INFORMATION SHEET

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