

Specific Teaching Practices to help promote Indigenization - Equity, Diversity, Inclusion, Accessibility and Anti-racism (I-EDIAA)

(Version 1.1, February 2023)

Introduction

This document is aimed at helping teachers (i.e. professors, program associates, and teaching assistants) raise awareness of, and promote Indigenization - Equity, Diversity, Inclusion, Accessibility, Anti-Racism (I-EDIAA). It is a collation of a variety of teaching practices and resources that were gleaned from a survey of faculty, teaching staff and graduate students of the Queen's Department of Biology in November 2021, and contains a blend of general and biology-focussed suggestions. The development of this document has been strongly supported by the Chair of the Department of Biology Undergraduate Studies Committee and has benefited from several lengthy discussions and contributions from within that committee. Specific inputs were also received from the Department's EDI committee, and Zoe Kane (M.Sc. student, Dept. of Biology). In addition to the above contributors, the following people deserve special thanks for their extensive, detailed, and comprehensive feedback on an earlier draft:

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All feedback comments and suggestions were carefully considered, and some I-EDIAA components received considerably more input than others. Hence this compilation should be considered as a 'early step' to which much could, and should, be added. And of course, as a Settler Canadian (Lowman and Barker, 2015) born and raised in Europe, an oldish white male, and a professional scientist, the document contains multiple innate biases not just in content, but also in tone and style. Accordingly, suggestions for edits and further inclusions are most welcome, and regular revision will be required to keep abreast of ongoing developments. Hopefully, as a starting point, it will at least help teachers begin or advance their I-EDIAA implementation, and promote I-EDIAA dialogue.

Practices for broadly introducing the principles of I-EDIAA

This section outlines some general practices to raise awareness of I-EDIAA principles, and of the white, western, scientific, settler-colonial mindsets that have been, and continue to be, the primary context underlying the scientific process, and our educational practices (what we teach, and how).

1. Be aware that Curriculum diversification is a specific pedagogical goal at Queen's – Acknowledge this broad context, and share this information with your students to build mutual engagement. "Curriculum diversification aims to engage with diverse worldviews, ways of knowing, abilities, and experience to fulfill the Principal's Implementation Committee on Racism, Diversity, and

Inclusion (PICRDI) recommendation (#16) as well as the university's Strategic Framework to foster critical thinking and global engagement by expanding content, theoretical approaches, and pedagogies to reflect broader global and historical perspectives.

Curricular diversification involves questioning, disrupting, and challenging dominant western-centric knowledges, pedagogies, intellectual traditions, and ways of knowing, to include Indigenous, global, non-western, anti-racist, decolonial, and feminist perspectives.

Importantly, it aims to foster new perspectives to emerge from sustained engagement with/through/among these various perspectives. A diversified curriculum also seeks to meet the needs of diverse learners by weaving accessibility into the design, delivery, assessment, and evaluation of program curricula. By including diversified approaches to assessment and teaching styles, Faculties can ensure all students are treated equitably, and are reflecting the needs of our diverse student body. Diversifying the curriculum therefore requires a holistic approach that is enacted at all levels of the University and includes all faculties as well as professional services." (Lavery, 2021, Queen's Academic and Curricular Diversity Sub-Council).

2. Effectively promoting I-EDIAA awareness in your teaching will require a genuine commitment to learning and a deep engagement. In essence, the best approach is to fully rethink and rework your curriculum from the bottom-up so that it reflects I-EDIAA principles throughout. For example, to **avoid tokenism** such as simply adding examples of researcher diversity (or whatever) into your current course, set out from the content planning stage to be deliberately balanced by presenting material that spans the entire range of researcher diversity in the topic material.
3. **Approach coverage of I-EDIAA in your course from a mutual learning perspective.** These can be highly sensitive issues, and some students may well know more about, and feel more sensitive to them than you do. Establish a rapport with the student group at the outset of a course – reveal your naïveté and ignorance, but also your fundamental intention. Through discussion, generate an agreement with the class group aimed at acknowledging that mistakes will be made and should be followed up by a process of gentle correction ('calling in') – mutual learning in a respectful context. Students will greatly value the humility of this approach and perspective, and feel empowered, thereby creating opportunities for deep, respectful, mutual learning.
4. Consider including how our "Western" scientific method has limitations in that **although scientists strive for objectivity, we are all biased to some extent** - often without realizing it - by our personal experiences. Consider mentioning the recent formal acknowledgement by the editors of the flagship science journal *Nature* that their biases have contributed to science's **discriminatory legacy** by publishing "material that contributed to bias, exclusion and discrimination in research and society", and that elitism and an "air of imperiousness, imperialism, sexism and racism permeates many articles in Nature's historical archive" (*Nature*, Sept 29th, 2022). For example, in the early 1900s the journal published several papers by statistician **Francis Galton on eugenics**, which he defined as "the science which deals with all influences that improve and develop the inborn qualities of race". Although eugenics is now roundly rejected, the editorial cites a recent report which concluded that this idea still casts "a shadow on everyday life in the 21st century" and that "persons suffering discrimination live in the wake of the general identity-values promoted by eugenics".

5. Look out for **broad examples** to illustrate significant past abuses of I-EDIAA principles, and the long-term legacies of those abuses. For example, the ‘HeLa’ ‘immortal’ human cells that are still widely used in cancer research programs were obtained during the treatment of Henrietta Lack’s cancer by Johns Hopkins researcher Dr. George Gey in 1951 (*Nature*, Sept 1st 2020). Course textbooks often avoid mentioning the ethical issue that these ‘**HeLa**’ cells were taken without the patient’s consent. Although inappropriate, lack of consultation was commonplace at that time, but Henrietta’s health records and entire genome sequence were published without her family’s consent in 2013 – a time when awareness of, and laws about, consent were well established. Use this example to talk about the ethical issues associated with power dynamics between doctors and patients, and the process of obtaining these and other cell lines (e.g. Embryonic Stem Cells), to encourage students to think of ways in which I-EDIAA has been overlooked in the past. Other powerful historical examples to illustrate why there is often distrust in science from groups that have been marginalized by it include: 1) The Tuskegee Study of Untreated Syphilis in the Negro Male (<https://www.mcgill.ca/oss/article/history/40-years-human-experimentation-america-tuskegee-study>); and 2) The Northern Arizona Havasupai tribe “diabetes” study (<https://journalofethics.ama-assn.org/article/genetic-research-among-havasupai-cautionary-tale/2011-02>)
6. Seek out and highlight relevant **linkages** in your course material between the I-EDIAA principles and the **United Nation’s Sustainable Development Goals** so as to showcase globally diverse values, knowledges, and practices, and their role in addressing real-world issues.
7. If committed to implementing the I-EDIAA principles in your teaching, include an **I-EDIAA statement of support under policies in the syllabus section** of your onQ course sites. (Dr. Yasmine Djerbal at Queen’s Centre for Teaching and Learning has offered to assist in producing a generic one for all courses in the Department, or for any individual teacher)
8. Actively **promote upcoming university-wide events, but in a balanced way**. Try to ensure that over your full course you are highlighting a broad spectrum of events that includes white men but also women in science, Black, Indigenous and People of Colour (BIPOC) in science, visiting researchers/scientists from the Global South, and other equity-deserving groups (e.g. the Scientific QUEERies series). In addition, if you are teaching on **important cultural dates**, consider acknowledging them at the beginning of class out of respect to affected students (see the Queen’s multifaith calendar for details <http://multifaithcalendar.org/cal/index.php>)
9. In courses that involve Teaching Assistants, **consider the role and requirements of your Teaching Assistants in addressing I-EDIAA principles**. Incorporation of sensitive material in labs or tutorials can be particularly problematic because the TAs are the ones directly interacting with the students, and while some would probably be extremely capable of handling questions or concerns, others might not be so comfortable. Be aware of this issue, and make specific efforts to consult with and prepare all course TAs handling such material (Are they willing to do so? What supports might they need? What resources are available if they or their students experience a ‘triggering’ event?).
10. Include an **I-EDIAA statement of support in all undergraduate recruitment communications** (e.g. for awards, lab volunteer positions, summer work experience program positions, honours thesis positions)

11. **Gather specific feedback on students' perceptions of I-EDIAA in the Biology undergraduate teaching program** during your end-of-course reflection and assessment phases (and perhaps across the finishing 4th year students). For example, what has their experience in relation to I-EDIAA been like at Queen's, what has been good, what has been disappointing, what suggestions do they have? Note this feedback process would need to be done with sensitivity – explaining the rationale of wanting to improve I-EDIAA in our teaching, and recognising that such reflection may distress some students and therefore providing information links to counselling resources. Dr. Yasmine Djerbal at Queen's Centre for Teaching and Learning has offered to assist in producing such an assessment. Furthermore, it would have to be initiated and developed by the instructor using his/her own assessment sheet (hard-copy or online) – modifications to the QSSET system are unlikely to be a feasible option.
12. "No language is neutral" (Maracle, 2020). **Take opportunities to highlight the critical importance of the particular words we choose to use in our teaching and learning.** For example, the notion of 'incorporating' I-EDIAA into one's teaching content and approach is fundamentally different to 'reconciling' one's teaching with other ways of approaching what should be taught, and how. The former is essentially first-order change – amending or refining a current system by incorporating some new perspectives into an already established core foundation. Second-order change involves a complete rebuild of the system from the 'bottom-up' – a new beginning that results in a radically new system derived from careful and deep consideration of the values and perspectives that are being reconciled. Treating I-EDIAA as an 'add-on' that would be integrated into current teaching practices will be fundamentally insufficient to achieve the depth and extent of change envisaged by many (e.g. Aikenhead and Elliott, 2010; Tuck and Yang 2012; Bartlett et al 2012; Lowman and Barker, 2015; Cronin et al, 2021). 'Reconciliation' in this context means centering I-EDIAA as the primary foundational base on which teaching content, practices and classroom environments would be developed. See Murray Sinclair (2022) on diverse interpretations of the word 'reconciliation' in the context of equity-deserving groups.
13. Consider **starting a dialogue** with your colleagues and with your students to discuss the following questions:
 - a. What does 'decolonization of the curriculum' actually mean for the content and approaches to the teaching we do in the biology undergraduate program?
 - b. What exactly is 'cultural appropriation', and how would a better understanding of it influence I-EDIAA biology teaching initiatives?
 - c. What exactly are Indigenous 'ways of knowing', and how would teaching them fit within a department whose context is fundamentally based in scientific ways of knowing?
14. **Talk it up!** – Our civilisation's progress on I-EDIAA is a **very positive advance** that contrasts with widespread concerns about negatives. For example, many people feel **overwhelmed by severe global change anxiety** at our civilisation's seeming incapacity to significantly move toward more sustainable living quickly enough to avert an environmental crisis. By contrast, **the recent tangible progress in acknowledging, raising awareness, and at least attempting to comprehensively address many I-EDIAA issues is a huge leap forward for humanity.**

Practices for highlighting Indigenization

Indigenization “can be seen as the re-doing or reaffirming of education to include Indigenous ways of knowing, thinking, feeling, and being. It involves elevating the voices of Indigenous peoples, elevating traditional, and cultural knowledge, and intentional inclusion of Indigenous ways of teaching and learning to form and create pedagogical approaches” (Office of Indigenous Initiatives, <https://www.queensu.ca/indigenous/decolonizing-and-indigenizing>).

1. **Land acknowledgement.** Queen’s provides a standard wording (weblink below) that is at least a good starting point. However, there is growing concern that such standardised statements are shallow and ineffective (see excellent Robinson et al 2019 article, and Queen’s Office of Indigenous Initiatives links below), and several authors have suggested putting together a personalised land acknowledgment. Attempting such can be an extraordinarily powerful and deeply meaningful exercise for the instructor, especially if you can get feedback from an Indigenous person. Overall, making such a personal effort is likely to have a significant and positive impact on your student audience.
2. In **highlighting specific core concepts in physiology, cell biology and genetics, try to be respectful of Indigenous sensitivities in your choice of evidence.** Introducing Indigenous examples into physiology, cell biology, and genetics is more challenging than in ecology and conservation courses because Traditional Ecological Knowledge has more clear application in the latter. It is also a bit treacherous, and ‘a step backwards’, when the examples are mostly focused on pathophysiology related to genetic diseases or dysfunction in Indigenous populations. For example, a critical metabolic gene was first recognized because of polymorphisms in the Puma tribe in the Southwest where obesity is common. Despite the obvious relevance, this example is not helpful in raising the Indigenization issue and should be avoided. Likewise, teaching how Y chromosome phylogeny has helped advance scientifically-based understanding of the origins of Indigenous peoples is a very sensitive issue because it provides the basis for genetic-based testing to claim some sort of ‘legitimacy’ of Indigeneity that in some cases has been used inappropriately for personal gain. By contrast, differences in the gut microbiome of Indigenous people who live in cities compared to those on traditional diets may be more appropriate if it is directly relevant to the course material, and is presented in a balanced way that ideally includes data from other groups.
3. Teaching **evolution** as it specifically relates to humans is particularly challenging because there are **risks of explicitly conflicting with creation beliefs** – (not just theist-based religious creation beliefs, but also those of Indigenous cultures). Take care to find ways to talk about the science of evolution without being overtly offensive to those with countering belief systems. For example, avoid using the word ‘myth’ and instead use the word ‘belief’; personalise key statements – “For me, evolution is the most likely explanation for...”. Secondly, although the theory of evolution is indisputable from a science perspective, and a central foundation of all biology, **from an I-EDIAA perspective, consider highlighting how the theory has been used to justify all kinds of dreadful notions and practices** (e.g. eugenics – see specific coverage much earlier). Furthermore, **care and sensitivity are warranted in its use to interpret human history and cultural origins** (e.g. Many North American Indigenous peoples fundamentally reject the narrative that their ancestors arrived on ‘Turtle Island’ by migrating across the Bering strait toward the end of the last ice age).

4. Explore the instructor's and students' collective knowledge of the '**Indian Act**' and some common myths about First Nations in Canada (e.g. CBC documentary 'Colonisation Road' is an excellent starting point – full details below). Highlight the geographic distribution and diversity of First Nation languages. Although this material may not be directly related to the science content of your course material, it **provides a critically important wider context for that science**. (Consultation with Queen's Four Directions centre suggests that most students have very little knowledge of the history or contemporary issues for First Nations in Canada.)
5. Highlight **Queen's National Day for Truth and Reconciliation activities**. Students could be asked to write a reflection on what this day means to them and what role they see themselves playing toward Truth and Reconciliation in Canada
6. Explore the use and misuse of **Indigenous Knowledge/Traditional Ecological Knowledge (TEK)** in science. There are some excellent examples of the benefits conferred by the former to the latter (e.g. Waugh, 2018; Kimmerer 2002), but Monica Garvie and others point out that science tends to embrace TEK when it is supported by scientific evidence and to discard it as inaccurate myth if it disagrees with scientific evidence: *"On the one hand, these types of knowledge are valued when they support or supplements archaeological, or other scientific evidence. But when the situation is reversed—when Traditional Knowledge is seen to challenge scientific 'truths' — then its utility is questioned or dismissed as myth. Science is promoted as objective, quantifiable, and the foundation for 'real' knowledge creation or evaluation while Traditional Knowledge may be seen as anecdotal, imprecise and unfamiliar in form."* Nicholas, 2018.
7. Invite an **Indigenous knowledge keeper to give a live guest lecture** (Queen's Office of Indigenous Initiatives can facilitate)
8. Consider including **video and reading materials by leading Indigenous scholars** such as Drs. Robin Kimmerer and Leroy Little Bear (webinars from each that were specifically recorded at Queen's are listed below, along with multiple other reference materials).
9. Where appropriate in ecology/environmental science courses, **highlight the distinct inter-relationship and respect-based perspectives that Indigenous groups have with the land and water, and all the organisms that live in those habitats**. But, in the spirit of truly educating the students, do this **in a balanced way**. For example, point out that although much of science tends to be dominated by reductionist/isolationist approaches, ecology as a science is clearly focussed primarily on inter-relationships among organisms (including humans) and their environment. Secondly, if contrasting sustainability practices in the past compared to modern society, there's no doubt that Indigenous peoples had developed explicit doctrines of interconnectedness, gratitude, and reciprocity, and were living with relatively small impacts on the environment for thousands of years prior to colonisation (Mazzocchi, 2020). Nevertheless, it may be insightful to point out that at least part of the reason why they had minimal impact is that, unlike today, population densities were much lower and resource-intensive technologies had not been developed.
10. Consider including a KAIROS Indigenous sensitivity workshop in your course. The **KAIROS Blanket Exercise** is an interactive learning experience that teaches the history of Indigenous rights. By engaging on an emotional, physical, spiritual and intellectual level, the Blanket

Exercise effectively educates and increases empathy and encourages collaboration. (Queen's Office of Indigenous Initiatives can facilitate).

11. Use **species names stemming from Indigenous languages** (in addition to the Latin and Greek that many scientific names are derived from), and explain your rationale to the students.
12. If your course involves a **field excursion**, consider going to sites where efforts have been made **to highlight Indigenous perspectives on the land** (e.g. Queen's Biology Elbow Lake property has an excellent set of new information signboards on its Red Trail).
13. Consider introducing yourself and your students to the **Thanksgiving Address entitled "The Words Before All Else"** (full reference below). Haudenosaunee people speak these words before ceremonial and governmental gatherings, and some speak it at the start and end of each day. "The words are simple, but in the art of their joining, they become a statement of sovereignty, a political structure, a Bill of Responsibilities, an educational model, a family tree, and a scientific inventory of ecosystem services. It is a powerful document, a social contract, a way of being – all in one piece. But first and foremost, it is the credo for a culture of gratitude." (Kimmerer, 2013).

This document can be very effectively used to teach about our interdependence and connection with the rest of nature – to dispel the myth of separateness. It takes several minutes to read, and afterwards some short reflective comments can be offered on the value of being aware of different ways of 'knowing' – i.e. western science versus generally more holistic, Indigenous perspectives. Furthermore, the text can be used to highlight the close parallel between interconnectedness as a theme in ecology (and especially 'deep ecology') and interconnectedness as a fundamental component of Indigenous perspectives on the Earth and our place as humans within it.

N.B. This is a **sacred document** to Northeastern North American Indigenous cultures (The Six Nations peoples) and therefore requires very respectful and sensitive treatment. The full text is widely available (i.e. posted on the internet, and reported in seminal literature - e.g. *Braiding Sweetgrass* by Dr. Kimmerer). However, **out of respect, it should only be read aloud by an Indigenous person, or by a non-Indigenous person who has been specifically authorized by an Indigenous person to do so**. On specific request, Lindsay Brant (an Indigenous Educational Developer at the Queen's Centre for Teaching and Learning) has previously encouraged and 'authorized' its reading for individual teachers, provided that the reading is done with respect, sensitivity and dignity. If you are considering using it, and are not Indigenous, you should first consult with Lindsay or another Indigenous person from The Six Nations peoples for authorization to do so, and then you should explicitly state that authorization to your audience at the beginning of the reading. Alternatively, you could arrange through the Queen's Office of Indigenous initiatives to invite an elder to visit your class and teach the Thanksgiving Address (<https://www.queensu.ca/indigenous/ways-knowing/protocols-indigenous-guests>)

14. **Consider attempting to include some coverage of non-science based 'ways of knowing'** (<https://www.queensu.ca/indigenous/ways-knowing/about>). This suggestion is controversial. - Why should a science-based department teach anything other than science and the scientific process (i.e. evidence-based, empirical, rational determination of mechanisms to explain ourselves and the world around us)? In the specific context of I-EDIAA, one answer is that there is educational value to science students in reflecting that science is an extraordinarily powerful

way of knowing which is centred on rational, evidence-based, empirical, determination of mechanisms to explain ourselves and our social and physical environment. But it is not the only way of knowing, and therefore it has distinct limitations which can be augmented by other approaches. For example, 'knowing' that incorporates emotionally-related input is also a very powerful force contributing to the development of our society and how we treat each other (e.g. the 'knowing' that has led our society to initiate the current push for I-EDIAA is a case in point). More generally, emotional-based knowing is particularly powerful in distinguishing 'right' from 'wrong'.

It seems to me that every human being - no matter what their cultural background - has the capacity for, and regularly uses, both rational and emotional ways of knowing. However, since the advent of modern science which first emerged in the Age of Enlightenment, the rational-based way of knowing has risen to strong dominance in Western society (See Little Bear webinar cited below; Armstrong, 2022). As a result, the balance between different ways of knowing in Western culture has been distorted, and in particular the perceived value of emotionally-based ways of knowing has been weakened and suppressed. By contrast, Indigenous cultures seem to have a much more balanced approach to knowing that involves both rational (incorporating both the intellectual thinking activity of the mind and direct physical sensation components that some Indigenous writers consider as separate ways of knowing), emotional, and even spiritual components all interplaying with each other (Kimmerer, 2013). If the above perspective is correct, it suggests that Western culture would benefit from reprioritizing the relative value it places on the various different ways of knowing so as to achieve more balance between rational and emotional insights. It also suggests that the term 'Indigenous ways of knowing' may not be very helpful and indeed is likely to confuse many who would think the term describes some unique ways of knowing.

Finally, and again specifically from an I-EDIAA perspective, there is educational value to science students in being aware that the scientific mindset/worldview has been utilized over centuries as an agent of oppression, colonialism, and legitimizer of authoritarian power structures (e.g. Mayorga et al. 2019), and is also a major cause of our current environmental crisis (Wright, 2004; Kimmerer, 2013). In summary, awareness of other 'ways of knowing' may help science students to place science knowledge in a broader, more holistic context.

For these reasons, some instructors may wish to consider attempting to include coverage of other 'ways of knowing' as a complement to the scientific 'way of knowing'. Obviously, most instructors have no credentials to do so – most are not Indigenous, and most probably will have no formal training on this topic. You could arrange through the Queen's Office of Indigenous initiatives to invite an elder to visit your class and teach Indigenous ways of knowing (<https://www.queensu.ca/indigenous/ways-knowing/protocols-indigenous-guests>). Alternatively, non-Indigenous teachers can inform themselves of the basics using some of the many resources listed below (e.g. Aikenhead and Michell, 2011; Bartlett et al, 2012; Kimmerer, 2013; webinars detailed below by Little Bear, Kimmerer etcetera). Be open about your lack of credentials and naïveté at the outset, but also explain your rationale for even attempting to include such material, provide a reference list so that students can further investigate for themselves, and frame your approach as a mutual learning opportunity. Acknowledge that some students may be more informed than you, and agree that when mistakes are made, they should be followed up by a process of gentle correction ('calling in'). From an I-EDIAA perspective, students are likely to greatly benefit from your efforts.

Practices for highlighting Equity

Equity is defined as the removal of systematic barriers and biases enabling all individuals to have equal opportunity to access and benefit from an organisation (<https://www.sshrc-crsh.gc.ca/funding-financement/nfrf-fnfr/edi-eng.aspx#2>).

1. Deliberately **highlight researcher contributions from women, BIPOC, queer, trans, and other under-represented groups**, but in a balanced way. Don't cut out "old white guys" – you can't teach evolution without talking about Darwin, Wallace, Wright, Fisher, etc. However, you could also include a description of how Rosalind Franklin's critically important contribution to the first determination of the structure of DNA was largely ignored by her male counterparts Watson and Crick (Markel, H. 2022). Furthermore, you could include a picture of Barbara McClintock when discussing transposons, or a picture of Bonnie Bassler and a link to her TedX talk when discussing quorum sensing.
2. Take the opportunity in your science course to discuss the **lack of diversity in STEM**, particularly in environmental fields where minorities are disproportionately impacted. Make students aware that those who are most impacted are therefore NOT driving the research agenda and **science may not be asking the 'right questions'**. Furthermore, the lack of diversity **stifles creativity** and deprives society of true innovation and problem-solving capacity. Some relevant reads: <https://grist.org/article/environmental-science-diversity-asthma-aradhna-tripati-esteban-burchard/> (10 minutes) <https://blogs.scientificamerican.com/voices/silence-is-never-neutral-neither-is-science/> (5 minutes – includes action items)
3. Highlight the fact that although equity-redeeming measures have been in place within the scientific community for some time, there is still a **strong gender bias in the power structure** with women well-represented in graduate positions but scarce in higher status positions (James et al. 2019).

Practices for highlighting Diversity

Diversity is defined as differences in race, colour, place of origin, religion, immigrant and newcomer status, ethnic origin, ability, sex, sexual orientation, gender identity, gender expression and age (<https://www.sshrc-crsh.gc.ca/funding-financement/nfrf-fnfr/edi-eng.aspx#2>).

1. Consider the balance in diversity of researchers highlighted across your course to ensure that you are including some articles that are authored **by research groups from the Global South** (i.e. Indian, Middle Eastern, African, Chinese, South and Central American).
2. If using downloaded quiz questions which are generally biased toward English names, **change** some of the **people names** (e.g. Mark -> Ahmed, John -> Arjun, Sue -> Akasuki) to achieve a more balanced overall representation of human diversity.

3. If using photographs with humans to illustrate some point in tutorial assignments or lectures, **intentionally balance your selection of images** to include not just white Caucasian people but also a range of other groups. Furthermore, be aware that many scientific and medically-related photos were/are non-consensual, exploitive, eugenicist, colonial, racist, sexist, ableist, abusive, etc. Think carefully about selected images to ensure they are not reinforcing unwanted narratives.
4. In selecting species data for biodiversity lectures or tutorials, **intentionally choose species/situations that are not local** (e.g. frogs from Europe and fish from the South Pacific).
5. If your course has a tutorial section, aim to achieve balance in diversity across all material by **developing some of your tutorials to specifically draw attention to equity-deserving groups in science**. For example, do some research to locate a relevant journal paper that you are confident is from one such group (i.e. be very wary of just assuming identity), and then have the students delve into the history of the people who wrote it.
6. If intentionally incorporating material from diverse human populations, be deliberately balanced by attempting to **specifically include reference to Indigenous communities and traditional practices**. For example, "the real paleo diet" National Geographic videos illustrate diverse diets and lifestyles of the Bajau from Malaysia, Inuit from Greenland, and Hadza from Tanzania. Perhaps go further by making connections to how these diets were influenced by colonialism.
7. If your course includes a focus on the **communication of science**, include examples illustrating effective communication that were produced by representatives from multiple **equity-deserving groups**, and that involved diverse presentation formats.

Practices for highlighting Inclusion

Inclusion is defined as the practice of ensuring that all individuals are valued and respected for their contributions and are equally supported (<https://www.sshrc-crsh.gc.ca/funding-financement/nfrf-fnfr/edi-eng.aspx#2>).

1. If doing round-the-table 'icebreaker' introductions at the outset of a course, or in a tutorial section, ask everyone to say not just their name, but also invite them to indicate their **preferred pronoun** if they wish to do so. When introducing yourself at the very beginning of the activity, indicate your own preferred pronoun. In addition, offer the opportunity for students to share their preferred pronoun privately with you.
2. Human-focused subject material can sometimes be contentious and/or reliant on evidence collected from problematic studies (e.g., experiments conducted on humans without full informed consent, data collection in a gender-exclusive way). Consider: a) Beginning with a content warning before lectures that include sensitive topics (e.g., suicide, homicide, miscarriage); b) Trying to use gender-inclusive language as much as possible, and clearly distinguishing sex and gender (See excellent resource at: <https://cihr-irsc.gc.ca/e/50836.html>);

- c) providing information on relevant support and counselling services in case students experience distress.
3. Specifically set out at the beginning of discussion-based components of a course to provide clear guidelines for open, honest and respectful discussion, in which individuals will be held accountable for the words they use and concepts they express. Through early discussion, develop a mutually-agreed follow-up protocol to comprehensively deal with microaggressions (intended or unintended) or harm, and post it onQ.
 4. Utilise **Universal Design for Learning** principles and practices to recognize and address diversity in learning among students in your course (<https://healthsci.queensu.ca/sites/opdes/files/modules/EDI/universal-design-for-learning/#/>) (<https://www.queensu.ca/studentwellness/accessibility-services/universal-design-learning>). For example, use different question-types for quizzes (short answer, matching, multi-select) and allow students to work with classmates on them - these quizzes may also be 'open book'. In discussion sections, allow for differences in how comfortable students feel speaking in front of their peers by offering multiple ways to participate in class (e.g. orally as compared to submitting written questions beforehand, or posting questions in the online chat...)
 5. Be careful of the potential for **unconscious bias in grading assignments, academic expectations, and communication** by you, or your teaching assistants. Explicitly outlining your attempts to counter such bias are likely to be greatly appreciated – especially by those students who feel they may be victims of this innate tendency. For example, when grading assignments, consider blocking out or replacing student names so as to remove their identity prior to beginning marking; and use the double-blind approach (i.e. identity of both the student and grader are hidden) when your students are doing peer-review marking of written materials.
 6. If teaching courses with field excursions, be conscious and sensitive to the fact that the **costs of field trips can be a prohibitive issue for some students**. Apart from the field trip fee, there's also the cost of necessary equipment (clothing, shoes, etc.). The Queen's Outdoor Field Experience group (<https://www.qofei.com>) is helping to address the equipment issue, but they do not have the capacity to support large quantities of students.
 7. In courses with a strong data analysis/computation focus, **be aware, and plan for, students that don't have an adequate laptop computer** (or whose computer is unavailable because of being under repair). Ideally, the university should have a small set of designated laptops that can be signed out by affected students for such in-person tutorials and labs.

Practices for highlighting Accessibility

Accessibility refers to the design of products, devices, services, or environments for people who experience disabilities. The Accessibility for Ontarians with Disabilities Act (AODA) seeks to ensure that all Ontarians have fair and equitable access to programs and services and to improve opportunities for persons with disabilities (<https://accessibilitycanada.ca/aoda/definitions/>).

Below are some suggestions to enhance accessibility for students who have hearing disabilities (provided by Queen's American Sign Language (<https://queensuniasl.wixsite.com/qasl>)). Obviously, there are many more disabilities that need to be considered and included in further revisions of this document (see <https://www.queensu.ca/accessibility/across-campus/queens-accessibility-initiatives>)

1. Make accommodations for the **possibility that some of your students may be deaf/hard of hearing (D/HOH)**. Normalize discussions around accessibility and don't assume that all students have full hearing ability.
 - a) Avoid saying "Can everyone hear me/this?" since a D/HOH student may feel uncomfortable stating they cannot hear in front of the class.
 - b) Make students aware that you prioritize their individual learning needs, and provide a space where they can discuss this with you privately (office hours, anonymous google forms, email etc.)
 - c) Some students benefit from lip reading, so ensure you speak facing the class and are in good lighting for them to see your face as you teach.
 - d) Familiarize yourself with the availability of microphones and any other sound projection devices in your learning spaces if needed. However, also be conscious that some students may have hearing devices with which the microphone may interfere.
 - e) Consider adopting methods to maintain the standard of accessibility that Zoom and other online platforms set for D/HOH students as we move back into the in-person learning space after the COVID restrictions. It is crucial for instructors to recognize the enhanced accessibility that platforms such as Zoom offer to the community of D/HOH students. Such students experience many obstacles in learning spaces that are focused on the audial perception of information. Platforms such as Zoom offer several accessibility options, such as automatic live captioning, and access to a transcript of all discussions afterwards, that together allow a D/HOH student to engage in audio-based learning at their own pace. Furthermore, online platforms implicitly slow the pace of material, as they typically have only one person speaking at a time. By contrast, the overlapping noise of several students talking at once, or in groups, during in-person classroom settings often makes hearing difficult for D/HOH students. The methods listed above will help D/HOH students, but in addition there may be technical ways of assisting via simultaneous online presentations that provide live-captioning, or by the provision of a dedicated microphone connected to a student laptop that runs live captioning software. If a student informs you of a D/HOH problem, be very open to their suggestions.

Practices for highlighting Anti-racism

Anti-racism is "an active process of identifying and counteracting racism by changing systems, organizational structures, policies, practices, and attitudes so that power is redistributed" (Queen's Human Rights and Equity Office – 'Showing up for Anti-Racism' workshop resources).

1. Describe how past, present, and future biotech advances contributed to, and continue to contribute to racist and other marginalizing practices. Outline the complicated legacies of relevant historical figures and discuss how we as researchers and academics, and more broadly we as a society, view the benefits of scientific discoveries that were obtained using unethical practices. If appropriate, highlight how these practices were not just ethically wrong, but also scientifically unsound. For example, if discussing the conclusions of a population study that did not include a representative sample of human diversity, highlight this as a limitation of the generalizability of the author's findings.
2. Consider incorporating some of the materials in the recent *Nature* special issue entitled Racism – Overcoming Science's toxic legacy (*Nature*, Oct 20th, 2022) that is focussed on the importance of scientific institutions (including *Nature* itself) acknowledging the ways in which their histories have compounded systemic racism. For example, a 1921 *Nature* editorial reported on a national science meeting as “devoted to the discussion of ways and means by which the science of anthropology might be made of greater practical utility in the administration of the Empire, particularly in relation to the government of our subject and backward races.”(*Nature*, Sept 29th 2022).

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<https://www.un.org/development/desa/indigenouspeoples/declaration-on-the-rights-of-indigenous-peoples.html>

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<https://www.cbc.ca/radio/ideas/the-2004-cbc-massey-lectures-a-short-history-of-progress-1.2946872>

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Specific Indigenous topic resources

Indigenous-related broad topic webinar talks and video documentaries (* indicates strongly recommended):

Kimmerer, R. Queen's Dept of Biology webinar: What does the Earth ask of Us? Dr. Robin Wall Kimmerer (Nov. 12th, 2020). Queen's Dept of Biology webinar:

<https://www.youtube.com/watch?v=KAoBJa61-D0>

*Little Bear, Leroy. Rethinking our Science: Blackfoot Metaphysics Waiting in the Wings. Reflections by a Blackfoot. (April 20, 2021). Queen's Dept of Biology webinar:

<https://www.youtube.com/watch?v=YWH6RTgLRaU>

Aikenhead, G. Consultation-based webinar on insights and practical advice regarding how to integrate Indigenous knowledge into science education. (July 8, 2021). Queen's Dept of Biology webinar: https://youtu.be/rfMLj_IXYcU

Colonization Road: The path of reconciliation is long and winding (– An excellent documentary on the history and impacts on settler colonisation on Canadian indigenous communities by CBC Documentaries PointOfView*) <https://www.youtube.com/watch?v=u03qLJ50bf4>

*Doxtater, M. The Adoption of Canada into the Long House of Many Nations. Webinar (SNID seminar) by Queen's National Scholar in October 2019. ("Hurt-people hurt people; Hurt-people help hurt-people hurt people; Hurt-people healing hurt-people hurts people; Healed hurt-people help hurt people heal")

https://stream.queensu.ca/Playlist/p6M3WtGo?destinationID=kKude6yc0000pprOBbb46g&contentID=6k8g9t9IGeerrA_SSdku7Q&pageIndex=1&pageSize=10

Sinclair, M. 2022. A short talk on the meaning of the word 'reconciliation' in the context of Indigenous issues. <https://www.youtube.com/watch?v=HuKOZj8vJw0>

*Cajete, Gregory. Native Ecology: An interview on Dr. Cajete's book 'Look to the Mountain' (Accessible through the Queen's library service Omni) https://digital-films-com.proxy.queensu.ca/p_ViewVideo.aspx?xtid=56718

Land acknowledgement

Queen's standard Land Acknowledgement

https://www.queensu.ca/indigenous/sites/oiwww/files/uploaded_files/Acknowledgement%20of%20Territory%20Poster.pdf)

Critiques and constructive suggestions for effective land acknowledgement practices: Queen's Office of Indigenous Initiatives (<https://www.queensu.ca/indigenous/ways-knowing/land-acknowledgement>)

Beyond Territorial Acknowledgements: <https://apihtawikosisan.com/2016/09/beyond-territorial-acknowledgments/>

Understanding the Land Acknowledgement <https://www.youtube.com/watch?v=qNZi301-p8k&t=6s>
(MG: *An 8 minute video from Indigenous individuals at York University who share their thoughts about land acknowledgments and its purpose*)

Territorial Acknowledgements: Going Beyond the Script.

<https://www.youtube.com/watch?v=yXYhBml2c2I> (University of Alberta) *This territorial acknowledgement video offers seven tips for creating your own acknowledgement.*

Meaningful Land Acknowledgements. Lindsay Brant (Indigenous Educational Developer at the Queen's Centre for Teaching and Learning)

<https://www.youtube.com/watch?v=btmU25mtAT8&list=PLQVD63Mifqa5lqoAhcVSoHPOOVKD97AZR&index=3>

The Words That Come Before All Else (Thanksgiving Address) See Kimmerer 2013, and also

<https://www.ducc.ca/wp-content/uploads/2009/04/Thanksgiving-from-Tracking-Project.pdf>;

<https://donnalong.com/sustainable-living/words-before-all-else/>;

<https://www.smithsonianmag.com/blogs/national-museum-american-indian/2018/11/22/haudenosaunee-thanksgiving-address/>

Queen's University Indigenous websites

Queen's Office of Indigenous Initiatives: <https://www.queensu.ca/indigenous/decolonizing-and-indigenizing>

Queen's Truth and Reconciliation website: <https://www.queensu.ca/provost/committees-and-reports/truth-and-reconciliation-commission-task-force>

Extending the Rafters: Truth and Reconciliation Commission Task Force Final Report (Queen's University)

[https://www.queensu.ca/provost/sites/webpublish.queensu.ca/provwww/files/files/Comittees/TRC%20Reports/\(WEB%20VERSION\)%20Final%20Report%20of%20the%20Truth%20and%20Reconciliation%20Commission%20Task%20Force.pdf](https://www.queensu.ca/provost/sites/webpublish.queensu.ca/provwww/files/files/Comittees/TRC%20Reports/(WEB%20VERSION)%20Final%20Report%20of%20the%20Truth%20and%20Reconciliation%20Commission%20Task%20Force.pdf)

Together We Are – Conversations about EDI at Queen's - <https://www.queensu.ca/connect/equity/>

Queen's Human Rights and Equity Office: <https://www.queensu.ca/hreo/>

General I-EDIAA resources

I-EDIAA Biology-Specific Resource sites

- [Biology: Diversity and Anti-Racism in Biology](#) – Northeastern University Library
- [Can Biology Class Reduce Racism?](#) The New York Times

- [Ten simple rules for building an antiracist lab](#)- PLOS Computational Biology
- Tools for promoting diversity and inclusivity in biology classrooms
<https://projectbiodiversify.org/examples/>

I-EDIAA implementation in science and academia

- [100 ways to Indigenize and decolonize academic programs and courses](#)—University of Regina
- [Decolonizing Science & making meaning of “decolonizing ”](#)- Chanda Prescod-Weinstein
- [Best Practices in EDII in Research](#)—SSHRC-CRSH-CIHR
- [Conversations on Decolonization Introductory Module](#)—Health Science, Queen’s university
- [The intersections of science and racism](#)- UTM Biology Graduates Society
- [Confronting Anti-Black Racism: Scientific Racism](#)- Harvard Library
- [Equity, Diversity and Inclusion in Pedagogy and Practice](#)—Queen’s HREO & CTL
- <https://internet.edu/network-organization/diversity-resources/> (MG: Website with links to many resources on many topics related to EDII in biology)
- <https://smallpondscience.com/> (MG: Blog about academia – leans heavily into issues of EDII in Science)
- <https://www.ioes.ucla.edu/diversity/> (MG: Institution that focuses specifically on diversity in environmental science)

Teaching for Inclusion

- [Resource Guides to Deepen Understanding of Inclusivity in STEM Courses](#)- LSA University of Michigan
- [Tips in Inclusive Teaching Practices](#) – Dartmouth University
- Evidence-Based Teaching Guide for Inclusive Teaching (https://lse.ascb.org/evidence-based-teaching-guides/inclusive-teaching/?_ga=2.256414984.249518507.1619809794-460905395.1619809794) (MG: *This interactive site provides information and resources on both the concepts behind inclusivity teaching and ways to implement inclusivity while teaching. This resource is designed specifically for educators; Also see publication related to the site: Dewsbury, B. and Brame, C.J., 2019. Inclusive teaching. CBE—Life Sciences Education, 18(2), p.fe2.*)

Microaggressions

- [Dealing with Microaggressions and Microaggressions](#)—Brown University
- “Microaggressions in the classroom” <https://www.youtube.com/watch?v=ZahtlxW2CIQ> (18:03) (MG: *Describes types of microaggressions (microassaults, microinsults, microinvalidations) and their impact*)
- “How microaggressions are like mosquito bites” <https://www.youtube.com/watch?v=hDd3bzA7450> (1:57) (MG: *Brief video on the cumulative impact of microaggressions*)

General I-EDIAA training resources

Online I-EDIAA modules from Queen’s Human Rights and Equity Office (HREO): <https://www.queensu.ca/hreo/education>) provides a large number of resources including workshops. Students can be organised to take relevant modules, and then set up to participate

in a scenario workshops in-class with Erin Clow and others. These modules and workshops could be specifically modified for our core biology undergraduate courses.

Course Instructional Designers (via CTL and our Department) can provide enormously helpful insights and can directly lead to actionable steps and concrete improvements. See many excellent CTL resources at: <https://www.queensu.ca/ctl/resources/equity-diversity-inclusivity>

Indigenous Canada is a highly recommended 12-lesson Massive Open Online Course (MOOC) from the [Faculty of Native Studies](https://www.ualberta.ca/admissions-programs/online-courses/indigenous-canada/index.html) at University of Alberta that explores the different histories and contemporary perspectives of Indigenous peoples living in Canada. <https://www.ualberta.ca/admissions-programs/online-courses/indigenous-canada/index.html> (You can take it for free or pay a modest fee and do it for credit, and it takes about 20 hours to complete at your own pace).

Queen's Arts and Science course modules on Indigenous issues (e.g. DEVS 220, and 221 https://www.queensu.ca/artsci_online/courses/indigenous-studies-ii-resistance-and-resurgence)