MANAGEMENT ANALYTICS AND DECISION-MAKING (MAD) MINOR
DEPARTMENT OF MANAGEMENT OF COMPLEX SYSTEMS – SCHOOL OF ENGINEERING
UNIVERSITY OF CALIFORNIA, MERCED
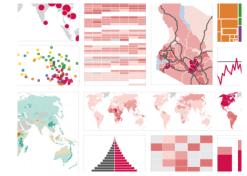
The **MAD Minor** *([webpage](#))* sits at the intersection of the *[Data Science & Analytics](#)* (B.A.) and *[Management of Innovation, Sustainability & Technology](#)* (MIST, B.A.) majors offered by the *Management of Complex Systems* (MCS) department faculty, and will immerse you in interdisciplinary courses that foster data analytics skills, communication skills, and critical systems thinking skills related to leadership, entrepreneurship and data-driven decision-making. It will teach you skills that will help you succeed in interdisciplinary environments, solve problems, and manage resources mindful of risk, uncertainty, human dimensions, and sustainability. It will cultivate skills for managing people, data, and the natural world – the interface of all three can help you explore sustainable growth in human and built environments. **The MAD Minor will equip you with the tools to develop highly adaptable and marketable management skills around principles of the *People, Planet, and Profit* (PPP) mindset.**

The MAD Minor requires a total of 5 four-unit courses, one of which may come from your major. Most MAD Minor courses – with MIST course codes – fulfill GE requirements. Courses rely on case studies and applied projects to exemplify the diverse challenges encountered when simultaneously seeking profitability, social justice, and environmental sustainability. Data governance and ethical considerations underlie decision-making and resource management. You will be introduced to the fundamentals of entrepreneurial decision-making, ethics of data use and custodianship, and communication. Case studies and project materials are drawn from real management problems from the Central Valley, Sierra Nevada, and Bay Area. You will engage in hands-on, practical experiences with data-driven analytics, professional communication, and entrepreneurship to acquire knowledge needed to understand and manage complex systems, including:

- **Critical Thinking and Analytics for Management of Complex Systems.** You will identify and use appropriate analytical, quantitative, and data-oriented techniques and apply reasoning to evaluate case studies for strategic decision-making in a multi-disciplinary setting and in the management of complex systems.

- **Communication of Quantitative Analysis, Results, and Implications.** You will communicate effectively in classroom settings and with business and community stakeholders, preparing and delivering clear, persuasive, and professional oral and written presentations.

- **Leadership and Teamwork in Practice.** You will apply principles and practices of effective leadership and teamwork in classroom and project settings.

- **Ethics and Sustainability.** You will apply knowledge of ethical and legal requirements and of professional, societal and cultural contexts of coupled environments.

DEVELOPING THE ABILITY TO **WRANGLE, WEAVE, ANALYZE,** AND **COMMUNICATE** USING A WIDE RANGE OF DATA SOURCES AND COMMUNICATION METHODS – TO FACILITATE THE INCREASINGLY **QUANTITATIVE PRACTICE OF MANAGEMENT, EVALUATION AND DECISION-MAKING**

MAD MINOR REQUIREMENTS

Fundamental Requirement [4 units] – Complete one of the following courses:

- MIST 050: Introduction to Entrepreneurship
- MIST 060: Introductory Data Analytics/DSA 001: Foundations of Data Science & Analytics
- MIST 070: Innovation Management

Core Areas Requirement [12 units] - Complete three of the following courses:

- MIST 011: Climate Justice Units: 4
- MIST 116: Applied Climatology Units: 3
- MIST 128: Cognitive Engineering Units: 4
- MIST 130: Statistical Data Analysis and Optimization in R for Decision Support Units: 4
- MIST 131: Data Governance for Analytics Projects Units: 4
- MIST 132: Geographic Information Systems Analysis for Management Units: 4
- MIST 133: Service Innovation Units: 4
- MIST 134: Methods of Data and Network Science Units: 4
- MIST 135: Technical Communication and Visualization Skills Units: 4
- MIST 136: Retailing Management Units: 4
- MIST 137: Managing Teamwork Units: 4
- MIST 138: Systematic Financial Trading & Analysis Units: 4
- MIST 164: Energy Policy Units: 4 / ENVE 164: Energy Policy
- MIST 175: Information Systems for Management Units: 4 / ENGR 175: Information Systems for Management / MGMT 170: Information Systems for Management
- MIST 190: Special Topics Units:

Elective Requirement [4 units] - Complete one course from the following:

- BIOE 108: Genetic Engineering Units: 3
- COGS 103: Introduction to Neural Networks in Cognitive Science Units: 4
- COGS 104: Complex Adaptive Systems Units: 4
- COGS 105: Research Methods for Cognitive Scientists Units: 4
- COGS 182: Service Science Units: 4 /MGMT 150: Service Science
- CSE 100: Algorithm Design and Analysis Units: 4
- CSE 111: Database Systems Units: 4
- CSE 120: Software Engineering Units: 4
- CSE 126: Information Systems and Service Design Units: 4 / MGMT 126: Information Systems and Service Design
- CSE 173: Computational Cognitive Neuroscience Units: 4 /COGS 123: Computational Cognitive Neuroscience
- CSE 175: Introduction to Artificial Intelligence Units: 4 /COGS 125: Introduction to Artificial Intelligence
- CSE 176: Introduction to Machine Learning Units: 4
- ECON 110: Econometrics Units: 4
- ENGR 180: Spatial Analysis and Modeling Units: 4
- ENVE 155: Decision Analysis in Management Units: 4
- ESS 110: Hydrology and Climate Units: 4
- MATH 180: Applied Statistics and Machine Learning Units: 4
- MGMT 180: Entrepreneurship Theory and Practice Units: 4
- ME 135: Finite Element Analysis Units: 4
- ME 137: Computer Aided Engineering Units: 3
- ME 141: Introduction to Control Systems Units: 4
- ME 142: Mechatronics Units: 4
- MSE 104: Engineering Living Systems Units: 3
- MSE 119: Computational Materials Science Units: 4
- POLI 175: Advanced Analysis of Political Data Units: 4
- PSY 105: Advanced Research Methods in Psychology Units: 4