

## INF 2177 Information Management and Systems

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Lectures:	<b>Wednesdays 6:30-9:30pm. Room BL538</b>
Office hours:	<b>Mondays 4 – 5:30pm.</b>

Information systems and technologies are used extensively for information management in organizations. Notions of architecture are introduced to help manage the complexity of information management and the numerous systems in an organization. This course examines various notions of information architecture, systems architecture, and organizational architecture, and their inter-relationships and interactions. Examples will be drawn from a wide variety of systems types, such as workflow systems, document management systems, content management systems, enterprise (ERP) systems, customer relationship management (CRM) systems, and data warehousing and business intelligence (BI). Issues will include dealing with legacy and change, enterprise-wide interoperability and beyond (e.g., e-commerce), convergence of information content and processing, and support for knowledge management. Frameworks and techniques for architectural modeling, analysis, and design will be considered.

### Course objectives

- To acquire a good understanding of the issues and challenges in the use of information technologies and systems in managing information in organizations.
- To be able to analyze specific types of IT systems in terms of their capabilities and limitations, organizational contexts, and future directions.
- To understand the interplay between information technologies and changes in organizational structures and business models.
- To study the concepts, methods, and frameworks of enterprise architecture advocated for effective information management.
- To learn about how strategy, policy, and standards are manifested in or exercised through information management practices and systems, including issues of compliance, governance, and business-IT alignment.
- To study current developments in digital transformation and how the latest information technologies are transforming organizations.

### Course learning outcomes

At the end of this course, students will be able to:

- analyze a wide range of information systems technologies to understand how they contribute to information management in organizations (Assignment 1)

- understand how conceptual frameworks such as those in enterprise architecture can help manage complex issues in information management (Assignment 1, 2 and 3)
- appreciate the different roles and specialized skills needed for enterprise information management, and how they complement each other. (Assignment 2 and 3)
- apply conceptual frameworks for information management in realistic settings (Assignment 2 and 3)
- apply alignment concepts to address information management architectures (Assignment 3)

### **Relationship between Course Learning Outcomes and Program Learning Outcomes**

This course helps students understand and be conversant in the role of information systems in managing information in organizations (Program Outcome 1). Students develop an understanding of the application of new technological developments, particularly digital technologies, in organizational and business settings (Program Outcome 5). The course helps students acquire learning skills through integration of material from diverse sources, and by applying learned concepts in realistic case studies, preparing them for life-long learning (Program Outcome 6).

### **Who should take this course**

This course should be of interest to anyone planning to work in (or already working in) large organizations and institutions dealing with a variety of information types, supported by different kinds of computer-based information systems, and subject to organizational or external policies and standards. For the research-oriented student, there are many open problems that can lead to thesis topics.

### **Format**

The course is organized around lectures, readings, case studies, in-class and online discussions, presentations, and student peer reviews and critique. The subject area encompasses a wide swath of material. The scope and coverage will likely be adjusted according to the interests and needs of the class.

### **Prerequisites**

Students should have a general understanding of information systems and technologies, e.g., from an introductory course on information technology applications such as INF1003, and/or experience using, designing, or managing information systems. INF1341 (systems analysis and innovation), INF1343 (database design), and INF1342 (system requirements and architectural design) are recommended as complementary to this course, either before or after taking this course.

## **COURSE SCHEDULE**

Readings shown in smaller font (10pt) are supplementary readings.

### **Week 1 (Jan 11) Course overview.**

Enterprise information management.

Readings:

- Ross, Jeanne W., and Peter Weill. [Four Questions Every CEO Should Ask About IT](#). *Wall Street Journal*. April 25, 2011.
- Heidmann, Marcus. (2010). [Overhauling Banks' IT Systems](#). McKinsey & Co. 9 pp.

- McAfee, Andrew, and Eric Brynjolfsson. (2012). Big Data: The Management Revolution. *Harvard Business Review* 90(10): 61-67.
- Cummins, Fred A. (2010). [Building the Agile Enterprise: with SOA, BPM and MbM](#). Burlington, MA: Morgan Kaufmann. Chapter 1, pp. 9-17 (from EAI to SOA); Chapter 5, pp. 127-131: (enterprise information management issues).
- Desai, Parag, Potia, Ali, and Brian Salsberg. (2013). [Retail 4.0: The Future of Retail Grocery in a Digital World](#). Toronto: McKinsey & Company.
- Kiron, David, Prentice, Pamela K., and Renee B. Ferguson. (2014). [The Analytics Mandate](#). *MIT Sloan Management Review* 55(4): 23pp.

## Week 2 (Jan 18) Information & IT Systems in the Enterprise

The evolving landscape of IT systems for enterprise information management.

Readings:

Emerging technologies

- Bughin, Jacques, Chui, Michael, and James Manyika. (2013). [Ten IT-enabled Business Trends for the Decade Ahead](#). *McKinsey Quarterly*. 13pp.
- Zammuto, R. F., Griffith, T. L., Majchrzak, A., Dougherty, D. J., & Faraj, S. (2007). [Information Technology and the Changing Fabric of Organization](#). *Organization Science* 18(5): 749-762.
- Tapscott, Don. (2006). [Winning with the Enterprise 2.0](#). *IT&CA Big Idea Series*. 62pp. (skim).
- Dumas, M., La Rosa, M., Mendling, J., & H. A. Reijers (2013). [Fundamentals of Business Process Management](#). Berlin; New York: Springer. Ch. 2.
- Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., et al. (2010). [A View of Cloud Computing](#). *Communications of the ACM* 53(4): 50-58.

Enterprise Architecture

- Zachman, J. A. (1987). [A Framework for Information System Architecture](#). *IBM Systems Journal* 26(3): 276-292.
- Winter, Robert, and Ronny Fischer. (2006). [Essential Layers, Artifacts, and Dependencies of Enterprise Architecture](#). In: *EDOCW '06 Proceedings of the 10th IEEE on International Enterprise Distributed Object Computing Conference Workshop, October 16-20, 2006*. Washington, DC: IEEE Computer Society.

## Week 3 (Jan 25) Enterprise Architecture

Systematic methods and approaches for managing information and systems in enterprises.

Readings:

Enterprise Architecture Frameworks

- Lankhorst, Marc, et al. (2013). [Enterprise Architecture at Work: Modelling, Communication and Analysis](#). In: *Enterprise Engineering Series*. Berlin: Springer. Chapter 1, pp. 1-10; Chapter 2, pp. 22-26 (Zachman, TOGAF); Chapter 5, pp. 77-78 (Service-orientation and layering).
- Sessions, Roger. (2007, May). [Comparison of the Top Four Enterprise Architecture Methodologies](#). ObjectWatch.

- Zachman Framework <http://www.zachman.com/about-the-zachman-framework>
- Open Group. (2011). The Open Group Architecture Framework (TOGAF) Version 9.1, 692 pp. online document: <http://pubs.opengroup.org/architecture/togaf9-doc/arch/>
- van't Wout, Jack, Waage, Maaten, et al. (2010) [Integrated Architecture Framework Explained: Why, What, How](#). Berlin: Springer and Capgemini SA. 260 pp. Detailed illustration of Business, Information, and System Architecture “aspect areas” for IAF, including examples of modeling (Chapters 3.3 – 3.5).
- Federal Enterprise Architecture. (2013) <http://www.whitehouse.gov/omb/e-gov/fea>
- FEAPO. (2013). [A Common Perspective on Enterprise Architecture](#). *Architecture & Governance Magazine* 9(4): 11-17. (Free registration required.)

#### Enterprise Architecture modeling

- Lankhorst, Marc, et al. (2013). [A Language for Enterprise Modeling](#). In: *Enterprise Architecture at Work: Modelling, Communication and Analysis*. The Enterprise and Engineering Series. Berlin: Springer. Chapter 5, pp. 75-114
- Jonkers, Henk, Band, Iver, and Dick Quartel. (2012). [ArchiSurance Case Study](#). The OpenGroup. 32 pp.
- ISO/IEC/IEEE 42010:2011 - [Systems and Software Engineering - Architecture Description](#). International standard. Previously IEEE Standard 1471.
- Greefhorst, Danny, and Erik Proper. (2011). [Architecture Principles: The Cornerstones of Enterprise Architecture](#). In: The Enterprise Engineering Series 4. Berlin: Springer. 197pp.

### Week 4 (Feb 1) Business Architecture & Strategy

Notions of business architecture.

**1P presentations:** document management systems; workflow management systems; e-records management systems (*Schedule of topics may be adjusted after teams sign-up*).

#### Readings:

##### Business architecture

- Business Architecture Guild. (2016). [A Guide to the Business Architecture Body of Knowledge](#) (BIZBOK™ Guide). V5.1 Part1-Intro. 15 pp.
- Harmon, Paul. (2011). [What is a Business Architecture?](#) BPTrends 8(19): 14pp.
- Glissman, S., & Sanz, J. (2010). [Business Architectures for the Design of Enterprise Service Systems](#). In: P. Maglio et al. *Handbook of Service Science*. New York; London: Springer. (HD9980.5 .H359 2010 – 2 day loan [[Check availability](#)])
- Doucet, Gary, Götze, John, Saha, Pallab, & Scott Bernard. (2008). [Coherency Management: Using Enterprise Architecture for Alignment, Agility, and Assurance](#). *Journal of Enterprise Architecture* 4(2). (online edition: Free registration required)
- Scott, Jeff. (2013). [Five Paradigm Shifts for Business Architecture Success](#). *Architecture & Governance Magazine* 9(4): 3-5. (Free registration required.)

##### Strategy

- Kaplan, Robert, and David Norton. (2000). Having Trouble with Your Strategy? Then Map It. *Harvard Business Review* 78(5):167-276.
- Kaplan, Robert S., and David P. Norton. (1996). Using the Balanced Scorecard as a Strategic Management System. *Harvard Business Review* 74(1): 75-85.
- Porter, Michael E. (2008). The Five Competitive Forces that Shape Strategy. *Harvard Business Review* 86(1): 78-93.

- Ross, Jeanne W., Weill, Peter, and David C. Robertson. (2006). *Enterprise Architecture as Strategy: Creating a Foundation for Business Execution*. Boston, MA: Harvard Business School Press. (HD45.2 .R72 2006 -- 2 day loan [[Check availability](#)])

#### Business capabilities

- Open Group Architecture Forum (2016). [Business Capabilities – Open Group Guide G161](#). 25pp. (Free registration required).
- Teece, David J., Pisano, Gary, and Amy Shuen. (1997). [Dynamic Capabilities and Strategic Management](#). *Strategic Management Journal* 18(7): 509-533.
- Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic management journal*, 28(13), 1319-1350.
- Danesh, M. H., Loucopoulos, P., & Yu, E. (2015). [Dynamic capabilities for sustainable enterprise IT—a modeling framework](#). In *Int. Conf. on Conceptual Modeling*. Springer. 358-366. (extended version)

### Week 5 (Feb 8) **Business Model Innovation**

How does your organization create and deliver value to the people it serves? How does it leverage the internet to obtain or disseminate information, and to exchange value in a value network? How are competitors innovating or reshaping their value networks?

**1P presentations:** content management systems, business process management systems, ERP

#### Business models

- Johnson, Mark W., Christensen, Clayton M., and Henning Kagermann. (2008). Reinventing Your Business Model. *Harvard Business Review* 86(12): 50-59.
- Osterwalder, Alexander, and Yves Pigneur. (2010). *Business Model Generation*. Hoboken, NJ: John Wiley & Sons. (HD30.28 .O88 2010 – 2 hour loan [[Check availability](#)]). See also [book excerpt](#) (72 pp.) and [Canvas – your business model on one page](#).
- Chesbrough, Henry. (2010). [Business Model Innovation: Opportunities and Barriers](#). *Long Range Planning* 43(2/3): 354-363.
- Frank, Malcolm. (2012). [Don't Get SMACkEd – How Social, Mobile, Analytics, and Cloud Technologies Are Reshaping the Enterprise](#). 24pp.
- Eyring, Matthew, Johnson, Mark, and Hari Nair. (2014). [New Business Models in Emerging Markets](#). *IEEE Engineering Management Review* 42(2): 19-26.
- Normann, Richard and Rafael Ramirez. (1993, July/August). From Value Chain to Value Constellation: Designing Interactive Strategy. *Harvard Business Review* 71(4): 65-77.

#### Business Motivation/Strategy modeling

- Barone, D., Yu, E., Won, J., Jiang, L., & Mylopoulos, J. (2010). [Enterprise Modeling for Business Intelligence](#). In: P. van Bommel, et al (Eds.), *PoEM 2010: The Practice of Enterprise Modeling* (pp. 31-45). LNBIP, 68. Berlin: Springer.
- Business Rules Group/OMG. (2010). [Business Motivation Model – Business Governance in a Volatile World](#). 87p.

### Week 6 (Feb 15) **Mid-Term Test; Guest Speaker; Tutorial**

## Assignment 1W due February 27 Monday

### Week 7 (Mar 1) IT Management and Governance

How can policies be exercised through IT systems? How can information systems and processes be managed and governed effectively? How can an organization take advantage of information technologies in formulating or pursuing its strategies? Should strategy drive IT or should technology drive strategy?

**1P presentations:** CRM, data warehousing; business intelligence

Readings:

Policy compliance and governance

- Lankhorst, Marc, et al. (2013). [State of the Art](#). In: *Enterprise Architecture at Work: Modelling, Communication and Analysis*. The Enterprise Engineering Series. Berlin: Springer. Chapter 2 (CoBIT, ITIL), pp. 11-41.
- IT Governance Institute. (2008). [Aligning COBIT® 4.1, ITIL® V3 and ISO/IEC 27002 for Business Benefit](#). 130pp.
- Andriole, Stephen J. (2015) [Who owns IT?](#) Communications of the ACM, 58(3): 50-57
- Walters, Jonathan. (2009). [Transforming Information Technology at the Department of Veteran Affairs](#). *Governing Magazine*. 41pp. case study.
- Ghanavati, Sepideh, Amyot, Daniel, and Liam Peyton. (2007). [Towards a Framework for Tracking Legal Compliance in Healthcare](#). In: *Proceedings of 19th International Conference on Advanced Information Systems Engineering*, LNCS 4495. Berlin: Springer, pp. 218-232.
- COBIT 5 <https://cobitonline.isaca.org/> COBIT 4.1 [isaca.org](https://isaca.org)

Alignment

- Henderson, J. C. and N. Venkatraman (1993). [Strategic Alignment - Leveraging Information Technology for Transforming Organizations](#). *IBM Systems Journal* 32(1): 4-16.

### Week 8 (Mar 8) Digital Transformation and Innovation

Current developments in IT-enable transformation.

**1P presentations:** big data and analytics; social media and social analytics

Readings:

- Westerman, George, Bonnet, Didier and Andrew McAfee. (2014). [The Nine Elements of Digital Transformation](#). *MIT Sloan Management Review*, 7 pp.
- Chen, H. M., Schütz, R., Kazman, R., & Matthes, F. (2016). [Amazon in the Air: Innovating with Big Data at Lufthansa](#). *Proc. 49th Hawaii International Conference on System Sciences (HICSS)*, IEEE: 5096-5105.
- Brynjolfsson, Erik, Hu, Yu J., and Mohammad S. Rahman. (2013). [Competing in the Age of Omnichannel Retailing](#). *MIT Sloan Management Review* 54(4): 23-29.
- Boston Consulting Group. (2015). [The Digital Imperative](#). (See also the [video](#) 3:56)
- Lori Beer (Wellpoint) interviewed by Michael Fitzgerald. The Digital Transformation of Health Care. *MIT Sloan Management Review*. ([video](#) 38:33)
- PwC. [Retail Banking 2020: Evolution or Revolution?](#) 44p (read first half)



- Brian Solis. [The 2014 State of Digital Transformation](#) (executive survey).
- Brynjolfsson, Erik, and Andrew McAfee. (2012). [Winning the Race with Ever-Smarter Machines](#). *MIT Sloan Management Review* 53(2): 53-60.
- Fitzgerald, Michael, Kruschwitz, Nina, Bonnet, Didier and Michael Welch. (2013). [Embracing Digital Technology - A New Strategic Imperative](#). *MIT Sloan Management Review* and CapGemini. Global Executive Study and Research Project.

## Assignment 2 due March 13 Monday

### Week 9 (Mar 15) Enterprise Agility

Information management in highly dynamic environments.

**1P presentations:** mobile and location-aware applications; Internet of Things

Readings:

- The Economist Intelligence Unit. [The Challenge of Speed: Driving Slow in the Fast Lane](#). (2014). 29 pp.
- Kotter, John P. (2012). Accelerate! Building Strategic Agility for a Faster-Moving World. *Harvard Business Review* 90(11): 44-58.
- Haeckel, Stephan H. (2003). [Leading on Demand Businesses—Executives as Architects](#). *IBM Systems Journal* 42(3): 405-413.
- Sull, Donald. (2010). [Competing through Organizational Agility](#). *McKinsey Quarterly* (1): 48-56.
- Blank, Steve. (2013). Why the Lean Start-up Changes Everything. *Harvard Business Review* 91(5): 63-72.
- Bachmann, Felix, Nord, Robert L., and Ipek Ozkaya. (2012, May/June). [Architectural Tactics to Support Rapid and Agile Stability](#). *Crosstalk* 25(3): 20-25.
- Lee, Hau L. (2004). The Triple-A Supply Chain. *Harvard Business Review* 82(10): 102-112.
- Cummins, Fred A. (2010). [Building the Agile Enterprise: with SOA, BPM and MBM](#). Amsterdam; Boston: Morgan Kaufmann.
- Bloomberg, Jason. [Is Enterprise Architecture Completely Broken?](#) *Forbes Magazine*. July 11, 2014.

### Week 10 (Mar 22) Multidisciplinary perspectives on IM challenges; Future Directions

Why is it hard to manage information in an organization? What are the different dimensions and aspects?

**1P presentations:** 3D-printing, wearables

Readings:

- Kellogg, Katherine C., Orlikowski, Wanda J., and JoAnne Yates. (2006, Jan/Feb). [Life in the Trading Zone: Structuring Coordination Across Boundaries in Postbureaucratic Organizations](#). *Organization Science* 17(1): 22-44.
- Teece, David J. (2010). [Business Models, Business Strategy and Innovation](#). *Long Range Planning* 43(2): 172-194.
- Yoo, Y., Boland Jr., R. J., Lyytinen, K., & Majchrzak, A. (2012). [Organizing for innovation in the digitized world](#). *Organization Science* 23(5): 1398-1408.
- Brown, Tim. (2008). Design Thinking. *Harvard Business Review* 86(6): 84-92.
- Gartner. (2015). [Top 10 Strategic Technology Predictions for 2015 and Beyond](#).

**Week 11 (Mar 29) Assignment 3P presentations**

**Week 12 (Apr 5) Assignment 3P presentations**

**Assignment 3W due Friday April 7.**

*N.B. Changes to this schedule will likely be made, with appropriate notice given. Additional or alternate readings may also be assigned.*

### **Additional References**

- Baan, Paul. (2013) [Enterprise Information Management: When Information Becomes Inspiration](#). In: Management for Professionals 2. New York: Springer.
- Bytheway, Andy. (2014). [The Information Management Body of Knowledge](#). In: *Investing in Information* (pp. 25-34). Switzerland: Springer International Publishing.
- Cook, Melissa A. (1996). *Building Enterprise Information Architectures: Reengineering Information Systems*. Upper Saddle River, NJ: Prentice Hall. (HD30.2 .C656 1996X -- 2 day loan [[Check availability](#)])

### **Course requirements**

(15%) **Mid-Term Test.** This will be an in-class closed-book written test that covers material up to the preceding class. No aids allowed. Duration 45 minutes.

#### **Assignment 1 (4-person teams): Analysis of a type of organizational information system or technology from architectural perspectives.**

Analyze one type of IT system or technology from business, organization, information, and technical architecture perspectives. The types of systems may include: document management systems, workflow systems, enterprise content management systems, business process management systems, enterprise resource planning (ERP) systems, customer relationship management (CRM) systems, data warehousing, business intelligence, and others. Additional technologies may include big data analytics, social media and social analytics, mobile and location-aware applications, and Internet of Things. Each team will analyze a different type of system. This assignment will be submitted in two parts.

(15%) **1W:** Written report. 13-16 pages including figures, excluding references. The report must include a brief statement of individual contributions.

(10%) **1P:** In-class presentation and discussion. The presentation dates for each topic are indicated on the course schedule, though they may be subject to change. Slides are to be posted on Blackboard 24 hours in advance and will be available to the class for critique and discussion and as resources for subsequent assignments. (5% is individual mark, 5% for group)

#### **Assignment 2 (4-person teams): An enterprise information management case study - analyzing the current state.**

This assignment will analyze the current state of a real organization from business, organizational, information, and application systems perspectives. The same organization should



be used for Assignment 3. In case access to a real organization is not possible, a fictitious organization constructed from the literature may be used.

(15%) The deliverable is a written report – 10-12 pages of text, plus figures and references. The report must include a brief statement of individual contributions.

### **Assignment 3 (4-person teams): Aligning business, organization, information, and systems architectures.**

In this assignment, you will propose a plan for information management, aligning the business, organization, information, and application systems architectures of the enterprise. The plan should cover a time horizon over several years, considering the impact of digital transformation. Issues of legacy, evolution, and sustainability should also be considered. Deliverables include a presentation and a final report.

(10%) **3P**: In-class presentation and discussion. There will be designated discussants for each presentation. (5% is individual mark, 5% for group)

(20%) **3W**: Final Report. 15-18 pages of text, plus figures and references. The report must include a brief statement of individual contributions.

(15%) Participation: in-class and online. Class notes and summaries of readings posted on the Discussion Forum will be counted towards online participation grade.

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### **Group work**

In group work assignments, team members are expected to work closely with each other and to coordinate their work throughout. It is essential that you keep each other updated on your work, and about any break in availability. You should start early to review and discuss each other's work and to integrate, and to ensure overall quality. Be prepared to do several rounds of improvements and editing before the report (or presentation) is ready for final submission.

In addition to the brief statement of individual contributions that you will include with your assignment, each student will be asked to fill out an online form to indicate the contribution of individual members of your team to the team work. Individual members may receive different grades on group work assignments depending on contributions. The instructor should be notified immediately if there is any indication that a team member is not contributing fully. All team members are jointly responsible for the collaborative process and the resulting deliverable. Here is a [quick guide](#) to effective group work.

### **Late Policy**

There will be a penalty of half a letter grade for every 24 hour period an assignment is submitted after the specified due date and time. For example, a B+ becomes a B+/B if submitted on the day after the due date, a B if submitted on the second day after the due date. Requests for extensions will only be considered for medical reasons with doctor's note. The request must be received before the due date.

### **Plagiarism**

Plagiarism is a serious offence. See U of T SGS Calendar and iSchool policies. You are expected to have attended the workshop on "Cite It Right: Proper Citation Practices vs. Plagiarism" offered by the Faculty.

## Use of Turnitin

“Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com website”.

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## Writing support

Please review the material you covered in the Cite it Right workshop [<http://current.ischool.utoronto.ca/workshops/2016/cite-it-right>], familiarize yourself with this site [<http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>] (about plagiarism) and UofT's plagiarism policy [<http://www.sgs.utoronto.ca/current/plagiarism.asp>], and consult the SGS writing centre [<http://www.writing.utoronto.ca/writing-centres/graduate-students>] or the UC writing centre [<http://www.writing.utoronto.ca/home>], if necessary.

## Academic integrity

Please acquaint yourself with UofT's Code of Behaviour on Academic Matters [<http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppjun011995.pdf>]

## Students with a disability or health considerations

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability or health consideration that may require accommodations, please feel free to approach me and/or the Accessibility Services Office [<http://www.studentlife.utoronto.ca/as>] as soon as possible. The Accessibility Services staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. The sooner you let them and me know your needs, the quicker we can assist you in achieving your learning goals in this course.

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[Reading List Service provided and links accessed by the Information Services Unit at the Inforum: Winter term, 2016-2017]