This course has MSCI 603 as a prerequisite, but since 2017 our MASc/PhD students have been required to take MSCI 634 instead of MSCI 603 (which is offered for coursework MMSc students).

Form completed by: Erin Ackersviller
Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Prior to form submission, review the content revision instructions. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Effective date: Term: Spring Year: 2021

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New:

☐ Inactivate:

☐ Revise: from to

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Updating the Course title, Course description, and Antirequisites

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: MSCI

Course number: 724

Course ID: 014928

Course title (max. 100 characters including spaces):

Current title: Design and Analysis of Information Procurement Mechanisms
Revised title: Game Theory and Recent Applications

Course short title (max. 30 characters including spaces): Game Theory & Applications

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Instructor

Course description:

Current description: This course covers analytical models and analysis for information procurement mechanisms. This class leverages optimization, game theory, and probability theory. Topics covered in this course include: mechanism design, scoring rules, prediction markets, and modeling feedback in markets.

Revised description: Introduction to game theory including symmetric and asymmetric games, as well as static and dynamic games. Topics include game rules and information, mixed and continuous strategies, moral hazard, adverse selection, and introductory mechanism design. Applications such as: sustainability in supply chains, prediction markets, and contract design, are reviewed in this course.

Meet type(s): Lecture Reading

Primary meet type: Lecture

Delivery mode: On-campus

Requisites:

Current antirequisite: MSCI 760 - Topic 35
Revised antirequisites: MSCI 760 - Topic 35, MSCI 700 - Topic 33

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

Updating the course description and title to be more consistent with how the course is currently taught. Originally the course was intended as an advanced applications course that assumed prior background in game theory. However, few students had the relevant background, so in practice the course has covered introductory topics in game theory as well as applications to various problems in Management Sciences.

Form completed by: Erin Ackersviller
Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Prior to form submission, review the content revision instructions. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Effective date: Term: Spring Year: 2021

Milestone

Note: milestone changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New:

☐ Inactivate:

☐ Revise: from to

Course

Note: some course changes also require the completion/submission of the Graduate Studies Program Revision Template.

☐ New: Complete all course elements below

☐ Inactivate: Complete the following course elements:
Course subject code, Course number, Course ID, Course title

☒ Revise: Complete all course elements below to reflect the proposed change(s) and identify the course elements being revised (*e.g. Course description, Course title*):

Updating Prerequisites

Course elements (complete as indicated above. Review the glossary of terms for details on course elements)

Course subject code: MSCI

Course number: 734

Course ID: 014930

Course title (max. 100 characters including spaces): Network Models and Applications

Course short title (max. 30 characters including spaces): Network Models

Grading basis: Numerical

Course credit weight: 0.50

Course consent required: Not required

Course description:

This course treats the broad subject of network models. Network flow problems form a special class of linear programming that arise in a wide variety of applications including transportation, telecommunications, logistics

and supply chain management. The purpose is to study the properties of network flow models, to discuss extensions and various solutions approaches, and to survey some applications.

Meet type(s): Lecture Reading

Primary meet type: Lecture

Delivery mode: On-campus

Requisites:

Current antirequisite: MSCI 700 - Topic 18
Current prerequisite: MSCI 603
Revised prerequisites: MSCI 603 or MSCI 634

Special topics course: Yes ☐ No ☒

Cross-listed course: Yes ☐ No ☒

Course subject code(s) and number(s) to be cross-listed with and approval status:

Sections combined/held with:

Rationale for request:

Updating prerequisites. This course has MSCI 603 as a prerequisite, but since 2017 our MASc/PhD students have been required to take MSCI 634 instead of MSCI 603 (which is offered for coursework MMSc students).

Form completed by: Erin Ackersviller
Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):

Graduate Studies
Program Revision Template

Prior to form submission, review the content revision instructions and information regarding major/minor modifications. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Program: Graduate Diploma (GDip) in Data Analytics (Type 2)

Program contact name(s): Rob Duimering, Hossein Abouee Mehrizi

Form completed by: Erin Ackersviller, Rob Duimering

Description of proposed changes:
Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

Updating the course requirements list in the GSAC.

Is this a major modification to the program? No

Rationale for change(s):

The course requirements section incorrectly lists MSCI 723 as a required course instead of MSCI 623. MSCI 723 was inactivated in Fall 2017. The title of MSCI 605 is being revised to better reflect the course material that is currently taught.

Proposed effective date: Term: Spring Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences/graduate-diploma-gdip-data-analytics

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements **Coursework option:** • **Courses** o Students must complete the following courses: ▪ MSCI 603 Principles of Operations Research ▪ MSCI 605 Organizational ~~Theory &~~ Behaviour ▪ MSCI 607 Applied Economics for Management	**Degree requirements** **Coursework option:** • **Courses** o Students must complete the following courses: ▪ MSCI 603 Principles of Operations Research ▪ MSCI 605 Organizational Behaviour ▪ MSCI 607 Applied Economics for Management

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
▪ MSCI 609 Quantitative Data Analysis for Management Sciences ▪ MSCI 718 Statistical Methods for Data Analytics ▪ MSCI 719 Operations Analytics ▪ MSCI ~~723~~ Big Data Analytics ▪ 1 pre-approved elective course	▪ MSCI 609 Quantitative Data Analysis for Management Sciences ▪ MSCI <u>623</u> Big Data Analytics ▪ MSCI 718 Statistical Methods for Data Analytics ▪ MSCI 719 Operations Analytics ▪ 1 pre-approved elective course

How will students currently registered in the program be impacted by these changes?

There will be no impact on current students. MSCI 723 has not been offered in recent years.

Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

Graduate Studies
Program Revision Template

Prior to form submission, review the content revision instructions and information regarding major/minor modifications. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Program: Master of Management Sciences (MMSc) - Management of Technology

Program contact name(s): Rob Duimering, Hossein Abouee Mehrizi

Form completed by: Erin Ackersviller, Rob Duimering

Description of proposed changes:
Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

Updating the course requirements list in the GSAC.

Is this a major modification to the program? No

Rationale for change(s):

The title of MSCI 605 is being revised to better reflect the course material that is currently taught. The titles of MSCI 602 and 607 are being revised in the GSAC to match the titles that appear in the course catalog.

Proposed effective date: Term: Spring Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences/master-management-sciences-mmsc-management-technology

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements **Coursework option:** • **Courses** o Students must demonstrate competency in the material covered by the following 6 courses: ▪ MSCI 602 ~~Principles~~ of Management of ~~Technology~~ ▪ MSCI 603 Principles of Operations Research ▪ MSCI 605 Organizational ~~Theory &~~ Behaviour ▪ MSCI 606 Foundations of Senior Management	**Degree requirements** **Coursework option:** • **Courses** o Students must demonstrate competency in the material covered by the following 6 courses: ▪ MSCI 602 Strategic Management of Technological Innovation ▪ MSCI 603 Principles of Operations Research ▪ MSCI 605 Organizational Behaviour ▪ MSCI 606 Foundations of Senior Management

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
▪ MSCI 607 Economic ~~Concepts~~ for Management ▪ MSCI 609 Quantitative Data Analysis for Management Sciences o Students in the program must take at least 2 additional courses, totaling a minimum requirement of 8 courses overall (0.50 unit weight per course/4 units of credit). These courses must be at the 600 and 700 level. Students must maintain an overall average of at least 73% at the end of each term, with no more than two failed courses overall.	▪ MSCI 607 <u>Applied</u> Economic<u>s</u> for Management ▪ MSCI 609 Quantitative Data Analysis for Management Sciences o Students in the program must take at least 2 additional courses, totaling a minimum requirement of 8 courses overall (0.50 unit weight per course/4 units of credit). These courses must be at the 600 and 700 level. Students must maintain an overall average of at least 73% at the end of each term, with no more than two failed courses overall.

How will students currently registered in the program be impacted by these changes?

There will be no impact on current students.

Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

Graduate Studies
Program Revision Template

Prior to form submission, review the content revision instructions and information regarding major/minor modifications. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Program: 1) Master of Management Sciences (MMSc)

2) Master of Management Sciences (MMSc) - Co-operative Program

Program contact name(s): Rob Duimering, Hossein Abouee Mehrizi

Form completed by: Erin Ackersviller, Rob Duimering

Description of proposed changes:
Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

Updating the course requirements list in the GSAC.

Is this a major modification to the program? No

Rationale for change(s):

The title of MSCI 605 is being revised to better reflect the course material that is currently taught. The title of MSCI 607 is being revised in the GSAC to match the title that appears in the course catalog.

Proposed effective date: Term: Spring Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences/master-management-sciences-mmsc

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences/master-management-sciences-mmsc-co-operative-program

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements **Coursework option:** • **Courses** o Students must successfully complete the following 4 General Requirement courses (0.50 unit weight per course/4 units): ▪ MSCI 603 Principles of Operations Research [this course may be replaced with	**Degree requirements** **Coursework option:** • **Courses** o Students must successfully complete the following 4 General Requirement courses (0.50 unit weight per course/4 units): ▪ MSCI 603 Principles of Operations Research [this course may be replaced with

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
MSCI 634 if a student has a strong background in Operations Research] ▪ MSCI 605 Organizational ~~Theory &~~ Behaviour ▪ MSCI 607 Economic ~~Concepts~~ for Management ▪ MSCI 609 Quantitative Data Analysis for Management Sciences	MSCI 634 if a student has a strong background in Operations Research] ▪ MSCI 605 Organizational Behaviour ▪ MSCI 607 <u>Applied</u> Economic<u>s</u> for Management ▪ MSCI 609 Quantitative Data Analysis for Management Sciences

How will students currently registered in the program be impacted by these changes?

There will be no impact on current students.

Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

Graduate Studies
Program Revision Template

Prior to form submission, review the content revision instructions and information regarding major/minor modifications. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Engineering

Program: 1) Doctor of Philosophy (PhD) in Management Sciences

2) Master of Applied Science (MASc) in Management Sciences

3) Master of Applied Science (MASc) in Management Sciences - Co-operative Program

Program contact name(s): Rob Duimering, Hossein Abouee Mehrizi

Form completed by: Erin Ackersviller, Rob Duimering

Description of proposed changes:
Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

Updating the core course requirements list in the GSAC.

Is this a major modification to the program? No

Rationale for change(s):

The title of MSCI 605 is being revised to better reflect the course material that is currently taught.

Proposed effective date: Term: Spring Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences/doctor-philosophy-phd-management-sciences

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences/master-applied-science-masc-management-sciences

https://uwaterloo.ca/graduate-studies-academic-calendar/engineering/department-management-sciences/master-applied-science-masc-management-sciences-co-operative-program

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Degree requirements **Thesis option:** • **Courses** o Core courses: ▪ MSCI 605 Organizational ~~Theory &~~ Behaviour	**Degree requirements** **Thesis option:** • **Courses** o Core courses: ▪ MSCI 605 Organizational Behaviour

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
▪ MSCI 607 Applied Economics for Management ▪ MSCI 623 Big Data Analytics ▪ MSCI 630 Human Computer Interaction ▪ MSCI 631 Probabilistic Models in Operations Research ▪ MSCI 634 Deterministic Models in Operations Research ▪ MSCI 641 Text Analytics	▪ MSCI 607 Applied Economics for Management ▪ MSCI 623 Big Data Analytics ▪ MSCI 630 Human Computer Interaction ▪ MSCI 631 Probabilistic Models in Operations Research ▪ MSCI 634 Deterministic Models in Operations Research ▪ MSCI 641 Text Analytics

How will students currently registered in the program be impacted by these changes?

There will be no impact on current students.

Department/School approval date (mm/dd/yy): 12/07/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 12/17/20
Faculty approval date (mm/dd/yy):
Senate Graduate & Research Council (SGRC) approval date (mm/dd/yy):
Senate approval date (mm/dd/yy) (if applicable):

UNIVERSITY OF WATERLOO

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Fax 519-746-3051

Senate Graduate and Research Council – Course/Milestone – New/Revision/Inactivation form

Faculty: Engineering
Effective term: Term/Year Spring 2021

Course ☒ New ☐ Revision ☒ Inactivation ☐
Milestone ☐ New ☐ Revision ☐ Inactivation ☐
New milestone title: Choose an item.

For course revisions, indicate the type(s) of changes *(e.g. consent, description, title, requisites)*: Remove anti-requisite ECE 765 from ECE 668.

Course Subject code: ECE Course number: 668
Course Title (max. 100 characters incl. spaces): Distribution System Engineering
Course Short Title (max. 30 characters incl. spaces): Distro Sys Eng
Grading Basis: NUMERICAL
Course Credit Weight: 0.50
Course Consent Required: ☐ Choose an item.
Course Description: This course covers the following topics in distribution engineering: Load Characteristics and distribution system load forecasting; Distribution system planning; Distribution system automation; Design and application of distribution transformers; Design and optimal operation of sub-transmission lines and distribution systems; Distribution system voltage regulation; Reactive power control for distribution systems; Application of capacitors to distribution systems; Calculation of voltage drops in lateral distribution systems; Calculation of power losses in distribution systems; Introduction to distribution system protection. Background Required - basic knowledge of power system operation and analysis.
New course description (for revision only):

Meet Type(s): Lecture Choose an item. Choose an item. Choose an item.
Primary Meet Type: Lecture
Requisites: none

Special topics course: Yes ☐ No ☒
Cross-listed: Yes ☐ No ☒
Course Subject(s) to be cross-listed with and approval status:
Sections combined/held with:

Rationale for request:

Many years back, ECE 765 was the course number for Distribution Systems, this course was later given the new course number ECE 668. Therefore, ECE 765 and ECE 668 were made anti-requisites. Now, we want to use the course number

ECE 765 for the new course Power System Protection. Hence the anti-requisite of ECE 765 with ECE 668 should be removed.

Prepared by: Jessica Rossi Date: 7-Apr-20

MEMORANDUM

TO: **Members of Senate Graduate and Research Council**

FROM: **Shoshannah Holdom, Administrator, Graduate Studies, Faculty of Environment**

SUBJECT: **Environment Graduate Studies Committee Report, February 2021**

The attached Program Revisions were approved by a Faculty of Environment e-vote (concluded on February 25, 2021); were reviewed by Trevor Clews; and are now being submitted for approval by the Senate Graduate and Research Council on March 8th, 2021.

Shoshannah Holdom

Attach.

Faculty of Environment

Graduate Studies Committee

Report to Senate and Graduate Research Council

1. **Program Revisions for Approval**

A) Planning Master's programs:

- to add a Master's Research Paper study option;
- to add information about course average requirements to the thesis study option;
- to add a description to the "Project Proposal Development Workshop" milestone within the thesis study option.

Proposed effective date: Spring 2021

i) MA
ii) MES

Graduate Studies
Program Revision Template

Prior to form submission, review the content revision instructions and information regarding major/minor modifications. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Environment

Program: Master of Arts (MA) in Planning

Program contact name(s): Joe Qian

Form completed by: Joe Qian

Description of proposed changes:
Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

1) *Adding a Master's Research Paper study option to the MA in Planning program.*
2) *Adding information about course average requirements to the thesis study option.*
3) *Adding a description to the "Project Proposal Development Workshop" milestone within the thesis study option.*

Is this a major modification to the program? Yes

Rationale for change(s):

1) *The changes offer students two options – a thesis or a master's research paper as a milestone for their MA degree. The newly introduced master's research paper option aims to prepare students to be planning practitioners after the completion of the degree. Most planning programs in Canada have the options of thesis and master's research paper. Students' research expertise can be demonstrated through a master's research paper. Students in the option of master's research paper would benefit from courses that provide opportunities for more training in planning.*
2) *To provide clarity and information for students, faculty, and staff on the course average requirements.*
3) *To provide clarity and information for students, faculty, and staff on the milestone requirements.*

Proposed effective date: Term: Spring Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/environment/school-planning/master-arts-ma-planning

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Graduate research fields	**Graduate research fields**

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:

• Human and Built Environment
• Physical/Natural Environment
 	
Program information
 	
• Admit term(s)
  ○ Fall
• Delivery mode
  ○ On-campus
• Length of program
  ○ Full-time: 2 years - 6 terms
  ○ Part-time: 5 years - 15 terms
• Program type
  ○ Master's
  ○ Research
• Registration option(s)
  ○ Full-time
  ○ Part-time
• Study option(s)
  ○ Thesis
 	
Admission requirements
 	
• Minimum requirements
  ○ A four-year honours bachelor degree (or equivalent), with a minimum overall average of 78%, from a recognized university; the undergraduate degree may be in planning or other fields relevant to planning including: architecture, biology, civil engineering, economics, forestry, geography, geology, landscape architecture, law, political science, sociology, or other resource disciplines or social sciences.
  ○ The name of one or more School of Planning faculty member(s) who would be a suitable advisor.
• Application materials
  ○ Résumé/Curriculum vitae
  ○ Supplementary information form
  ○ Transcript(s)
  ▪ Two official academic transcripts from each post-secondary institution.
  ○ Writing sample
  ▪ At least one substantial example of work completed during the last two years of academic study. Students with professional experience may submit a professional report of
	• Human and Built Environment
	• Physical/Natural Environment
	
	Program information
	
	• Admit term(s)
	  ○ Fall
	• Delivery mode
	  ○ On-campus
	• Length of program
	  ○ Full-time: 2 years - 6 terms
	  ○ Part-time: 5 years - 15 terms
	• Program type
	  ○ Master's
	  ○ Research
	• Registration option(s)
	  ○ Full-time
	  ○ Part-time
	• Study option(s)
	  ○ Thesis
	  ○ Master’s Research Paper
	
	Admission requirements
	
	• Minimum requirements
	  ○ A four-year honours bachelor degree (or equivalent), with a minimum overall average of 78%, from a recognized university; the undergraduate degree may be in planning or other fields relevant to planning including: architecture, biology, civil engineering, economics, forestry, geography, geology, landscape architecture, law, political science, sociology, or other resource disciplines or social sciences.
	  ○ The name of one or more School of Planning faculty member(s) who would be a suitable advisor.
	• Application materials
	  ○ Résumé/Curriculum vitae
	  ○ Supplementary information form
	  ○ Transcript(s)
	  ▪ Two official academic transcripts from each post-secondary institution.
	  ○ Writing sample
	  ▪ At least one substantial example of work completed during the last two years of academic study. Students with professional experience may

Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:
which they were sole or senior author. • References o Number of references: 3 o Type of references: at least 2 academic • English language proficiency (ELP) (if applicable) **Degree requirements** **Thesis option:** • Graduate Academic Integrity Module (Graduate AIM) • Courses o 5 700-level required one-term courses for a total of 2.50 units: ▪ PLAN 700 Planning Paradigms and Theory ▪ PLAN 701 Land Use Planning Fundamentals* ▪ PLAN 703 Planning Professional Practice ▪ PLAN 704 Methods of Planning Analysis ▪ PLAN 710 Research Design o 2 700-level required studio courses for a total of 2.00 units: ▪ PLAN 720 Introductory Planning Project Studio ▪ PLAN 721 Advanced Planning Project Studio o 3 600-level elective one-term courses for a total of 1.50 units. o Some elective graduate courses may be taken in other departments but the supervisor's advice and approval should be sought before registering. One half course may be a reading course. ▪ *Students with a prior degree in planning may request to substitute an extra elective in place of PLAN 701, subject to approval by the Associate Director, Graduate Studies. Requests should be emailed to the Graduate Program Administrator. • Link(s) to courses o Planning (PLAN) courses o Graduate course search • Graduate Studies Internship o Required during the first spring term.	submit a professional report of which they were sole or senior author. • References o Number of references: 3 o Type of references: at least 2 academic • English language proficiency (ELP) (if applicable) **Degree requirements** **Thesis option:** • Graduate Academic Integrity Module (Graduate AIM) • Courses o 5 700-level required one-term courses for a total of 2.50 units: ▪ PLAN 700 Planning Paradigms and Theory ▪ PLAN 701 Land Use Planning Fundamentals* ▪ PLAN 703 Planning Professional Practice ▪ PLAN 704 Methods of Planning Analysis ▪ PLAN 710 Research Design o 2 700-level required studio courses for a total of 2.00 units: ▪ PLAN 720 Introductory Planning Project Studio ▪ PLAN 721 Advanced Planning Project Studio o 3 600-level elective one-term courses for a total of 1.50 units. o Some elective graduate courses may be taken in other departments but the supervisor's advice and approval should be sought before registering. One half course may be a reading course. ▪ *Students with a prior degree in planning may request to substitute an extra elective in place of PLAN 701, subject to approval by the Associate Director, Graduate Studies. Requests should be emailed to the Graduate Program Administrator. o <u>Students must obtain an average of at least 70% in the courses presented in fulfilment of the degree requirements. A failing grade in any course will occasion</u>

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
○ The internship is intended to provide students who have not had prior planning work experience with the opportunity to work as paid or unpaid interns in professional settings. Internships will normally occur in the summer between the first and second years of the program, and are usually three to four months in duration. Internships may be with community-based organizations, corporations, government agencies, consulting firms, public interest groups, district health units, and planning departments of all levels of government, among other potential employers. ○ Although the School of Planning cannot guarantee a placement to every student who requires an internship, assisting students in securing valuable work experience during their program is a priority. ○ Students who have already completed a minimum of 10 weeks of work (min. 20 hours/week) in planning or a planning-related field will be considered to have met the internship requirement and will receive credit for the milestone (subject to approval by the Associate Director, Graduate Studies). Requests should be emailed to the Graduate Program Administrator. • Project Proposal Development Workshop • Master's Research Plan ○ An oral presentation must be completed in April of first year. • Master's Thesis ○ Students must write a thesis ~~(2.00 unit weight)~~ which contains evidence of research, analysis and synthesis. The thesis is supervised by a faculty advisor, examined by a committee of three or more members and is made available for anyone in the university or general public to use. The thesis must be defended successfully before an Examining Committee composed of a minimum of the student's Supervisor, one Committee member and one Reader. • Other requirements ○ Transfer between programs: permission to transfer from the Master of Planning (MPlan) program to the	an automatic review of a student's status by the School and may, in some cases, result in the requirement to withdraw from the program. • Link(s) to courses ○ Planning (PLAN) courses ○ Graduate course search • Graduate Studies Internship ○ Required during the first spring term. ○ The internship is intended to provide students who have not had prior planning work experience with the opportunity to work as paid or unpaid interns in professional settings. Internships will normally occur in the summer between the first and second years of the program, and are usually three to four months in duration. Internships may be with community-based organizations, corporations, government agencies, consulting firms, public interest groups, district health units, and planning departments of all levels of government, among other potential employers. ○ Although the School of Planning cannot guarantee a placement to every student who requires an internship, assisting students in securing valuable work experience during their program is a priority. ○ Students who have already completed a minimum of 10 weeks of work (min. 20 hours/week) in planning or a planning-related field will be considered to have met the internship requirement and will receive credit for the milestone (subject to approval by the Associate Director, Graduate Studies). Requests should be emailed to the Graduate Program Administrator. • Project Proposal Development Workshop ○ The Project Proposal Development Workshop helps students to refine their master's thesis research topic and develop their master's thesis research plan. • Master's Research Plan ○ An oral presentation must be completed in April of first year. • Master's Thesis ○ Students must write a thesis which contains evidence of research, analysis and synthesis. The thesis is supervised

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:

Master of Arts (MA) in Planning or Master of Environmental Studies (MES) in Planning programs, or from the MA or MES programs to the MPlan program, may be granted after the end of the first term of year one by the Associate Director, Graduate Studies (Graduate Officer) providing the student fulfills the requirements of the program they want to transfer to. A key requirement for MPlan students transferring to the MA or MES program is the written agreement of an appropriate faculty member to advise the students and of another appropriate faculty member to act as a committee member. The transfer does not imply any financial commitment by the School of Planning to support the student after the change in program of studies. However, this does not preclude a faculty member providing research support from grants or contract funds.	by a faculty advisor, examined by a committee of three or more members and is made available for anyone in the university or general public to use. The thesis must be defended successfully before an Examining Committee composed of a minimum of the student's Supervisor, one Committee member and one Reader.
	• Other requirements
	  ○ Transfer between programs: permission to transfer from the Master of Planning (MPlan) program to the Master of Arts (MA) in Planning or Master of Environmental Studies (MES) in Planning programs, or from the MA or MES programs to the MPlan program, may be granted after the end of the first term of year one by the Associate Director, Graduate Studies (Graduate Officer) providing the student fulfills the requirements of the program they want to transfer to. Students in the thesis option may switch to the master's research paper option by the end of their first academic year upon approval by the Associate Director, Graduate Studies. A key requirement for MPlan students transferring to the MA or MES program is the written agreement of an appropriate faculty member to advise the students and of another appropriate faculty member to act as a committee member. The transfer does not imply any financial commitment by the School of Planning to support the student after the change in program of studies. However, this does not preclude a faculty member providing research support from grants or contract funds.
	
	Master's Research Paper option:
	
	• Graduate Academic Integrity Module (Graduate AIM)
	• Courses
	  ○ 5 700-level required one-term courses for a total of 2.50 units:
	  ▪ PLAN 700 Planning Paradigms and Theory
	  ▪ PLAN 701 Land Use Planning Fundamentals*

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
	▪ PLAN 703 Planning Professional Practice ▪ PLAN 704 Methods of Planning Analysis ▪ PLAN 710 Research Design ○ 2 700-level required studio courses for a total of 2.00 units: ▪ PLAN 720 Introductory Planning Project Studio ▪ PLAN 721 Advanced Planning Project Studio ○ 5 600-level elective one-term courses for a total of 2.50 units. ○ Some elective graduate courses may be taken in other departments but the supervisor's advice and approval should be sought before registering. One half course may be a reading course. ▪ *Students with a prior degree in planning may request to substitute an extra elective in place of PLAN 701, subject to approval by the Associate Director, Graduate Studies. Requests should be emailed to the Graduate Program Administrator. ○ Students must obtain an average of at least 70% in the courses presented in fulfilment of the degree requirements. A failing grade in any course will occasion an automatic review of a student's status by the School and may, in some cases, result in the requirement to withdraw from the program. • Link(s) to courses ○ Planning (PLAN) courses ○ Graduate course search • Graduate Studies Internship ○ Required during the first spring term. ○ The internship is intended to provide students who have not had prior planning work experience with the opportunity to work as paid or unpaid interns in professional settings. Internships will normally occur in the summer between the first and second years of the program, and are usually three to four months in duration. Internships may be with community-based organizations, corporations, government agencies, consulting firms, public interest groups, district health

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How will students currently registered in the program be impacted by these changes?

Currently registered students in the thesis option will be permitted to switch to the Master's Research Paper option once the option is effective in Spring, 2021.

Department/School approval date (mm/dd/yy): 12/11/20
Reviewed by GSPA (for GSPA use only) ☒ date (mm/dd/yy): 02/19/21
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Graduate Studies
Program Revision Template

Prior to form submission, review the content revision instructions and information regarding major/minor modifications. For questions about the form submission, contact Trevor Clews, Graduate Studies and Postdoctoral Affairs (GSPA).

Faculty: Environment

Program: Master of Environmental Studies (MES) in Planning

Program contact name(s): Joe Qian

Form completed by: Joe Qian

Description of proposed changes:
Note: changes to courses and milestones also require the completion/submission of the SGRC Graduate Studies Course/Milestone Form.

1) *Adding a Master's Research Paper study option to the MES in Planning program.*
2) *Adding information about course average requirements to the thesis study option.*
3) *Adding a description to the "Project Proposal Development Workshop" milestone within the thesis study option.*

Is this a major modification to the program? Yes

Rationale for change(s):

1) *The changes offer students two options – a thesis or a master's research paper as a milestone for their MES degree. The newly introduced master's research paper option aims to prepare students to be planning practitioners after the completion of the degree. Most planning programs in Canada have the options of thesis and master's research paper. Students' research expertise can be demonstrated through a master's research paper. Students in the option of master's research paper would benefit from courses that provide opportunities for more training in planning.*
2) *To provide clarity and information for students, faculty, and staff on the course average requirements.*
3) *To provide clarity and information for students, faculty, and staff on the milestone requirements.*

Proposed effective date: Term: Spring Year: 2021

Current Graduate Studies Academic Calendar (GSAC) page (include the link to the web page where the changes are to be made):

https://uwaterloo.ca/graduate-studies-academic-calendar/environment/school-planning/master-environmental-studies-mes-planning

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:
Graduate research fields	**Graduate research fields**

Current Graduate Studies Academic Calendar content:	**Proposed Graduate Studies Academic Calendar content**:

• Human and Built Environment
• Physical/Natural Environment
 	
Program information
 	
• Admit term(s)
  ○ Fall
• Delivery mode
  ○ On-campus
• Length of program
  ○ Full-time: 2 years - 6 terms
  ○ Part-time: 5 years - 15 terms
• Program type
  ○ Master's
  ○ Research
• Registration option(s)
  ○ Full-time
  ○ Part-time
• Study option(s)
  ○ Thesis
 	
Admission requirements
 	
• Minimum requirements
  ○ A four-year honours bachelor degree (or equivalent), with a minimum overall average of 78%, from a recognized university; the undergraduate degree may be in planning or other fields relevant to planning including: architecture, biology, civil engineering, economics, forestry, geography, geology, landscape architecture, law, political science, sociology, or other resource disciplines or social sciences.
  ○ The name of one or more School of Planning faculty member(s) who would be a suitable advisor.
• Application materials
  ○ Résumé/Curriculum vitae
  ○ Supplementary information form
  ○ Transcript(s)
  ▪ Two official academic transcripts from each post-secondary institution.
  ○ Writing sample
  ▪ At least one substantial example of work completed during the last two years of academic study. Students with professional experience may submit a professional report of
	• Human and Built Environment
	• Physical/Natural Environment
	
	Program information
	
	• Admit term(s)
	  ○ Fall
	• Delivery mode
	  ○ On-campus
	• Length of program
	  ○ Full-time: 2 years - 6 terms
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Current Graduate Studies Academic Calendar content:	Proposed Graduate Studies Academic Calendar content:

which they were sole or senior author.
• References
  ○ Number of references: 3
  ○ Type of references: at least 2 academic
• English language proficiency (ELP) (if applicable)
 	
Degree requirements
Thesis option:
 	
• Graduate Academic Integrity Module (Graduate AIM)
• Courses
  ○ 5 700-level required one-term courses for a total of 2.50 units:
  ▪ PLAN 700 Planning Paradigms and Theory
  ▪ PLAN 701 Land Use Planning Fundamentals*
  ▪ PLAN 703 Planning Professional Practice
  ▪ PLAN 704 Methods of Planning Analysis
  ▪ PLAN 710 Research Design
  ○ 2 700-level required studio courses for a total of 2.00 units:
  ▪ PLAN 720 Introductory Planning Project Studio
  ▪ PLAN 721 Advanced Planning Project Studio
  ○ 3 600-level elective one-term courses for a total of 1.50 units.
  ○ Some elective graduate courses may be taken in other departments but the supervisor's advice and approval should be sought before registering. One half course may be a reading course.
  ▪ *Students with a prior degree in planning may request to substitute an extra elective in place of PLAN 701, subject to approval by the Associate Director, Graduate Studies. Requests should be emailed to the Graduate Program Administrator.
• Link(s) to courses
  ○ Planning (PLAN) courses
  ○ Graduate course search
• Graduate Studies Internship
  ○ Required during the first spring term.
	submit a professional report of which they were sole or senior author.
	• References
	  ○ Number of references: 3
	  ○ Type of references: at least 2 academic
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UNIVERSITY OF WATERLOO | Graduate Studies and Postdoctoral Affairs

February 22, 2021

TO: Kathy Winter, Assistant University Secretary and Privacy Officer, Senate Graduate and Research Council

FROM: Heidi Mussar, Associate Director, Graduate Financial Aid & Awards

RE: Agenda items for Senate Graduate & Research Council – March 2021

Items for Approval

a) Graduate Scholarship in Clinical Psychology – trust

One scholarship valued at $4,000 will be awarded annually to a full-time student enrolled in the doctoral program of the Clinical Psychology program in the Department of Psychology in the Faculty of Arts. The award will be granted to a student who does not hold an external scholarship at the time of selection and is amongst the top-ranked in the current year's Ontario Graduate Scholarship (OGS) departmental rankings, as determined by the Department of Psychology's OGS ranking committee. The Department of Psychology will identify candidates and select recipients normally each Spring. This scholarship is made possible by an anonymous donor.

The first selection will be made in May 2021 and the last in May 2025.

Total gift: $20,000

b) Professor James A.A. Field Graduate Scholarship in Electrical & Computer Engineering – trust

A scholarship, valued at $4,000, will be awarded annually to a full-time female graduate student enrolled in the course-based master's program in the Electrical & Computer Engineering Department in the Faculty of Engineering, wherein women are underrepresented. Eligible candidates must have a minimum overall average of 80% in their current program. Selection of a recipient will be made automatically in the Winter term by the Department of Electrical & Computer Engineering.

This award is made possible by a donation from Isobel Field in memory of her late husband to help support female graduate students. Professor James A.A. Field was one of the founding members of the Department of Electrical & Computer Engineering at the University of Waterloo, from which he retired as Professor Emeritus.

Total gift = $20,000; first selection will be made in 2021 and the last in 2025.

Items for Information

c) Ping Yang Memorial Graduate Scholarship – trust

Originally approved in May 2014 and then sent for information purposes in October 2014 as follows:

> A scholarship, valued at $5,000 will be awarded annually to a full-time graduate student registered in the Master's or Doctoral program in the Department of Applied Mathematics in the Faculty of Mathematics who is conducting research in Mathematical Oncology. Selection will be made on the basis of academic excellence (minimum 80%). This fund is made possible by donations from friends and family to honour Ping Yang, the late wife of Barry Henderson MBATH '69.

The scholarship is being renewed with an additional gift of $20,000; the last award selection through this gift will be made in May 2025.

d) Economic Development Program Graduate Scholarship – endowment

Originally established in 1987, a review of the terms of the MAES Industrial development Graduate Scholarship was done and an amendment implemented to reflect programmatic changes and to better meet the needs of the student body.

The MAES Industrial Development Graduate Scholarship will now be known as the Economic Development and Innovation Graduate Scholarship.

The eligibility criteria and selection process will be updated from:
The award will be made by the Admissions Committee for the MAES – Industrial Development Program. It will not be necessary to apply for the award. Preference will be given to applicants with work experience in economic development. There will not be any restrictions in terms of recipients holding the awards.

to:

- Open to graduate students registered full time in the Master of Economic Development and Innovation Program in the School of Environment, Enterprise and Development, Faculty of Environment.
- Selection to be based on academic excellence (minimum 80% cumulative average).
- No application is required.
- The Program Director of the Master of Economic Development and Innovation Program will identify candidates and select recipients normally each Fall term.
- The Program Director of the Master of Economic Development and Innovation Program will determine where funds are most beneficial either as entrance scholarship or in course scholarship.