1. Course Information:

Tuesdays 14:30-17:00, MSA 3204
Start date: 9 September, 2025
End date: 21 October, 2025
Remote (non-UWO) attendees can attend via Zoom. Note that in-person attendance is required for UWO students.

Enrollment:

To be capped at 20 students

2. Instructor Information:

Dr. Yolanda Hedberg
E-mail: yhedberg@uwo.ca
Tel: *ext.* 86248
Office: ChB 126

3. Course Description:

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

Course content:

- 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

Learning objectives:

1. Describe, analyze, and identify societal aspects of corrosion science and engineering in selected case studies.
2. Communicate sustainability development goals, environmental pollution, equity and policy aspects, and/or business aspects of a particular corrosion case analyzed.

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.

4. Course Materials:

An electronic copy of the course materials will be provided.

Costs of Corrosion
Shipilov, 2009. What corrosion costs Canada: Or, can we afford to ignore corrosion? Proceedings of the 48th 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://elaw.org/wp-content/uploads/archive/attachments/publicresource/guidebook_for_evaluating_mining_project_eias_english.pdf
Hudson, Fox & Plumlee, 1999. Metal mining and the environment. https://profession.americangeosciences.org/society/intersections/faq/how-can-metal-mining-impact-environment/
Liboiron, M. 2017. Pollution is colonialism. https://discardstudies.com/2017/09/01/pollution-is-colonialism/
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. Available on Brightspace
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
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 Reading material on Brightspace: Mandatory Environmental Risk and Assessment.pdf
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
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
An Indigenous perspective on land, materials, and resources
Indigenous Learning Bundle 1: Orientation to Indigenous Knowledges. Resource on Brightspace
Indigenous Learning Bundle 2: Indigenous Lands, Spaces, and Places. Resource on Brightspace
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=iOq9fEHKRMs
Cry of the Sacred Marutu Tao and its Defenders, Guyana (2021). https://www.forestpeoples.org/publications-resources/news/article/video-cry-of-the-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.
Global gender issues within engineering fields
Baruah & Biskupski-Mujanovic, 2021. Chapter 13: Closing the gender gaps in energy sector recruitment, retention and advancement. On Brightspace.
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

Additional Reading; Materials of Interest

- Leygraf et al., 2016. Chapter 10: Environmental Dispersion of Metals from Corroded Outdoor Constructions. In Atmospheric Corrosion, 2016. On Brightspace
- 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. On Brightspace.
- 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
- Maatookiiying 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://mfnerc.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

5. Methods of Evaluation:

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)	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. General Topics: • 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)	Sept 23, 2025 for report and video Sept 30, 2025 for comments to others
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 14, 2025
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 21, 2025.

Course attendance and missed/late assignments

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.

Statement on the Use of Generative Artificial Intelligence (AI)

The use of generative artificial intelligence (AI) tools/software/apps is acceptable if it is used responsible. It is the student's responsibility to ensure accuracy of any suggested text, references, or cases that any AI tools contribute. It is suggested that AI tools are not used for historical, political, or technical guidance without any fact-checking. Each AI-suggested fact has to be fact-checked down to the initial source of information. Use rigorous citations and always go back to the root source of information, as citation errors are common in the literature and media.

6. **Statement on Academic Offences:**

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 website: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.pdf.

7. **Statement on Gender-Based and Sexual Violence:**

Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who is going through or has gone through these traumatic events. If you are experiencing or have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts at the following website: https://www.uwo.ca/health/student_support/survivor_support/get-help.html To connect with a case manager or set up an appointment, please contact support@uwo.ca.

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	• Participates limitedly	• Participates adequately	• Participates well	• Participates highly
	• Demonstrates limited focus on class activities	• Demonstrates some focus on class activities	• Demonstrates good focus on class activities	• Demonstrates consistent focus on class activities
	• Offers support & feedback to peers occasionally	• Offers support & feedback to peers usually	• Offers support & feedback to peers regularly	• Offers support & feedback to peers consistently
	• Demonstrates poor understanding of the topics being discussed	• Demonstrates adequate understanding of the topics being discussed	• Demonstrates good understanding of the topics being discussed	• Demonstrates exceptional understanding of the topics being discussed
	• Respects the opinions of others limitedly	• Respects the opinions of others somewhat	• Respects the opinions of others	• Encourages respect amongst the group
	• Demonstrates a limited level of active listening	• Demonstrates an adequate level of active listening	• Demonstrates a good level of active listening	• Demonstrates an exceptional level of active listening
	• Fails to notify Instructor of absences and requests to leave early	• Usually notifies Instructor of absences and requests to leave early	• Regularly notifies Instructor of absences and requests to leave early	• Consistently notifies Instructor of absences and requests to leave early
	• Attends classes rarely (excused with notification or documentation as required)	• Attends some classes (excused with notification or documentation as required)	• Attends classes regularly (excused with notification or documentation as required)	• Attends classes consistently (excused with notification or documentation as required)
	• Demonstrates limited punctuality	• Demonstrates sporadic punctuality	• Demonstrates regular punctuality	• Demonstrates consistent punctuality
	• Avoids assisting in classroom	• Assists in classroom occasionally	• Assists in classroom regularly	• 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

	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 sources of information
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 organized.	Writing lacks clarity or conciseness and contains numerous errors; gives insufficient detail and relevant data and information; lacks	Writing is accomplished in terms of clarity and conciseness and contains only a few errors; includes sufficient details and relevant data and	Writing demonstrates a sophisticated clarity, conciseness, and correctness; includes thorough details and relevant data 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