

# INNOVATION ET TRANSFORMATION NUMÉRIQUE (DTI)

## Les cours en innovation et transformation numérique (DTI) sont offerts par la Faculté de génie

### 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 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 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 crédits / 1.5 units)

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

### DTI 5991 Études dirigées / Directed Readings II (1.5 crédits / 1.5 units)

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

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

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 units)**

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 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.

**Course Component:** Lecture

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

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

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 and DTO 6107 cannot be combined for units.

### **DTI 6130 Cloud Services Architecture (1.5 units)**

Evolution of Web and Cloud Services Architecture (SOA, WOA, REST, microservices). API Economy and Business Models. Core web service infrastructure components (compute, network, databases, and storage). Cloud resource and policy management tools. Cloud services adoption frameworks and maturity models. Cloud services technology and management best practices.

**Course Component:** Lecture

### **DTI 6160 Cyber Security Strategy, Architecture and Governance (3 units)**

Cyber security planning principles, processes and practices. Cyber security program and risk frameworks. Threat actor profiles and motivations. Cyber risk assessment. Technical, managerial and human behavioural factors in cyber security. Security architecture and controls. Cyber threat intelligence. Case studies in cyber security crisis management.

**Course Component:** Lecture

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

### **DTI 6220 Data Analytics and Business Intelligence (1.5 units)**

Role of data analytics and business intelligence in driving business decision-making. Topics include techniques for data collection and preprocessing, understanding data warehousing and storage solutions such as data marts, data lakes, and ETL processes. Emphasis on exploratory data analysis and visualization using tools like Tableau and Power BI, with applications in creating interactive dashboards and conducting descriptive statistics. Predictive and descriptive modeling techniques, including linear regression, decision trees, and clustering, are introduced using Weka or other no-code/low-code tools. Applications focus on business use cases such as forecasting, customer segmentation, sales prediction, and CRM insights, including churn prediction.

**Course Component:** Lecture

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

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 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 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 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 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 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 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 crédits / 1.5 units)**

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

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 units)**

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, and interaction design theories and principles as they relate to User Experience Design (UXD). A series of 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