USC Viterbi School of Engineering

CSCI 548: Information Integration on the Web, Spring 2019

Units: 4

Class: MW – 3:00-4:50pm, THH 114
Final Exam: Friday, May 3, 2-4 pm, THH 114

Instructor: Jose Luis Ambite
Office Hours: Monday & Wednesday after class, or by appointment
Contact Info: ambite@isi.edu, 310-448-8472.

Instructor: Shobeir Fakhraei
Office Hours: Monday & Wednesday after class, or by appointment
Contact Info: fakhraei@usc.edu, 310-448-9341.

Teaching Assistant: Dimitrios Stripelis
Office Hours: Wednesday, 12:00pm - 2:00pm at RTH 323
Contact Info: stripeli@isi.edu

Prerequisite(s): CSCI 561
Co-Requisite (s): none
Concurrent Enrollment: none
Recommended Preparation: CSCI 585 and programming experience

Course Description

This course focuses on foundations, techniques, and algorithms for information extraction, data modeling and integration. Topics include logical data integration, entity linkage, schema mappings, source modeling, data cleaning, information extraction, knowledge representation, Semantic Web (RDF, OWL, SPARQL) and linked data.

The class emphasizes automating the data integration process as much as possible, which generally requires the use of machine learning methods, including techniques such as probabilistic graphical models and deep learning.

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.

In a nutshell, this course deals with everything you need to do to prepare your data for meaningful analysis/machine learning, which often takes 80% of the time of a data science project.

Learning Objectives

- Understand theory and techniques of data integration, including logical data integration and entity linkage.
- Understand approaches for information extraction from unstructured (e.g., natural language text, or ungrammatical text like classified ads or tweets) and semi-structured (e.g., HTML) data.
- Understand the theory and application of the state-of-the-art software and tools for data cleaning and data normalization.
- Understand approaches for automatic source modeling and learning logical schema mappings.
- Understand the foundations and techniques of the Semantic Web, including knowledge representation languages like RDF and OWL; query languages like SPARQL; and data modeling approaches such as Linked Data.
- 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, and homeworks will be posted online. 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 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

Quizzes: There will be weekly in-class 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 **two** quiz grades.

Homework: There will be 6 homework assignments as listed in the Course Schedule. 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.

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, and present the project in class.

Grading Breakdown

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

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

Course Schedule

	Topics	Readings	Homeworks	Instructor
Jan 7	Course Introduction			Prof. Ambite
Jan 9	Wrapper Generation	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 9. Morgan Kaufmann, 2012. http://www.sciencedirect.com/science/book/9780124160446 Optional: 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. http://www.isi.edu/integration/papers/muslea99-agents.pdf. W. Crescenzi, G. Mecca, and P. Merialdo. RoadRunner. Towards automatic data extraction from large web sites. 2001. http://www.vldb.org/conf/2001/P109.pdf. B. Cenk Gazen and Steven Minton. Overview of autofeed: An unsupervised learning system for generating webfeeds. In Proceedings of AAAI, 2006. http://www.isi.edu/integration/courses/csci548/Papers/gazen06-aaai.pdf T Furche, G Gottlob, G Grasso, X Guo, G Orsi, C Schallhart, C Wang. DIADEM: thousands of websites to a single database. Proceedings of the VLDB Endowment 7 (14), 1845-1856. www.vldb.org/pvldb/vol7/p1845-furche.pdf T Furche, J Guo, S Maneth, C Schallhart. Robust and noise resistant wrapper induction. Proceedings of the 2016 International Conference on Management of Data, 773-784 http://christian.schallhart.net/publications/2016--sigmod--robust-and-noise-resistant-wrapper-induction.pdf		Prof. Ambite
Jan 14	Information Extraction 1: (Introduction, CRF, and Name Entity Extraction)	Andrew McCallum. Information Extraction: Distilling Structured Data from Unstructured Text. ACM Queue, volume 3, Number 9, November 2005. http://people.cs.umass.edu/~mccallum/papers/acm-queue-ie.pdf Hanna M. Wallach, Conditional Random Fields: An Introduction, 2004. http://repository.upenn.edu/cgi/viewcontent.cgi?article=1011&context=cis_reports Optional: Sarawagi, Sunita. "Information extraction." Foundations and Trends in Databases 1.3 (2008): 261-377 (Parts 1-3). http://pages.cs.wisc.edu/~anhai/courses/784-fall13/ieSurvey.pdf Sutton, Charles, and Andrew McCallum. "An introduction to conditional random fields." Foundations and Trends® in Machine Learning 4.4 (2012): 267-373.	HW1: Wrappers (due Jan 28)	Dr. Fakhraei

		http://faculty.cse.tamu.edu/huangrh/Fall16/crf_tut.pdf Ratinov, Lev, and Dan Roth. "Design challenges and misconceptions in named entity recognition." Proceedings of the Thirteenth Conference on Computational Natural Language Learning. Association for Computational Linguistics, 2009. http://www.aclweb.org/anthology/W09-1119		
Jan 16	Information Extraction 2 (Name Entity Extraction, Relation Extraction)	Sarawagi, Sunita. "Information extraction." Foundations and Trends in Databases 1.3 (2008): 261-377 (Part 4). http://pages.cs.wisc.edu/~anhai/courses/784-fall13/ieSurvey.pdf Michele Banko, Michael J Cafarella, Stephen Soderland, Matt Broadhead and Oren Etzioni, Open Information Extraction from the Web, 2007. https://homes.cs.washington.edu/~soderlan/OpenIE-ijcai07.pdf Optional: Fader, Anthony, Stephen Soderland, and Oren Etzioni. "Identifying relations for open information extraction." Proceedings of the conference on empirical methods in natural language processing. Association for Computational Linguistics, 2011. http://reverb.cs.washington.edu/emnlp11.pdf T. Mitchell, W. Cohen, et. al. Never-Ending Learning, In Proceedings of the Conference on Artificial Intelligence (AAAI), 2015. http://www.cs.cmu.edu/~tom/pubs/NELL_aaai15.pdf		Dr. Fakhraei
Jan 21	NO CLASS	Martin Luther King Day		
Jan 23	Information Extraction 3 (Ungrammatical, Unstructered)	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. http://www.isi.edu/integration/papers/michelson05-ijcai.pdf Ritter, Alan, Sam Clark, and Oren Etzioni. "Named entity recognition in tweets: an experimental study." Proceedings of the conference on empirical methods in natural language processing. Association for Computational Linguistics, 2011. http://www.aclweb.org/anthology/D11-1141 Ritter, Alan, Oren Etzioni, and Sam Clark. "Open domain event extraction from twitter." Proceedings of the 18th ACM SIGKDD international conference on Knowledge discovery and data mining. ACM, 2012. https://homes.cs.washington.edu/~mausam/papers/kdd12.pdf		Dr. Morstatter Prof. Ambite
Jan 28	Information Extraction 4 (Deep Learning Methods)	Ma, Xuezhe, and Eduard Hovy. "End-to-end sequence labeling via bi-directional LSTM-CNN-CRF." arXiv preprint arXiv:1603.01354 (2016). https://arxiv.org/pdf/1603.01354.pdf Optional:	HW2: Information Extraction (due Feb 11)	Dr. Fakhraei

		Chiu, Jason PC, and Eric Nichols. "Named entity recognition with bidirectional LSTM-CNNs." Transactions of the Association for Computational Linguistics 4 (2016): 357-370. https://www.mitpressjournals.org/doi/pdf/10.1162/tacl_a_00104 Li, Jing, et al. "A Survey on Deep Learning for Named Entity Recognition." arXiv preprint arXiv:1812.09449 (2018). https://arxiv.org/pdf/1812.09449.pdf Yadav, Vikas, and Steven Bethard. "A survey on recent advances in named entity recognition from deep learning models." Proceedings of the 27th International Conference on Computational Linguistics. 2018. http://aclweb.org/anthology/C18-1182 Understanding LSTM Networks http://colah.github.io/posts/2015-08-Understanding-LSTMs/ 3BLUE1BROWN Deep Learning Video Series: https://www.youtube.com/watch?v=aircAruvnKk&list=PLZHQObOWTQDNU6R1_67000Dx_ZCJB-3pi		
Jan 30	Entity Linkage 1: (String Matching)	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, Chapter 4 (String Matching). Morgan Kaufmann, 2012. http://www.sciencedirect.com/science/book/9780124160446		Dr. Fakhraei
Feb 4	Entity Linkage 2: (Overview)	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, Chapter 7 (Data Matching). Morgan Kaufmann, 2012. http://www.sciencedirect.com/science/book/9780124160446		Dr. Fakhraei
Feb 6	Entity Linkage 3: (Advanced Topics)	Jure Leskovec, Anand Rajaraman, Jeff Ullman. Mining of Massive Datasets, Chapter 3 (Finding Similar Items). http://infolab.stanford.edu/~ullman/mmds/ch3.pdf Singla, Parag, and Pedro Domingos. "Entity resolution with markov logic." Data Mining, 2006. ICDM'06. Sixth International Conference on. IEEE, 2006. https://alchemy.cs.washington.edu/papers/singla06b/singla06b.pdf Optional: Datar, Mayur, et al. "Locality-sensitive hashing scheme based on p-stable distributions." Proceedings of the twentieth annual symposium on Computational geometry. ACM, 2004. http://www.cs.princeton.edu/courses/archive/spring05/cos598E/bib/p253-datar.pdf		Dr. Fakhraei
Feb 11	Entity Linkage 4: (Deep Learning Methods)	Fakhraei, Shobeir, and Jose Luis Ambite. "NSEEN: Neural Semantic Embedding for Entity Normalization." arXiv preprint arXiv:1811.07514 (2018). https://arxiv.org/pdf/1811.07514.pdf Ebraheem, Muhammad, et al. "Distributed representations of tuples for entity resolution." Proceedings of the VLDB Endowment 11.11 (2018): 1454-1467. http://da.qcri.org/ntang/pubs/vldb18-deeper.pdf	HW3: Entity Linkage (due Feb 25)	Dr. Fakhraei

		Optional: Mudgal, Sidharth, et al. "Deep Learning for Entity Matching: A Design Space Exploration." Proceedings of the 2018 International Conference on Management of Data. ACM, 2018. http://pages.cs.wisc.edu/~anhai/papers1/deepmatcher-tr.pdf		
Feb 13	Data Cleaning (openrefine, Wrangler, trifecta, tamr) Normalization	Erhard Rahm, Hong Hai Do. Data cleaning: problems and current approaches. IEEE Data Engineering Bulletin, 2000. https://dbs.uni-leipzig.de/file/TBDE2000.pdf Wrangler: Interactive visual specification of data transformation scripts. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2011. http://vis.stanford.edu/papers/wrangler. Open Refine, Explore data. http://youtu.be/B70J_H_zAWM. Open Refine, Clean and transform data. http://youtu.be/cO8NVCs_Ba0. Open Refine, Reconcile and match data. http://youtu.be/5tsyz3ibYzk. Optional: 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. http://www.isi.edu/integration/papers/wu14-iui.pdf Wu, B.; and Knoblock, C. A. An Iterative Approach to Synthesize Data Transformation Programs. In Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI), 2015. http://usc-isi-i2.github.io/papers/wu15-ijcai.pdf		Prof. Ambite
Feb 18	NO CLASS	President's Day		
Feb 20	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. http://www.sciencedirect.com/science/book/9780124160446	HW4: Data Cleaning (due Mar 1)	Prof. Ambite
Feb 25	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. http://www.sciencedirect.com/science/book/9780124160446		Prof. Ambite
Feb 27	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. http://www.vldb.org/conf/2000/P484.pdf. Scalable query rewriting: a graph-based approach, 2001. http://www.isi.edu/~ambite/konstantinidis2011-sigmod.pdf	HW5: Logical Data Integration (due March 18)	Prof. Ambite

Mar 4	Project Proposals			Prof. Ambite Dr. Fakhraei
Mar 6	Project Proposals			Prof. Ambite Dr. Fakhraei
Mar 10-17	NO CLASS	Spring Recess		Prof. Ambite
Mar 18	Data Warehousing: Logical Approaches, Kafka/Spark	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 10. Morgan Kaufmann, 2012. http://www.sciencedirect.com/science/book/9780124160446 Optional: Dimitris Stripelis, Jose Luis Ambite, Yao-Yi Chiang, Sandrah P. Eckel, and Rima Habre. A Scalable Data Integration and Analysis Architecture for Sensor Data of Pediatric Asthma. IEEE International Conference on Data Engineering, San Diego CA, April 2017. http://www-scf.usc.edu/~stripeli/documents/publications/ICDE2017.pdf Dimitris Stripelis, Chrysovalantis Anastasiou, José Luis Ambite. Extending Apache Spark with a Mediation Layer. International Semantic Big Data Workshop, SIGMOD, Houston TX, April 2018 http://www-scf.usc.edu/~stripeli/documents/publications/SIGMODSBD2017.pdf		Prof. Ambite Dimitri Stripelis
Mar 20	Schema Mapping	AnHai Doan, Alon Y. Halevy, and Zachary G. Ives. Principles of Data Integration, chapter 5. Morgan Kaufmann, 2012. http://www.sciencedirect.com/science/book/9780124160446 Reconciling schemas of disparate data sources: a machine-learning approach, 2001. http://homes.cs.washington.edu/~pedrod/papers/sigmod01.pdf		Prof. Ambite
Mar 25	Semi-Automatic Source Modeling (Karma)	Craig Knoblock, Pedro Szekely, Jose Luis Ambite, Aman Goel, Shubham Gupta, Kristina Lerman, Parag Mallick, Maria Muslea and Mohsen Taheriyan. Semi-Automatically Mapping Structured Sources into the Semantic Web. Proceedings of the 9th Extended Semantic Web Conference (ESWC 2012), Heraklion, Crete, Greece, 2012. http://www.isi.edu/~ambite/eswc-karma.pdf Optional: Craig A. Knoblock, Pedro Szekely. Exploiting Semantics for Big Data Integration. AI Magazine, 2015. http://usc-isi-i2.github.io/papers/knoblock15-aimagazine.pdf Mohsen Taheriyan, Craig A. Knoblock, Pedro Szekely, José Luis Ambite. Learning the Semantics of Structured Data Sources. Journal of Web Semantics Special Issue on Knowledge Graphs, 2015. https://www.sciencedirect.com/science/article/pii/S1570826815001444		Prof. Ambite

Mar 27	Automatic Source Modeling	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. http://www.isi.edu/integration/papers/carman07-ijcai.pdf. Jose´ 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. http://www.isi.edu/integration/papers/ambite09-iswc.pdf		Prof. Ambite
Apr 1	RDF	Frank Manola and Eric Miller. RDF primer. Technical report, W3C, February 2004. http://www.w3.org/TR/2004/REC-rdf-primer-20040210/. Tim Berners-Lee. Why rdf model is different from the xml model. Technical report, W3C, 1998. http://www.w3.org/DesignIssues/RDF-XML.html.		Prof. Ambite
Apr 3	RDF Schema / Inference	RDF Schema 1.1: W3C Recommendation 25 February 2014. https://www.w3.org/TR/rdf-schema/		Prof. Ambite
Apr 8	SPARQL Query Language	SPARQL 1.1 Query Language: W3C Recommendation 21 March 2013. http://www.w3.org/TR/sparql11-query/		Prof. Ambite
Apr 10	OWL2 and Ontology-based Data Integration	Krtzsch Markus, Simancik Frantisek, and Horrocks Ian. A description logic primer. 2012. http://arxiv.org/pdf/1201.4089.pdf. 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. http://www.aaai.org/Papers/AAAI/2005/AAAI05-094.pdf. 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. https://www.cs.ox.ac.uk/boris.motik/pubs/puhm09query-OWL2.pdf	HW6: RDF/S SPARQL OWL (due Apr 19)	Prof. Ambite
Apr 15	Knowledge Graphs	Singhal, Amit. "Introducing the Knowledge Graph: Things, Not Strings". Google Official Blog. May 16, 2012. https://googleblog.blogspot.com/2012/05/introducing-knowledge-graph-things-not.html Introducing the Knowledge Graph https://www.youtube.com/watch?v=mmQl6VGvX-c Szekely, P., Knoblock, C. A., Slepicka, J., Philpot, A., Singh, A., Yin, C., ... & Ferreira, L. (2015). Building and Using a Knowledge Graph to Combat Human Trafficking. In *The Semantic Web-ISWC 2015* (pp. 205-221). Springer International Publishing. http://iswc2015.semanticweb.org/sites/iswc2015.semanticweb.org/files/93670175.pdf Optional: Nickel, Maximilian, et al. "A review of relational machine learning		Prof. Pujara

		for knowledge graphs." Proceedings of the IEEE 104.1 (2016): 11-33. https://arxiv.org/pdf/1503.00759.pdf Wang, Quan, et al. "Knowledge graph embedding: A survey of approaches and applications." IEEE Transactions on Knowledge and Data Engineering 29.12 (2017): 2724-2743. https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8047276		
Apr 17	Network Extraction	Namata, Galileo Mark, Ben London, and Lise Getoor. "Collective graph identification." ACM Transactions on Knowledge Discovery from Data (TKDD) 10.3 (2016): 25. https://linqs.soe.ucsc.edu/sites/default/files/papers/namata-tkdd.pdf Tang, Jie, et al. "Arnetminer: extraction and mining of academic social networks." Proceedings of the 14th ACM SIGKDD international conference on Knowledge discovery and data mining. ACM, 2008. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.141.3839&rep=rep1&type=pdf		Dr. Fakhraei
Apr 22	Geospatial Data Integration	Fonseca, F. T., Egenhofer, M. J., Agouris, P., & Câmara, G. (2002). Using Ontologies for Integrated Geographic Information Systems. Transactions in GIS, 6(3), 231–257. Zhang, Y., Chiang, Y.-Y., Szekely, P., & Knoblock, C. A. (2013). A Semantic Approach to Retrieving, Linking, and Integrating Heterogeneous Geospatial Data. In Joint Proceedings of the Workshop on AI Problems and Approaches for Intelligent Environments and Workshop on Semantic Cities (pp. 31–37). New York, NY, USA: ACM. Optional: Güting, R. H. (1994). An Introduction to Spatial Database Systems. The International Journal on Very Large Data Bases, 3(4), 357–399. Church, R. L. (2002/5). Geographical information systems and location science. Computers & Operations Research, 29(6), 541–562. Chiang, Y.-Y., Leyk, S., & Knoblock, C. A. (2014). A Survey of Digital Map Processing Techniques. ACM Computing Surveys (CSUR), 47(1), 1.		Prof. Chiang
Apr 22	Project Presentations			Prof. Ambite Dr. Fakhraei
Apr 24	Project Presentations			Prof. Ambite Dr. Fakhraei

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 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