

INFO 6550 Bibliometrics and Scholarly Communication
Fall 2023

Course Type: In-person

Instructor name/title: Philippe Mongeon

Office: Rowe 4032

Contact info: pmongeon@dal.ca

Office hours: You can book a virtual or in-person meeting with me anytime using this [link](#).

Course website: <https://pmongeon.github.io/bibliometrics-and-scholarly-communication/>

COURSE DESCRIPTION

This course introduces students to the scholarly communication system and the use of bibliometrics to measure the production, dissemination and use of knowledge. Topics covered will include the reward system of science, peer-review, scholarly publishing and open access, research funding, research evaluation, bibliometric and altmetric data sources and indicators, and networks.

COURSE PRE-REQUISITES

None

LEARNING OUTCOMES

This course will equip the students with a broad understanding of the research system and the technical and analytical skills required to produce high-quality analyses of research activities at the individual, unit, organization, country, or field levels. Such reports are often used at different levels of higher education organizations, libraries, governments, funding agencies, and other organizations that engage with or participate in the scientific research system. Upon completion of the course, students will be able to:

1. Explain the scholarly communication process.
2. Select appropriate data sources to conduct a bibliometric study.
3. Calculate and interpret bibliometric indicators.
4. Visualize and analyze research networks.
5. Use bibliometrics to support research evaluation processes.
6. Explain the advantages and limitations of bibliometrics.
7. Understand the social and organizational context of research evaluation.

TECHNOLOGY REQUIREMENTS

Some software that may be used in the course include:

- Microsoft Excel (or OS equivalent)
- SciVal (accessible via Dal libraries: <https://dal.ca.libguides.com/scival>)
- Network analysis tools
 - Gephi: <https://gephi.org/>
 - VOSviewer: <https://www.vosviewer.com/>
- RStudio (optional)

INSTRUCTIONAL METHODS

Weekly readings, lectures, discussions, and labs.

LEARNING MATERIALS

<https://pmongeon.github.io/bibliometrics-and-scholarly-communication/>

METHODS OF EVALUATION

Detailed instructions regarding each assignment will be provided. Assessment of all assignments is directly related to attention to the instructions, clarity of expression and presentation, and evidence of significant analysis and reflection.

See also the [Grading Policy](#).

COMPONENT	DETAILS	DUE DATE	VALUE
1. Article review*	Critical review of an article that uses bibliometrics	Sep 29	15%
2. Plan for research project*	Short outline of the research project	Oct 13	5%
3. Network analysis*	Descriptive analysis of a collaboration network or research map	Nov 17	10%
4. Research assessment report*	A bibliometric assessment of the research activities of an individual or a group	Dec 01	30%
5. Research project*	A bibliometric analysis on a topic of your choice	Dec 16	30%
6. Participation	See rubric below	N/A	10%

PARTICIPATION EVALUATION RUBRIC

CRITERIA	WEIGHTING	INDICATORS
Preparation	25%	The student demonstrates consistent preparation for class.
Quality of contributions	25%	The student's comments are relevant and reflect understanding of concepts discussed in the course.
Frequency of participation	25%	The student is actively engaged in the class discussions.
Attendance/Punctuality	25%	The student is punctual.

INTEGRATION OF [MI Competencies](#)

PROGRAM COMPETENCY	COURSE LEARNING OUTCOME	COURSE ASSESSMENT
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Adaptation		
Collaboration		
Commitment to equity, diversity, inclusion, accessibility, and decolonization	6, 7	
Communication	3, 6	6, 7
Digital and technological literacy		
Evidence-based practices	2, 3, 4, 5	1, 2, 3, 5, 6
Leadership	1	5, 6
Learning		
Management		
User-centred design	3	5

CLASS POLICIES

Attendance

Class attendance is required in all MI courses and is included in the participation mark. Attendance records will be kept by the instructor.

Citation Style

MI courses use APA as the default standard citation style. Unless the instructor provides alternative written instructions, please use the APA citation style in your assignments to briefly identify (cite) other people's ideas and information and to indicate the sources of these citations in the References list at the end of the assignment. For more information on APA style, consult Dalhousie Library website at <https://libraries.dal.ca/help/style-guides.html> or the APA's Frequently Asked Questions about APA

Late penalties for assignments

A penalty for late assignments will be assessed, unless prior permission has been given by the instructor to submit an assignment late, which normally will be for extended illness, medical, or family emergencies only (see below). Late submissions will be assessed a penalty of five percent per day, including weekends. Assignments will not normally be accepted seven days or more after the due date; in such cases the student will receive a grade of zero.

Missed or Late Academic Requirements due to Student Absence:

Dalhousie University recognizes that students may experience short-term physical or mental health conditions, or other extenuating circumstances that may affect their ability to attend required classes, tests, exams or submit other coursework.

Dalhousie students are asked to take responsibility for their own short-term absences (3 days or less) by contacting their instructor by phone or email prior to the academic requirement deadline or scheduled time **AND** by submitting a completed [Student Declaration of Absence form](#) to their instructor in case of missed or late academic requirements. Only 2 separate Student Declaration of Absence forms may be submitted per course during a term.

GRADING POLICY

A+	90-100	Demonstrates original work of distinction.
A	85-89	Demonstrates high-level command of the subject matter and an ability for critical analysis.
A-	80-84	Demonstrates above-average command of the subject matter.
B+	77-79	Demonstrates average command of the subject matter.
B	73-76	Demonstrates acceptable command of the subject matter.
B-	70-72	Demonstrates minimally acceptable command of the subject matter.

ACCOMMODATION POLICY FOR STUDENTS

The Student Accessibility Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students on the Halifax campus who request accommodation as a result of: a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (NS, NB, PEI, NFLD).

If there are aspects of the design, instruction, and/or experiences within this course that result in barriers to your inclusion please contact the Student Accessibility Centre. Please visit www.dal.ca/access for more information and to obtain the Request for Accommodation form.

A note taker may be required as part of a student's accommodation. Visit https://www.dal.ca/campus_life/academic-support/accessibility/accommodations-/classroom-accommodation.html for more details.

Please note that your classroom may contain accessible furniture and equipment. It is important that these items remain in the classroom, undisturbed, so that students who require their use will be able to fully participate.

ACADEMIC INTEGRITY

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect. As a student, you are required to demonstrate these values in all of the work you do. The University provides [policies and procedures](#) that every member of the university community is required to follow to ensure academic integrity.

The commitment of the Faculty of Management is to graduate future leaders of business, government and civil society who manage with integrity and get things done. This is non-negotiable in our community and it starts with your first class at Dalhousie University. So when you submit any work for evaluation in this course or any other, please ensure that you are familiar with your obligations under the Faculty of Management's Academic Integrity Policies and that you understand where to go for help and advice in living up to our standards. You should be familiar with the [Faculty of Management Professor and Student Contract on Academic Integrity](#), and it is your responsibility to ask questions if there is anything you do not understand.

Dalhousie offers many ways to learn about academic writing and presentations so that all members of the University community may acknowledge the intellectual property of others. Knowing how to find, evaluate, select, synthesize and cite information for use in assignments is called being "information literate." Information literacy is taught by Dalhousie University Librarians in classes and through Dalhousie Libraries' online [Citing & Writing](#) tutorials.

Do not plagiarize any materials for this course. For further guidance on what constitutes plagiarism, how to avoid it, and proper methods for attributing sources, please consult the University Secretariat's [Academic Integrity](#) page.

Please note that Dalhousie subscribes to plagiarism detection software that checks for originality in submitted papers. Any paper submitted by a student at Dalhousie University may be checked for originality to confirm that the student has not plagiarized from other sources. Plagiarism is considered a very serious academic offence that may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree. It is essential that there be correct attribution of authorities from which facts and opinions have been derived. At Dalhousie, there are University

Regulations which deal with plagiarism and, prior to submitting any paper in a course; students should read the [Policy on Academic Dishonesty](#) contained in the Calendar.

Furthermore, the University's Senate has affirmed the right of any instructor to require that student assignments be submitted in both written and computer readable format, e.g.: a text file or as an email attachment, and to submit any paper to a check such as that performed by the plagiarism detection software. As a student in this class, you are to keep an electronic copy of any paper you submit, and the course instructor may require you to submit that electronic copy on demand. Use of third-party originality checking software does not preclude instructor use of alternate means to identify lapses in originality and attribution. The result of such assessment may be used as evidence in any disciplinary action taken by the Senate.

Finally:

If you suspect cheating by colleagues or lapses in standards by a professor, you may use the confidential email: ManagementIntegrity@dal.ca which is read only by the Assistant Academic Integrity Officer.

Faculty of Management clarification on plagiarism versus collaboration:

There are many forms of plagiarism, for instance, copying on exams and assignments. There is a clear line between group work on assignments when explicitly authorised by the professor and copying solutions from others. It is permissible to work on assignments with your friends but only when the professor gives you permission in the specific context of the assignment. University rules clearly stipulate that all assignments should be undertaken individually unless specifically authorised.

Specific examples of plagiarism include, but are not limited to, the following:

- Copying a computer file from another student, and using it as a template for your own solution
- Copying text written by another student
- Submitting the work of someone else, including that of a tutor as your own

An example of acceptable collaboration includes the following:

- When authorised by the professor, discussing the issues and underlying factors of a case with fellow students, and then each of the students writing up their submissions individually, from start to finish.

UNIVERSITY STATEMENTS

This course is governed by the academic rules and regulations set forth in the [University Calendar](#) and the Senate.

ACCESSIBILITY

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. We work collaboratively with Dalhousie and King's students, faculty, and staff to create an inclusive educational environment for students. The Centre is responsible for administering the university-wide [Student Accommodation Policy](#) working across all programs and faculties.

STUDENT CODE OF CONDUCT

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

DIVERSITY AND INCLUSION

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2).

INTERNATIONALIZATION

At Dalhousie, “thinking and acting globally” enhances the quality and impact of education, supporting learning that is “interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders.”

RECOGNITION OF MI'KMAQ TERRITORY

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people. For more information about the purpose of territorial acknowledgements, or information about alternative territorial acknowledgements if your class is offered outside of Nova Scotia, please visit <https://native-land.ca/>.

The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the McCain Building (room 3037) or contact the programs at elders@dal.ca or 902-494-6803 (leave a message).

FAIR DEALING POLICY

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie.

COURSE SCHEDULE

Week	Section	Topics
1	Understanding the research system	Introduction: bibliometrics and scholarly communication
2		Function, social structure, norms, and the research reward system.
3		Journals, peer-review, and the organization and evaluation of research.
4	Analyzing and evaluating research	Bibliometric data sources
5		Delineating fields, disciplines, and topics
6		Measuring research output (authorship)
7		Measuring research impact (citations)
8		Measuring media and policy attention to research (altmetrics)
9		Mapping research (networks)
10	Improving the research system	Open Research
11		Bias, errors, fraud, misconduct, and questionable research practices
12		Equity, diversity, and inclusion in research

SUGGESTED READINGS

Introduction to bibliometrics

De Bellis, N. (2009). *Bibliometrics and citation analysis: From the Science citation index to cybermetrics*. Scarecrow Press.

Sugimoto, C. R., & Larivière, V. (2018). *Measuring research: What everyone needs to know*. Oxford University Press.

Wang, D., & Barabási, A.-L. (2021). *The science of science*. Cambridge University Press.

Foundations of bibliometrics

Bourdieu, P. (1975). The specificity of the scientific field and the social conditions of the progress of reason. *Social Science Information*, 14(6), 19–47. <https://doi.org/10.1177/053901847501400602>

Cole, J. R., & Cole, S. (1973). *Social stratification in science*. University of Chicago Press.

Merton, R. K. (1942). A note on science and democracy. *Journal of Legal and Political Sociology*, 1–2, 115–126. <https://doi.org/2027/mdp.39015008014428>

Merton, R. K. (1957). Priorities in scientific discovery: A chapter in the sociology of science. *American Sociological Review*, 22(6), 635–635. <https://doi.org/10.2307/2089193>

Narin, F. (1976). *Evaluative bibliometrics: The use of publication and citation analysis in the evaluation of scientific activity*. Computer Horizons Washington, D. C.

Peer review

Bornmann, L. (2011). Scientific peer review. *Annual Review of Information Science and Technology*, 45(1), 197–245. <https://doi.org/10.1002/aris.2011.1440450112>

Bibliometric data sources

Mongeon, P., & Paul-Hus, A. (2016). The journal coverage of Web of Science and Scopus: A comparative analysis. *Scientometrics*, 106(1), 213–228. <https://doi.org/10.1007/s11192-015-1765-5>

Visser, M., van Eck, N. J., & Waltman, L. (2021). Large-scale comparison of bibliographic data sources: Scopus, Web of Science, Dimensions, Crossref, and Microsoft Academic. *Quantitative Science Studies*, 2(1), 20–41. https://doi.org/10.1162/qss_a_00112

Authorship

Birnholtz, J. P. (2006). What does it mean to be an author? The intersection of credit, contribution, and collaboration in science. *Journal of the American Society for Information Science and Technology*, 57(13), 1758–1770. <https://doi.org/10.1002/asi.20380>

Katz, J. S., & Martin, B. R. (1997). What is research collaboration? *Research Policy*, 26(1), 1–18. [https://doi.org/10.1016/S0048-7333\(96\)00917-1](https://doi.org/10.1016/S0048-7333(96)00917-1)

Larivière, V., Desrochers, N., Macaluso, B., Mongeon, P., Paul-Hus, A., & Sugimoto, C. R. (2016a). Contributorship and division of labor in knowledge production. *Social Studies of Science*, 46(3), 417–435. <https://doi.org/10.1177/0306312716650046>.

Laudel, G. (2002). What do we measure by co-authorships? *Research Evaluation*, 11(1), 3–15. <https://doi.org/10.3152/147154402781776961>

Mongeon, P., Smith, E., Joyal, B., & Larivière, V. (2017). The rise of the middle author: Investigating collaboration and division of labor in biomedical research using partial alphabetical authorship. *PLOS ONE*, 12(9), e0184601. <https://doi.org/10.1371/journal.pone.0184601>

Osborne, J. W., & Holland, A. (2009). What is authorship, and what should it be? A survey of prominent guidelines for determining authorship in scientific publications. *Practical Assessment, Research & Evaluation*, 14(15). <https://doi.org/10.7275/25PE-BA85>

Zuckerman, H. A. (1968). Patterns of name ordering among authors of scientific papers: A study of social symbolism and its ambiguity. *American Journal of Sociology*, 74(3), 276–291. <https://doi.org/10.2307/2775535>

Citations

- Bornmann, L., & Daniel, H.-D. H. (2008). What do citation counts measure? A review of studies on citing behavior. *Journal of Documentation*, 64(1), 45–80. <https://doi.org/10.1108/00220410810844150>
- Buranyi, S. (2017, June 27). Is the staggeringly profitable business of scientific publishing bad for science? *The Guardian*. <https://www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science>
- Wildgaard, L., Schneider, J. W., & Larsen, B. (2014). A review of the characteristics of 108 author-level bibliometric indicators. *Scientometrics*, 101(1), 125–158. <https://doi.org/10.1007/s11192-014-1423-3>

Altmetrics (week 7)

- Gläser, J., & Laudel, G. (2016). Governing Science: How Science Policy Shapes Research Content. *European Journal of Sociology / Archives Européennes de Sociologie*, 57(1), 117–168. <https://doi.org/10.1017/S0003975616000047>
- Holmberg, K., Bowman, T. D., Haustein, S., & Peters, I. (2014). Astrophysicists' Conversational Connections on Twitter. *PLOS ONE*, 9(8), e106086. <https://doi.org/10.1371/journal.pone.0106086>
- Sugimoto, C. R., Work, S., Larivière, V., & Haustein, S. (2017). Scholarly use of social media and altmetrics: A review of the literature. *Journal of the Association for Information Science and Technology*, 68(9), 2037–2062. <https://doi.org/10.1002/asi.23833>
- Thelwall, M., Haustein, S., Larivière, V., & Sugimoto, C. R. (2013). Do altmetrics work? Twitter and ten other social web services. *PloS One*, 8(5), e64841–e64841. <https://doi.org/10.1371/journal.pone.0064841>

Mapping research (week 8-9)

- Kessler, M. M. (1963). Bibliographic coupling between scientific papers. *American Documentation*, 14(1), 10–25. <https://doi.org/10.1002/asi.5090140103>
- Klavans, R., & Boyack, K. W. (2017). Which Type of Citation Analysis Generates the Most Accurate Taxonomy of Scientific and Technical Knowledge? *Journal of the Association for Information Science and Technology*, 68(4), 984–998. <https://doi.org/10.1002/asi.23734>

Open access and scholarly publishing (week 10)

- Larivière, V., Haustein, S., & Mongeon, P. (2015). The Oligopoly of Academic Publishers in the Digital Era. *PLOS ONE*, 10(6), e0127502. <https://doi.org/10.1371/journal.pone.0127502>
- Mongeon, P., Siler, K., Archambault, A., Sugimoto, C. R., & Larivière, V. (2021). *Collection Development in the Era of Big Deals*. <https://doi.org/10.5860/crl.82.2.219>
- Nwagwu, W. E., & Onyancha, B. (2015). Back to the Beginning—The Journal is Dead, Long Live Science. *The Journal of Academic Librarianship*, 41(5), 669–679. <https://doi.org/10.1016/j.acalib.2015.06.005>
- Piowar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., Farley, A., West, J., & Haustein, S. (2018). The state of OA: A large-scale analysis of the prevalence and impact of Open Access articles. *PeerJ*, 6, e4375. <https://doi.org/10.7717/peerj.4375>
- Lozano, G. A., Larivière, V., & Gingras, Y. (2012). The weakening relationship between the impact factor and papers' citations in the digital age. *Journal of the American Society for Information Science and Technology*, 63(11), 2140–2145.

Bias and inequality in science

- Lee, C. J., Sugimoto, C. R., Zhang, G., & Cronin, B. (2013). Bias in peer review. *Journal of the American Society for Information Science and Technology*, 64(1), 2–17. <https://doi.org/10.1002/asi.22784>
- Merton, R. K. (1968). The Matthew Effect in Science. *Science*, 159(3810), 56–63. <https://doi.org/10.2307/1723414>

Mongeon, P., Brodeur, C., Beaudry, C., & Larivière, V. (2016). Concentration of research funding leads to decreasing marginal returns. *Research Evaluation*, rvw007. <https://doi.org/10.1093/reseval/rvw007>

Rossiter, M. W. (1993). The Matthew Matilda Effect in science. *Social Studies of Science*, 23(2), 325–341. <https://doi.org/10.2307/285482>

Larivière, V., Ni, C., Gingras, Y., Cronin, B., & Sugimoto, C. R. (2013). Bibliometrics: Global gender disparities in science. *Nature*, 504(7479), 211–213. <https://doi.org/10.1038/504211a>

Scientific fraud and questionable research practices

Fanelli, D. (2009). How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data. *PLOS ONE*, 4(5), e5738. <https://doi.org/10.1371/journal.pone.0005738>

Reich, E. Samuel. (2009). *Plastic fantastic: How the biggest fraud in physics shook the scientific world*. Palgrave Macmillan.

Steneck, N. (2006). Fostering integrity in research: Definitions, current knowledge, and future directions. *Science and Engineering Ethics*, 12(1), 53–74.

Best practices in research evaluation

Gingras, Y. (2016). *Bibliometrics and research evaluation: Uses and abuses*.

Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., & Rafols, I. (2015). Bibliometrics: The Leiden Manifesto for research metrics. *Nature*, 520(7548), 429–431. <https://doi.org/10.1038/520429a>