INTEG 120

Disciplines & Integrative Practices

Tuesday & Thursday, 2:30 pm - 3:50 pm, EV2-2069
slack: integ120-f2016.slack.com

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DESCRIPTION

This course is the first part of a year long introduction to Knowledge Integration. Students will be introduced to (1) interdisciplinary systems thinking, (2) strategies for cultivating effective research and writing habits, (3) strategies for making sense of large disciplinary and interdisciplinary research literatures, and (4) strategies for effective collaborations. Group discussions will usually take place at the beginning of the class, followed by any lecture material at the end. When I lecture, it will mostly be to explain difficult concepts or aspects of the readings that are not addressed in group discussion.

LEARNING OUTCOMES

By the end of the class, students should be able to:

1. Explain and compare the fundamentals of *systems thinking* across disciplinary boundaries
2. Explain the value of diversity, trust, and social capital for effective collaboration
3. Effectively search databases like the Web of Science and use specialized software to conduct literature reviews
4. Explain how social and information networks shape expert knowledge
5. Start developing good writing habits

DELIVERABLES AND EVALUATION

Given the learning objectives, your grade in this course will be based on the deliverables outlined in the table above. To do well in this course, you have to take the material seriously, consider it, and discuss it. If you have strongly held opinions, you should be willing to change your mind on the basis of empirical evidence, or rational and respectful argument. That said, you do not have to agree with the readings, with what I say about them, or what others say about them. When you disagree, **be respectful**.

Assignment	Deadline	Value
Systems Thinking Paper (Collaborative)	November 8	30%
Knowledge Networks Paper (Collaborative)	December 5	30%
10 Comprehension Quizzes (Individual)	See Below	30%
Engagement / Participation (Individual)	Ongoing	10%

You can download a calendar file (`.ics`) with the dates for all quizzes and deliverables here.[1]

Systems Thinking Paper & Knowledge Networks Paper

You will co-author two papers in this course.

1. **Systems Thinking Paper**: You will co-author a paper that uses Meadows (2008) and/or Watts (2011) to apply interdisciplinary systems-thinking to a contemporary problem. Depending on your topic, Heffernan (2015) may also be useful. You may also draw on other sources, but it is not required. In addition to interpreting the problem from a systems perspective, you should compare possible interventions into the system and explain why some are more likely to succeed (i.e. make things better) than others. As in more senior undergraduate classes, you will be responsible for choosing your own paper topics, which should be informed by class material. I will be available to discuss topics with you, and to help you make a good decision.

2. **Knowledge Networks Paper**: You will co-author a "knowledge networks" paper on any disciplinary or interdisciplinary research area of your choosing. To write this paper, you will have to search a database like the Web of Science or PubMed and download meta-data on published journal articles. Then you will use (very simple) software such as *VOSViewer* or *metaknowledge* to interpret the high-level topics and network structure of your chosen research area. (I will teach you everything you need to know about the software during lectures marked "computing" on the schedule below.) Then, you will select a small number of important papers (~6), explain why they are important, and identify their primary intellectual contributions.

Both papers will be co-authored in teams of 4. You should make sure that everyone has similar availability. Undergraduate students rarely co-author papers in university, but co-authoring is *very* common in most disciplines and in the public, private, and non-profit sectors. We will discuss co-authoring throughout the semester, including how to avoid violating academic integrity policies.

Each paper should be roughly 4,000 words before references, have standard 1 inch margins, use a 12 pt font, and be single-spaced. Put the title and your names *in alphabetical order* at the top of the first page. You are free to use any citation style you like, but you must use it consistently. You will submit your research papers for everyone to read on the course LEARN website, which is set up with the plagiarism detector Turnitin. If you do not want to submit your paper to Turnitin, your team can schedule a meeting with me to discuss your paper in detail.

I will discuss my grading criteria in more detail in our class meetings, and I am happy to discuss your work in progress or when it is finished. If you feel you have been given a grade you do not deserve, please wait 24 hours and then write a 500-600 word memo to me outlining the perceived error. Finally, I encourage you to make appointments with people at the writing centre. Their services are available to all University of Waterloo students.

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1. The download url is http://www.johnmclevey.com/integ120/downloads/INTEG120.ics.

Comprehension Quizzes

Although there are no tests or exams in this course, there are 10 very short quizzes to test student comprehension of the readings and other class material. Each of these quizzes will take approximately 10 minutes and will consist of short answer and/or multiple choice questions. The material on each quiz will include any readings or lectures that come after the previous quiz.

Quiz Topics:

Q1-3 Thinking, Understanding, Explaining (i.e. Watts)

  Q4 Collaboration & Openness (i.e. Heffernan)

Q5-7 Complexity & Systems Thinking (i.e. Meadows)

  Q8 Databases & Literature Reviews

  Q9 Networked Knowledge: Surveying Content & Historical Bibliometrics

 Q10 Networked Knowledge: Network Analysis (citation, co-citation, co-author, keyword, etc.)

Engagement / Participation

The quality of this course – like any other – depends on you being engaged. Your participation grade will be based on (a) contributions to class discussion, (b) small group discussion, (c) your involvement in any online discussions, and (d) attendance. If you *really* don't like speaking up in class, you can participate more online, but you *must* speak with me about this. Although I will not be assigning a participation grade until the end of the semester, I am happy to provide qualitative feedback on your participation throughout the semester.

    The TA and I will be tracking attendance using the attendance register in LEARN. Your attendance will be recorded as either (1) present, (2) absent, (3) late, or (4) excused. If you arrive more than 5 minutes late, you will lose 50% of the credit for attending class. In other words, arriving late twice is equivalent to missing a class. There is no penalty for excused absences, which **always** require advance notice and generally require a note from a doctor. You can log on and view your attendance record under the "assessments" tab. The schedule at the end of this syllabus includes a unique ID for each class. The ID is also used in the attendance register.

TEACHING ASSISTANT

Bronwyn McIlroy-Young is the teaching assistant for this course. She is a 4th year KI student. Among other things, she will be responsible for grading your systems thinking paper and any short answer responses on the comprehension quizzes. Feel free to get in touch with her on #slack or over email (bmcilroy@uwaterloo.ca).

READINGS

The books by Duncan Watts, Donella Meadows, and Margaret Heffernan are available for purchase at the University of Waterloo bookstore. Articles and the relevant selections from Silvia (2007) and Lamott (1995) are available through the university library and will be posted the the LEARN website.

1. Duncan Watts (2011) *Everything Is Obvious Once You Know the Answer: How Common Sense Fails Us*. New York: Crown Publishing.
2. Donella Meadows (2008) *Thinking in Systems: A Primer*. Vermont. Chelsea Green Publishing.
3. Margaret Heffernan (2015) *Beyond Measure: The Big Impact of Small Changes*. TED.

COMPUTING

You will need to bring a laptop to class when there are "labs" scheduled. If you are unable to do so, please speak with me as soon as possible so that I can arrange something for you. You will need a laptop, phone, or tablet when there are quizzes scheduled.

We will be using *VOSViewer* (Van Eck and Waltman 2010) and *metaknowledge* (McLevey and McIlroy-Young Under Review) to facilitate the process of conducting literature reviews and exploring knowledge networks in this class. *metaknowledge* is a Python library, but we will not be writing any Python code in this class. Instead, we will use a new GUI app that runs in your web browser. Both *VOSViewer* and the *metaknowledge* GUI are easy to use. You will learn everything you need to know about them in the lectures marked "computing" in the schedule below.

SUBMITTING WORK & LATE POLICY

I will only grade work that you upload to Learn. If it is not on the Learn website, I will not grade it. Do not ever submit a Microsoft Word document. Submit a PDF file instead. I will deduct **5 points** a day for every day, or part of a day, that your work is late, including weekends. I will not make exceptions without a medical note.

Plagiarism Detection Software (Turnitin)

Plagiarism detection software (Turnitin) will be used to screen assignments in this course. This is being done to verify that use of all materials and sources in assignments is documented. In the first week of the term, details will be provided about arrangements for the use of Turnitin in this course.

Turnitin: Text matching software will be used to screen assignments in this course. This is being done to verify that use of all materials and sources in assignments is documented. Students will be given an option if they do not want to have their assignment screened by Turnitin. If you do not wish to submit your work to Turnitin, your group can schedule a meeting with me to discuss your submissions in person.

LAPTOPS AND THE FACEBOOK PENALTY

Laptops may be used in the classroom on the honors system. If I see Facebook, email, an IM client other than #slack, a newspaper story, a blog, or *any* other content not related to the class, I will remove 1 point from your participation grade on the spot. No exceptions.

COMMUNICATION

We will be using the collaboration tool slack for all class communication. Of course you are free to email me, but I tend to respond to slack messages from students faster than I respond to emails. *I use the do not disturb settings on #slack, so I will not see any messages you send me outside of normal*

working hours. Sign up and sign into slack by going to slack.com. There are slack apps for Mac OS X, iOS, and Android. If you are a Linux or Windows user, there is a very good web app.

Feedback

I will solicit brief, informal, and confidential course evaluations throughout the semester. These will only take a few minutes of your time. The purpose is to make sure that we are moving at a comfortable pace, that you feel you understand the material, and that my teaching style is meeting your needs. I will use this ongoing feedback to make adjustments as the course progresses. Although you are not obligated to do so, please fill out the evaluations so that I can make this the best learning experience for you, and the best teaching experience for me.

ON CAMPUS RESOURCES

The Writing Centre

Although I will be giving you feedback on your work throughout the term, I encourage you to make appointments with people at the writing centre. Their services are available to all UW students.

Access Ability Services

The AccessAbility Office, located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AccessAbility Office at the beginning of each academic term.

Mental Health

The University of Waterloo, the Faculty of Environment, and our Departments consider students' well-being to be extremely important. We recognize that throughout the term students may face health challenges – physical and / or emotional. Please note that help is available. Mental health is a serious issue for everyone and can affect your ability to do your best work. Counselling Services is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more.

UNIVERSITY POLICIES

Academic Integrity

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

We will all uphold academic integrity policies at University of Waterloo, which include but are not limited to promoting academic freedom and a community free from discrimination and harassment. You can educate yourself on these policies – and the disciplinary processes in place to deal with violations – on the Office of Academic Integrity website.

A student is expected to know what constitutes academic integrity, to avoid committing academic offense, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about 'rules' for group work / collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for Assessment of Penalties.

Grievances and Appeals

A student who believes that a decision affecting some aspect of his / her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70: Student Petitions and Grievances, Section 4. When in doubt please contact your Undergraduate Advisor for details.

A decision made or penalty imposed under Policy 70 – Student Petitions and Grievances (other than a petition) or Policy 71 – (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals).

Religious Observances

Student needs to inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and deliverables.

SCHEDULE & READINGS

ID	DATE	TOPIC	QUIZ	LAB	GUEST	READING
1	Sept. 8	Introduction				
2	Sept. 13	Thinking, Understanding, Explaining				Watts Preface & Ch. 1
3	Sept. 15	Thinking, Understanding, Explaining				Watts Ch. 2
4	Sept. 20	Thinking, Understanding, Explaining	Yes			Watts Ch. 3
5	Sept. 22	Thinking, Understanding, Explaining				Watts Ch. 4
6	Sept. 27	Thinking, Understanding, Explaining	Yes			Watts Ch. 5
7	Sept. 29	Thinking, Understanding, Explaining				Watts one of Ch. 6-10
8	Oct. 4	Collaboration & Openness	Yes			Heffernan Ch. 1-3
9	Oct. 6	Collaboration & Openness				Heffernan 4-Epilogue
–	Oct. 11	*Study Day, No Class*				—
10	Oct. 13	Writing	Yes			Silvia Ch. 2 & Lamott pp. 16-27
11	Oct. 18	Complexity & Systems Thinking				Meadows Ch. 1 & 2
12	Oct. 20	Complexity & Systems Thinking				Meadows Ch. 3
13	Oct. 25	Complexity & Systems Thinking	Yes			Meadows Ch. 4
14	Oct. 27	Complexity & Systems Thinking				Meadows Ch. 5
15	Nov. 1	Complexity & Systems Thinking	Yes			Meadows Ch. 6 & 7
16	Nov. 3	Databases & Literature Reviews	Yes	Yes		
17	Nov. 8	Networked Knowledge: Introduction	Yes	Yes		Evans and Foster (2011)
18	Nov. 10	Networked Knowledge: Surveying Content		Yes	SG	Skim Van Eck and Waltman (2010)
19	Nov. 15	Networked Knowledge: A Historical View		Yes		Elango, Bornmann, and Kannan (2016)
20	Nov. 17	Networked Knowledge: Network Analysis	Yes	Yes		*Readings selected based on student projects*
21	Nov. 22	Networked Knowledge: *metaknowledge* GUI		Yes	JA	*Readings selected based on student projects*
22	Nov. 24	Networked Knowledge: Project Work		Yes		*Readings selected based on student projects*
23	Nov. 29	Networked Knowledge: Project Work	Yes	Yes		*Readings selected based on student projects*
24	Dec. 1	Debriefing				

Guest Speakers

SG **Alexander (Sasha) Graham**, Knowledge Integration Grad (2015), MA Student in Sociology & Legal Studies at University of Waterloo. McLevey NetLab and Plaisance McLevey Lab Research Assistant.

JA **Jillian Anderson**, 4th year Knowledge Integration and Computer Science Student, McLevey NetLab Research Assistant, *metaknowledge* developer on releases > 3.1.

REFERENCES

Elango, Bakthavachalam, Lutz Bornmann, and Govindaraju Kannan. 2016. "Detecting the Historical Roots of Tribology Research: A Bibliometric Analysis." *Scientometrics* 107(1): 305–13.

Evans, James, and Jacob Foster. 2011. "Metaknowledge." *Science* 331: 721–25.

Heffernan, Margaret. 2015. *Beyond Measure: The Big Impact of Small Changes*. Simon; Schuster.

Lamott, Anne. 1995. *Bird by Bird: Some Instructions on Writing and Life*. Anchor.

McLevey, John, and Reid McIlroy-Young. Under Review. "Introducing *Metaknowledge*: Software for Computational Research in Information Science, Quantitative Sociology of Science, and Network Analysis."

Meadows, Donella. 2008. *Thinking in Systems: A Primer*. chelsea green publishing.

Silvia, Paul. 2007. *How to Write a Lot: A Practical Guide to Productive Academic Writing*. American Psychological Association.

Van Eck, Nees Jan, and Ludo Waltman. 2010. "Software Survey: VOSviewer, a Computer Program for Bibliometric Mapping." *Scientometrics* 84(2): 523–38.

Watts, Duncan. 2011. *Everything Is Obvious Once You Know the Answer: How Common Sense Fails Us*. New York: Crown.