

Research Impact and Performance

2021-2022



The College of Biological Science (CBS) at the University of Guelph (U of G) prides itself on being a globally recognized academic unit with a mission to expand the understanding of life, from DNA to cells to complex ecosystems.

One hundred full-time faculty, 70 full-time staff, 400 graduate students and numerous undergraduates contribute to our research enterprise across three departments: Human Health and Nutritional Sciences (HHNS), Integrative Biology (IB), and Molecular and Cellular Biology (MCB). CBS is also home to the Centre for Biodiversity Genomics (CBG) and the re-envisioned Biodiversity Institute for Conservation Synthesis or BICS (formerly the Biodiversity

Institute of Ontario), which officially launched in October 2022.

This is CBS's second annual Research Impact and Performance Report, which evaluates 20 metrics across four themes (Table 1). The period covered by this report is the 2021/22 fiscal year (FY22), May 1, 2021 to April 30, 2022. Because this is our second year of reporting, we are pleased to now provide a comparison with last year's data for each metric as well.

For a summary of how all CBS research metrics have changed between FY21 and FY22, see Table 2 at the end of this report. Please note that BICS funding will start being reported in FY23.

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Photography courtesy of Dr. Leah Bent, Claire Bruner-Prime, Dr. Jamie Burr, Dr. John Fryxell, Emma Mably, Dr. Amy Newman, Dr. Ryan Norris, Karen Whyllie

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Table 1: Research impact and performance metrics, May 2021–April 2022

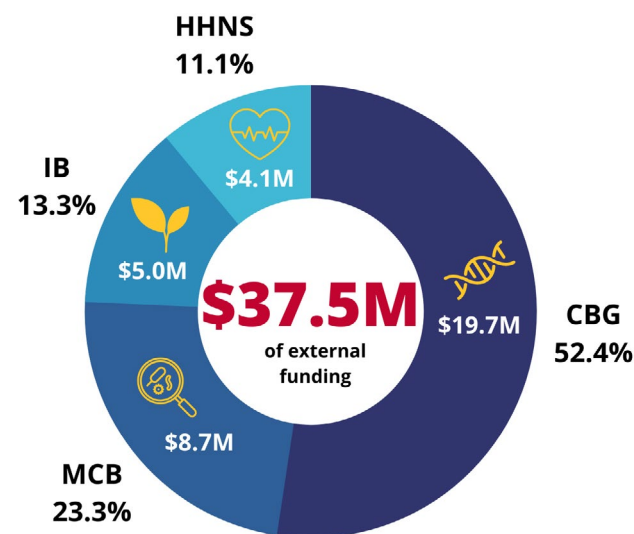
1. Research funding	1.1	Amount of external research funding secured by CBS members
	1.2	Percentage of CBS faculty holding tri-agency funding
	1.3	Amount of tri-agency and non tri-agency funding brought into CBS
	1.4	Number of distinct funding organizations to which CBS faculty apply
	1.5	Number of distinct funding organizations providing support to CBS research
	1.6	Percentage of CBS faculty holding two or more grants
	1.7	Amount of college investment in research support
2. Research excellence and impact	2.1	Number of awards or prizes that recognize excellence in research
	2.2	Number of occasions where CBS endeavours are promoted by a credible external party
	2.3	Number of peer-reviewed publications
	2.4	Citation impact for CBS
	2.5	Percentage of publications that include two or more CBS faculty coauthors
3. SoTL research	3.1	Quantity and citation impact of SoTL publications
	3.2	Number of faculty and staff actively engaged in SoTL and teaching innovations
	3.3	Value of grants awarded for SoTL and teaching innovations
4. Graduate training	4.1	Number of graduate students entering the college
	4.2	Amount of research-specific funding awarded to CBS graduate students
	4.3	Percentage of full-time students with a major research award
	4.4	Time to completion
	4.5	Student satisfaction with quality of graduate supervision





1. Research Funding

1.1 Amount of external research funding secured by CBS members

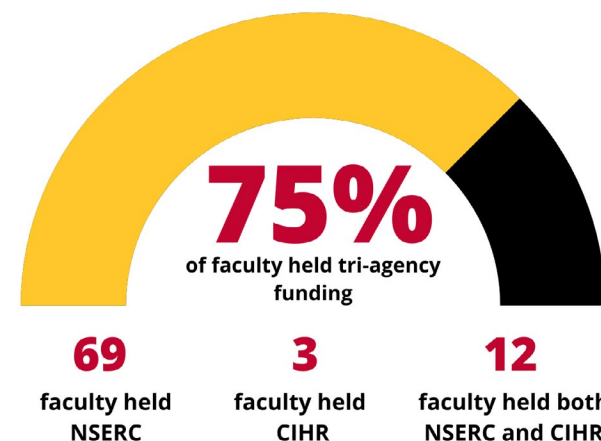


CBS faculty secured a total of \$37,586,501 in external research funding, including philanthropic research donations, in the period May 2021–April 2022. The breakdown of this total was \$19,695,360 for CBG, \$8,744,662 for MCB, \$4,992,898 for IB, and \$4,135,582 for HHNS. The average funding per year per faculty member was \$224,222 for MCB, \$207,679 for HHNS, and \$161,061 for IB.

Change since last year: +97%

FY22 saw a 97% increase in total funding to CBS compared to FY21, when the College received a total of \$19.1M. The increase in FY22 is due in large part to several major grants to CBG in FY22, including a New Frontiers Transformation Grant, Ontario Research Fund – Research Excellence award, Food from Thought funding and a Genome Canada Large Scale Applied Research Project.

Other major grants received by CBS faculty in FY22 include a CIHR Training Grant and a philanthropic gift from the G. Magnotta Foundation.



Change since last year:
+13.77% (tri-agency)
+144.73% (non tri-agency)

Overall, CBS faculty received \$4,182,619 from NSERC and \$3,727,941 from CIHR. This means CBS secured 14.7% of total NSERC and 57.7% of total CIHR funding at UofG during the reporting period.

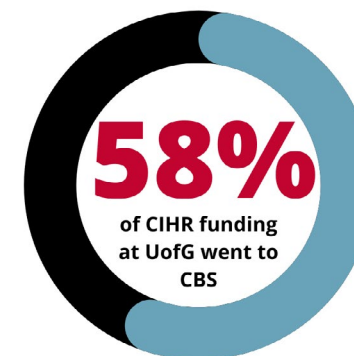
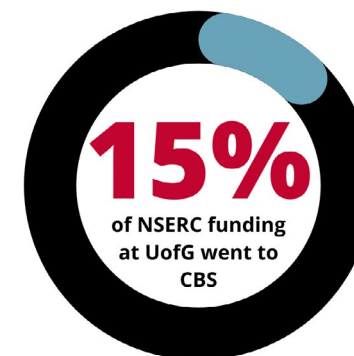
1.2. Percentage of CBS faculty holding tri-agency funding

In this reporting period, 75% of CBS faculty members (84 out of 112, including regular, contractually limited, adjunct and retired faculty with active research programs) held tri-agency funding. Most faculty (69) held funding from the Natural Science and Engineering Research Council (NSERC), while 12 others held both NSERC and Canadian Institutes of Health Research (CIHR) grants concurrently, and three faculty held CIHR grants alone.

Change since last year: -5.06%

1.3. Amount of tri-agency and non tri-agency funding brought into CBS

CBS faculty secured \$7,910,560 from tri-agency and \$29,675,941 from non tri-agency sources. HHNS primarily received tri-agency funding (\$2,304,269 tri-agency; \$1,849,313 non tri-agency). IB received more funding from non tri-agency sponsors (\$3,416,831 non tri-



1.4. Number of distinct funding organizations to which CBS faculty apply

CBS faculty applied to 60 distinct funding organizations during 2021–22. These included the New Frontiers in Research Fund, CIHR,

NSERC, SSHRC, Parks Canada, Environmental and Climate Change Canada, Agriculture and Agri-Food Canada, Ontario Centre for Innovation, Great Lakes Fishery Commission, Mitacs, Heart and Stroke Foundation of Canada, Johnson & Johnson, and Illumina Canada, among others.

 Change since last year: +7.14%

1.5. Number of funding organizations providing support to CBS research

A total of 59 organizations provided research funding to CBS in the reporting period. The 25 (43.4%) not-for-profit or charitable organizations that funded CBS research included Ontario Genomics, Battelle Memorial Institute, Brain



59

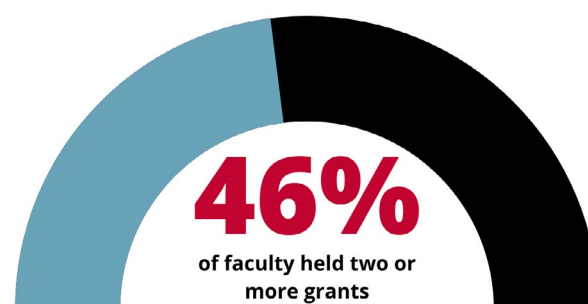
distinctive organizations provided funding support

-  **25** not-for-profit/charitable org.
-  **17** businesses and industries
-  **13** government agencies
-  **4** others

Canada Foundation, G. Magnotta Foundation, and Weston Family Foundation, among others. The Canadian government (both federal or provincial) also supported CBS research through 13 agencies and/or programs. Some examples at the federal level include Fisheries and Oceans Canada, Environment and Climate Change Canada, the Canada Foundation for Innovation, and the New Frontiers in Research Fund. At the provincial level, CBS research was supported by the Ministries of Agriculture, Food, and Rural Affairs and Colleges and Universities. Lastly, 17 distinct businesses and industries (e.g., Atlas 365, Songbird Life Science Inc., grower associations) and four other groups (e.g., universities in the U.S., private citizens) supported CBS research in 2021–22.

 Change since last year: +1.72%

1.6. Percentage of CBS faculty holding two or more grants



Forty-six percent of CBS faculty (52 out of 112, including regular, contractually limited, adjunct and retired faculty with active research programs) held two or more grants in the reporting period. Three faculty members held nine grants, the highest number of grants held by single faculty members. A total of 212 unique research projects were carried out in 2021–22 across CBS.

 Change since last year: -9.80%

1.7. Amount of college investment in research support

Research investments by the College in 2021–22 amounted to \$5,712,605. Most of the investment was put towards Grad Growth Funding (RAG) transfers to faculty and CBS-funded scholarships and awards (\$1,726,112), start-up funding for new faculty (\$1,376,930), and research-related staffing and research stipends for Associate Deans and Chairs (\$1,325,639). Other significant investments included operation of facilities (AAC: \$304,201; Aqualab: \$193,178; HNRU: \$169,321; Animal Wing: \$169,634), as well as ADR operations and ad hoc general research support (\$447,591), which included college contributions for matching funds. The breakdown of investments per department is shown in figure above right.

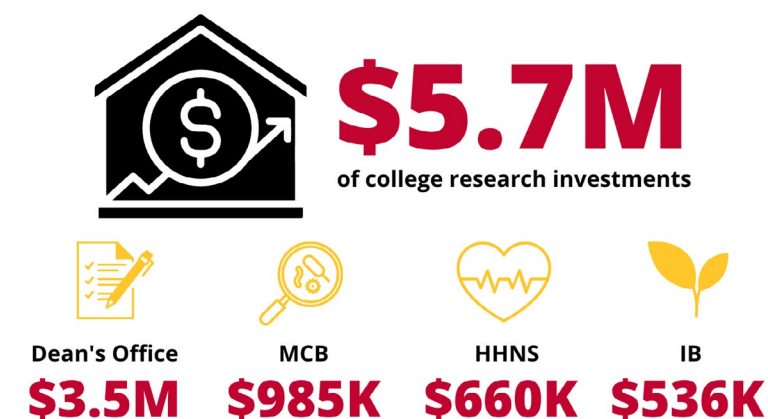
 Change since last year: +15.05%

Research Excellence and Impact

2.1. Number of awards or prizes that recognize excellence in research

In 2021–22, Jennifer Geddes-McAlister and Wei Zhang were recognized with an Early Researcher Award from the Ontario government for their research excellence. Scott Ryan was selected as a

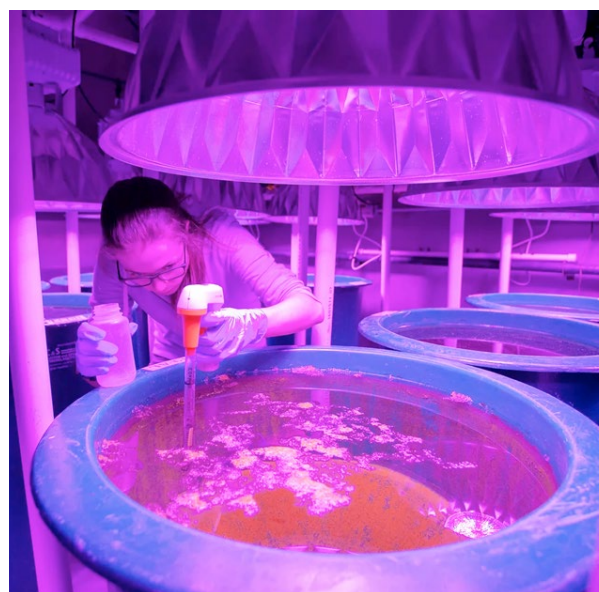
Data sources:
1.1-1.6: Office of Institutional Research and Planning
1.7: CBS Dean's Office




recipient of a U of G Research Excellence Award. Rebecca Shapiro was named CIFAR Azrieli Global Scholar for 2021-23 and Clara Cho became a Tier 2 Canada Research Chair (CRC).

Leah Bent and Hafiz Maherali continued to hold U of G Research Leadership Chairs, while five other faculty members continued existing CRC positions: Emma Allen-Vercoe (Tier 1), Paul Hebert, (Tier 1), Chris Whitfield (Tier 1), David Wright (Tier 2), and Rebecca Shapiro (Tier 2).

Nina Jones and Andrew MacDougall continue their membership of the Royal Society of Canada's College of New Scholars, Artists and Scientists, while Paul Hebert, John Fryxell, and Kevin McCann are lifetime fellows of the Royal Society of Canada's Academy of Science.



 Change since last year: +57.14%

2.2. Number of occasions where CBS endeavours are promoted by a credible external party


The College was mentioned at least 55 times by external parties as well as featured 58 times on the U of G News website. CBS endeavours were promoted primarily in the context of recent research discoveries from faculty, but also faculty expert opinions highlighted in the media, new grants awarded to CBS faculty, student awards and scholarships, recent publications, and scientific translation and outreach pieces written by CBS members.


1 New Canada Research Chair **2** New Early Researcher Awards **1** New Research Excellence Award **1** New Azrieli Global Scholar



2.3. Number of peer-reviewed publications

According to Web of Science, CBS produced a total of 383 publications (peer-reviewed articles) between May 2021 and April 2022. Out of these 383 papers, 160 were published by CBG/IB, 137 by HHNS, 84 by MCB, and two were interdepartmental collaborations. The breadth of disciplines represented in these traditional research outputs is a result of the diverse research happening across CBS, from ecology to physiology, sport science, nutrition, microbiology, environmental sciences, microbiology, and neuroscience, among others.

 **383** peer-reviewed publications

 Change since last year: -5.90%

2.4. Citation impact for CBS

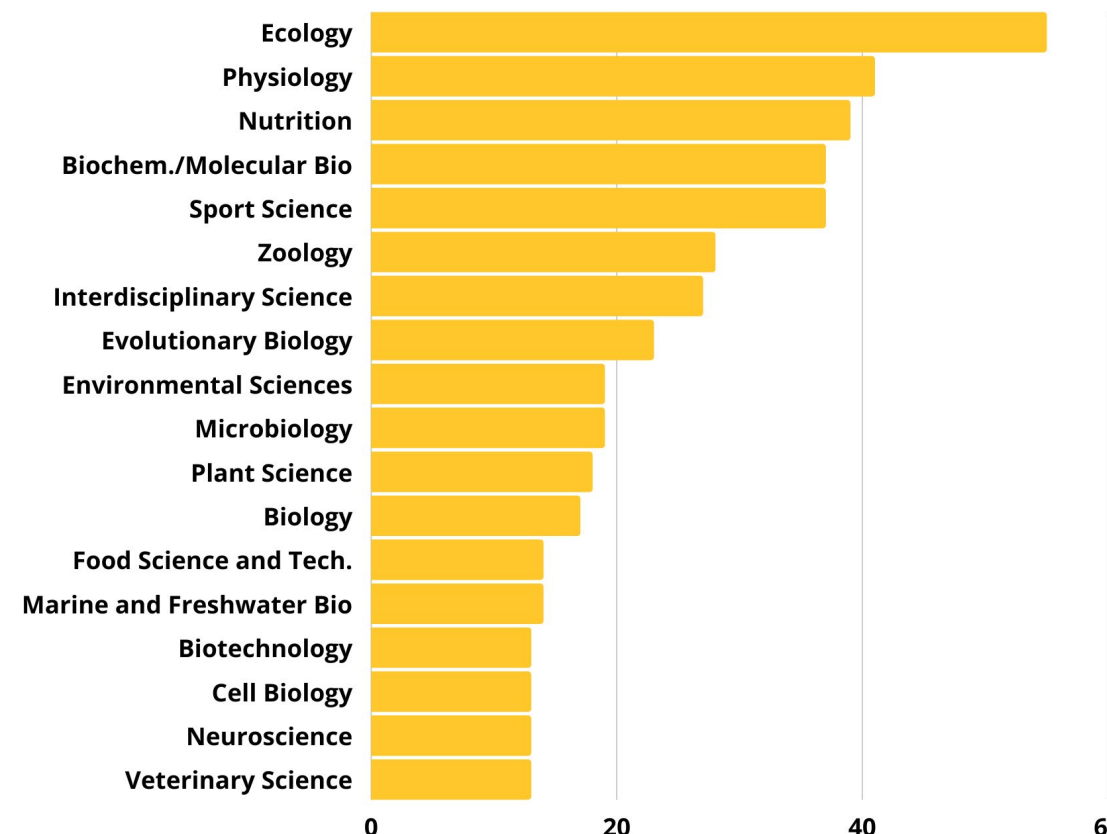
The 383 publications produced by CBS between in the fiscal year 2021–22 had received 902 citations by November 2022, resulting in an average citation

rate of 2.36. For comparison purposes, Web of Science baseline citations rates (i.e., expected citations) in November 2022 for papers published in 2021 were 2.03 for plant and animal science, 2.95 for neuroscience and behaviour, 3.59 for microbiology, 3.6 for environment/ecology, 3.57 for biology and biochemistry, and 4.32 for molecular biology and genetics.

 Change since last year: -35.52%

To add more context to the impact of CBS publications, papers published by CBS faculty since 2019 (which have had more time to gain traction) had received a citation rate of 7.46 by

Number of publications within major research areas




The classification of publications into research areas in the bar graph below is provided by Web of Science. A publication can be classified into more than one research area. The graph does not show all research areas.

November 2022. Baseline citations rates reported by Web of Science in November 2022 for papers published in 2019 were 7.94 for plant and animal science, 12.92 for neuroscience and behaviour, 13.39 for microbiology, 13.25 for environment/ecology, 14.43 for biology and biochemistry, and 17.88 for molecular biology and genetics.

2.5. Percentage of publications that include two or more CBS faculty co-authors


Out of the 383 publications produced by CBS, 10.97% (42) are collaborations that include two or more CBS faculty as co-authors. When looking at the affiliation of those CBS co-authors, 40 were intradepartmental collaborations (within HHNS, MCB, or IB/CBG), and two were interdepartmental (across departments).

 Change since last year: -30.13%

3. Scholarship of Teaching and Learning Research


3.1. Quantity and citation impact of SoTL publications

Seven publications were produced by CBS faculty and staff in the Scholarship of Teaching and Learning (SoTL) during the reporting period. The average citation rate of these publications in February 2023 was 1.43, while the baseline citation rate for 2021 social sciences papers was 2.3.

 Change since last year:
0.00% (quantity)
-37.28% (citation impact)

3.2. Number of faculty and staff actively engaged in SoTL and teaching innovations

Seventeen faculty and 19 staff members across CBS conduct research in SoTL and/or are involved in the design and development of innovative teaching practices.


 Change since last year:
+6.25% (staff)
+18.75% (faculty)

3.3. Value of grants awarded for SoTL and teaching innovations

The College of Biological Science Office of Educational Scholarship and Practice (COESP) committed \$10,000 to BioEd Research Grants




and \$500 to a COESP BioEd Graduate Student Research Award, setting the internal investment in SoTL at \$10,500.

 Change since last year: +16.67%

4. Graduate Training

4.1. Number of graduate students entering the college

In 2021–2022, 140 graduate students entered CBS to pursue graduate studies: 119 students enrolled in a master's program (thesis or coursework) and 21 in a PhD program (transfer students not included).

 Change since last year: +6.06%

In the same period, 149 students graduated — 122 from a master's program and 27 from a PhD program. The total enrollment was 427 students: 84 in course-based masters (30 MBIOT, 29 MBINF, 25 HHNS), 163 in MSc (8 BINF, 28 HHNS, 64 IB, 53 MCB, 10 collaborative programs), and 180 in PhD (7 BINF, 40 HHNS, 56 IB, 63 MCB, 14 collaborative programs). Two PhD students are engaged with cotutelles with other institutions (Maastricht University and University of Bremen).

Data sources:

2.1: CBS Dean's Office, Royal Society of Canada, Government of Ontario, Office of Institutional Research and Planning.

2.2: Google, U of G News

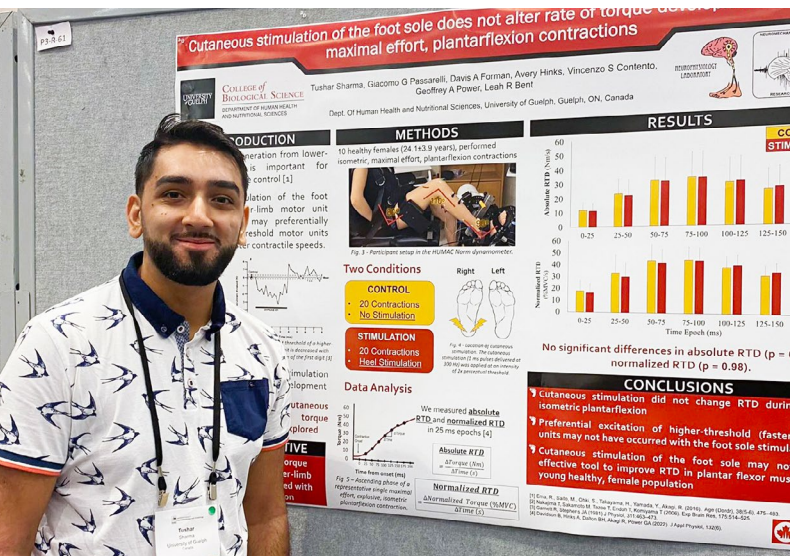
2.3-2.5: Web of Science

Data sources:

3.1: Web of Science, Google Scholar

3.2, 3.3: COESP

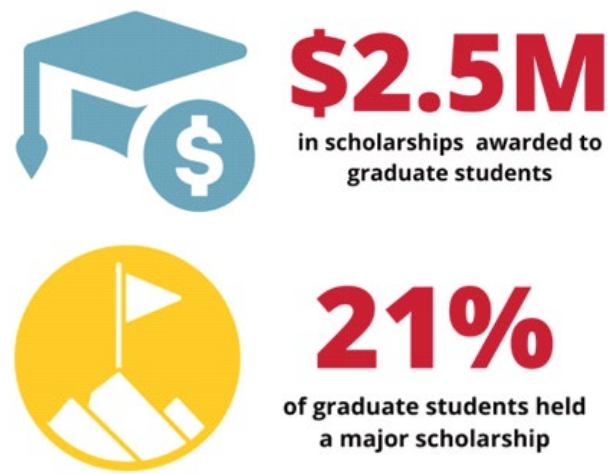
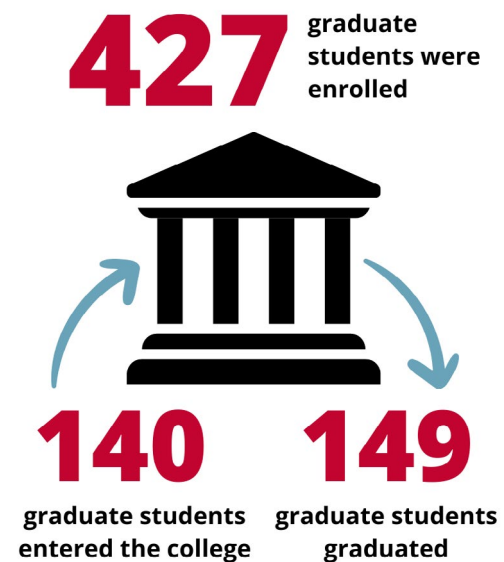




4.2. Amount of research-specific funding awarded to CBS graduate students

CBS graduate students in thesis-based programs received a total of \$2,494,745 in scholarships from sources outside the college. The CBS graduate student body saw an additional \$104,600 in the form of bursaries. Overall, 194 students (45.4%) received some form of external scholarship or bursary support for their graduate studies.

Change since last year: -10.91%



4.3. Percentage of full-time students with a major research award

During 2021–22, 88 graduate students (20.6% of the graduate student population) held a total of 97 major awards. Of these awards, 42 were Ontario Graduate Scholarships (OGS), 20 were Canada Graduate Scholarship-Doctoral (CGS-D), 14 were Postgraduate Scholarship-Doctoral (PGS-D), and 15 were Canada Graduate Scholarship-Masters (CGS-M). Two students held Arrell Scholarship funding and another two were supported by a Brock Doctoral Scholarship. Two students also held the prestigious Vanier Doctoral Scholarship.

Change since last year: -11.59%

4.4. Time to completion

The cohort of PhD students who started their program in 2014–15* has graduated with an average time to completion of 14.2 terms**. Thesis-based master students who entered the college in 2018–19* have needed, on average, 6.4 terms (without leaves of absence) to complete their program**. The cumulative average for time to completion in CBS (since 2003–04) is 13.9 terms for PhD programs and 5.8 terms for thesis-based master programs (without leaves of absence).

Change since last year:
0.00% (PhD)
-7.25% (MSc)

4.5. Student satisfaction with quality of graduate supervision

On average, 82% of graduate students in CBS have expressed satisfaction with the quality of their supervision. There were small differences between departments, with IB being the department with the highest satisfaction (87.5%), followed by MCB (81%) and HHNS (79%).

Change since last year: +6.49%

In general, most students agree (somewhat agree or completely agree) that their advisor cares about their long-term professional success (84%), gives them an appropriate level of autonomy and independence (82%), stimulates their intellectual development (81%), and ensures students have the resources they need for their research (80%). Many students also think their advisor provides a

safe and respectful work environment (79%), cares about their wellbeing (78%), is available to meet when needed (77%), supports them in publishing research (76%), and is friendly in their interactions (76%).

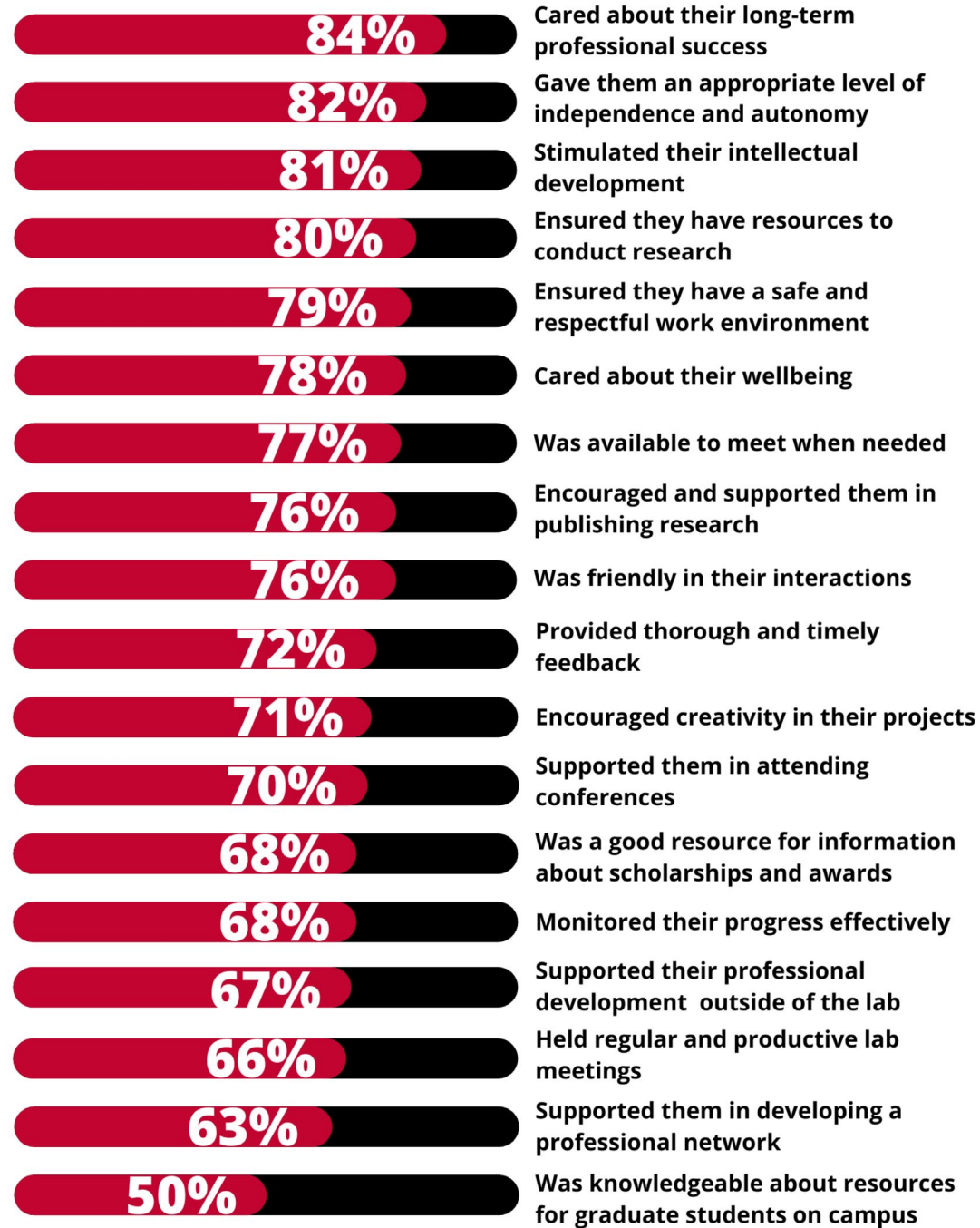
Students across CBS expressed lower agreement with other aspects of their graduate supervision. These include, for example, their advisor's capacity to provide timely and thorough feedback (72%), encourage creativity (71%), support conference attendance (70%), monitor their progress effectively (68%), support them in developing professional networks (63%), and be aware of resources available to graduate students across campus (50%).

*Most recent year for which at least 90% of the cohort have graduated.
**Some delays were caused by the pandemic.
Data sources:
4.1, 4.4: Office of Institutional Research and Planning
4.2, 4.3: Office of Graduate and Postdoctoral Studies
4.5: ADR Office 2022 Quality of Graduate Supervision Survey





Students agreed that their advisor...



Conclusion

The College will continue monitoring these metrics of Research Impact and Performance metrics on an annual basis to support evidence-based decision-making and to guide the development of existing and new initiatives for its research and graduate studies enterprise. The information contained in this report will be used to assess CBS

strengths and weaknesses, but more importantly to reflect upon past experiences and identify areas of improvement for the future. Information in this report is also being considered in the development of the College's 2023–2028 Strategic Plan.

Any comments or questions about this report can be directed to cbsadr@uoguelph.ca.

Table 2. Research impact and performance metrics in FY 2020–21 and 2021–22

Research Funding

Research impact and performance metrics	2020–21	2021–22	Net change (%)
1.1. Amount of external research funding secured by CBS members	19,079,273	37,586,501	+97.00
i. MCB	8,027,531	8,744,662	+8.93
ii. HHNS	2,051,231	4,135,582	+101.61
iii. IB	4,432,029	4,992,898	+12.65
iv. CBG	4,658,478	19,695,360	+322.79
1.2 Percentage of CBS faculty holding tri-agency funding	79	75	-5.06
1.3 Amount of tri-agency and non tri-agency funding brought into CBS	6,953,061; 12,126,212	7,910,560; 29,675,941	+13.77; +144.73
1.4 Number of distinct funding organizations to which CBS faculty apply	56	60	+7.14
1.5 Number of distinct funding organizations providing support to CBS research	58	59	+1.72
1.6 Percentage of CBS faculty holding two or more grants	51	46	-9.80
1.7 Amount of college investment in research support	4,965,125	5,712,605	+15.05

Research Excellence and Funding

Research impact and performance metrics	2020–21	2021–22	Net change (%)
2.1 Number of awards or prizes that recognize excellence in research	5 (new awards)	5 (new awards)	0.00
2.2 Number of occasions where CBS endeavours are promoted by a credible external party	35	55	+57.14
2.3 Number of peer-reviewed publications	407	383	-5.90
2.4 Citation impact for CBS	3.66	2.36	-35.52
2.5 Percentage of publications that include two or more CBS faculty coauthors	15.7	10.97	-30.13

SoTL Research

Research impact and performance metrics	2020–21	2021–22	Net change (%)
3.1 Quantity and citation impact of SoTL publications	7; 2.28	7; 1.43	0.00; -37.28
3.2 Number of faculty and staff actively engaged in SoTL and teaching innovations	16; 16	17; 19	+6.25; +18.75
3.3 Value of grants awarded for SoTL and teaching innovations	9,000	10,500	+16.67

Graduate Training

Research impact and performance metrics	2020–21	2021–22	Net change (%)
4.1 Number of graduate students entering the college	132	140	+6.06
4.2 Amount of research-specific funding awarded to CBS graduate students	2,800,408	2,494,745	-10.91
4.3 Percentage of full-time students with a major research award	23.3	20.6	-11.59
4.4 Time to completion (semesters)	14.2 (PhD); 6.9 (MSc)	14.2 (PhD); 6.4 (MSc)	0.00 (PhD); -7.25 (MSc)
4.5 Student satisfaction with quality of graduate supervision	77	82	+6.49



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