

# USC Viterbi School of Engineering

## **CSCI 548: Information Integration on the Web**

**Units: 4**

**Fall 2015**

Class: MW – 4:00-5:50pm, WPH B27

Final Exam: Wednesday, Dec 7<sup>th</sup>, 4:30-6:30pm in WPH B27

**Instructor:** Jose Luis Ambite

**Office Hours:** Monday & Wednesday after class, or by appointment

**Contact Info:** [ambite@isi.edu](mailto:ambite@isi.edu), 310-448-8472.

**Instructor:** Mayank Kejriwal

**Office Hours:** Monday & Wednesday after class, or by appointment

**Contact Info:** [kejriwal@isi.edu](mailto:kejriwal@isi.edu), 310-448-8201.

**Teaching Assistant:** Chung Ming Cheung

**Office:** EEB 242

**Office Hours:** Thursdays 3:00-5:00pm

**Contact Info:** [chungmin@usc.edu](mailto:chungmin@usc.edu)

**Teaching Assistant:** Ruhollah (Roohy) Shemirani

**Office:** TBD

**Office Hours:** Monday & Wednesday after class, or by appointment

**Contact Info:** [rshemira@usc.edu](mailto:rshemira@usc.edu)

**Prerequisite(s):** CSCI 561

**Co-Requisite (s):** none

**Concurrent Enrollment:** none

**Recommended Preparation:** CSCI 585 and programming experience

**Online materials:** <http://bit.ly/csci548-2016-Fall>

### **Catalogue Course Description**

Foundations, techniques, and algorithms for information integration. Topics include Semantic Web, linked data, data integration, entity linkage, source modeling, and information extraction.

### **Expanded Course Description**

This course focuses on foundations, techniques, and algorithms for information extraction, modeling and integration. Topics covered include semantic web (RDF, OWL, SPARQL), linked data and services, mash-ups, theory of data integration, schema mappings, record/entity linkage, data cleaning, source modeling, and information extraction. The class will be run as a lecture course with lots of student participation and significant hands-on experience. As an integral part of the course each student will do a project using the research and tools covered in the class.

## Learning Objectives

The learning objectives for this course are:

- Understand the theory and techniques of traditional data integration, including logical view integration, schema mapping, and record linkage
- Understand the foundations and techniques of the Semantic Web, including RDF, OWL, SPARQL, linked data
- Understand the algorithms and techniques for data cleaning, source modeling, semi-structured extraction, and information extraction
- Understand the theory and application of the state-of-the-art software and tools for information extraction
- For any given integration problem, be able to select and apply the most relevant information integration techniques to solve that problem

## Course Notes

The course will be run as a lecture class with student participation strongly encouraged. There are weekly readings and students are encouraged to do the readings prior to the discussion in class. All of the course materials, including the readings, lecture slides, homeworks will be posted online at <http://bit.ly/csci548-2016-Fall>. The class project is a significant aspect of this course and at the end of the semester, students will present their projects in class.

## Technological Proficiency and Hardware/Software Required

Students are expected to know how to program in a language such as Java, C++, or Python. Students are also expected to have their own laptop or desktop computer where they can install and run software to do the weekly homework assignments.

## Required Readings and Supplementary Materials

Required Textbook: Principles of Data Integration by Doan, Halevy, & Ives, Morgan Kaufmann, 2012

The book is available online at no cost from the USC library at:

<http://www.sciencedirect.com/science/book/9780124160446>

and is also available for purchase.

All of the required readings are listed in the course schedule.

## Description and Assessment of Assignments

### Homework Assignments

There will be weekly homework assignments. The assignments must be done individually. The homework assignments are expected to take 6-8 hours per week. Each assignment is graded on a scale of 0-100 and the specific rubric for each assignment is given in the assignment. The homework topics are listed in the Course Schedule.

### Course Project

An integral part of this course is the course project, which builds on the topics and techniques covered in the class. Students can work in teams of up to two people on this project. They will present a project proposal in class, conduct the project, create a video demonstration of the work, and present the project in class.

*Sample project:* "Geotagging Ansel Adams' Photographs" Ansel Adams was one of the most famous American photographers. However, there is no single coherent source, which provides a structured collection of all of Ansel's photographs. Also most of his photos are not geotagged and thus there is no easy way to visualize Ansel's journey across the globe. This project extracted Ansel's photos along with their metadata from various sources into a single coherent consolidated schema and geotagged them by extracting and identifying location entities from each photo's metadata. The end result is a web application, which used the Google Maps API and Timeline JS to visualize his geotagged and time-stamped photos in a very impressive manner.

## Grading Breakdown

Quizzes	20%
Homeworks	20%
Final:	20%
Class Project	40%
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Total	100%

**Quizzes:** There will be weekly quizzes based on the material from the week before. There will be no make-up quizzes for any reason, but we will drop the worst quiz grade.

**Homework:** There will be weekly homeworks based on the topics of the class each week. All homeworks must be done individually even when they are part of the group project. All homeworks must be submitted in Blackboard before 11:59pm PT on the date they are due in order to receive full credit. You may submit any homework up to one week late with for 80% of the grade. Homeworks more than one week late will receive no credit.

**Midterm:** There is no mid-term for this class.

**Final Exam:** There is a final exam at the end of the semester covering all of the material covered in the class.

**Class Project:** Each student will do a group project based on the topics covered in the class. Students will propose their own project, do the research and build a proof-of-concept, present the work in class, and create a video demonstration of the work. The grades of the project are based on:

- Proposal: 5%
- Project video: 30%
- Presentation: 35%
- Overall project innovation: 30%

Course grades will range from A through F. The following is the breakdown for grading:

94 - 100 = A	74 - 76.9 = C
90 - 93.9 = A-	70 - 73.9 = C-
87 - 89.9 = B+	67 - 69.9 = D+
84 - 86.9 = B	64 - 66.9 = D
80 - 83.9 = B-	60 - 63.9 = D-
77 - 79.9 = C+	Below 60 is an F

## Assignment Submission Policy

Homework assignments are due at 11:59pm on the due date and should be submitted in Blackboard. You can submit homework up to one week late, but you will lose 20% of the possible points for the assignment. After one week, the assignment cannot be submitted.

## Course Schedule

	Topics	Readings	Homeworks	Instructor
Aug 22	Course Introduction			Prof. Ambite
Aug 24	Database Theory Basics	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 2.1, 2.2, 2.3 and 2.4. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a>		Prof. Ambite
Aug 29	Logical Data Integration 1 (Query Rewriting)	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 2.4, 3.1, 3.2, 3.3, 3.4. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a>		Prof. Ambite
Aug 31	Logical Data Integration 2 (Scalability)	Alon Halevy and Rachel Pottinger. A scalable algorithm for answering queries using views. The VLDB Journal The International Journal on Very Large Data Bases, 2001. <a href="http://www.vldb.org/conf/2000/P484.pdf">http://www.vldb.org/conf/2000/P484.pdf</a> .  Scalable query rewriting: a graph-based approach, 2001. <a href="http://www.isi.edu/~ambite/konstantinidis2011-sigmod.pdf">http://www.isi.edu/~ambite/konstantinidis2011-sigmod.pdf</a>	HW1: Data Integration (due Sept 7)	Prof. Ambite
Sep 7	Data Warehousing	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 10. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a>		Prof. Ambite
Sep 12	Information Extraction 1	Andrew McCallum. Information Extraction: Distilling Structured Data from Unstructured Text. ACM Queue, volume 3, Number 9, November 2005. <a href="http://people.cs.umass.edu/~mccallum/papers/acm-queue-ie.pdf">http://people.cs.umass.edu/~mccallum/papers/acm-queue-ie.pdf</a>		Dr. Kejriwal
Sep 14	Information Extraction 2	Matthew Michelson and Craig A. Knoblock. Semantic Annotation of Unstructured and Ungrammatical Text. In Proceedings of the 19th International Joint Conference on Artificial Intelligence (IJCAI-2005), Edinburgh, Scotland, 2005. <a href="http://www.isi.edu/integration/papers/michelson05-ijcai.pdf">http://www.isi.edu/integration/papers/michelson05-ijcai.pdf</a>  Hanna M. Wallach, Conditional Random Fields: An Introduction, 2004. <a href="http://repository.upenn.edu/cgi/viewcontent.cgi?article=1011&amp;context=cis_reports">http://repository.upenn.edu/cgi/viewcontent.cgi?article=1011&amp;context=cis_reports</a>  Michele Banko, Michael J Cafarella, Stephen Soderland, Matt Broadhead and Oren Etzioni, Open Information Extraction from the Web, 2007. <a href="https://homes.cs.washington.edu/~soderlan/OpenE-ijcai07.pdf">https://homes.cs.washington.edu/~soderlan/OpenE-ijcai07.pdf</a>	HW2: Information Extraction (due Sept 21)	Dr. Kejriwal
Sep 19	Wrapper Generation 1	Ion Muslea, Steve Minton, and Craig A. Knoblock. A hierarchical approach to wrapper induction. In Proceedings of the 3rd International Conference on Autonomous Agents, Seattle, WA, 1999. <a href="http://www.isi.edu/integration/papers/muslea99-agents.pdf">http://www.isi.edu/integration/papers/muslea99-agents.pdf</a> .		Dr. Kejriwal
Sep 21	Wrapper Generation 2		HW3: Wrapper (due Sept 28)	Dr. Kejriwal

		<p>AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 9. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a></p> <p>W. Crescenzi, G. Mecca, and P. Merialdo. RoadRunner. Towards automatic data extraction from large web sites. 2001. <a href="http://www.vldb.org/conf/2001/P109.pdf">http://www.vldb.org/conf/2001/P109.pdf</a>.</p> <p>B. Cenk Gazen and Steven Minton. Overview of autofeed: An unsupervised learning system for generating webfeeds. In Proceedings of AAI, 2006. <a href="http://www.isi.edu/integration/courses/csci548/Papers/gaze_n06-aaai.pdf">http://www.isi.edu/integration/courses/csci548/Papers/gaze_n06-aaai.pdf</a>.</p>		
Sep 26	RDF	<p>Frank Manola and Eric Miller. RDF primer. Technical report, W3C, February 2004. <a href="http://www.w3.org/TR/2004/REC-rdf-primer-20040210/">http://www.w3.org/TR/2004/REC-rdf-primer-20040210/</a>.</p> <p>Tim Berners-Lee. Why rdf model is different from the xml model. Technical report, W3C, 1998. <a href="http://www.w3.org/DesignIssues/RDF-XML.html">http://www.w3.org/DesignIssues/RDF-XML.html</a>.</p>		Prof. Ambite
Sep 28	RDF Schema / Inference	<p>RDF vocabulary description language 1.0: Rdf schema. Technical report, W3C, February 2004. <a href="http://www.w3.org/TR/2004/REC-rdf-schema-20040210/">http://www.w3.org/TR/2004/REC-rdf-schema-20040210/</a>.</p> <p>Ben Adida, Ivan Herman, Manu Sporny, and Mark Birbeck. Rdfa 1.1 primer rich structured data markup for web documents. Technical report, W3C, June 2012. <a href="http://www.w3.org/TR/2012/NOTE-rdfa-primer-20120607/">http://www.w3.org/TR/2012/NOTE-rdfa-primer-20120607/</a>.</p>	HW4: RDF/S SPARQL (due Oct 7)	Prof. Ambite
Oct 3	SPARQL Query Language	<p>Steve Harris and Andy Seaborne. Sparql 1.1 query language. Technical report, W3C, January 2012. <a href="http://www.w3.org/TR/2012/PR-sparql11-query-20121108/">http://www.w3.org/TR/2012/PR-sparql11-query-20121108/</a>.</p>		Prof. Ambite
Oct 5	OWL2 and Ontology-based Data Integration	<p>Krtzsch Markus, Simancik Frantisek, and Horrocks Ian. A description logic primer. 2012. <a href="http://arxiv.org/pdf/1201.4089.pdf">http://arxiv.org/pdf/1201.4089.pdf</a>.</p> <p>Diego Calvanese, Giuseppe De Giacomo, Domenico Lembo, Maurizio Lenzerini, and Riccardo Rosati. DL-lite: tractable description logics for ontologies. In Proc. of the 20th National Conference on Artificial Intelligence, 2005. <a href="http://www.aaai.org/Papers/AAAI/2005/AAAI05-094.pdf">http://www.aaai.org/Papers/AAAI/2005/AAAI05-094.pdf</a>.</p> <p>Hector Prez-Urbina, Ian Horrocks, and Boris Motik. Efficient query answering for owl 2. In International Semantic Web Conference, 2009. Efficient Query Answering for OWL 2. <a href="https://www.cs.ox.ac.uk/boris.motik/pubs/puhm09query-OWL2.pdf">https://www.cs.ox.ac.uk/boris.motik/pubs/puhm09query-OWL2.pdf</a></p>	HW5: OWL (due Oct 21)	Prof. Ambite
Oct 10	Shark Tank	Project Proposal Presentations		Prof. Ambite
Oct 12	Shark Tank	Project Proposal Presentations		Prof. Ambite

Oct 17	Linked Data	<p>Linked Data: Evolving the Web into a Global Data Space, Synthesis Lectures on the Semantic Web: Theory and Technology, February 2011, (doi:10.2200/S00334ED1V01Y201102WBE001) Tom Heath and Christian Bizer Chapters 1 to 4.2 (including section 4.2). <a href="https://west.uni-koblenz.de/files/ws1213/seminar-web-science/linked-data.pdf">https://west.uni-koblenz.de/files/ws1213/seminar-web-science/linked-data.pdf</a></p>		Dr. Kejriwal
Oct 19	Data Cleaning	<p>Wrangler: Interactive visual specification of data transformation scripts. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2011. <a href="http://vis.stanford.edu/papers/wrangler">http://vis.stanford.edu/papers/wrangler</a>.</p> <p>Open Refine, Explore data. <a href="http://youtu.be/B70J_H_zAWM">http://youtu.be/B70J_H_zAWM</a>.</p> <p>Open Refine, Clean and transform data. <a href="http://youtu.be/cO8NVCs_Ba0">http://youtu.be/cO8NVCs_Ba0</a>.</p> <p>Open Refine, Reconcile and match data. <a href="http://youtu.be/5tsyz3ibYzk">http://youtu.be/5tsyz3ibYzk</a>.</p> <p>Bo Wu, Pedro Szekely, and Craig A. Knoblock. Minimizing user effort in transforming data by example. In Proceedings of the International Conference on Intelligent User Interface, 2014. <a href="http://www.isi.edu/integration/papers/wu14-iui.pdf">http://www.isi.edu/integration/papers/wu14-iui.pdf</a>.</p>	HW6: Data Cleaning (due Oct 26)	Dr. Kejriwal
Oct. 24	String Matching	<p>AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 4. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a></p> <p>AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 4. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a></p>		Dr. Kejriwal
Oct 26	Record Matching 1	<p>AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 7. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a></p>	HW8: Record Linkage (due Nov 2)	Dr. Kejriwal
Oct 31	Record Matching 2	<p>AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 7. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a></p>		Dr. Kejriwal
Nov 2	Schema Mapping	<p>AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 5. Morgan Kaufmann, 2012. <a href="http://www.sciencedirect.com/science/book/9780124160446">http://www.sciencedirect.com/science/book/9780124160446</a></p> <p>Reconciling schemas of disparate data sources: a machine-learning approach, 2001. <a href="http://homes.cs.washington.edu/~pedrod/papers/sigmod01.pdf">http://homes.cs.washington.edu/~pedrod/papers/sigmod01.pdf</a></p>		Prof. Ambite
Nov 7	Semi-Automatic Source Modeling (Karma)	<p>Craig A. Knoblock, Pedro Szekely. Exploiting Semantics for Big Data Integration. AI Magazine, 2015. <a href="http://usc-isi-i2.github.io/papers/knoblock15-aimagazine.pdf">http://usc-isi-i2.github.io/papers/knoblock15-aimagazine.pdf</a></p> <p>Mohsen Taheriyani, Craig A. Knoblock, Pedro Szekely, José Luis Ambite. Learning the Semantics of Structured Data Sources. Journal of Web Semantics Special Issue on</p>		Dr. Taheriyani

		Knowledge Graphs, 2015. Available at <a href="#">Blackboard</a> .		
Nov 9	Automatic Source Modeling	<p>Mark James Carman and Craig A. Knoblock. Learning semantic descriptions of web information sources. In Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI), January 2007. <a href="http://www.isi.edu/integration/papers/carman07-ijcai.pdf">http://www.isi.edu/integration/papers/carman07-ijcai.pdf</a>.</p> <p>José Luis Ambite, Sirish Darbha, Aman Goel, Craig A. Knoblock, Kristina Lerman, Rahul Parundekar, and Thomas Russ. Automatically constructing semantic web services from online sources. In Proceedings of the 8th International Semantic Web Conference (ISWC 2009), 2009. <a href="http://www.isi.edu/integration/papers/ambite09-iswc.pdf">http://www.isi.edu/integration/papers/ambite09-iswc.pdf</a></p>	HW9:Karma (due Nov 16)	Prof. Ambite
Nov 14	Querying Knowledge Graphs	<p>Oren, E., Delbru, R., Catasta, M., Cyganiak, R., Stenzhorn, H., &amp; Tummarello, G. (2008). Sindice. com: a document-oriented lookup index for open linked data. <i>International Journal of Metadata, Semantics and Ontologies</i>, 3(1), 37-52. <a href="http://wtlab.um.ac.ir/images/e-library/linked_data/other/Sindice.pdf">http://wtlab.um.ac.ir/images/e-library/linked_data/other/Sindice.pdf</a></p> <p>Freitas, A., Oliveira, J. G., Curry, E., O’Riain, S., &amp; da Silva, J. C. P. (2011, June). Treo: combining entity-search, spreading activation and semantic relatedness for querying linked data. In <i>Proc. of 1st Workshop on Question Answering over Linked Data (QALD-1) at the 8th Extended Semantic Web Conference (ESWC 2011)</i>. <a href="https://www.deri.ie/sites/default/files/publications/freitas_qald_2011_0.pdf">https://www.deri.ie/sites/default/files/publications/freitas_qald_2011_0.pdf</a></p> <p>Szekely, P., Knoblock, C. A., Slepicka, J., Philpot, A., Singh, A., Yin, C., ... &amp; Ferreira, L. (2015). Building and Using a Knowledge Graph to Combat Human Trafficking. In <i>The Semantic Web-ISWC 2015</i> (pp. 205-221). Springer International Publishing. <a href="http://iswc2015.semanticweb.org/sites/iswc2015.semanticweb.org/files/93670175.pdf">http://iswc2015.semanticweb.org/sites/iswc2015.semanticweb.org/files/93670175.pdf</a></p>		Jason Slepicka
Nov 16	Geospatial Data Integration	<p>Required:</p> <p>Fonseca, F. T., Egenhofer, M. J., Agouris, P., &amp; Câmara, G. (2002). Using Ontologies for Integrated Geographic Information Systems. <i>Transactions in GIS</i>, 6(3), 231–257.</p> <p>Zhang, Y., Chiang, Y.-Y., Szekely, P., &amp; Knoblock, C. A. (2013). A Semantic Approach to Retrieving, Linking, and Integrating Heterogeneous Geospatial Data. In <i>Joint Proceedings of the Workshop on AI Problems and Approaches for Intelligent Environments and Workshop on Semantic Cities</i> (pp. 31–37). New York, NY, USA: ACM.</p> <p>Optional:</p> <p>Güting, R. H. (1994). An Introduction to Spatial Database Systems. <i>The International Journal on Very Large Data Bases</i>, 3(4), 357–399.</p>		Prof. Chiang

		Church, R. L. (2002/5). Geographical information systems and location science. <i>Computers &amp; Operations Research</i> , 29(6), 541–562.		
		Chiang, Y.-Y., Leyk, S., & Knoblock, C. A. (2014). A Survey of Digital Map Processing Techniques. <i>ACM Computing Surveys (CSUR)</i> , 47(1), 1.		
Nov 21	Intellectual Property	Thomas P. Vartanian and Robert H. Ledig. Scrape it, scrub it and show it: The battle over data aggregation. <a href="http://web.archive.org/web/20070818130311/http://www.ffhsj.com/bancmail/bmarts/aba_art.htm">http://web.archive.org/web/20070818130311/http://www.ffhsj.com/bancmail/bmarts/aba_art.htm</a> .  Kembrew McLeod. Intellectual property law, freedom of expression, and the web, 2003. <a href="http://www.electronicbookreview.com/thread/technocapitalism/proprietary">http://www.electronicbookreview.com/thread/technocapitalism/proprietary</a> .  Electronic frontier foundation. <a href="http://www.eff.org/issues/intellectual-property">http://www.eff.org/issues/intellectual-property</a> .		Prof. Knoblock
Nov 28	Project Presentations			Dr. Kejriwal
Nov 30	Project Presentations			Dr. Kejriwal

## Statement on Academic Conduct and Support Systems

### Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

### Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* [http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.



