

Description

The main objective of the course is to provide a societal and environmental context to the global field of corrosion science and engineering.

Topics

- Introduction to corrosion – a system process between environment and a degrading material
- Corrosion- and mining-induced environmental pollution
- Sustainability in engineering, and UN sustainability goals
- Introduction to environmental impact assessments and business cases
- The importance of corrosion and chemical speciation for health outcomes
- An Indigenous perspective on land, materials, and resources
- Discrimination related to environmental pollution: Environmental racism and sexism
- Global gender issues within engineering fields

Lectures and Seminars

This course employs a flipped classroom strategy, with instructor-led discussions and seminar sessions. Students are required to come prepared with the mandatory videos and readings completed.

Course Policies: Attendance and Missed/Late Assignments

In addition to the evaluation criteria, **attendance and active participation** in at least 85% of the class sessions is required for successful completion of this course. If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed.

Schedule

Date	Instructors	Required	Preparations*
Session 1			
Introduction: Course & Assignments			
Introduction to Corrosion			
		✓	Shipilov, 2009. What corrosion costs Canada: Or, can we afford to ignore corrosion? Proceedings of the 48 th Annual Conference of Metallurgists of CIM. Sudbury, ON, Canada. Pp. 55-76. https://www.researchgate.net/publication/289985675_What_Corrosion_Costs_Canada_Or_Can_We_Afford_to_Ignore_Corrosion
			IMPACT Canada study: https://www.ampp.org/resources/what-is-corrosion/corrosion-reference-library/impact-canada
Corrosion- and mining-induced environmental pollution			
		✓	Overview of Mining and its impacts. https://www.elaw.org/files/mining-eia-guidebook/Chapter1.pdf
			Hudson, Fox & Plumlee, 1999. Metal mining and the environment. https://www.americangeosciences.org/sites/default/files/metalefull.pdf
		✓	Liboiron, M. 2017. Pollution is colonialism. https://discardstudies.com/2017/09/01/pollution-is-colonialism/

Session 2			
	Sustainability in engineering, and UN sustainability goals		
		✓	Coull, Wilson & Wei, 2021. Practical examples to move operations towards UN sustainable development goals (SDGs) by managing corrosion risk. CIM Academy.
			Atkins & Lambert, (2022). Sustainability and corrosion. Proceedings of the Institution of Civil Engineers – Engineering Sustainability. 175(1): 221-29. https://owl.uwo.ca/access/content/group/54f53712-8dcf-46f8-83da-050d0a00a0d6/Reading%20material/Nov%20%20Sustainability/EXTRA-Atkins%20and%20Lambert%20Sustainability%20and%20corrosion.pdf
		✓	Women in renewable energy. From Kindea Labs on Vimeo. https://publish.uwo.ca/~bbaruah/publications/research_videos.html
		✓	Why should Canadians care about gender equity in clean energy employment? From Kindea Labs on Vimeo. https://publish.uwo.ca/~bbaruah/publications/research_videos.html
		✓	How to promote gender equity in green jobs. From Kindea Labs on Vimeo. https://publish.uwo.ca/~bbaruah/publications/research_videos.html
Session 3			
	Introduction to environmental impact assessments and business cases		
		✓	AMPP, 2016. The NACE International IMPACT Study. https://www.youtube.com/watch?v=abWBonOwiY4
		✓	Last Week Tonight with John Oliver, 2015. https://www.youtube.com/watch?v=Wpzvaqypav8&t=324s
		✓	See OWL's Reading material → Nov 15 business case and EIA → Mandatory Environmental Risk and Assessment.pdf
Assignment 1 due			
Session 4			
	The importance of corrosion and chemical speciation for health outcomes		
		✓	Hedberg, YS. 2018. Chapter 27 - Metal Allergy: Chromium. In: Chen, J., Thyssen, J. (eds) Metal Allergy. Springer, Cham. https://doi-org.proxy1.lib.uwo.ca/10.1007/978-3-319-58503-1_27
		✓	Fair Action. About us. https://fairaction.se/english/
		✓	J. Kaufman and A. Hajat, Confronting Environmental Racism, Editorial, Environmental Health Perspectives, 2021: https://ehp.niehs.nih.gov/doi/10.1289/EHP9511
Session 5			
	Discrimination related to environmental pollution: Social injustice issues		
		✓	Center for Environmental Health. Missions and values. https://ceh.org/about/mission-and-values/
		✓	Fair Action. About us. https://fairaction.se/english/
		✓	J. Kaufman and A. Hajat, Confronting Environmental Racism, Editorial, Environmental Health Perspectives, 2021: https://ehp.niehs.nih.gov/doi/10.1289/EHP9511
Session 6			
	An Indigenous perspective on land, materials, and resources		

		✓	Indigenous Learning Bundle 1: Orientation to Indigenous Knowledges. OWL resource.
			Indigenous Learning Bundle 2: Indigenous Lands, Spaces, and Places. OWL resource.
		✓	Black Rock. (2019). In this remote town you're either working at the uranium mines or fighting against them. https://www.youtube.com/watch?v=iQq9fEHKRMs
		✓	Cry of the Sacred Marutu Tao and its Defenders, Guyana (2021). https://www.forestpeoples.org/en/extractive-industries/video/2021/video-cry-sacred-marutu-tao-and-its-defenders-guyana
		✓	For non-UWO students: Reflect on where you are geographically located and determine what First Nations are nearby, and reflect on how you would seek out that learning information from those other Indigenous Peoples.
Assignment 2 due			
Session 7			
	Global gender issues within engineering fields		
		✓	Baruah & Biskupski-Mujanovic, 2021. Chapter 13: Closing the gender gaps in energy sector recruitment, retention and advancement. https://uwoca.sharepoint.com/:b:/s/CREATECORRECTCorrosiontrainingprogram/EVPco0w7n0FLlwj2WSPGA_gBekzkZ3ir1Bnl41WccE4Jtw?e=LaYbGh
		✓	Women in renewable energy. From Kindea Labs on Vimeo. https://publish.uwo.ca/~bbaruah/publications/research_videos.html
		✓	Why should Canadians care about gender equity in clean energy employment? From Kindea Labs on Vimeo. https://publish.uwo.ca/~bbaruah/publications/research_videos.html
		✓	How to promote gender equity in green jobs. From Kindea Labs on Vimeo. https://publish.uwo.ca/~bbaruah/publications/research_videos.html
By end of day: Final assignments submitted for publication at Scholarship@Western			

*mandatory reading materials are available on OWL in the folder 'resources'

Additional Reading Materials of Interest

- Leygraf et al., 2016. Chapter 10: Environmental Dispersion of Metals from Corroded Outdoor Constructions. In Atmospheric Corrosion, 2016.
https://uwoca.sharepoint.com/:b:/s/CREATECORRECTCorrosiontrainingprogram/EfeVrChtDitKo5x4Jh2hjVYBplwU-IGNy4ibZ5Wt5E_dsg?e=euyLnt
- Chen & Thyssen, Eds., 2018. Metal allergy - from dermatitis to implant and device failure. Springer International Publishing, Cham, Switzerland.
<https://link.springer.com/book/10.1007/978-3-319-58503-1>
- Eisler, 2004. Mercury hazards from gold mining to humans, plants, and animals.
<https://pubmed.ncbi.nlm.nih.gov/14738199/>
- Arsenic trioxide and underground issues at Giant Mine. <https://www.rcaanc-cirnac.gc.ca/eng/1100100027413/1617999134934>

- UN-SDGs at <https://sdgs.un.org/goals>
- Ferroukhi, García-Baños López, & Baruah, 2021. Chapter: Global trends in women's employment in renewable energy. https://uwoca.sharepoint.com/:b:/s/CREATECORRECTCorrosiontrainingprogram/EcK33Z-XAbFDuCBszSUXpXIBaLYDa8g1jCZn_v_5wxBSOW?e=H0tg3Rgarc%C3%ADa-ba%C3%B1os-l%C3%B3pez-bipasha-baruah
- Global education monitoring report 2022: Gender report, deepening the debate on those still left behind. <https://unesdoc.unesco.org/ark:/48223/pf0000381329>
- New UNESCO and IEA brief: Missing out on half the world's potential in mathematics and science. <https://www.unesco.org/en/articles/new-unesco-and-iea-brief-missing-out-half-worlds-potential-mathematics-and-science>
- Maatookiying gaa-miinigoowiziying (Sharing Our Gifts). https://indigenous.uwo.ca/initiatives/learning/indigenous_learning_bundles.html
- Canadian Commission for UNESCO (2021). Land as teacher: understanding Indigenous land-based education. <https://en.ccunesco.ca/idealab/indigenous-land-based-education>
- Fullerton (2021). Indigenous education: Land as text. BU Journal of Graduate Studies in Education, 13(2). <https://files.eric.ed.gov/fulltext/EJ1304405.pdf>
- Neeganagwedgin, E. (2022). Indigenous Science Knowledge and Epistemologies in Practice: Living Everyday Research. Journal of Indigenous Social Development, 11(1), 145-158. <https://journalhosting.ucalgary.ca/index.php/jisd/article/view/73893>
- Wildcat, M., Mcdonald, M., Irlbacher-Fox, S., & Coulthard, G. (2014). Learning from the land: Indigenous land-based pedagogy and decolonization. <https://nycstandswithstandingrock.files.wordpress.com/2016/10/wildcat-et-al-2014.pdf>
- Weenie, A. (2009) First Nations Perspectives. First Nations University of Canada. 2, 1: pp.57-70. https://mfncrc.org/wp-content/uploads/2012/11/007_Weenie.pdf
- National Centre for Collaboration in Indigenous Education (2020). Introduction to Land-Based Education. <https://www.youtube.com/watch?v=4F6hg8uwZuQ>

Evaluations and Assignments

This course is evaluated through two individual assignments and participation. Focus is on the chemical, societal, environmental, political and/or economic interplay of the corrosion process within its environment.

Course Weight	Assignment	Description	Due Date
35%	Case Study (group work): a written report (max. 6 pages, references included)	<p>An individual will prepare a case study focused on one of the general corrosion topics, highlighting the various concerns each stakeholder might have. Includes individual reflections and peer assessments.</p> <p>General Topics:</p> <ul style="list-style-type: none"> • Corrosion related to nuclear waste (A) • Corrosion of oil pipelines (B) • Corrosion inside or in contact with human body (C) • Corrosion of contact materials with food and/or drinking water (D) • Corrosion of infrastructure (E) • Industrial corrosion (F) 	<p>Sept 19, 2023 for report and video</p> <p>Sept 26, 2023 for comments to others</p>

55%	Environmental and/or economical assessment or analysis of case study: A written report (max. 6 pages, references included) + max. 5 min video – this can be highlighting interesting aspects of both assignments for the public.	The individual will further prepare an assessment of their case study. This includes an environmental (impact) assessment and/or a cost/benefit analysis. Specifically assess the case from different stakeholder, environmental, and societal perspectives.	October 10, 2023
10%	Participation and professionalism	Based on attendance, preparation, participation in class, engagement, professionalism. See Appendix A.	ongoing

Students should publish their coursework at https://ir.lib.uwo.ca/nserc_create_sci_institute/ latest on October 17, 2023.

Academic Honesty

Scholastic offences are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf.

All required assignments/submissions will be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Health and Wellness

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre.

Numerous cultural events are offered throughout the year. For example, please check out the Faculty of Music web page <http://www.music.uwo.ca/>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca/>. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at http://www.health.uwo.ca/mental_health/resources.html.

Appendix A: Professionalism & Participation Rubric

Category/Criteria	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)
Class Session Contributions and Responsibilities	<ul style="list-style-type: none"> • Participates limitedly • Demonstrates limited focus on class activities • Offers support & feedback to peers occasionally • Demonstrates poor understanding of the topics being discussed • Respects the opinions of others limitedly • Demonstrates a limited level of active listening • Fails to notify Instructor of absences and requests to leave early • Attends classes rarely (excused with notification or documentation as required) • Demonstrates limited punctuality • Avoids assisting in classroom 	<ul style="list-style-type: none"> • Participates adequately • Demonstrates some focus on class activities • Offers support & feedback to peers usually • Demonstrates adequate understanding of the topics being discussed • Respects the opinions of others somewhat • Demonstrates an adequate level of active listening • Usually notifies Instructor of absences and requests to leave early • Attends some classes (excused with notification or documentation as required) • Demonstrates sporadic punctuality • Assists in classroom occasionally 	<ul style="list-style-type: none"> • Participates well • Demonstrates good focus on class activities • Offers support & feedback to peers regularly • Demonstrates good understanding of the topics being discussed • Respects the opinions of others • Demonstrates a good level of active listening • Regularly notifies Instructor of absences and requests to leave early • Attends classes regularly (excused with notification or documentation as required) • Demonstrates regular punctuality • Assists in classroom regularly 	<ul style="list-style-type: none"> • Participates highly • Demonstrates consistent focus on class activities • Offers support & feedback to peers consistently • Demonstrates exceptional understanding of the topics being discussed • Encourages respect amongst the group • Demonstrates an exceptional level of active listening • Consistently notifies Instructor of absences and requests to leave early • Attends classes consistently (excused with notification or documentation as required) • Demonstrates consistent punctuality • Assists in classroom consistently
Rubric developed by Dr. Isha DeCoito				

CEDES 1, ASSIGNMENTS 1-2 RUBRIC

Criteria/Category	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)
Completeness	Incomplete in most respects; does not reflect requirements	Incomplete in many respects; reflects few requirements	Complete in most respects; reflects most requirements	Complete in all respects; reflects all requirements
Understanding	Demonstrates an inadequate understanding of the topic(s) and issue(s); inadequate description of issue, context and background	Demonstrates an acceptable understanding of the topic(s) and issue(s); some description of issue, context and background	Demonstrates an accomplished understanding of the topic(s) and issue(s); good description of issue, context and background	Demonstrates a sophisticated understanding of the topic(s) and issue(s); thorough description of issue, context and background
Analysis, description of cognitive processes (scientific inquiry, decision-making), evaluation, and recommendations	Presents an incomplete analysis of the issues identified	Presents a superficial analysis of some of the issues identified	Presents a thorough analysis of most issues identified	Presents an insightful and thorough analysis of all issues identified
	Makes little or no connection between the issues identified and strategic concepts	Makes appropriate but somewhat vague connections between issues and concepts studied; demonstrates limited command of strategic concepts	Makes appropriate connections between issues identified and strategic concepts; demonstrates good command of strategic concepts	Makes appropriate and in-depth connections between issues identified and strategic concepts; demonstrates complete command of strategic concepts
	Supports diagnosis and opinions with few reasons and little evidence; argument is one-sided and not objective	Supports diagnosis and opinions with limited reasons and evidence; presents a somewhat one-sided argument	Supports diagnosis and opinions with reasons and evidence; presents a fairly balanced view; interpretation is both reasonable and objective	Supports diagnosis and opinions with strong arguments and evidence; presents a balanced and critical view; interpretation is both reasonable and objective

Corrosion, Equity, Diversity, Environment, and Society – Part 1

	Presents realistic or appropriate recommendations with little, if any, support from the information presented	Presents realistic or appropriate recommendations supported by the information presented	Presents specific, realistic, and appropriate recommendations supported by the information presented	Presents detailed, realistic, and appropriate recommendations clearly supported by the information presented
Research	Supplements case study, if at all, with incomplete research and documentation	Supplements case study with limited research into the present situation; provides limited documentation of sources consulted	Supplements case study with relevant research into the present situation; documents all sources of information	Supplements case study with relevant and extensive research into the present situation; clearly and thoroughly documents all
Principles of Equity, Diversity, and Inclusion and Decolonization (e.g.,	Demonstrates an inadequate understanding of principles of equity, diversity and inclusion	Demonstrates an acceptable understanding of principles of equity, diversity and inclusion	Demonstrates an accomplished understanding of principles of equity, diversity and inclusion	Demonstrates a sophisticated understanding of principles of equity, diversity and inclusion
Reflection	Reflection on developing the case study is somewhat complete.	Reflection on developing the case study is acceptable.	Reflection on developing the case study is insightful and complete.	Reflection on developing the case study is well articulated, complete, with recommendations.
Writing mechanics and Presentation	Writing is unfocused, rambling, or contains serious errors; lacks detail and relevant data and information; poorly	Writing lacks clarity or conciseness and contains numerous errors; gives insufficient detail and relevant data and	Writing is accomplished in terms of clarity and conciseness and contains only a few errors; includes sufficient details and	Writing demonstrates a sophisticated clarity, conciseness, and correctness; includes thorough details and
References: uses Corrosion Science (ISSN: 0010-938X) guidelines	Does not use Corrosion Science guidelines	Reflects incomplete knowledge of Corrosion Science guidelines	Uses Corrosion Science guidelines with minor violations to cite sources	Uses Corrosion Science guidelines accurately and consistently to cite sources

Rubric developed by Dr. Isha DeCoito