University at Buffalo
Department of Information Science
Graduate School of Education

We acknowledge the land on which the University at Buffalo operates, is the territory of the Seneca Nation, a member of the Haudenosaunee/Six Nations Confederacy.

LIS 565 / 610: Information Retrieval

Thomas Rowlandson, *Inside View of the Public Library, Cambridge*, 1809.

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Instructor Information

Instructor: Samuel Dodson, Ph.D. (he/him/his)
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Office Hours: By appointment

Course Information

Program: Information and Library Science
Semester: Spring 2026
Dates: 1/21/2026–5/5/2026
Credits: 3
Type of Instruction: Lecture
Delivery Mode: Online
Location: Remote
Learning Management System: UB Learns
Course Prerequisites: None

This course satisfies the *Information Management Electives* category of the Plan of Study.

As per the Handbook, successful completion of this course is defined as completion with a grade of C or better or with a grade of S.

Course Description

This course provides an introduction to information retrieval. Students will learn about theories and techniques for automatically processing, storing, and retrieving documents. Topics include indexing data structures and algorithms, retrieval models (geometric, logic-based, and probabilistic), query languages, search user interfaces, methods of system evaluation, and ethical issues, such as bias, censorship, and privacy. Students will apply these teachings to a number of domains, such as conversational search, digital libraries, multimedia search, recommender systems, and search engines.

Course Topics

- Current information retrieval research issues and trends,
- Indexing data structures, with emphasis on storage and retrieval of information on the web,
- Use of search vocabularies (e.g., controlled and free-text),
- Models of information retrieval, including Boolean, vector space model, and probabilistic,
- Presentation of results to users,
- Evaluation of efficiency and effectiveness, and
- Applications of information retrieval.

Learning Outcomes

Upon completion of this course, students will be able to:

- Understand the foundations of information retrieval concepts, models, and theories,
- Analyze and discuss current issues and research in information retrieval,
- Understand the capabilities and limitations of information retrieval systems, and
- Identify and discuss challenges and future developments in information retrieval.

This course addresses the following Master of Science in Information and Library Science (MS ILS) program goals:

1. Graduates demonstrate theoretical and conceptual understanding of information science, including the creation, representation, organization, retrieval, dissemination, use and curation of information.
2. Graduates are prepared to apply disciplinary knowledge and skills in a variety of information contexts.

3. Graduates demonstrate professional competences, including leadership, critical and analytical thinking, research, communication, collaboration, cultural competence, reflective practice, and adherence to professional ethics.
4. Graduates demonstrate values, attitudes and behaviors that are essential for information and library professionals, including diversity, equity and inclusion.

Mode of Instruction

This is a remote and asynchronous course. All course materials will be available through UB Learns, UB Libraries, or the web.

The objectives for this course will be accomplished through the following:

- Instructional video lectures,
- Readings from the textbook, book chapters, journal articles, and conference papers, and
- Individual assignments.

Each week will begin on Monday at 9:00 AM EST / EDT, except for holidays officially observed by the University and Fall / Spring Break. Weekly course materials will be available on UB Learns at the beginning of each week. Weekly activities should be completed six days later, on Sunday at 11:59 PM.

Course Technologies & Required Technology Skills

You are expected to have Prerequisite Technology Skills, and it is your responsibility to develop the technology proficiency needed to complete course objectives and assignments. You must also have reliable internet access on a device capable of using UB Learns. A detailed description of course technology requirements may be found in the UB Student Computer Standards. A UBITName is required to log in to UB Learns and access course materials. If you do not have a UBITName, please contact the UB Information Technology (UBIT) Help Center at (716) 645-3542 or ubithelp@buffalo.edu. For general questions about course technologies, you may contact the UBIT Help Center. For questions specific to UB Learns, please see UB Learns Guides for Students or contact UB Learns at (716) 645-6188 or ublearns@buffalo.edu.

University Libraries

You have full access to the University Libraries resources and services. Through the University Libraries, you have online access to many full-text databases, including: Library Literature & Information Science and Library, Information Science & Technology Abstracts. You can also request physical and electronic materials using the Delivery+ service. For reference questions, you may contact Molly Dahl Poremski, the Information

Science subject librarian, at (716) 645–7750 or poremski@buffalo.edu, or use the Instant Librarian service.

Course Assignments

Assignment	Due Date	Weight	MS ILS Goals
A1: Search System Profile	February 8 (Week 3)	20%	1, 2, 3
A3, Part 1: Final Project Proposal	February 22 (Week 5)	5%	1, 2, 3
A2: Wiki Page	March 8 (Week 7)	20%	1, 2, 3
A3, Part 2: Final Project Presentation	April 12 (Week 11)	10%	1, 2, 3, 4
A3, Part 3: Final Project Paper	May 3 (Week 14)	40%	1, 2, 3, 4
Participation	Throughout the semester	5%	1, 2, 3, 4

All assignment descriptions are available on the UB Learns course homepage by navigating to Content → Assignments → Assignment Descriptions.

Grading Policy

This course uses the letter grading scale established by the Office of the Registrar for both individual assignments and the overall course grade:

Letter Grade	Percentage	Description
A	93–100	Well above expectations
A–	90–92	
B+	87–89	

B	83–86	Above expectations
B–	80–82	
C+	77–79	
C	73–76	Meets expectations
C–	70–72	
D+	67–69	
D	65–66	Below expectations
F	0–64	Well below expectations

You are expected to submit assignments to UB Learns by the due date. I apply a late penalty of 5% per day. For example, an assignment submitted one day late receives a 5% reduction (e.g., A– to B+), and an assignment submitted two days late receives a 10% reduction (e.g., A– to B–). I do not accept assignments submitted more than one week after the due date.

Each assignment is graded starting from zero. I award points based on how well your work addresses the components in the assignment description. Completing all required components means *meeting expectations*. Assignment feedback and grades will be posted throughout the semester in UB Learns.

Your final grade is based entirely on your course work. The participation grade is calculated as the numerical average of your scores across all assignments. No extra credit is available. Final grades will be available through the HUB Student Center approximately two weeks after the last day of classes.

The assignment of an incomplete grade (I) is at my discretion, and is only given in exceptional circumstances. Furthermore, you must have a passing average in coursework already completed. You must make a request for an incomplete grade in writing with me before the last day of final examinations. A detailed description of an interim grade of incomplete may be found in the Graduate Incomplete Policy.

Weekly Course Schedule

You are responsible for completing all readings by the dates noted in the course schedule:

Date	Topic	Required & Recommended Materials
Week 1 Jan. 21–25	Introduction	Required Croft, W. B., Metzler, D., & Strohman, T. (2010). Search engines and information retrieval. In *Search engines: Information retrieval in practice* (ch. 1, pp. 1–12). Pearson. https://ciir.cs.umass.edu/downloads/SEIRiP.pdf Croft, W. B., Metzler, D., & Strohman, T. (2010). Architecture of a search engine. In *Search engines: Information retrieval in practice* (ch. 2, pp. 13–29). Pearson. Recommended Bush, V. (1945, July). As we may think. *The Atlantic Monthly*. https://www.theatlantic.com/past/docs/unbound/flashbks/computer/bushf.htm Westin, M. (2023, June 5). Ingenious librarians. *Aeon*. https://aeon.co/essays/the-1970s-librarians-who-revolutionised-the-challenge-of-search
Week 2 Jan. 26–Feb. 1	Document Representation & Processing	Required Croft, W. B., Metzler, D., & Strohman, T. (2010). Processing text. In *Search engines: Information retrieval in practice* (ch. 4, pp. 73–124). Pearson. Recommended Manning, C. & Schütze, H. (1999). Corpus-based work. In *Foundations of statistical natural*

		language processing (ch. 4, pp. 117–147). MIT Press. PDF available on UB Learns.
Week 3 Feb. 2–8	Indexing	Assignment 1 is due by the end of the week. Required Manning, C., Raghavan, P., & Schütze, H. (2008). Boolean retrieval. *Introduction to information retrieval* (ch. 1, pp. 1–18). Cambridge University Press. https://nlp.stanford.edu/IR-book/information-retrieval-book.html Manning, C., Raghavan, P., & Schütze, H. (2008). The term vocabulary and postings lists. *Introduction to information retrieval* (ch. 2, pp. 19–47). Cambridge University Press. Recommended Borges, J. L. (1962). The library of Babel. In A. Kerrigan (Ed.), *Ficciones* (pp. 79–88). Grove Weidenfeld. (Original work published 1941) PDF available on UB Learns. Zobel, J., & Moffat, A. (2006). Inverted files for text search engines. *ACM Computing Surveys, 38*(2), 1–56. https://doi.org/10.1145/1132956.1132959
Week 4 Feb. 9–15	Query Representation & Processing	Required Baeza-Yates, R. & Navarro, G. (2011). Queries: Language & properties. In R. Baeza-Yates & B. Ribeiro-Neto (Eds.), *Modern information retrieval: The concepts and technology behind*

search (2nd ed., ch. 7, pp. 255–280). Addison Wesley.

PDF available on UB Learns.

Week 5 Feb. 16–22	Access Models	Part 1 of Assignment 3 is due by the end of the week. Required Rasmussen, E. (2011). Access models. In I. Ruthven & D. Kelly (Eds.), *Interactive information seeking, behaviour and retrieval* (ch. 6, pp. 95–112). Facet Publishing. Recommended Croft, W. B., Metzler, D., & Strohman, T. (2010). Retrieval models. In *Search engines: Information retrieval in practice* (ch. 7, pp. 233–296). Pearson.
Week 6 Feb. 23–Mar. 1	Search User Interfaces	Required Hearst, M. (2009). The design of search user interfaces. In *Search user interfaces* (ch. 1, pp. 1–28). Cambridge University Press. https://searchuserinterfaces.com/book/sui_ch1_design.html Hearst, M. (2009). Presentation of search results. In *Search user interfaces* (ch. 5, pp. 120–140). Cambridge University Press. https://searchuserinterfacs.com/book/sui_ch5_retrieval_results.html Recommended Hearst, M. (2009). Integrating navigation with search. In *Search user interfaces* (ch. 8, pp. 174–210). Cambridge University Press.

https://searchuserinterfaces.com/book/sui_ch8_navigation_and_search.html

Week 7 Mar. 2–8	Evaluation	Assignment 2 is due by the end of the week. Required Manning, C. D., Raghavan, P., & Schütze, H. (2008). Evaluation in information retrieval. In *Introduction to information retrieval* (ch. 8, pp. 139–161). Cambridge University Press. https://nlp.stanford.edu/IR-book/information-retrieval-book.html
Week 8 Mar. 9–15	Ethics & Politics	Required Herman, T. (2020). Search engines and ethics. In E. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Fall 2020 ed.). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/fall2020/entries/ethics-search/ Noble, S. (2013). Google Search: Hyper-visibility as a means of rendering Black women and girls invisible. *InVisible Culture*, (19). https://doi.org/10.47761/494a02f6.50883fff Recommended Gillespie, T. (2014). The relevance of algorithms. In T. Gillespie, P. J. Boczkowski, & K. A. Foot (Eds.), *Media technologies: Essays on communication, materiality, and society* (ch. 9, pp. 167–193). MIT Press. PDF available on UB Learns. Winner, L. (1980). Do artifacts have politics?

		Daedalus, 109(1), 121–136. https://www.jstor.org/stable/20024652
Mar. 16–22	No Class (Spring Break)	No readings.
Week 9 Mar. 23–29	Search Engines	Required Croft, W. B., Metzler, D., & Strohman, T. (2010). Crawls and feeds. In *Search engines: Information retrieval in practice* (ch. 3, pp. 31–72). Pearson. Zuboff, S. (2019, September 5). How Google discovered the value of surveillance. *Longreads*. https://longreads.com/2019/09/05/how-google-discovered-the-value-of-surveillance/ Recommended Graham, R. (2023). The real costs of search engines: Digital advertising, linguistic capitalism, and the rise of fake news. In *Investigating Google's search engine: Ethics, algorithms, and the machines built to read us* (ch. 5, pp. 181–212). Bloomsbury Academic. Sweeney, L. (2013). Discrimination in online ad delivery. *Communications of the ACM, 56*(5), 44–54.
Week 10 Mar. 30–Apr. 5	Multimedia Search	Required Little, S., Brown, E., & Rüger, S. (2011). Multimedia: Information representation and access. In I. Ruthven & D. Kelly (Eds.), *Interactive information seeking, behaviour and retrieval* (ch. 13, pp. 235–254). Facet Publishing. Walker, R. (2009, October 14). The song decoders.

The New York Times Magazine. https://www.nytimes.com/2009/10/18/magazine/18Pandora-t.html

Recommended

Downie, J. S. (2003), Music information retrieval. *Annual Review of Information Science and Technology, 37*, 295–340. https://doi.org/10.1002/aris.1440370108

Enser, P. G. B. (2008), Visual image retrieval. *Annual Review of Information Science and Technology, 42*, 1–42. https://doi.org/10.1002/aris.2008.1440420108

Hill, K. (2022, May 26). A face search engine anyone can use is alarmingly accurate. *The New York Times*. https://www.nytimes.com/2022/05/26/technology/pimeyes-facial-recognition-search.html

Smeaton, A. F. (2004), Indexing, browsing, and searching of digital video. *Annual Review of Information Science and Technology, 38*, 371–407. https://doi.org/10.1002/aris.1440380109

Week 11 Apr. 6–12	Semantic Search	Part 2 of Assignment 3 is due by the end of the week.

Required

Jurafsky, D. & Martin, J. H. (2026). Embeddings. In *Speech and language processing: An introduction to natural language processing, computational linguistics, and speech recognition with language models* (3rd ed., ch. 5, pp. 96–119). https://web.stanford.edu/~jurafsky/slp3/5.pdf

		Recommended Weil, E. (2023, March 1). You are not a parrot. *New York Magazine*. https://nymag.com/intelligencer/article/ai-artificial-intelligence-chatbots-emily-m-bender.html
Week 12 Apr. 13–19	Social Search & Recommender Systems	Required Nichols, D., & Twidale, M. (2011). Recommendation, collaboration and social search. In I. Ruthven & D. Kelly (Eds.), *Interactive information seeking, behaviour and retrieval* (ch. 11, pp. 205–220). Facet Publishing. Recommended Thompson, C. (2008, November 21). If you liked this, you're sure to love that. *The New York Times Magazine*. https://www.nytimes.com/2008/11/23/magazine/23Netflix-t.html
Week 13 Apr. 20–26	Final Project Presentations	No readings.
Week 14 Apr. 27–May. 3	Digital Libraries	Part 3 of Assignment 3 is due by the end of the week. Required Rasmussen, E. (2011). Library systems. In R. Baeza-Yates & B. Ribeiro-Neto (Eds.), *Modern information retrieval: The concepts and technology behind search* (2nd ed., ch. 16, pp. 685–710). Addison Wesley. PDF available on UB Learns. Somers, J. (2017, April 20). Torching the modern-day Library of Alexandria. *The Atlantic*. https://www.theatlantic.com/technology/

archive/2017/04/the-tragedy-of-google-books/523320/

Recommended

Borgman, C. L. (2000). Is it digital or is it a library? Digital libraries and information infrastructure. In *From Gutenberg to the global information infrastructure: Access to information in the networked world* (ch. 2, pp. 33–52). MIT Press.

PDF available on UB Learns.

Labbe, C. (Host). (2020, February, 11). Jake Goldenfein on Google Scholar [Audio podcast episode]. In *Good Code*. Cornell Tech. https://www.dli.tech.cornell.edu/goodcode/episode/1ea86721/jake-goldenfein-on-google-scholar

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Required Course Materials

All other course materials will be freely available through UB Learns, UB Libraries, or the web. The required and recommended readings are listed in the course schedule.

Course Communication

I endeavor to create a learning environment in which people of all identities are welcomed and supported. I ask you to, optionally, share your name, gender identity, or pronouns with me at the beginning of the semester. Similarly, you can update your name, gender identity, or pronouns in the HUB Student Center.

I encourage you to actively participate in the UB Learns discussion forum throughout the semester. You will find that reading your peers' posts and writing your own will be beneficial to your understanding of the course materials. I read all discussion forum posts, but am not always able to respond. In this class, you are expected to engage in respectful communication. I will not tolerate any form of disrespect directed towards anyone in the class.

If you have any questions or comments about the course, please do not hesitate to contact me. Because this is an asynchronous online course, I prefer to communicate by e-mail. All

messages sent to me should come from your @buffalo.edu e-mail address. When contacting me, please include the course number in the subject of your e-mail. I will do my best to respond to you within 48 hours between Monday at 9:00 AM and Friday at 5:00 PM. Consequently, you should review assignment descriptions well in advance of their due dates in order to identify questions and allow sufficient time for a response.

Course Evaluation

Course evaluations are an important part of the University's commitment to academic excellence. Once you complete the course, you will receive an e-mail from UB Course Evaluations notifying you that course evaluations are open. When you complete a course evaluation, you give me the tools to strengthen the course offerings and improve student learning. I cannot see individual responses; I receive a summary report that compiles responses across all students in the class. I do not receive a copy of the report until after grades have been submitted.

Academic Integrity

The University is founded on principles of civility, honesty, and integrity. As a member of the community, you are expected to understand and follow the University's codes of conduct regarding academic integrity. You are responsible for completing all course work in accordance with both the University's academic integrity policies and my expectations for this course.

My teaching emphasizes reading and writing as central practices through which students develop critical thinking. Accordingly, this course is structured around learning activities that require your full engagement. The use of generative artificial intelligence tools, such as ChatGPT, is prohibited.

By enrolling in this course, you accept responsibility for upholding academic integrity and contributing to the University's tradition of academic excellence. A detailed description of academic integrity, including the University's policies and procedures, may be found in the Graduate Academic Integrity Policy.

Accessibility Policies and Services

The University is committed to providing equal access to individuals with disabilities, in part, through Accessibility Resources. If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources and also me during the first week of class. It is your responsibility to make a request for academic accommodation with Accessibility

Resources:

Accessibility Resources
University at Buffalo
60 Capen Hall (North Campus)
Buffalo, NY 14260
Phone: (716) 645–2608
Web: https://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html

Accessibility Resources will review appropriate arrangements for reasonable accommodations. If Accessibility Resources determines a request is reasonable, a memorandum describing the recommended academic adjustments or auxiliary aids will be issued. It is your responsibility to provide the memorandum to me and to arrange to meet with me regarding implementation of the recommendations. I may contact Accessibility Resources for consultation if there are any questions or concerns about a recommendation.

Student Success and Wellbeing Policies and Services

The University provides resources to support student learning and wellbeing. You can learn more about these programs and services by contacting:

Counseling Services
University at Buffalo
120 Richmond Quadrangle (North Campus)
Buffalo, NY 14261
Phone: (716) 645–2720
Web: https://www.buffalo.edu/studentlife/who-we-are/departments/counseling.html

Health Promotion
University at Buffalo
114 Student Union (North Campus)
Buffalo, NY 14260
Phone: (716) 645–2837
Web: https://www.buffalo.edu/studentlife/who-we-are/departments/health-promotion.html

Health Services
University at Buffalo
Michael Hall, 3435 Main Street (South Campus)

Buffalo, NY 14214
Phone: (716) 829–3316
Web: https://www.buffalo.edu/studentlife/who-we-are/departments/health.html

The University values and respects all members of the community. Harassment and discrimination are not tolerated. A detailed description of discrimination and harassment may be found in the Discrimination and Harassment Policy.

The University provides appropriate accommodation for religious and cultural observances. Students who require a religious accommodation should make the request directly to me. A detailed description of religious accommodation may be found in the Religious Accommodation and Expression Policy.

If you have experienced violence or harassment on the basis of sex or gender, the University has resources to help. For more information, please contact the Title IX Coordinator:

Office of Equity, Diversity and Inclusion
University at Buffalo
406 Capen Hall (North Campus)
Buffalo, New York 14260
Phone: (716) 645–2266
Web: https://www.buffalo.edu/equity.html

For confidential assistance, you may also contact a Crisis Services Campus Advocate at (716) 796–4399.

University at Buffalo faculty are mandated to report violence or harassment on the basis of sex or gender. This means that if you tell me about a situation involving violence or harassment, I will need to report it to the Office of Equity, Diversity and Inclusion. If you do not wish to have the University proceed with an investigation, your request will be honored unless the University's failure to act does not adequately mitigate the risk of harm to you or other members of the community. You also have the option of speaking with trained counselors who can maintain confidentiality. A full explanation of the resources and services available may be found in the Options for Confidentially Disclosing Sexual Violence.