

# MASTER OF DIGITAL TRANSFORMATION AND INNOVATION AND CONCENTRATION APPLIED DATA SCIENCE

## Overview Summary

- Degree offered: Master of Digital Transformation and Innovation (MDTI)
- Registration status options: Full-time; Part-time
- Language of instruction: English
- Program option (expected duration of the program):
  - within two years of full-time study
- For immigration purposes, the summer term (May to August) for this program is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.
- 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 Electrical and Computer Science (<http://engineering.uottawa.ca/eecs/>)

## Program Description

The Digital Transformation and Innovation 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.

The concentration in Applied Data Science is a multidisciplinary graduate program with a strong commitment to industry relevance and ethics. In the program, students will:

1. Develop and demonstrate the ability to communicate with and integrate multi-disciplinary expertise related to data.
2. Develop and demonstrate the ability to lead, design, and create data-driven transformation and innovation using current and emerging tools, techniques and technology.
3. Obtain the required skills in data cleaning, data quality, data analytics and machine learning to apply data science methods in practice to real problems involving digital transformation and innovation.
4. Develop and demonstrate the ability to assess, test and research innovation in data science with sensitivity and awareness around ethics, equity, diversity, business impact 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
- Master of Digital Transformation and Innovation with Concentration in UX Design

## 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 academic regulations (<https://www.uottawa.ca/about-us/leadership-governance/policies-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  
Email: [engineering.grad@uottawa.ca](mailto:engineering.grad@uottawa.ca)

Twitter | Faculty of Engineering (<https://twitter.com/uOttawaGenie/?lang=en>)  
Facebook | Faculty of Engineer (<https://www.facebook.com/uottawa.engineering/>)

## Admissions 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 75% (B+).

Note: International candidates must check the admission equivalencies (<https://www.uottawa.ca/graduate-studies/international/study-uottawa/admission-equivalencies/>) for the diploma they received in their country of origin.

- 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); technology (online application development or data science).

## 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).
- 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 academic regulations (<https://www.uottawa.ca/about-us/leadership-governance/policies-regulations/>) in effect for graduate studies.

## Applying to the COOP Option

In order to apply to the co-op option, you must first be admitted to a program that offers co-op.

Your application must be submitted by the end of the first month of enrollment in your primary program, i.e., by the end of September.

Admission to the co-op option occurs on a competitive basis and is managed by the Co-op office. Enquiries should be directed to that office.

To be admitted to the co-op option, you must:

- Be enrolled as a full-time student in the master's in Master of Digital Transformation and Innovation.
- Have and maintain a minimum CGPA of 7.0 (B+ or 75%) in course taken at the University of Ottawa.
- Be a Canadian citizen, a permanent resident or an international student (authorization or diplomat)
- Pay the required co-op fees.

## 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 with Project

To receive this Master's degree, a student enrolled in the program must successfully complete 30 course units.

Students must meet the following requirements:

### Compulsory Courses:

DTI 5125	Data Science Applications	3 Units
DTI 5126	Fundamentals for Applied Data Science	3 Units
DTI 7101	Research Workshop in Digital Transf. and Innovation	1.5 Units

3 optional course units from: 3 Units

DTI 5115	Communication Ethics
DTI 5310	Ethics for Design, AI, and Robotics
ISI 5310	Ethics, Values and Information Dilemmas

6 optional course units from the list of Applied Data Science courses 6 Units

4.5 optional course units from the list of Foundation courses 4.5 Units

3 optional course units from the list of Applied Data Science, Foundation, or Optional courses 3 Units

### Research Project

6 course units from: 6 Units

DTI 5902	Industry Project
DTI 6997	Research project

## Applied Data Science Courses

ADM 6277	E-Business Energy Management	1.5 Units
ADM 6420	Digital Marketing	1.5 Units

CSI 5115	Database Analysis and Design	3 Units
CSI 5180	Topics in Artificial Intelligence	3 Units
CSI 5311	Distributed Databases and Transaction Processing	3 Units
CSI 5386	Natural Language Processing	3 Units
DTI 6302	Topics in Applied Data Science	3 Units
DTI 6303	Topics in Applied Data Science	1.5 Units
DTI 6230	Business Process Management and Performance Measurement	3 Units
DTI 6287	Business Intelligence Technologies Big Data Analytics	1.5 Units
ELG 5142	Ubiquitous Sensing for Smart Cities	3 Units
GNG 5121	Taguchi methods for efficient Engineering RD	3 Units
GNG 5122	Operational Excellence and Lean Six Sigma	3 Units
GNG 5123	Enterprise Architecture	3 Units
ISI 6322	Digital Preservation	3 Units
ISI 6332	Metadata and Taxonomies	3 Units
ISI 6343	Digital Asset Management Technologies	3 Units
ISI 6351	Social Media	3 Units

## Foundation Courses

### Management Orientation

DTI 5124	Internet Technologies and Mobile Commerce	3 Units
DTI 6130	Web Services	1.5 Units
DTI 6160	Cyber Security Systems and Strategies	3 Units
MGT 6160	Systems of Innovation	3 Units

### Technology Orientation

DTI 5175	Mobile Commerce Technologies	3 Units
DTI 5389	Electronic Commerce Technologies	3 Units

### Creative Arts and Humanities Orientation

ISI 6342	Web Architecture and Technologies	3 Units
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## Optional Courses

### Management Orientation

ADM 6260	Project Management I	1.5 Units
ADM 6261	Project Management II	1.5 Units
ADM 6276	Enterprise Resource Planning Systems Management	1.5 Units
ADM 6277	E-Business Energy Management	1.5 Units
ADM 6279	Socio-Technical Change	1.5 Units
ADM 6286	International E-Business Strategies for DTI	1.5 Units
ADM 6420	Digital Marketing	1.5 Units
DTI 5124	Internet Technologies and Mobile Commerce	3 Units
DTI 5125	Data Science Applications	3 Units
DTI 5126	Fundamentals for Applied Data Science	3 Units
DTI 5990	Directed Readings I	1.5 Units
DTI 5991	Directed Readings II	1.5 Units
DTI 6105	Design Thinking	1.5 Units
DTI 6130	Web Services	1.5 Units
DTI 6160	Cyber Security Systems and Strategies	3 Units
DTI 6180	Strategic Knowledge Management	1.5 Units
DTI 6220	Data Analytics and Business Intelligence	1.5 Units

DTI 6230	Business Process Management and Performance Measurement	3 Units
DTI 6240	Mobile Commerce	1.5 Units
DTI 6260	Integrated Networks for the Enterprise	1.5 Units
DTI 6300	Topics in Digital Transformation and Innovation	3 Units
DTI 6301	Topics in Digital Transformation and Innovation	1.5 Units
DTI 6302	Topics in Applied Data Science	3 Units
DTI 6303	Topics in Applied Data Science	1.5 Units
DTI 6304	Topics in User Experience Design	3 Units
DTI 6305	Topics in User Experience Design	1.5 Units
MBA 5270	Knowledge and Information Management	1.5 Units
MBA 6220	Sales Development Strategies for Products Services	1.5 Units
MGT 6111	Venture Capital and Private Equity	3 Units
MGT 6160	Systems of Innovation	3 Units
MHA 6271	Application of Information Technology in Health Care	1.5 Units
POP 8950	Special Topics in Population Health	3 Units

### Technology Orientation

CSI 5105	Network Security and Cryptography	3 Units
CSI 5111	Software Quality Engineering	3 Units
CSI 5112	Software Engineering	3 Units
CSI 5115	Database Analysis and Design	3 Units
CSI 5118	Automated Verification and Validation of Software	3 Units
CSI 5122	Software Usability	3 Units
CSI 5180	Topics in Artificial Intelligence	3 Units
CSI 5311	Distributed Databases and Transaction Processing	3 Units
CSI 5386	Natural Language Processing	3 Units
DTI 5175	Mobile Commerce Technologies	3 Units
DTI 5380	Systems and Architectures for Electronic Commerce	3 Units
DTI 5389	Electronic Commerce Technologies	3 Units
DTI 6287	Business Intelligence Technologies Big Data Analytics	1.5 Units
DTI 6402	Affective and Persuasive Computing	3 Units
ELG 5121	Multimedia Communications	3 Units
ELG 5142	Ubiquitous Sensing for Smart Cities	3 Units
ELG 5373	Data Encryption	3 Units
GNG 5100	Introduction to Engineering Management	3 Units
GNG 5120	Technology entrepreneurship for Engineers and Computer Scientists	3 Units
GNG 5121	Taguchi methods for efficient Engineering RD	3 Units
GNG 5122	Operational Excellence and Lean Six Sigma	3 Units
GNG 5123	Enterprise Architecture	3 Units
GNG 5130	Communication and Influence for Engineers	3 Units
GNG 5131	Sales and Influence for Engineers	3 Units
GNG 5231	Sales Engineer Internship Project	6 Units
GNG 5300	Topics in Engineering	3 Units
GNG 5301	Professional Skills and Responsibility	3 Units
GNG 5310	Topics in Industry Practice	3 Units

GNG 5140	Engineering Design	3 Units
GNG 5141	Creativity and Innovation	3 Units
<b>Creative Arts and Humanities Orientation</b>		
AHL 5300	Creativity and Innovation	3 Units
CMN 5110	Social History of Communication Technologies	3 Units
CMN 5140	Communication, Globalization and Change	3 Units
CMN 5150	Knowledge Management	3 Units
CMN 5900	Directed Studies in Communication	3 Units
DTI 6102	User Experience Principles and Practices	1.5 Units
DTI 6103	User Research	1.5 Units
DTI 6104	Interaction Design	1.5 Units
DTI 7103	Visual Literacy and User Experience Design Principles	3 Units
ISI 6300	Special Topics in Information Studies	3 Units
ISI 6312	Global Information and Communications Policy	3 Units
ISI 6322	Digital Preservation	3 Units
ISI 6332	Metadata and Taxonomies	3 Units
ISI 6342	Web Architecture and Technologies	3 Units
ISI 6343	Digital Asset Management Technologies	3 Units
ISI 6351	Social Media	3 Units
ISI 6353	Access and Services to Diverse Populations	3 Units
ISI 6381	Knowledge in Organizations	3 Units

## Co-op Option

Co-op students must enroll full-time and complete two work terms: CGI 6001 and CGI 6002.

Each work term is graded P/F (Pass/Fail), based on the employer's report and on the written report completed by the student (the student report should be 30 pages long, including annexes). The report is evaluated by the professor in charge of the graduate co-op option in Digital Transformation and Innovation. The units awarded for co-op terms may not be used to obtain equivalences for other courses. In other words, the co-op units are additional to the minimum requirements of the degree.

To remain enrolled in the co-op option, students must:

- Maintain full-time status.
- Maintain a 7.0 grade point average.
- Obtain a satisfactory grade (P) for each co-op work term.

## Research

### Research at the University of Ottawa

Located in the heart of Canada's capital, a few steps away from Parliament Hill, the University of Ottawa ranks among Canada's top 10 research universities. Our research is founded on excellence, relevance and impact and is conducted in a spirit of equity, diversity and inclusion.

Our research community thrives in four strategic areas:

- Creating a sustainable environment
- Advancing just societies
- Shaping the digital world
- Enabling lifelong health and wellness

From advancing healthcare solutions to tackling global challenges like climate change, the University of Ottawa's researchers are at the forefront of innovation, making significant contributions to society and beyond.

## Courses

### DTI 5100 Introductory Seminar (1.5 unit)

**Course Component:** Seminar

### DTI 5115 Communication Ethics (3 units)

Emphasis on the significance of ethical principles and responsibilities of public communicators, as well as sanctions faced when communicators fail to uphold these principles. Critique of self-regulation of the media. Analysis of argumentation. Study of legal precedents with respect to defamation.

**Course Component:** Seminar

### DTI 5124 Internet Technologies and Mobile Commerce (3 units)

An examination of current Internet technologies, protocols and wired and wireless infrastructures. Analysis of current Internet-based businesses and consumer applications and services. Discussion of mobile commerce business models and strategies and their relevant technologies. Hands-on experience with discussed technologies and applications. Students will complete a project demonstrating and analyzing how an Internet-based application or service could be applied in their field of graduate study.

**Course Component:** Lecture

The courses DTI 5124, GNG 5124 cannot be combined for units.

### DTI 5125 Data Science Applications (3 units)

Analysis and design of various data cleaning, wrangling, blending, and visualization, statistical inference, classification, clustering, regression, and content analysis methods. Use of machine learning algorithms to extract meaningful information from data to make decisions. Formulating analytics problems for business and developing, evaluating, and maintaining machine learning models. Analyzing, generating, and communicating insights on the models. Hands-on experience with an integrated set of current data analytics, data mining, and machine learning tools.

**Course Component:** Lecture

Courses CSI 5155, CSI 5387, DTI 5125, DTI 5126, DTO 5120, GNG 5125, MIA 5126, SYS 5170 cannot be combined for units

### DTI 5126 Fundamentals for Applied Data Science (3 units)

Essential data science concepts relevant to practical applications are covered including: problem formulation; data acquisition; data pre-processing, modeling and statistical analysis. Hands on experience with data science tools and techniques including: supervised and unsupervised machine learning; presentation of results; applications in areas such as accounting, finance, marketing and supply chain management.

**Course Component:** Lecture

Courses DTI 5126, DTI 5125, DTO 5120, IAI 5120, MIA 5126, SYS 5170 cannot be combined for units.

### DTI 5175 Mobile Commerce Technologies (3 units)

Wireless and mobile electronic commerce architecture and applications. Electronic banking, digital cash. Wireless exchanges, business models. Fixed and mobile wireless networks. Routing techniques. Content presentation. Security issues and solutions. Satellite networks for electronic commerce. Overview of relevant standards, protocols and technologies. Case studies.

**Course Component:** Lecture



### **DTI 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

Courses CSI 5195, DTI 5310, DTO 5310, ELG5295, IAI 5130 and SYS 5295 cannot be combined for units. This course is reserved for students registered in a Computer Science Program with a Concentration Applied Artificial Intelligence.

### **DTI 5380 Systems and Architectures for Electronic Commerce (3 units)**

Content and transactions in e-commerce systems. System architecture with a focus on frameworks, tools and development process. Application frameworks. Information management. Security, standards, and regulatory compliance. Current research issues. Hands-on experience with an integrated set of current e-commerce tools. E-commerce development project.

**Course Component:** Lecture

### **DTI 5389 Electronic Commerce 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

The courses DTI 5389, DTO 5389 cannot be combined for units.

### **DTI 5501 Fondements de gestion pour les affaires électroniques (3 crédits)**

Théorie des organisations et modèles d'affaires. Cadres d'analyse de gestion. Modèles de l'avantage compétitif. Introduction aux modèles de marketing. Chaînes de valeur. La gestion par les processus. Gestion de la chaîne d'approvisionnement. Gestion de la qualité. Gestion des ressources humaines.

**Volet :** Cours magistral

### **DTI 5502 Fondements des technologies de l'information pour les affaires électroniques (3 crédits)**

Technologies d'Internet. Développement d'applications Web. Fondements des réseaux. Gestion des données et résolution de problèmes. Gestion de bases de données et d'entrepôts de données. Outils logiciels.

**Volet :** Cours magistral

### **DTI 5503 Fondements des statistiques pour les affaires électroniques (3 crédits)**

Théorie élémentaire des probabilités. Statistiques descriptives. Corrélations. Tables de fréquences. Tableaux croisés. Tests statistiques. Analyse multivariée.

**Volet :** Cours magistral

### **DTI 5902 Projet en entreprise / Industry Project (6 crédits / 6 units)**

Les étudiants participent à des lectures hebdomadaires sur des sujets tels que le travail en équipe, la gestion de projet et le processus de conception. Travaillant en équipe, ils entreprennent un projet basé sur un client et reçoivent les conseils d'un conseiller technique. / Students participate in weekly lectures covering topics such as teamwork, project management, and the design process. Working in teams, they undertake a client-based project and receiving guidance from a technical advisor.

**Volet / Course Component:** Recherche / Research

Préalable : GNG 5301. Les cours DTI 5902, ELG5901, ELG5902 et GNG 5902 ne peuvent être combinés pour l'obtention de crédits. / Prerequisite: GNG 5301. The courses DTI 5902, ELG 5901, ELG 5902, and GNG 5902 cannot be combined for units.

### **DTI 5990 Études dirigées / Directed Readings I (1.5 crédit / 1.5 unit)**

**Volet / Course Component:** Recherche / Research

### **DTI 5991 Études dirigées / Directed Readings II (1.5 crédit / 1.5 unit)**

**Volet / Course Component:** Recherche / Research

### **DTI 6102 User Experience Principles and Practices (1.5 unit)**

User experience (UX) facets including functionality, usability and desirability as key success factors for technology adoption and acceptance; Human-computer interaction (HCI) theories; UX frameworks and patterns for interaction design, information design, and visual design; UX management best practices; UX design methods and tools; UX evaluation and usability engineering.

**Course Component:** Lecture

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

### **DTI 6103 User Research (1.5 unit)**

Understanding users' behaviours, needs, motivations and challenges in user experience (UX); Common 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, and moderated vs automated approaches; heuristic evaluations and usability testing.

**Course Component:** Lecture

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

### **DTI 6104 Interaction Design (1.5 unit)**

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.

**Course Component:** Lecture

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

### **DTI 6105 Design Thinking (1.5 unit)**

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

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

**DTI 6130 Web Services (1.5 unit)**

Web services business models and strategies. Enterprise Application Integration and Service Oriented Architectures. Web services technology standards. Consumer and enterprise adoption of web service technologies and platforms such as Mashups and Cloud Computing.

**Course Component:** Lecture

**DTI 6160 Cyber Security Systems and Strategies (3 units)**

User, data and network security principles. Information systems security standards. Security risk analysis frameworks. Overview of cyber security mechanisms including authentication, access control, data encryption and integrity, and Public Key Infrastructure. Cyber security including security in the wireless, cloud and IoT environments. Payment card industry security standards and compliance.

**Course Component:** Lecture

The courses DTI 6160, MIA 6160 cannot be combined for units.

**DTI 6180 Strategic Knowledge Management (1.5 unit)**

Leveraging a firm's intellectual capital to enhance organizational performance. Business analysis frameworks, strategy roadmaps and enterprise architectures relevant to the planning and execution of knowledge management initiatives in organizations. Using the web to maximize knowledge acquisition and sharing among employees.

**Course Component:** Lecture

The courses DTI 6180, MIA 6180 cannot be combined for units.

**DTI 6210 Electronic Commerce Architecture (1.5 unit)**

Three-tier Architecture. Building an e-Commerce Site. Client and Server side Scripting. Interactivity. E-Commerce Data bases. E-CRM. Wireless Internet and m-Business. Intermediaries and Software Agents. XML applications.

**Course Component:** Lecture

**DTI 6220 Data Analytics and Business Intelligence (1.5 unit)**

Introduction to business data collection, data pre-processing, data warehouses, data marts, and online analytical processing. Data mining tasks including classification, clustering and association rules. Data mining model building, tools and techniques including decision trees, neural networks, and regression analysis. Application of these techniques in business including CRM, target marketing, credit scoring, churn, survival analysis, and fraud detection.

**Course Component:** Lecture

**DTI 6230 Business Process Management and Performance Measurement (3 units)**

Hands on introduction to Business Process Management Technologies. Review of the latest concepts for using technology to improve performance of business processes. Analysis of advances in Internet-enabled B2B and enterprise business models with emphasis on service-oriented and event-driven architecture. Introduction to current performance measurement tools and the role of data science in business process management. Example applications such as supply chain management, order processing, and health care process management will be studied.

**Course Component:** Laboratory, Lecture

**DTI 6240 Mobile Commerce (1.5 unit)**

M-Commerce business models and strategies, Wireless technology standards and evolution. Industry analysis and value creation frameworks. Diffusion and adoption of M-Commerce technologies. Demand-side and supply-side enterprise applications of M-Commerce.

**Course Component:** Lecture

**DTI 6250 Document Engineering for Digital Transf. and Innovation (1.5 unit)**

Digital Transf. and Innovation from a Document Engineering Perspective. E-documents as the basis for DTI relationships. Modelling DTI documents and Processes. XML as a vehicle to defining a formal structural and semantic definition for electronic documents. XML syntax, styles and transformations, Document Type Definitions, and schema languages. XML Vocabularies for DTI. XML standards, specifications, and software architectures for DTI. E-documents within the enterprise. E-document exchanges for multi-company business activities.

**Course Component:** Lecture

**DTI 6260 Integrated Networks for the Enterprise (1.5 unit)**

OSI reference model. LAN characteristics. Interconnecting LAN. Interconnecting with TCP/IP. Routing protocols. IPv6. WAN options. Security protocols. VPN. Enterprise-Wide Solutions.

**Course Component:** Lecture

**DTI 6287 Business Intelligence Technologies & Big Data Analytics (1.5 unit)**

Business Intelligence (BI) as a concept; review of major BI tools and methods; identification of the right types of BI for different types of decision making environments; introduction to Big Data; business applications of Big Data; review of the supporting technologies such as data bases and data warehouses and Big Data Platforms for integrating structured and unstructured data including Hadoop, sandbox analytics; Streaming Analytics, and advances in data warehousing appliances that accelerate analytics.

**Course Component:** Lecture

Courses DTI 6287, ADM 6287 and ADM 6275 cannot be combined for units.

**DTI 6300 Topics in Digital Transformation and Innovation (3 units)**

Recent and advanced topics in the field of Digital Transformation and Innovation and its related areas. Topics vary from year to year.

**Course Component:** Lecture

**DTI 6301 Topics in Digital Transformation and Innovation (1.5 unit)**

Recent and advanced topics in the field of Digital Transformation and Innovation and its related areas. Topics vary from year to year.

**Course Component:** Lecture

**DTI 6302 Topics in Applied Data Science (3 units)**

Recent and advanced topics in the field of Applied Data Science and its related areas. Topics vary from year to year.

**Course Component:** Lecture

**DTI 6303 Topics in Applied Data Science (1.5 unit)**

Recent and advanced topics in the field of Applied Data Science and its related areas. Topics vary from year to year.

**Course Component:** Lecture

**DTI 6304 Topics in User Experience Design (3 units)**

Recent and advanced topics in the field of User Experience Design and its related areas. Topics vary from year to year.

**Course Component:** Lecture

**DTI 6305 Topics in User Experience Design (1.5 unit)**

Recent and advanced topics in the field of User Experience Design and its related areas. Topics vary from year to year.

**Course Component:** Lecture

**DTI 6402 Affective and Persuasive Computing (3 units)**

Overview of human affective models and affect modalities. Design and development of affect estimation algorithms using artificial intelligence. Modality fusion and multimodal affect estimation. Persuasive technology and its applications. Persuasion design and persuasive strategies. Application of persuasive strategies in serious gaming. Current challenges in the fields of affective computing and persuasive technology.

**Course Component:** Lecture

**DTI 6700 Thèmes choisis en affaires électroniques (3 crédits)**

Sujets actuels et avancés en affaires électroniques et disciplines connexes. Les sujets varient d'une année à l'autre.

**Volet :** Cours magistral

**DTI 6701 Thèmes choisis en affaires électroniques (3 crédits)**

Sujets actuels et avancés en affaires électroniques et disciplines connexes. Les sujets varient d'une année à l'autre.

**Volet :** Cours magistral

**DTI 6900 Stage international / International Work Term (3 crédits / 3 units)**

Expérience pratique dans un milieu de travail international. Noté S (satisfaisant) / NS (non satisfaisant) selon les résultats de rapport écrit et l'évaluation de l'employeur. / Practical international experience.

**Volet / Course Component:** Cours magistral / Lecture

**DTI 6950 Lectures dirigées / Directed Readings (1.5 crédit / 1.5 unit)**

**Volet / Course Component:** Cours magistral / Lecture

**DTI 6997 Projet de recherche / Research project (6 crédits / 6 units)**

Le sujet de recherche, ainsi que le professeur qui va le diriger, doivent être approuvés par la direction du programme avant l'inscription à la troisième session. Le sujet peut être de nature théorique (par exemple, une évaluation de la documentation ou une étude de la littérature scientifique) ou appliquée (par exemple, des études de cas). Un mémoire, d'une cinquantaine de pages, doit être rédigé et approuvé par le professeur qui le dirige ainsi qu'un autre professeur. / The research topic and the professor who will direct it must be approved by the program director prior to registration in the third session. The topic can be theoretical (for instance, based on a documentation assessment or a review of the scientific literature) or applied (based on case studies). A research paper, about 50 pages long, must be written and approved by the project director and another professor.

**Volet / Course Component:** Recherche / Research

**DTI 7100 Research Methods in Digital Transf. and Innovation (3 units)**

Philosophy of Science. Research problem definition. Research Designs. Experimental Research. Modeling principles: analytical modeling and simulation. Measurement and scaling. Sampling. Hypotheses testing and statistical significance. Multivariate Analysis. Mathematical properties of computational problems: decidability and computability. Qualitative methods. Writing a Research Manuscript. Presentation of research results.

**Course Component:** Lecture

**DTI 7101 Research Workshop in Digital Transf. and Innovation (1.5 unit)**

Writing a Research Project proposal including problem formulation and work plan. Essentials of graduate report writing, information management, literature search techniques and reference management. Research ethics including academic integrity and avoiding academic fraud.

**Course Component:** Lecture

**DTI 7102 Interdisciplinary Research Methods in Digital Transf. and Innovation (1.5 unit)**

Writing a Thesis Proposal. Research design. Introduction to positivist and interpretive approaches, behavioral and design science research, qualitative and quantitative research methods, and sampling strategies and techniques.

**Course Component:** Lecture

**DTI 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

The courses DTI 7103, DTO 7103 cannot be combined for units.

**DTI 7990 Proposition de thèse / Thesis Proposal**

**Volet / Course Component:** Recherche / Research

**DTI 8101 Interdisciplinary Doctoral Seminar in Digital Transformation and Innovation I (3 units)**

Recent developments in Digital Transformation and Innovation research. Critical analysis of theories, models, and methods. Critical synthesis of the field literature from different perspectives. Students will write a systematic survey paper of the literature relevant to their research in one of the three fields of the program. The paper must be in a different field from that selected for the paper in DTI 8102. Course reserved for students in the Digital Transformation and Innovation PhD program.

**Course Component:** Seminar

**DTI 8102 Interdisciplinary Doctoral Seminar in Digital Transformation and Innovation II (3 units)**

Recent developments in Digital Transformation and Innovation research. Critical analysis of theories, models, and methods. Critical synthesis of the field literature from different perspectives. Students will write a systematic survey paper of the literature relevant to their research in one of the three fields of the program. The paper must be in a different field from that selected for the paper in DTI 8101. Course reserved for students in the Digital Transformation and Innovation PhD program.

**Course Component:** Seminar

**DTI 9997 Projet de thèse doctoral / Doctorate Thesis Proposal**

**Volet / Course Component:** Recherche / Research

**DTI 9998 Examen général de doctorat / Comprehensive Exam**

**Volet / Course Component:** Recherche / Research