

PROGRAM-SPECIFIC COMPETENCIES - MASTER OF ENGINEERING IN APPLIED DATA SCIENCE (MADS)

Competencies are the skills, knowledge and attributes gained through every work, educational, volunteer and life experience.

UVic students in the **MADS** program develop the following program-specific competencies. We worked with the Faculty of Engineering to develop this document.

DATA ANALYSIS

Collecting and analyzing data according to data science best practices.

- + **Data preparation:** Queries databases to collect relevant data for analysis
- + **Data engineering:** Collects and cleans data and performs normalization and feature extraction as appropriate
- + **Data analysis:** Manages and analyzes large data sets efficiently and effectively
- + **Machine learning tuning:** Experiments to select an optimal set of hyperparameters for machine learning algorithms
- + **Model validation:** Validates data solutions to ensure robust functionality on real-world data
- + **Data visualization:** Creates informational visualizations to present clear and actionable recommendations
- + **Bias aversion:** Recognizes how and when biases occur in data and knows how to correct for such biases
- + **Mathematics fundamentals:** Demonstrates knowledge of the mathematical fundamentals of engineering
- + **Statistical methods:** Applies the correct statistical methods to analyze and investigate data
- + **Research practices:** Researches up-to-date tools, methods, and technologies and applies them as appropriate

SOFTWARE DEVELOPMENT

Using programming skills and application tools to build effective software solutions

- + **Software selection:** Determines the kinds of software tools needed to do a job
- + **Programming:** Writes programs to serve the needs of users and organizations
- + **Algorithm selection:** Determines the most suitable algorithms or methods for the task at hand
- + **Quality control analysis:** Conducts manual and automated tests to evaluate functionality and validate results
- + **Debugging:** Determines causes of operating errors and implements suitable fixes
- + **Distributed systems:** Understands distributed systems concepts and architectures

SYSTEMS

Being able to understand, monitor and improve the interaction between people and technology

- + **Systems analysis:** Determines how a system should work and how changes in data, conditions, operations, and the environment will affect outcomes
- + **Judgment and decision-making:** Considers the relative costs and benefits of potential decisions to choose the most appropriate one
- + **Systems evaluation:** Identifies measures or indicators of system performance and the actions needed to improve or correct performance while meeting the goals of the system
- + **Security and privacy:** Respects security and privacy in problem solving and decision making

DESIGN

Using fundamental design concepts when planning large projects

- + **Project requirements:** Gathers full requirements for a project according to client's needs
- + **Design justification:** Relates and justifies the design process to the client
- + **Design safety:** Implements designs that are safe and effective
- + **Project integration:** Demonstrates awareness of how the design integrates into its environment and existing resources

PROFESSIONAL PRACTICE

Employing professional engineering practice, standards and ethics, and soft skills

- + **Conflict resolution:** Utilizes conflict resolution strategies
- + **Communication:** Demonstrates effective technical communication skills, both in writing and verbally
- + **Management:** Implements project, risk, and time management strategies
- + **Entrepreneurship:** Familiar with entrepreneurship and the processes behind starting new ventures
- + **Career development:** Practices career development and exploration
- + **Networking:** Meets key stakeholders using professional network building practices
- + **Cultural intelligence:** Uses cultural intelligence skills to connect with people from everywhere around the world
- + **Health and safety:** Understands and promotes health and safety in the workplace and for the general public