



Canadian Society for Chemistry  
Société canadienne de chimie

# CSC Accreditation Guidelines — Resources

The following sections provide additional resources that can be used when preparing an application for CSC accreditation and improving programs in the areas listed.

Learning outcomes .....	1
Pedagogies.....	1
Equity, Diversity, and Inclusion (EDI).....	2
Course and laboratory design .....	2
Learning environment .....	2
Connections.....	2
Selection processes .....	3
Indigenous students .....	3

## Learning outcomes

(1) <http://oucqa.ca/framework/appendix-1/>

(2) <https://caqc.alberta.ca/learning-outcomes/>

(3) Elmgren, M.; Ho, F.; Åkesson, E.; Schmid, S.; Towns, M. H. Comparison and Evaluation of Learning Outcomes from an International Perspective: Development of a Best-Practice Process. *J. Chem. Educ.* 2014, 92 (3), 427–432. <http://pubs.acs.org/doi/abs/10.1021/ed500542b> (see SI for tables of learning outcomes)

## Pedagogies

(1) Waldrop, M. M. Why We Are Teaching Science Wrong, and How to Make It Right. *Nature* 2015, 523 (7560), 272–274. <https://www.nature.com/news/why-we-are-teaching-science-wrong-and-how-to-make-it-right-1.17963>

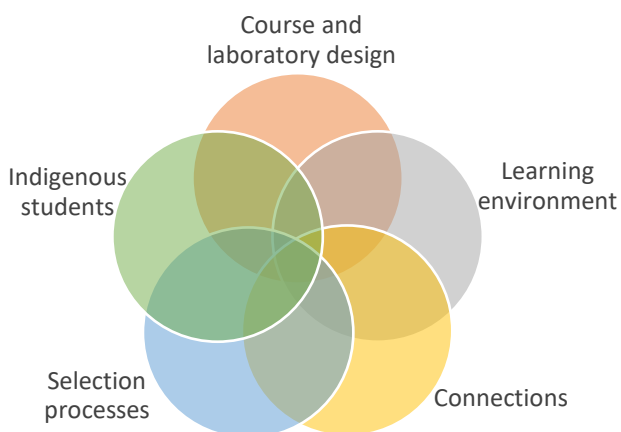
(2) Bradforth, S. E.; Miller, E. R.; Dichtel, W. R.; Leibovich, A. K.; Feig, A. L.; Martin, J. D.; Bjorkman, K. S.; Schultz, Z. D.; Smith, T. L. University Learning: Improve Undergraduate Science Education. *Nature* 2015, 523 (7560), 282–284. <http://www.nature.com/doi/abs/10.1038/523282a>

(3) Freeman, S.; Eddy, S. L.; McDonough, M.; Smith, M. K.; Okoroafor, N.; Jordt, H.; Wenderoth, M. P. Active Learning Increases Student Performance in Science, Engineering, and Mathematics. *Proc. Natl. Acad. Sci. U. S. A.* 2014, 111 (23), 8410–8415. <http://www.ncbi.nlm.nih.gov/pubmed/24821756>

(4) Stains, B. M.; Harshman, J.; Barker, M. K.; Chasteen, S. V.; Cole, R.; DeChenne-Peters, S. E.; Eagan Jr, M. K.; Esson, J. M.; Knight, J. K.; Laski, F. A.; et al. *Science*, 2018, 359 (6383), 1468–1470.  
<http://science.sciencemag.org/content/359/6383/1468>

## Equity, Diversity, and Inclusion (EDI)

The following approaches to incorporate EDI into university classes have been identified by the Canadian Society for Chemistry's Working group on Inclusion, Diversity, and Equity (Chemical Institute of Canada 2018) and based on additional resources (American Chemical Society Committee on Chemists with Disabilities 2001; Science & Engineering Leadership Initiative (SELI) 2019; TRC 2012). The approaches fall into five categories: course and laboratory design, learning environment, connections, selection processes, and indigenous students.



### Course and laboratory design

- Provide evidence and/or tracking of related initiatives such as universal design, language
- Address access, accommodations, and safety in the chemical laboratories
- Provide appropriate training for faculty and staff on equity and diversity issues. The departmental leaders are key persons who need to be educated on equity and diversity issues

### Learning environment

- Departments should be able to describe what they are doing to ensure that their program is accessible and welcoming to all persons.
- Offer activities aimed at involving and including equity-seeking groups
- Describe events that address EDI issues, e.g., conference symposia on EDI or integrated presentations/activities (Cathleen Crudden 2019)

### Connections

- Provide evidence and/or tracking of student advising
- Identify a selection of faculty and staff who are willing to be an ally for and mentor equity-seeking groups
- Include a webpage for Equity and Diversity on the Department's website. The page could make it clear that the Department welcomes all persons. Resources for faculty, staff and students would be available on that web page including but not limited to resources for inclusive language, an LGBT+ glossary (LGBT+

= lesbian, gay, bisexual, transgender, a list of faculty and staff allies, links to relevant university resources on mental health, non-discrimination policies, the Equity Office, the Student Code of Conduct, a description of relevant activities in the department, an invitation for students to contact appropriate lab staff to accommodate physical disabilities in the labs.

## Selection processes

- Describe what efforts have been made to ensure that the selection of undergraduate awardees and ranking of scholarship applicants has been an equitable process
- Describe how the principles of equity and diversity have been considered for speakers in the departmental seminar series, including speaker nominations and invitations
- Describe the diversity of the faculty including a description of appointment and promotion processes at the university. What efforts have been made to ensure adherence to equity policies relevant to appointments and promotion?
- Describe the institution's recruitment and admission policies for students, both graduate and undergraduate, to determine to what extent they are equitable and what efforts are being made to attract and retain underrepresented groups.

## Indigenous students

- If a university has multiple Indigenous students in the same program, e.g., a group of Indigenous pre-nursing students, the students who would have to take Chemistry, Biology, Mathematics, Introductory Computer Science, etc.
  - A group of departments could make sure the students get access to small classes sizes for as many classes as possible and attempt to keep the students all together in the same cohort. Since they are all in the same classes (mostly) they get to know and support each other. For example, the 6 would take intro Chemistry, Biology and Mathematics at the same time taught by a special instructor.
- Recognize that many Indigenous students coming from remote communities do not have the same opportunities for learning STEM disciplines due to the difficulties associated with attracting and retaining qualified STEM instructors, departments should be open to offering preparatory courses to small groups of indigenous students prior to their first-year studies to assist in the transition to university-level STEM courses. Alternatively, the department, with the university, should make designated student teaching assistants available to Indigenous students and funded using allocated university funds. Volunteer-driven learning communities can also be used to provide needed assistance to 1st year Indigenous students.
- Ensure access to elders, mentors (senior "cousins") for Indigenous students to aid in the transition from small communities to the university environment.
- Offer/participate in summer workshops for Indigenous students and teachers employed at schools within Indigenous communities.
- Offer/Participate in programs where a TA or instructor work with the community to provide a meaningful lab experience to Indigenous students with the goal of training the teachers to improve and sustain the quality of STEM instruction.
- Provide personal, social, and cultural support to ensure the academic and personal success of Indigenous students.
- See additional consideration in the Calls for Action of the Truth and Reconciliation Commission of Canada (<http://www.trc.ca>)

The CSC gratefully acknowledges the CSC's Working group on Inclusion, Diversity, and Equity for their suggestions and resources.

American Chemical Society Committee on Chemists with Disabilities. 2001. Teaching Chemistry to Students with Disabilities: A Manual for High Schools, Colleges, and Graduate Programs. Edited by Dorothy L Miner, Ron Nieman, and Anne B Swanson. 4th ed. The American Chemical Society.  
<https://www.acs.org/content/dam/acsorg/about/governance/committees/cwd/teaching-chemistry-v4-cwd.pdf>.

Cathleen Crudden. 2019. "Special Sessions | 102nd Canadian Chemistry Conference and Exhibition." Canadian Society for Chemistry. 2019. <http://www.ccce2019.ca/special-sessions>.

Chemical Institute of Canada. 2018. "CSC President's Event Fosters Brainstorming Session." Community Connections. 2018. <https://www.cheminst.ca/magazine/article/csc-presidents-event-fosters-brainstorming-session/>.

Science & Engineering Leadership Initiative (SELI). 2019. "Resources for Students with Disabilities in STEM Fields." Resources for the Community. 2019. <https://sites.udel.edu/seli-ud/resources/>.

TRC. 2012. "Truth and Reconciliation Commission of Canada: Calls to Action." Winnipeg, Manitoba.  
[http://nctr.ca/assets/reports/Calls\\_to\\_Action\\_English2.pdf](http://nctr.ca/assets/reports/Calls_to_Action_English2.pdf).

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