

NSERC Discovery Grant Application

Three components:

- 1. Excellence of the Researcher
- 2. Merit of the Proposal
- 3. Training of HQP
- Each of these three components will receive a separate score.
- This tripartite score will be used by NSERC to calculate your funding level.
- Training of HQP is therefore worth one-third of your application.

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NSERC Discovery Grant ApplicationTraining of HQP

A few general pieces of advice:

- Avoid platitudes.
- Be specific and detailed.
- Assume reviewers and evaluators are at least as smart as you are.

Training of HQP

Two components:

- 1. HQP Training Plan
- 2. Past Contributions to HQP Training

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1. HQP Training Plan

Max. 9,000 characters, i.e. approximately two letter-size pages, one-inch margins, single-spaced, 12-point Times New Roman.

Two components:

- 1.1. Training Philosophy
- 1.2. Research Training Plan

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1. HQP Training Plan

Max. 9,000 characters, i.e. approximately two letter-size pages, one-inch margins, single-spaced, 12-point Times New Roman.

Two components:

1.1. Training Philosophy

1.2. Research Training Plan

The Training Philosophy should describe the applicant's approach to training HQP, detailing the mentoring approach and the type of research training and development opportunities provided.

NSERC — Discovery Grants Program — Instructions for completing an application

Nobody expects you to be a philosopher; everybody expects you to be thoughtful. Instead, most Training Philosophy components lack details and individuality.

Some questions to inspire your thinking:

- Who designs your trainees' projects?
- Who teaches your trainees how to formulate and test hypotheses?
- Who trains your trainees in the required techniques?
- Who teaches your trainees how to troubleshoot?
- Who teaches your trainees how to make optimal use of their time?

Some more questions to inspire your thinking:

- Who teaches your trainees how to analyze and interpret their results?
- Who teaches your trainees how to prepare figures?
- Who teaches your trainees what the implications of their findings are?
- Who teaches your trainees how to communicate their findings in posters and talks?
- Who prepares your trainees for candidacy exams and thesis defenses?

More questions to inspire your thinking:

- Who teaches your trainees how to structure and write reports, scholarship applications, candidacy proposals, manuscripts, theses, and job applications?
- Who teaches your trainees how to address reviewers' concerns during manuscript revision?
- Who teaches your trainees how to review manuscripts and grant applications?
- Who helps your trainees develop their mentoring skills?

Part I

And finally:

• Do you teach **all** those skills to **all** your trainees or do you train differentially junior undergraduate students (1st/2nd year), senior undergraduate students (3rd/4th year), graduate students, postdoctoral fellows and technicians?

Part I

What was the applicant's role in the training of the **different types** of Highly Qualified Personnel (HQP)?

Undergraduate student participation in research projects is an important first phase in research training and plays a major role in encouraging excellent students to pursue research careers. For **technicians** and others who have been in long-term positions, the acquisition of new techniques and knowledge is an important contribution to training.

NSERC — Policy and Guidelines on Contributions to Research and Training

1.1. Training Philosophy Part I

Some questions to inspire your thinking:

- When do you teach your trainees those skills?
 - In lab meetings? How often do you have them? How long are they?
 - In one-on-one meetings? How often do you have them? How long are they?
- How do you teach your trainees those skills?

Part I

Some more questions to inspire your thinking:

- Do you encourage your trainees' involvement in science outreach activities?
 How?
- Do you involve your trainees in your (interdisciplinary) collaborations or interactions with the private or public sectors (e.g., industry, government agencies)? How?

Part I

And finally:

- Do you inquire about your trainees' long-term career goals? What do you do to help your trainees to achieve those goals and promote their career?
 - Do you inform your trainees of job opportunities?
 - Do you help your trainees to select and approach suitable employers or supervisors?
 - Do you coach your trainees for job interviews?
 - Do you provide your trainees with professional advice, reference letters, and access to resources generated in your lab?

A problematic, yet commonly used, expression:

Trainees will be taught/instructed/trained/...

By whom? Unclear. If you are the one training/instructing/teaching/... your trainees, why not write, for example:

I always train all my students in the most complex techniques (e.g., live imaging).

Your direct involvement is evidence of your commitment to training.

If instead you are not the one doing that, why not write, for example:

Undergraduate students are trained directly by my PhD students. This is an excellent way to introduce PhD students to mentoring. I act behind the scenes: I meet weekly with my PhD students to discuss the undergraduate students' progress, and to guide my PhD students in their new role as mentors.

Now your indirect involvement in the training of junior undergraduate students is evidence of your commitment to the development of mentoring skills in your PhD students.

Another problematic, yet commonly used, expression:

Trainees are **expected** to contribute intellectually/keep up with the literature in their field/read broadly/write manuscripts/publish papers/secure scholarships/move on to impactful positions/be successful...

Expectations are clear, but what is unclear is what the applicant will do to help their trainees meet these expectations.

Part II

Describe qualitatively any challenges or barriers encountered in ensuring an inclusive research and training environment.

Describe the planned approach to promoting participation from a diverse group of HQP, taking into account equity and inclusion in recruitment practices, mentorship approaches and initiatives aimed at ensuring an inclusive research and training environment and trainee growth.

NSERC — Discovery Grants Program — Instructions for completing an application

Part II

You are expected to increase the inclusion and advancement of **under-represented and disadvantaged groups** in the natural sciences and engineering as one way to enhance excellence in research and training. An inclusive research training environment exists where all people are respected and have access to the same opportunities, where each individual —including those from under-represented and disadvantaged groups—can reach their full potential, unimpeded by inequitable practices. A commitment from all researchers to implement specific actions that acknowledge and address barriers to participation (e.g. physical, procedural, visible, invisible, unintentional) is required in order to increase access to the largest pool of qualified potential participants and the overall excellence of research, across all natural sciences and engineering disciplines.

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Under-represented and disadvantaged groups are not only women, but also

...visible minorities, Indigenous peoples, people with diverse gender identities and people with disabilities.

NSERC Statement on Equity, Diversity and Excellence in Natural Sciences and Engineering Research

Part II

and people of different

...age, sexual orientation, parental status/
responsibility, immigration status, religion,
language, race, place of origin, ethnicity, culture
and socio-economic status.

NSERC — Guide for Applicants: Considering equity, diversity and inclusion in your application

More in general,

For the purpose of Discovery Grant assessment, "underrepresented groups" is not limited to existing equity employment groups (women, Indigenous Peoples, persons with disabilities, members of visible minorities/ racialized groups, and members of LGBTQ2+ communities), rather it broadly refers to any group that is under-represented in the research environment.

Inequality is real.

...despite decades of efforts to increase faculty, staff, and student diversity, the culture of academia remains distinctly white, male, heterosexual, and middle- to upper-class.

G. Gutiérrez y Muhs, Y. Flores Niemann, C.G. González & A.P. Harris eds. (2012). Presumed Incompetent: The Intersections of Race and Class for Women in Academia.

Inequality is not only the result of demographic inertia but of unconscious bias.

Shaw A.K. & Stanton D.E. (2012). Leaks in the Pipeline: Separating Demographic Inertia From Ongoing Gender Differences in Academia. Proceedings of the Royal Society B: Biological Sciences 279: 3736–3741.

1.1. Training Philosophy Part II

Women are just as biased as men.

Steinpreis R.E. et al. (1999). The Impact of Gender on the Review of the Curricula Vitae of Job Applicants and Tenure Candidates: A National Empirical Study. Sex Roles 41: 509-528.

1.1. Training Philosophy Part II

Describe qualitatively any challenges or barriers encountered in ensuring an inclusive research and training environment.

NSERC — Discovery Grants Program — Instructions for completing an application

A.K.A: Context

1.1. Training Philosophy Part II

Clearly described context:

- Identifies the field of research and institution* related to the proposed program of research.
- Names the participating and under-represented group(s) in proximity to the applicant's program of research.
- Gives further details of known challenges and barriers to participation, including current level of participation if known.

*Context details related to the "institution" can describe academic (team, department, faculty etc.), industrial (sector, company, etc.), or other institutional research environments trainees will encounter as part of the proposed program of research.

Part II

A problematic, yet common, way of integrating equity, diversity, and inclusion:

I have a strong track record of training HQP. The environment I maintain is both equitable and inclusive, as demonstrated by the gender balance of my team.

Context: not described / partially described

Part II

Under-represented trainee groups and faculty members:

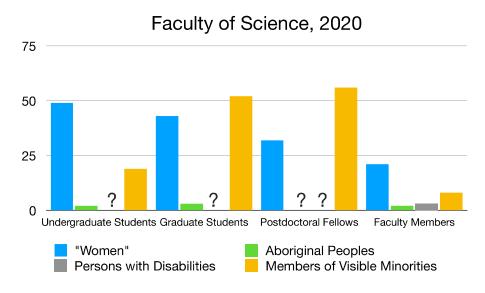
- "Women" "Females", really (GS, PDF, and FM)
- Aboriginal peoples (UGS, GS, and FM; PDF?)*
- Persons with disabilities?**
- Members of visible minorities?**

*FoS target: ≥5% **Target unknown

Engagement & EDI Plan 2020–2023 for the Faculty of Science

FGSR Graduate Student Enrolment Report 2019–20

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Part II

Under-represented trainee groups and faculty members:

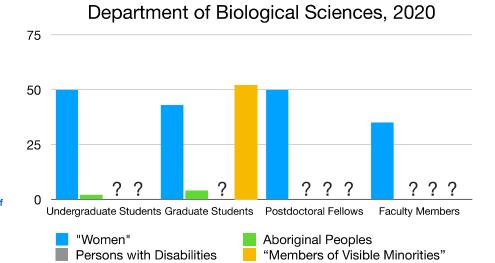
- "Women" (GS and FM)
- · Aboriginal peoples?*
- Persons with disabilities?*
- "Members of visible minorities" (i.e. ~95% of international students)?*

*Target unknown

Engagement & EDI Plan 2020-2023 for the Faculty of Science

Data from the UofA ACORN Database, courtesy of the Department of Biological Sciences

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Part II

Under-represented trainee groups and faculty members:

- "Women" (FM; PDF?)
- Aboriginal peoples?*
- · Persons with disabilities?*
- "Members of visible minorities"?*

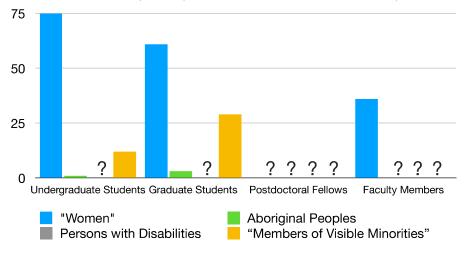
*Target unknown

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Data from the UofA ACORN Database, courtesy of the Department of Biological Sciences

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MolGen, MCDB, and PlantBio UGS, 2019; MolBiolGen and PlantBio GS, 2020; MolCellGen and PlantBio FM, 2020



Part II

Describe the planned approach to promoting participation from a diverse group of HQP, taking into account equity and inclusion in recruitment practices, mentorship approaches and initiatives aimed at ensuring an inclusive research and training environment and trainee growth.

NSERC — Discovery Grants Program — Instructions for completing an application

A.K.A. Specific actions

Part II

Clearly defined **specific actions**:

- Identify the stage(s) associated with the chosen specific actions (Outreach, Recruitment, Hiring, Training Environment, Mentorship)*.
- Name the underrepresented group(s) being considered.
- Identify one or more specific actions to address participation of the named group(s).
- Gives further details related to implementation of specific actions such as HQP-focused partner organizations, events, or training in proximity to their program of research.

^{*}Specific actions can occur at any stage of training (Outreach, Recruitment, Hiring, Training Environment, Mentorship); there is no priority or value placed on different stages; and applicants are not expected to participate at every stage.

Part II

Another problematic, yet common, way of integrating equity, diversity, and inclusion:

I accept the best students based on research excellence to become part of my research team. I recruit through word of mouth within my department and through my Canadian and international collaborators. I will continue to use this successful approach throughout my next Discovery Grant.

Specific actions: not defined / partially defined

Part II

Some suggestions:

- Take the Bias in Peer Review online learning module.
- Take the GBA+ (Gender-Based Analysis Plus) course.
- · Ask your trainees to do the same.

Awareness of discrepancies between the ideals of impartiality and actual performance, together with strong internal motivations to respond without prejudice, effectively reduces prejudicial behavior.

Devine P.G. et al. (2002). The Regulation of Explicit and Implicit Race Bias: The Role of Motivations to Respond Without Prejudice. Journal of Personality and Social Psychology 82: 835–848.

Smith J.L. et al. (2015). Now Hiring! Empirically Testing A Three-Step Intervention To Increase Faculty Gender Diversity In STEM. Bioscience 65: 1084-1087.

Part II

Document your participation and your trainees' (in the Past Contributions to HQP Training), or describe plans for you and your trainees to participate (in the HQP Training Plan's Training Philosophy), to workshops (e.g., Gordon Research Conferences Power Hour) that increase awareness of unconscious bias.

Awareness of discrepancies between the ideals of impartiality and actual performance, together with strong internal motivations to respond without prejudice, effectively reduces prejudicial behavior.

Devine P.G., Plant E.A., Amodio D.M., Harmon-Jones E., Vance S.L. (2002). The Regulation of Explicit and Implicit Race Bias: The Role of Motivations to Respond Without Prejudice. Journal of Personality and Social Psychology 82: 835–848.

Smith J.L. et al. (2015). Now Hiring! Empirically Testing A Three-Step Intervention To Increase Faculty Gender Diversity In STEM. Bioscience 65: 1084–1087.

Now that you are aware of unconscious bias, how do you ensure your decisions are not affected by it?

In all programs NSERC encourages applicants to explain their process of identifying, recruiting and selecting research personnel based on equity and diversity best practices* as one means to enhance excellence in research, training and outreach.

NSERC - Guide for Applicants: Considering equity, diversity and inclusion in your application

*For example, check out Reviewing Applicants - Research on Bias and Assumptions

Part II

- Document your participation (in the Past Contributions to HQP Training), or describe your plans to participate (in the HQP Training Plan's Training Philosophy), to programs (e.g., WiSEST) that aim at increasing equity, diversity, and inclusion.
- Document the historical inclusion of members of under-represented groups among your trainees (in the Past Contributions to HQP Training); **however**:

Trainee demographic data is not requested, nor required to assess impacts of consideration of equity, diversity and inclusion in the past research and training environment.

Advertise available positions internationally. Use inclusive language.

I post available positions in my lab on bulletin boards at national and international conferences (see CCV for those attended in the past six years), on my lab website, and on the websites of The Canadian Botanical Society, The Canadian Society of Plant Biologists, The American Society of Plant Biologists, and The Arabidopsis Information Resource. Over the years, I have identified, contacted, and established a professional relationship with key people (e.g., Chairs, Career and Academic Advisors, etc.) in relevant departments at major universities in developing countries. I send ads for available positions in my lab to those key people, who kindly select their best students and invite them to apply. I explicitly encourage women, Aboriginal peoples, persons with disabilities, and members of visible minorities to apply.

Part II

Develop and rank evaluation criteria prior to evaluating candidates and apply them consistently to all applicants.

Different standards are used to evaluate male and female applicants, and when criteria are not clearly articulated before reviewing candidates, evaluators may shift or emphasize criteria that favor candidates from well-represented demographic groups.

Biernat M. & Fuegen K. (2001). Shifting Standards and the Evaluation of Competence: Complexity in Gender-Based Judgment and Decision Making. Journal of Social Issues 57: 707-724.

Uhlmann E.L. & Cohen, G.L. (2005). Constructed Criteria: Redefining Merit to Justify Discrimination. Psychological Science 16: 474-480.

Moss-Racusin C. et al. (2012). Science Faculty's Subtle Gender Biases Favor Male Students. Proceedings of the National Academy of Science USA 109: 16474-16479.

van Dijk D. et al. (2014). Publication Metrics and Success on the Academic Job Market. Current Biology 24: R516-R517.

Milkman K.L. et al. (2015). What Happens Before? A Field Experiment Exploring How Pay and Representation Differentially Shape Bias on the Pathway Into Organizations. Journal of Applied Psychology 100: 1678–1712.

Eaton A.A. et al. (2020). How Gender and Race Stereotypes Impact the Advancement of Scholars in Stem: Professors' Biased Evaluations of Physics and Biology Post-Doctoral Candidates. Sex Roles 82: 127–141

Part II

Explain in your application (in the HQP Training Plan's Training Philosophy and/or in the Past Contributions to HQP Training) how you identify, recruit, and select trainees.

Trainee applications are forwarded to my wife, who kindly blacks out name, gender, marital status, country, and photograph from email, accompanying letter, CV, and reference letters. My wife keeps the original; I only evaluate the blacked-out copy.

Part II

Be aware of and correct unconscious bias in the reference letters you write for your trainees and referees write for candidate trainees in your lab.

Reference letters for female applicants differ systematically from those for males: they are shorter; provide "minimal assurance", rather than solid recommendation; raise more doubts; portray women as students and teachers, and men as researchers and professionals; and more frequently mention women's personal lives.

Trix, F. & Psenka C. (2003). Exploring the Color of Glass: Letters of Recommendation for Female and Male Medical Faculty. Discourse & Society 14: 191–220.

Part II

- Provide flexible hours to allow communication with family in different time zones; to allow dropping off and picking up children to and from school and day care; and to respect religious obligations, rituals, celebrations, and ceremonies.
- Consider family and religion when scheduling times of lab journal clubs as well as of lab and individual meetings.
- Discuss lab tasks so that each lab member invests a comparable amount of time and energy in their tasks; re-evaluate tasks on a regular basis (e.g., every six months).
- Consider dietary concerns when planning social outings (e.g., lab lunches and guest hosting).
- Mention in your application (in the HQP Training Plan's Training Philosophy and/or in the Past Contributions to HQP Training) that you do/did all that.

1. HQP Training Plan

Max. 9,000 characters, i.e. approximately two letter-size pages, one-inch margins, single-spaced, 12-point Times New Roman.

Two components:

- 1.1. Training Philosophy
- 1.2. Research Training Plan

1. HQP Training Plan

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Two components:

1.1. Training Philosophy

1.2. Research Training Plan

The Research Training Plan should explain the planned future contributions to knowledge, and the expected training value of the proposed projects.

. . .

Impact of the Proposal: The anticipated significance of the work.

HQP Training Plan

For expected outcome and training value of proposed research, see Proposal (Section V).

PROPOSAL

V. Impact

The impact of this research will be threefold.

- 1. ... [Contribution to the discovery of knowledge].
- 2. This research will provide students with training in bioimaging, genetics, molecular biology and plant methods, a versatile toolkit which trainees will be able to apply to different questions and organisms in their future careers [contribution to training].
- 3. ... [Contribution to the application of knowledge].

The Research Training Plan should discuss the involvement of trainees in individual projects.

HQP Training Plan

For connection between trainees and research objectives, see Budget Justification (Section 1.a).

BUDGET JUSTIFICATION

1. Salaries and Benefits

a. Students

I am currently training two PhD students (X and Y) and one MSc student (Z). I expect X will graduate by the end of Apr 2016, so I do not request funds to support him/her. I request funds to support the last two years of Y's PhD (years 1 and 2 of this application), during which he/she will characterize the orientation of cell division in vein formation (see **Proposal, Objective 2, Section 2.3.1**). Z started graduate school in Sep 2015 and will characterize the effects of clonal activation of GN (see **Proposal, Objective 1, Section 1.2.1**); I request funds to support the two years of his/her MSc (years 1 and 2 of this application).

BUDGET JUSTIFICATION

1. Salaries and Benefits

a. Students

I also request funds to support: (1) three years of graduate studies for a PhD student (to be determined) who will characterize cell polarity maintenance through vascular cell division (see **Proposal, Objective 2, Section 2.3.2**) after Y's graduation (years 3–5 of this application); (2) two years of graduate studies for an MSc student (to be determined) who will characterize the effects of clonal deletion of GN (see **Proposal, Objective 1, Section 1.2.2**) after Z's graduation (years 3 and 4 of this application); and (3) five years of graduate studies for two PhD students (to be determined), **each of whom** will screen the progeny of ~5,000 M1 plants and will characterize one or two genetic suppressors of gn (see **Proposal, Objective 3**) (years 1–5 of this application).

- Proposal, Objective 1, Section 1.2.1
- Proposal, Objective 1, Section 1.2.2
- Proposal, Objective 2, Section 2.3.1
- Proposal, Objective 2, Section 2.3.2
- Proposal, Objective 3

Each of these Objectives/Sections includes bioimaging, genetics, molecular biology, and plant methods.

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PROPOSAL

V. Impact

This research will provide students with training in bioimaging, genetics, molecular biology and plant methods, a versatile toolkit which trainees will be able to apply to different questions and organisms in their future careers.

Are the projects feasible and appropriate for the training proposed? Will trainees be able to make an original contribution to knowledge?

NSERC — Policy and Guidelines on Contributions to Research and Training

Common problems

- Multiple HQP share the same objective (e.g., Objective 1: PDF1 and PhD1), but it's unclear who will be doing what, so it's impossible to evaluate whether "projects are appropriate for training" and whether "trainees will be able to make an original contribution to knowledge".
- Each trainee will be trained in one technique only: one trainee will generate constructs, another will transform these constructs in the organism of choice, yet another trainee will phenotype the resulting transgenics, etc.: the projects are not appropriate for training, and trainees will not be able to make an original contribution to knowledge.

Common problems

The proposal will only train one HQP. Training potential is limited and perhaps most important: is it really a program or a project?

Define the short- and long-term objectives of your research program. Note that a research program should have a long-term vision that expands beyond the five years of the Discovery Grant. A single, short-term project or collection of projects does not constitute a research program.

Common problems

- The applicant plans to encourage HQP to attend conferences and requests funds for them to do so (and explains that request in Budget Justification), but the Past Contributions to HQP Training section suggests that the applicant's HQP rarely, if ever, attend conferences.
- The applicant requests funds to support HQP whose involvement in the proposed research are unclear (e.g., technicians).

Training of HQP

Two components:

- 1. HQP Training Plan
- 2. Past Contributions to HQP Training

Training of HQP

Two components:

- 1. HQP Training Plan
- 2. Past Contributions to HQP Training

Max. 6,000 characters, i.e. approximately one and a half letter-size pages, one-inch margins, single-spaced, 12-point Times New Roman.

Discuss your most significant contributions to the training of HQP over the last six years.

Training supported by NSERC ranges from undergraduate theses and summer projects to postdoctoral research, and includes technical and other research personnel.

You must clearly explain your role in any co-supervision of HQP.

The assessment of past contributions to HQP training focuses on the quality and impact of training, as demonstrated through three components. Each component should be supported by your CCV and/or application text.

Three components:

- 2.1. Training Environment
- 2.2. HQP Awards and Research Contributions
- 2.3. Outcomes and Skills Gained by HQP

Three components:

- 2.1. Training Environment
- 2.2. HQP Awards and Research Contributions
- 2.3. Outcomes and Skills Gained by HQP

2.1. Training Environment

Describe the research training and development opportunities provided for HQP.

2.1. Training Environment

PAST CONTRIBUTION TO TRAINING

For my approach to training and training environment, see HQP Training Plan.

2. Past Contributions to HQP Training Three components:

•

- 2.1. Training Environment
- 2.2. HQP Awards and Research Contributions
- 2.3. Outcomes and Skills Gained by HQP



Describe **research contributions** by HQP (e.g., publications, patents, key presentations) and highlight awards, scholarships and fellowships won by HQP.

2.2. HQP Awards and Research Contributions

PAST CONTRIBUTION TO HQP TRAINING

Impact factor (IF), rounded to one decimal, was obtained from Journal Citation Reports; number of citations (C) from Google Scholar.

My graduate students have published ...[No.] papers (IF: ...-...; C: ...-...[Ranges of citations and impact factors]), and they have been invited to present ...[No.] times at national conferences and ...[No.] times at international ones (most notably, Y and W were the only graduate students to be invited to speak at, respectively, ... and ...[Names of conferences])*.

*In your CCV, remember to label HQP with an asterisk in publications and in your presentations; however, please note that presentations by HQP should not be included in the applicant's CCV.



Describe research contributions by HQP (e.g., publications, patents, key presentations) and highlight awards, scholarships and fellowships won by HQP.

2.2. HQP Awards and Research Contributions

PAST CONTRIBUTION TO HQP TRAINING

I have graduated one MSc student (X, NSERC CGSM, QEII Graduate Scholarship) and three PhD students (Y, NSERC CGSM and CGSD, Alberta Ingenuity Student Scholarship; W, NSERC CGSM and CGSD; and Z).

- Three components:
- 2.1. Training Environment
- 2.2. HQP Awards and Research Contributions
- 2.3. Outcomes and Skills Gained by HQP

2.3. Outcomes and Skills Gained by HQP

Describe your most significant examples of HQP outcomes and explain how your training contributed to their success (e.g., skills and experiences gained, outcomes such as further studies or career).

2.3. Outcomes and Skills Gained by HQP

PAST CONTRIBUTION TO HQP TRAINING

X is now a ... [Name of position clearly related to skills gained in my lab] with ... [Name of company]. Y was faculty at ... [Name of university] until Jul 2015; from Aug 2015, Y is at ... [Name of university]. W is a sessional instructor at ... [Name of university]. And Z is a post-doctoral fellow at ... [Name of university].

Many thanks to:

(In alphabetical order)

- Corey Davies, Department of Biological Sciences, Faculty of Science
- Maya Evenden, Associate Chair Undergraduate Studies, Department of Biological Sciences, Faculty of Science
- Tara McGee, Associate Dean Engagement and EDI, Faculty of Science
- Tracy Raivio, Acting Chair, Department of Biological Sciences, Faculty of Science; Associate Dean — Awards and Scholarships, Faculty of Graduate Studies and Research

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Good Luck!