

# MASTER OF DIGITAL TRANSFORMATION AND INNOVATION (ONLINE)

## Overview Summary

- Degree offered: Master of Digital Transformation and Innovation (MDTO)
- Registration status options: Part-time
- Language of instruction: English
- Program option (expected duration of the program):
  - within two years of full-time study
- Academic units: Telfer School of Management (<https://telfer.uottawa.ca/en/>), Faculty of Arts (<https://arts.uottawa.ca/en/>), Faculty of Engineering (<http://engineering.uottawa.ca/>), School of Engineering Design and Teaching Innovation (<https://www.uottawa.ca/faculty-engineering/>)

## Program Description

The Digital Transformation and Innovation program offers an online Master of Digital Transformation and Innovation.

The program is a multi-faculty collaboration between the Telfer School of Management, the Faculty of Arts, and the Faculty of Engineering to train highly qualified professionals to create, manage and research the profound change to our world that is happening as a result of electronic digital technology. At its heart, the technology enables the collection and communication of huge amounts of data that transforms how business and society works. It also creates a new online environment where the experience of business and social interactions by individuals is being reinvented. Innovation is an important aspect of the program to emphasize the re-invention and creative design of user experiences in business and social interactions.

Digital Transformation and Innovation is a multidisciplinary graduate program with a strong commitment to industry relevance as well as business and social implications of the technology. In the program, students will:

1. Develop and demonstrate the ability to communicate with and integrate multidisciplinary expertise related to digital transformation and innovation.
2. Develop and demonstrate the ability to lead, design and create applications of digital transformation and innovation using current and emerging tools, techniques and technology.
3. Develop skills in management, technology, communications, information architecture, data science, UX design, and gender / cultural awareness and demonstrate the ability to apply them in practice.
4. Develop and demonstrate the ability to assess, test and research digital transformation and innovation with sensitivity and awareness around ethics, equity, diversity, business and social impact.

For more information please see the DTI Student Association (<https://dtiottawa.ca/>) webpage.

## Other Programs Offered Within the Same Discipline or in a Related Area

- Doctorate in Philosophy Digital Transformation and Innovation
- Master of Science Digital Transformation and Innovation
- Master of Digital Transformation and Innovation with Concentration in UX Design
- Master of Digital Transformation and Innovation with Concentration in Applied Data Science

## Fees and Funding

- Program fees
  - The estimated amount for university fees (<https://www.uottawa.ca/university-fees/>) associated with this program are available under the section Finance your studies (<http://www.uottawa.ca/graduate-studies/programs-admission/finance-studies/>).
  - International students enrolled in a French-language program of study may be eligible for a differential tuition fee exemption (<https://www.uottawa.ca/university-fees/differential-tuition-fee-exemption/>).
- To learn about possibilities for financing your graduate studies, consult the Awards and financial support (<https://www.uottawa.ca/graduate-studies/students/awards/>) section.

## Notes

- Programs are governed by the general regulations (<http://www.uottawa.ca/graduate-studies/students/general-regulations/>) in effect for graduate studies at the University of Ottawa.
- In accordance with the University of Ottawa regulation, students have the right to complete their assignments, examinations, research papers, and theses in French or in English.

## Program Contact Information

Graduate Studies Office, Faculty of Engineering (<https://engineering.uottawa.ca/graduate-studies-office/>)  
STE 1024  
800 King Edward Ave.  
Ottawa ON Canada  
K1N 6N5

Tel.: 613-562-5347  
Fax.: 613-562-5129  
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Twitter | Faculty of Engineering (<https://twitter.com/uOttawaGenie/?lang=en>)

Facebook | Faculty of Engineer (<https://www.facebook.com/uottawa.engineering/>)

## Admission Requirements

For the most accurate and up to date information on application deadlines, language tests and other admission requirements, please visit the specific requirements (<https://www.uottawa.ca/graduate-studies/programs-admission/apply/specific-requirements/>) webpage.

## To be eligible, candidates must:

- Have a Bachelor's degree with a specialization or a major (or equivalent) in a relevant discipline with a minimum admission average of 70% (B).
- Have completed a course in statistics; a course in management information systems or computing; and two advanced courses showing specialization in one of three disciplines: creative arts and humanities (online multi-media or communications); management (digital transformation management or strategy); or technology (online application development or data science).
- A minimum 2 years of experience and demonstrated proficiency in English are required.
- Students are responsible for having their own computers and a broadband connection to the Internet sufficient for videoconferencing.

- IELTS minimum score of 7 for 3 of the 4 tests (Reading, Listening, Writing, Speaking) and a minimum score of 6 in the fourth test.
- A score of at least 14 on the CANTEST, with no individual test score below 4.0, along with a minimum score of 4.5 on the oral component of the test.

### Note:

- Candidates are responsible for any fees associated with the language tests.
- Test scores cannot be more than two-years-old as of September 1 of the year of potential entry into the program.

## Notes

- The admission requirements listed above are minimum requirements and do not guarantee admission to the program.
- Admissions are governed by the general regulations (<http://www.uottawa.ca/graduate-studies/students/general-regulations/>) in effect for graduate studies.

## Program Requirements

Requirements for this program have been modified. Please consult the 2023-2024 calendars (<http://catalogue.uottawa.ca/en/archives/>) for the previous requirements.

## Master's

To receive the Master of Digital Transformation and Innovation (Online), a student enrolled in the program must successfully complete 30 course units of academic work: 12 compulsory units and 18 optional course units.

Students must meet the following requirements:

### Compulsory Courses:

DTO 5310	Ethics for Design, AI and Robotics	3 Units
DTO 5389	Digital Transformation Technologies	3 Units
DTO 6160	Innovation Management	3 Units
DTO 6231	Process Modelling, Mining, and Automation	3 Units
18 optional course units from the list of optional courses		18 Units

## List of optional courses

DTO 5100	Foundations and Applications of Machine Learning	3 Units
DTO 5101	Foundations of Machine Learning for Scientists and Engineers	3 Units
DTO 5120	Essential Concepts in Data Science	3 Units
DTO 5140	Engineering Design	3 Units
DTO 6106	User Research and User Experience Principles and Practice	3 Units
DTO 6107	Interaction Design and Design Thinking	3 Units
DTO 7103	Visual Literacy and User Experience Design Principles	3 Units
MEM 5111	Creativity and Innovation	3 Units
MEM 5119	Project Information Management	3 Units
MEM 5120	Product Development and Management	3 Units
MEM 5121	Taguchi Methods for Engineering R D	3 Units
MEM 5122	Operational Excellence and Lean Six Sigma	3 Units

## Language Requirements

Most courses are delivered in English as the international language for advanced information technology. However, the program will provide an appropriately supportive environment for francophone students to develop professional competence in technical English at their own pace. Students have the right, as stipulated in the University's bilingualism regulations (Academic Regulations I-2), to complete all their work, including their thesis, in the official language of their choice (French or English). There are fully bilingual professors and advisors who can support students in French.

Applicants whose first language is neither French nor English must provide proof of proficiency in the language of instruction through one of the following two requirements or one of the language tests below.

- Proof of completion within the last five years, of a previous degree program in an English language university.
- Proof of recent prolonged residence and exercise of a profession in an English speaking country (normally at least four years over the last six years).

Language tests recognized by the University of Ottawa:

- TOEFL minimum score of 600 (paper-based) with a minimum score of 50 on the written and 50 on the spoken or a minimum score of 100 (internet-based).

MEM 5265	Business Intelligence and Performance Management	3 Units
MEM 5280	Principles of Operations Management	3 Units
MEM 5300	Principles of Data Analytics	3 Units
MEM 6100	Complex Project Management	3 Units
MEM 6281	Supply Chain Management	3 Units
MEM 6285	Project Risk Management	3 Units
MEM 6287	Advanced Data Analytics	3 Units
MIA 5130	System optimization and management	3 Units
MIA 6160	Cyber Security Systems and Strategies	3 Units
MIA 6180	Strategic Knowledge Management	1.5 Units
MIA 6260	Integrated Networks for Enterprise	1.5 Units

Students may pursue, upon approval, elective courses and area of expertise currently offered in the online Master of Engineering Management (MEM) program: Data Analytics, Product Innovation Management, Technology Project Management, and Operations Management or the proposed online Master of Interdisciplinary Applied Artificial Intelligence program: UX Design.

## Research

### Research Fields & Facilities

Located in the heart of Canada's capital, a few steps away from Parliament Hill, the University of Ottawa is among Canada's top 10 research universities.

uOttawa focuses research strengths and efforts in four Strategic Areas of Development in Research (SADRs):

- Canada and the World
- Health
- e-Society
- Molecular and Environmental Sciences

With cutting-edge research, our graduate students, researchers and educators strongly influence national and international priorities.

## Courses

### DTO 5100 Foundations and Applications of Machine Learning (3 units)

The capabilities and limitations of machine learning; problem formulation; supervised and unsupervised learning techniques; deploying, monitoring, and evaluating machine learning models; storytelling and assessing the results of learning; current advances in application areas such as business, law, arts, social sciences and education.

**Course Component:** Lecture

The courses CSI 5155, ELG 5255, IAI 5100, IAI 5101, MIA 5100, DTO 5100 cannot be combined for units.

### DTO 5101 Foundations of Machine Learning for Scientists and Engineers (3 units)

The capabilities and limitations of machine learning; problem formulation and requirement engineering; supervised and unsupervised learning techniques; designing, deploying, monitoring and evaluating machine learning models; assessing the results of learning; current advances in application areas such as engineering, science and health.

**Course Component:** Lecture

Courses CSI 5155, ELG 5255, IAI 5101, IAI 5100, MIA 5100, DTO 5101 cannot be combined for units.

### DTO 5120 Essential Concepts in Data Science (3 units)

An introduction to the foundations of data science using a case study approach; overview of the data science process: types of tasks and models, data manipulation, exploratory data analysis, data summarization and data visualization; predictive modeling, descriptive modeling; reporting and deployment.

**Course Component:** Lecture

Courses CSI 4142, DTI 5125, DTI 5126, MAT 4373, DTO 5120 cannot be combined for units.

### DTO 5140 Engineering Design (3 units)

Open ended, hands-on engineering design course that provides students with fundamentals and advanced concepts of the engineering design process from client empathy to prototyping and testing. Students work directly with clients to solve a real societal need. There is a strong component of teamwork and lifelong learning.

**Course Component:** Lecture

### DTO 5310 Ethics for Design, AI and Robotics (3 units)

Artificial Intelligence technologies are becoming ever more present in applications like: automated vehicles and mobility-as-a-service (e.g. driving and system-level control algorithms); business intelligence (e.g. predictive resource allocation); consumer electronics (e.g. social robots and smart speakers); healthcare (e.g. image classification in medical imaging); the justice system (e.g. recidivism prediction and sentencing); and weapons systems (e.g. targeting and kill decision-making). Many of these applications are raising significant ethical concerns. A range of topics in applied technology ethics are examined through the lens of contemporary philosophy and applied ethics texts and popular media articles. Practical frameworks, methodologies and tools for anticipating, and addressing, ethical issues are introduced through hands-on, group-based design thinking workshops and projects.

**Course Component:** Lecture

The courses DTO 5310, DTI 5310, CSI 5195 cannot be combined for units

### DTO 5389 Digital Transformation Technologies (3 units)

Introduction to business models and technologies. Search engines. Cryptography. Web services and agents. Secure electronic transactions. Value added e-commerce technologies. Advanced research questions.

**Course Component:** Lecture

Courses DTO 5389, DTI 5389 cannot be combined for units.

### DTO 6106 User Research and User Experience Principles and Practice (3 units)

User experience (UX) facets including functionality, usability, and desirability; Human-computer interaction (HCI) theories; UX frameworks and patterns for interaction/information/visual design; UX management, design methods, and tools; UX evaluation and usability engineering; Understanding of users' behaviours, needs, motivations, and challenges in user experience (UX); User research methods including interviews, surveys, focus groups, contextual inquiries; Principles and guidelines for generative & evaluative research; Methods in qualitative and quantitative user research; Tools and techniques for in-person and remote research; Heuristic evaluations and usability testing.

**Course Component:** Lecture

Courses DTO 6106, DTI 6102, DTI 6103 cannot be combined for units.

**DTO 6107 Interaction Design and Design Thinking (3 units)**

Principles of interaction design (IxD); Usability heuristics for user interface (UI) design; IxD tools and techniques including sketching, wireframing, and prototyping; UI design patterns for navigation, landing pages, search, and e-commerce; IxD best practices for mobile application design. Design thinking as a collaborative creative process for problem-solving and designing human-centered solutions. Design thinking for driving business innovation, new product development, and customer experience. Best practices for design inspiration, ideation and implementation; essential design research skills for empathy, listening, collaboration, observation, critical analysis, and experimentation. Design Thinking tools and techniques including visualization, mapping, storytelling, rapid prototyping, and testing.

**Course Component:** Lecture

Courses DTO 6107, DTI 6104, DTI 6105 cannot be combined for units.

**DTO 6160 Innovation Management (3 units)**

Examination of the context in which firms and other organizations operate and of the nature and evolution of industries. Survey of research on the nature and evolution of national and regional systems of innovation, and on politically and geographically defined systems that influence the competitiveness of firms and the prosperity of citizens.

**Course Component:** Lecture

Courses DTO 6160, MGT 6160 cannot be combined for units.

**DTO 6231 Process Modelling, Mining, and Automation (3 units)**

Business Process Management (BPM) languages and technologies. Modelling and analysis of processes. Algorithms, log pre-processing, and tools for Process Mining. Process discovery, conformance, and improvement. Performance and predictive process analytics. Robotic Process Automation (RPA). Process automation tools, challenges, and opportunities. Examples from diverse application domains will be studied.

**Course Component:** Lecture

**DTO 7103 Visual Literacy and User Experience Design Principles (3 units)**

Fundamentals of visual, interaction and motion design theories and principles as they relate to User Experience Design (UXD). A series of hands-on workshops and assignments focus on building visual literacy through guided observations, visual design critiques, and visual redesigns of existing screen-based digital products (i.e. website, interactive kiosk interface, mobile app etc.). Students will complete a design project. Students will conduct research and scholarship in visual literacy, and UXD and justify their design decisions in writing.

**Course Component:** Lecture

Courses DTO 7103, DTI 7103 cannot be combined for units.