Big Data Analytics

IN THE CENTER FOR HUMAN DYNAMICS IN THE MOBILE AGE
IN THE COLLEGE OF ARTS AND LETTERS

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Faculty

Committee for Big Data Analytics

Ming-Hsiang Tsou, Ph.D., Professor of Geography, Chair of Committee and Director of Program (Graduate Adviser)
Li An, Ph.D., Professor of Geography
C. Janie Chang, Ph.D., Professor of Accountancy, The Vern E. Odmark Chair in Accountancy
Robert A. Edwards, Ph.D., Professor of Biology
Jean Mark Gawron, Ph.D., Professor of Linguistics
Piotr L. Jankowski, Ph.D., Professor of Geography
Samuel S.P. Shen, Ph.D., Albert W. Johnson Distinguished Professor of Mathematics
Bongsik Shin, Ph.D., Professor of Management Information Systems
Brian H. Spitzberg, Ph.D., Professor of Communication, Emeritus
    [Senate Distinguished Professor]
Faramarz Valafar, Ph.D., Professor of Public Health
Jianwei Chen, Ph.D., Associate Professor of Statistics
Xiaobai Liu, Ph.D., Associate Professor of Computer Science
Atsushi Nara, Ph.D., Associate Professor of Geography
Bo-Wen Shen, Ph.D., Associate Professor of Mathematics
Jessica Pressman-Lupien, Ph.D., Associate Professor of English and Comparative Literature
Wei Wang, Ph.D., Associate Professor of Computer Science
Ke Huang, Ph.D., Assistant Professor of Electrical and Computer Engineering
Xialu Liu, Ph.D., Assistant Professor of Management Information Systems
Yang Xu, M.S., Assistant Professor of Computer Science
Nancy J. Jones, M.B.A., Lecturer in Accountancy

General Information

The Master of Science degree in big data analytics prepares students with skills to explore and identify research and business opportunities provided by big data across various application domains, such as information technology, geographic information systems (GIS), social and behavioral science, digital humanities, public health, business analytics, and biotechnology.

Students develop competencies in management and analysis of big data applications with appropriate programming tools, statistical models, social theories, business concepts, and analytic software. The program has a dual-core design for students to learn computational skills (programming languages and software) and analytical methods (data mining, machine learning, spatiotemporal analysis, statistics, visualization) for data models and business applications.

Big data analytics is transdisciplinary across business, engineering, science, social science, and technology domains and involves collecting, cleaning, organizing, analyzing, and modeling data for various applications. Students use the outcomes of big data analytics to formulate research hypotheses and guide decision-making in academic or business settings.

The Master of Science degree in big data analytics provides a flexible curriculum framework for students from various backgrounds by customizing individual study plans in different fields to include business analytics, digital humanities, geospatial technology, management information systems, social science, and text analytics. The degree builds a collaborative and active transdisciplinary educational environment for students and professionals who wish to advance their knowledge and skills in the fast growing fields of data science and data analytics.

Admission to Graduate Study

In addition to the general requirements for admission to the university with classified graduate standing, as described in Admission and Registration, applicants must satisfy the following requirements.

1. Relevant background (including previous coursework) in business, mathematics, computer science, geographic information systems, digital humanities or related fields.
2. Basic knowledge in computer science and programming, as demonstrated by a grade of C (2.0) or better in CS 107 or equivalent course, or work experience.
3. Basic knowledge in statistical data analysis, as demonstrated by a grade of C (2.0) or better in Statistics 119 or equivalent course, or work experience.

Students applying for admission should electronically submit the university application available at https://www2.calstate.edu/apply along with the application fee.

Graduate Admissions

The following materials should be submitted as a complete package directly to:

> **Graduate Admissions**
> San Diego State University
> 5500 Campanile Drive
> San Diego, CA 92182-7416

1. Official transcripts (in sealed envelopes) from all postsecondary institutions attended;
   NOTE:
   • Students who attended SDSU need only submit transcripts for work completed since last attendance.
   • Students with international coursework must submit both the official transcript and proof of degree. If documents are in a language other than English, they must be accompanied by a certified English translation.
2. GMAT scores (SDSU institution code 9LT-2P-73) or GRE scores (http://www.ets.org, SDSU institution score 4682);
3. English language score, if medium of instruction was in a language other than English (http://www.ets.org, SDSU institution code 4682);
4. One page statement of research interests and professional goals (maximum 500 words).

The following supplemental materials should be submitted to the program via Interfolio.

1. A current curriculum vitae or resume. Include undergraduate GPA and GRE or GMAT score (IELTS, PTE Academic, or TOEFL, if applicable) with curriculum vitae or resume;
2. One-page statement of research interests and professional goals (maximum 500 words);
3. Copies of transcripts from all colleges and universities attended (electronic, photocopies, and unofficial copies are acceptable). Note: This is in addition to transcripts submitted to Graduate Admissions;
4. Copies of GRE or GMAT score (IELTS, PTE Academic, or TOEFL, if applicable). Electronic, photocopies, and unofficial copies are acceptable. **NOTE**: This is in addition to transcripts submitted to Graduate Admissions;
5. One or two letters of recommendation (optional).

Advancement to Candidacy

All students must satisfy the general requirements for advancement to candidacy, as described in Requirements for Master's Degrees.

Specific Requirements for the Master of Science Degree

(Major Code: 05071) (SIMS Code: 112998)

In addition to meeting the requirements for classified graduate standing and the basic requirements for the master's degree as described in Requirements for Master's Degrees, students must complete 30 units of coursework in an officially approved course of study as outlined below. Students must earn a minimum grade point average of 3.0 in these courses and no less than a C (2.0) in each course. Students may fulfill the culminating experience through Plan A (thesis option) by completing Big Data Analytics 799A, or through Plan B (non-thesis option) by successfully passing a comprehensive examination.

Students admitted conditionally will be required to take courses in preparation for the Master of Science degree that do not fulfill degree requirements, if conditions warrant.

Required core courses (12 units)

BDA 572/		
LING 572	Python Scripting for Social Science	3
BDA 594/		
GEOG 594	Big Data Science and Analytics Platforms	3
B A 623	Statistical Analysis	3
MIS 686	Enterprise Database Management	3

Electives (6-12 units)

Prior approval of electives by the graduate adviser is required for their application towards the degree. Electives may be selected from the following list. Students should be aware that many electives require prerequisites that will not fulfill degree requirements.

ACCTG 621	Accounting Information Systems	3
ACCTG 673	Accounting Information Systems (AIS) Development	3
B A 625	Financial and Management Accounting	3
BIOMI 600	Methods in Bioinformatics and Medical Informatics	3
CS 503	Scientific Database Techniques	3
CS 514	Database Theory and Implementation	3
CS 581/		
LING 581	Computational Linguistics	3
CS 653	Data Mining and Knowledge Discovery	3
ENGL 560	Literature in the Digital Age	3
ENGL 562	Digital Methods in Literary Studies	3
GEOG 581	Cartographic Design	3
GEOG 583	Internet Mapping and Distributed GIServices	3
GEOG 584	Geographic Information Systems Applications	3
GEOG 593	GIS for Business Location Decisions	3
GEOG 780	Seminar in Techniques of Spatial Analysis	3
LING 571	Computational Corpus Linguistics	3
LING 583	Statistical Methods in Text Analysis	3
MATH 524	Linear Algebra	3
MIS 620	Electronic Business and Big Data Infrastructures	3
MIS 687	Secure Enterprise Networking and Mobile Technologies	3
MIS 691	Decision Support Systems	3
MIS 748	Seminar in Applied Multivariate Analytics	3
MIS 749	Business Analytics	3
SOC 607	Advanced Quantitative Methods: Core Course	3
SOC 730	Seminar in Social Institutions	3
STAT 550	Applied Probability	3
STAT 551A	Probability and Mathematical Statistics	3
STAT 610	Linear Regression Models	3

Research (3-6 units)

BDA 797	Research	1-3 (Cr/NC/RP)
BDA 798	Special Study	1-3 (Cr/NC/RP)

Capstone and culminating experience (3-6 units)

BDA 600	Big Data Analytics Capstone Seminar	3
BDA 799A	Thesis or Project	3 (Cr/NC/RP)
BDA 799B	Thesis or Project Extension	0 (Cr/NC)
BDA 799C	Comprehensive Examination Extension	0 (Cr/NC)

Courses Acceptable for Master's Degree Program in Big Data Analytics (BDA)

Refer to Courses and Curricula and Regulations of the Division of Graduate Affairs sections of this bulletin for explanation of the course numbering system, unit or credit hour, prerequisites, and related information.

UPPER DIVISION COURSES

BDA 572. Python Scripting for Social Science (3)
    (Same course as Linguistics 572)
    Prerequisite: Upper division or graduate standing.
    Python scripting for social science data. Statements and expressions. Strings, lists, dictionaries, files. Python with unformatted data (regular expressions). Graphs and social networks. Spatial data and simple GIS scripts.

BDA 594. Big Data Science and Analytics Platforms (3)
    (Same course as Geography 594)
    Prerequisites: Geography 104, Computer Science 100 or 107; and Geography 385, Sociology 201, Statistics 250, or graduate standing.
    Big data science to include analysis, data collection, filtering, GIS, machine learning, processing, text analysis, and visualization. Computational platforms, skills, and tools for conducting big data analytics with real world case studies and examples.

GRADUATE COURSES

BDA 600. Big Data Analytics Capstone Seminar (3)
    Prerequisites: Big Data Analytics 572 [or Linguistics 572], Big Data Analytics 594 [or Geography 594], Business Administration 623, Management Information Systems 686.
    Capstone course to integrate data analytics knowledge. Big data problems and research challenges. Student teams conduct group projects and present findings.

BDA 696. Advanced Special Topics in Big Data Analytics (3)
    Prerequisite: Consent of instructor.
    Advanced special topics in big data analytics. May be repeated with new content. See *Class Schedule* for specific content. Credit for 596 and 696 applicable to a master's degree with approval of the graduate adviser.

BDA 797. Research (1-3) Cr/NC/RP
    Research in one of the fields of big data analytics. Maximum credit six units applicable to a master's degree.

BDA 798. Special Study (1-3) Cr/NC/RP
    Prerequisite: Consent of staff; to be arranged with program director and instructor.
    Individual study. Maximum credit six units applicable to a master's degree.

BDA 799A. Thesis or Project (3) Cr/NC/RP
    Prerequisites: An officially appointed thesis committee and advancement to candidacy.
    Preparation of a project or thesis for the master's degree.

BDA 799B. Thesis or Project Extension (0) Cr/NC
    Prerequisite: Prior registration in Thesis 799A with an assigned grade symbol of RP.
    Registration required in any semester or term following assignment of RP in Course 799A in which the student expects to use the facilities and resources of the university; also, student must be registered in the course when the completed thesis is granted final approval.

BDA 799C. Comprehensive Examination Extension (0) Cr/NC
    Prerequisite: Completion or concurrent enrollment in degree program courses.
    Registration required of students whose only requirement is completion of the comprehensive examination for the master's degree. Registration in 799C limited to two semesters.