



BUSI – 4331 A Industry 4.0 Technologies and Applications

Fall 2026

Instructor	Kimia Ramezani
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Class Times	Tuesdays, 08:35 - 11:25
Modality	In-person
Office Hours	Tuesdays, 12:30 pm to 14:00 pm
Office Location	Nicol Building-7 th floor
TA Name/Email	TBD

Pre-Requisites & Preclusions:

Precludes additional credit for BUSI 4431 (no longer offered)
 Prerequisite(s): third year standing, and BUSI 2301 (with a grade of C or higher).
 Lecture three hours a week.

Course Description/Instructor's Statement

Carleton Calendar Description

Carleton Calendar Description (Find at <https://calendar.carleton.ca/undergrad/courses/BUSI/>)
 Concepts, models, and managerial issues in planning, designing, operating and controlling systems across supply chains for the provision of goods and services. Emphasis on basic ideas and tools.

Instructor's Course Description:

This course introduces students to the concepts, technologies, and business applications of **Industry 4.0** and the **Industrial Internet of Things (IIoT)**. Students will explore how emerging technologies such as Internet of Things (IoT), cyber-physical systems, cloud computing, big data analytics, artificial intelligence, machine learning, and smart manufacturing are transforming industrial operations and business models. This course shows how Industry 4.0 employs the IoT and AI technologies to achieve self-thinking supply chains. It demonstrates the use of Industry 4.0 in the transformation to smart industries. Lectures, demonstrations and hands-on exercises allow students to design, deploy and manage custom IoT solutions.

Course Learning Objectives:

1. Explain the fundamental concepts of Industry 4.0 and the Industrial Internet of Things (IIoT).
2. Analyze how Industry 4.0 technologies improve manufacturing, supply chain management

3. Evaluate digital transformation strategies and business models that support the adoption of Industry 4.0 technologies in organizations.
4. Identify the opportunities, challenges, and risks associated with Industry 4.0 implementation
5. Interpret industrial data and analytical results
6. Communicate Industry 4.0 concepts and digital transformation recommendations effectively through professional reports and presentations.
7. Develop industry 4 solution for a simulated problem

Required/Optional Materials & Prices

Text book:

Title: Introduction to Industrial Internet of Things and Industry 4.0

Author: Sudip Misra, Chandana Roy, Anandarup Mukherjee

Publisher: CRC Press

Edition: 1st

ISBN: 9781003020905

This book will be available at Carleton bookstore.

Grading Scheme

Three case studies	30%
One assignment	20%
Final Proposal presentation	20%
Final Group Project	30%
TOTAL	100%

University Academic Calendar: <https://calendar.carleton.ca/academicyear/>

Policies & Accommodations

<https://students.carleton.ca/course-outline/>

<https://carleton.ca/pmc/current-students/academic-accommodations/>



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Methods of Evaluation / Grading Scheme

1. Case studies (3 * 10% = 30%)

The objective of the class activities is to encourage students to improve their critical thinking and analytical skills. At the end of the class, you will have time to analyze the case study and upload it in Brightspace. This case study is individual and cannot be done in groups. These sessions are totally in-person and the absence students will lose

their mark.

2. Assignment (1*20% = 20%)

This assignment should be done in group 2 or 3. All details will be available in the assignment rubric.

3. Final project and proposal (30%+20% = 50%)

All students should do a final project and upload it by the deadline. This project is not individually and can be done in group 2 or 3. Each group should prepare a proposal of their project and present it in the last session of the class. All details will be available in the project rubric.

4. Bonus (10%)

Students are not obligated to participate in the class except for class with case studies. However, at the end of each session, a class activity will be done and uploaded to the Brightspace. The objective of the class activities is to encourage studying the course material on a regular basis. The students who attend the class and do their class activity inside the class will receive bonus. This class activity should be done in group 2 or 3. The group should be the same as the group for final project.

5. The entire textbook should be read by students

Use of Generative Artificial Intelligence

You are free to use any Generative AI Tool for your final projects and assignment but not for case studies. However, you bear responsibility for all your submissions. If you use GenAI for class assignments (class activities and case studies) you will lose the grade. Since Generative AI tools may plagiarize from other sources on the web, you should be extremely careful while using them. They are also prone to producing incorrect information with exaggerated confidence. All prior work should be rigorously cited, and any plagiarism will be considered an academic offence. Moreover, the way to use AI has separate grades which will be explained in the rubric completely.

Preparation and Participation:

This course is delivered in person and requires students to actively engage during lectures, group discussions, and case-based activities. Students are expected to come to each class well prepared. Active participation includes contributing thoughtfully to class discussions, engaging in problem-solving exercises, working collaboratively during group tasks, and asking relevant questions that deepen understanding.

Course Schedule

Week #	Week of	Topic
1	16 Sep	Overview of IoT
2	22 Sep	Overview of Industry 4.0 & IIoT
3	29 Sep	Industry 4.0: Basics
4	6 Oct	IIoT: Basics

5	13 Oct	Business Models & Reference Architecture
6	20 Oct	Key Technologies I
7	27 Oct	Fall Break – No Class
8	3 Nov	Sensors and Actuators
9	10 Nov	Industrial Data Pipeline
10	17 Nov	Analytics, ML & Data Science
11	24 Nov	Plant safety and security
12	1 Dec	Software Workshop
13	8 Dec	Proposal Presentations

Late Assignments:

The deadlines for assignments and projects will be strictly enforced, and no late submissions of In class assignments and projects will be accepted by default. If you need an exception for this, email the instructor at least 24 hours before the deadline. Note that more than one exception will not be made for the same student under any circumstances. This policy accommodates unexpected circumstances such as technical and personal issues; therefore, no additional extensions will be granted (excepting accommodations provided by university policy).

Contribution to Learning Goals of the Program (BCom, BIB):

Program Learning Goal	Competencies Not Covered	Competencies Introduced (only)	Competencies Taught But Not Assessed	Competencies Taught and Assessed
BC1 Knowledge <i>Graduates will be skilled in applying foundational business knowledge to appropriate business contexts.</i>		x		
BC2 Collaboration <i>Graduates will be collaborative and effective</i>			x	

<i>contributors in team environments that respect the experience, expertise and interest of all members.</i>				
BC3 Critical Thinking <i>Graduates will be discerning critical thinkers, able to discuss different viewpoints, challenge biases and assumptions, and draw conclusions based on analysis and evaluation.</i>			X	
BC4 Communication <i>Graduates will be effective and persuasive in their communications.</i>			X	
BI5 Global Awareness (BIB ONLY) <i>Graduates will be globally-minded.</i>			X	

ADDITIONAL INFORMATION

Course Sharing Websites

Materials created for this course (including presentations and posted notes, labs, case studies, assignments, and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

Recommended Calculator for Examinations

If you are purchasing a calculator, we recommend anyone of the following options: Texas Instruments BA II Plus (including Pro Model), Hewlett Packard HP 12C (including Platinum model), Staples Financial Calculator, Sharp EL-738C & Hewlett Packard HP 10bII

Group work

The Sprott School of Business encourages group assignments in the school for several reasons. They provide you with opportunities to develop and enhance interpersonal, communication, leadership, followership, and other group skills. Group assignments are also good for learning integrative skills for putting together a complex task. Your professor may assign one or more group tasks/assignments/projects in this course. Before embarking on a specific problem as a group, it is your responsibility to ensure that the problem is meant to be a group assignment and not an individual one.

Grading

In accordance with the Carleton University Undergraduate Calendar (p 34), the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A - = 80-84	B - = 70-72	C - = 60-62	D - = 50-52
F = Below 50			

Grades entered by Registrar:

WDN = Withdrawn from the course

DEF = Deferred

Academic Regulations

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here:

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

Requests for Academic Accommodation

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the *Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances*, are outlined on the Academic Accommodations website (students.carleton.ca/course-outline).

Pregnancy Accommodation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [pregnancy academic accommodation process](#).

Religious obligation

Please contact your instructor with any requests for academic accommodation during the first

two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [religious academic accommodation process](#).

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the [Paul Menton Centre website](#).

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the [Equity and Inclusive Communities website](#).

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities \(PDF, 25 KB\)](#).

Academic Consideration for Medical and Other Extenuating Circumstances

Due to medical and other extenuating circumstances, students may occasionally be unable to fulfil the academic requirements of their course(s) in a timely manner. The university supports the academic development of students and aims to provide a fair environment for students to succeed academically. Medical and/or other extenuating circumstances are circumstances that are beyond a student's control, have a significant impact on the student's capacity to meet their academic obligations, and could not have reasonably been prevented. Students may request Academic Consideration for Coursework or Other Academic Deliverable. For further information please review the [Procedure for Academic Consideration](#) and the [FAQ page](#).

Scheduling and Examination Support

Scheduling and Examination Services provides various supports for both in-term and end-of-term tests and exams. Details can be found on the [Exam Support website](#).

Academic Integrity

Violations of academic integrity are a serious academic offence. Violations of academic integrity – presenting another's ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the degree and will not be tolerated.

Process: If an alleged violation occurs, all relevant documentation will be forwarded to the Dean. If the allegation proves true, the penalties may include; a grade of Failure on the submitted work and/or course; academic probation; a refusal of permission to continue or to register in a specific degree program; suspension from full-time studies; suspension from all studies at Carleton; expulsion from Carleton, amongst others. **For a first offence, at a minimum, the penalty assigned will normally be a zero on the submitted work and at least a minimum full grade reduction of the final course grade. For a second offence, at a minimum, the penalty assigned will normally lead to a suspension from studies.**

Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy which is available, along with resources for compliance at: <https://carleton.ca/registrar/academic-integrity/>.

Sprott Student Services

The Sprott Undergraduate Student Services Office offers program advising and overall student success support. Our team is available to discuss your academic goals and your program progression plans. We can also work with you to develop strategies for success, including study skills for Business. If you experience any difficulty this term or if you would like to access support, please contact our team at academicadvising@sprott.carleton.ca.

Centre for Student Academic Support

The Centre for Student Academic Support (CSAS) is a centralized collection of learning support services designed to help students achieve their goals and improve their learning both inside and outside the classroom. CSAS offers academic assistance with course content, academic writing and skills development. Visit CSAS on the 4th floor of MacOdrum Library or online at: carleton.ca/csas.

Important Information:

- Students must always retain a copy of all work that is submitted.
 - All final grades are subject to the Dean's approval.
 - For us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid CARLETON address. Therefore, in order to respond to your inquiries, please send all email from your Carleton CMail account. If you do not have or have yet to activate this account, you may wish to do so by visiting <https://carleton.ca/its/get-started/new-students-2/>
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