

RYERSON UNIVERSITY

Ted Rogers School of Information Technology Management and G. Raymond Chang School of Continuing Education

COURSE OF STUDY 2017-2018

(C)ITM 711 – Cloud Computing

1.0 PREREQUISITE

The prerequisite for this course is ITM 301. Students who do not have the prerequisite will be dropped from the course.

2.0 INSTRUCTOR INFORMATION

- Name:
- Office Phone Number:
- E-mail address:
- Faculty/course web site(s): <https://my.ryerson.ca>
- Office Location & Consultation hours:
 - Your instructor is available for personal consultation during scheduled consultation hours which are posted on their office door or on the course shell in D2L Brightspace. However, you are advised to make an appointment by e-mail or by telephone before coming to ensure that the professor is not unavoidably absent.
- E-mail Usage & Limits:

Students are expected to monitor and retrieve messages and information issued to them by the University via Ryerson online systems on a frequent and consistent basis. ***Ryerson requires that any official or formal electronic communications from students be sent from their official Ryerson E-mail account.*** As such emails from other addresses may not be responded to.

3.0 CALENDAR COURSE DESCRIPTION

This course will provide a comprehensive coverage on the concepts, architectures and technologies of cloud computing from a business perspective. It provides a deep-down analysis of architectures and mechanisms that capture the real-world of cloud platforms. It dives into all of the details that organizations need to know in order to plan for developing applications on cloud and what to look for when using applications or services hosted on a cloud.

4.0 COURSE OVERVIEW

The objective of this course is to provide students with an opportunity to keep abreast of new topics of importance as they emerge in the field. Topics will vary from year to year and will be announced. Method of instruction will vary depending upon the topics offered. This course will provide a comprehensive coverage on the concepts, architectures, and technologies of cloud computing and its business perspective. It provides a deep-down analysis of architectures, mechanisms that capture the real-world cloud platforms. It dives into all of the details that an organization need to know in order to plan for developing applications on cloud and what to look for when using applications or services hosted on a cloud. It also prepares the students for organizational roles that require interaction with external vendors of cloud services.

5.0 COURSE OBJECTIVES

Upon completion of the course, students will be able to:

- Articulate the key concepts, technologies, strengths, and limitations of cloud computing.
- Explain the benefits, risks and challenges of using cloud services as an IT strategy.
- Characterize different cloud computing models, and describe different architecture models of cloud computing.
- Analyze and evaluate cloud computing solutions and recommend an appropriate solution according to the applications used.
- Explain the realization mechanism of cloud technologies

6.0 EVALUATION

The grade for this course is composed of the mark received for each of the following components:

Evaluation Component	Percentage of the Final Grade
Labs and Assignments	30%
Midterm Examination	25%
Final Examination	45%
Total	100%

NOTE: Students must achieve a course grade of at least 50% to pass this course.

Citation Format for Essays and Term Papers

All essay assignments, term paper and other written works must adhere with APA citation format. Technical errors (spelling, punctuation, proofing, grammar, format, and citations) and/or inappropriate levels of language or composition will result in marks being deducted. You are encouraged to obtain assistance from the Writing Centre (www.ryerson.ca/writingcentre) for help with your written communications as needed.

You can find APA guidelines and academic referencing from the following online resources:

a) Ryerson Writing Support Web site:

<http://www.ryerson.ca/content/dam/studentlearningsupport/resources/citation-conventions/APA%20Basic%20Style%20Guide.pdf>

b) Ryerson Library for APA style guide: <https://library.ryerson.ca/guides/style/>

7.0 POSTING OF GRADES

- ❖ All grades, on assignments or tests must be posted or made available to students through the return of their work. Grades on final exams must be posted. However, as there may be other consideration in the determination of final grades, students will receive their official final grade in the course only from the Registrar. Final official course grades may not be posted or disclosed anywhere by an instructor.
- ❖ Posting of grades on the Course Management System (D2L Brightspace) is preferred. If grades are posted in hard copy they must be posted numerically sorted by student identification number after at least the **first four digits** have been removed. Instructors must inform students in all course management documentation of the method to be used in the posting of grades. Students who wish not to have their grades posted must inform the instructor in writing.
- ❖ Some graded work will be returned to students prior to the last date to drop a course without academic penalty.

8.0 TOPICS – SEQUENCE & SCHEDULE

Session	Topic	Learning Outcomes	Readings	Activities & Due Dates
1	Introduction to Cloud Computing - Basic concepts, goals and benefits, risk and challenges	- Understand virtualization - Describe the advantages and disadvantages of cloud computing -Realize threats on data hosted on cloud	Chapters 2, 3 Lecture notes	Vendor products, services and technologies
2	Fundamental Models – Delivery models, deployment models	- Understand the architectures of delivery models Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) - Differentiate between Public cloud, Community cloud, Private cloud and Hybrid cloud	Chapters 4, 14 Lecture notes	Case Study:# 1, #2, #3
3	Working with Clouds (Cost and Pricing) – Business cost, usage cost, cost management	- Distinguish cost model, upfront cost and recurring cost - Logging usage of cloud resources - Understand bill management	Chapters 14, 15 Lecture notes	Lab exercise: Assignment 1
4	Cloud Service Quality Metrics and SLA – Availability, reliability, performance, scalability, resilience	- Identify and describe the parameters for quality of service (QoS) -Optimize QoS	Chapter 16 Lecture notes	Lab exercise
5	Cloud-Enabling Technologies – Data center technology, virtualization technology	- Distinguish types of hypervisors for virtualization - Understand Data Center Technology- self-configuration,	Chapter 5 Lecture notes	Lab exercise

		recovery, Remote Operation, Management and High Availability - Describe Multitenant Technology - Describe Service Technology		
6	Cloud Infrastructure Mechanisms – Logical network, virtual server, cloud storage	-Understand storage array and hot-swapping -Describe storage virtualization, fast data replication, SAN and NAS -Explore preconfigured virtual server, on-demand virtual server	Chapter 7 Lecture notes	Assignment 2
7	Cloud Infrastructure Mechanisms – Distributed architecture, resource management, load balancing, redundancy, failure recovery, Midterm Examination	- Describes cloud architectural models - Understand workload - Distribution Architecture - Understand Resource Pooling Architecture -Describe Scalability Architecture -Explain Elastic Resource -Understand Load Balancing Architecture -Explore Redundant Storage Technology -Describe Recovery Technology	Chapters 11, 12 Lecture notes	Lab exercise
8	Cloud Management Mechanisms – Resource, SLA and billing management systems	-Benefits of Remote Administration -Describe Resource Management mechanism -Understand SLA Management mechanism Understand Billing Management	Chapter 9 Lecture notes	Lab exercise
9	Cloud Security Mechanisms – Cloud-based security, hardened virtual server, secure communication channel	-Distinguish between Encryption, Hashing, and Digital Signature - Select appropriate security measure based on scenario -Differentiate between private key encryption and public key encryption	Chapter 10 Lecture notes	Assignment 3
10	Specialized Cloud Architecture – Direct I/O and LUN access, cross-storage and intra-storage device, multipath resource access	-Describe data access technology from storage -Understand the advantage and disadvantage of different data access technology	Chapters 14, 15 Lecture notes	Lab exercise
11	Cloud Monitor Mechanisms – SLA monitor,	-Comprehend Service Level Agreement	Chapter 8 Lecture notes	Assignment 4

	pay—per-use monitor, audit monitor	-Understand monitoring techniques		
12	Case study #1, #2, #3 conclusions	Reflect acquired knowledge to analyze case studies	Appendix	12

9.0 TEACHING METHODS

The pedagogical approach for this course is Outcomes Based Action Learning. The course will incorporate the following teaching/learning methods: Lectures, readings, case study analysis, labs exercises, lab assignments and discussions are the primary teaching methods in this course. Students are expected to have studied the assigned readings and completed any online or written pre-class assignments or quizzes prior to attending the lectures. The lectures will review and expand the textual material and provide students with the professor's commentary, examples, and illustration. The case studies will be used to link theoretical Cloud Computing concepts to practice in a business context. The in-class activities and problem sets will be used to allow the students to use their understanding of the material to develop Cloud solutions. The group assignment and regular status update meetings with the Professor will enable students to develop their "soft skills". Each student is expected to contribute to the active learning environment through in-class and/or online discussions and will be grade accordingly.

10.0 TEXTS & OTHER READING MATERIALS

Title: Cloud Computing: Concepts, Technology & Architecture (1st Edition)

Author: Thomas Erl , Ricardo Puttini, Zaigham Mahmood

Publisher: Prentice Hall

ISBN: 978-0133387520

Suggested/Recommended Textbook

Title: Cloud Computing Explained: Implementation Handbook for Enterprises (2nd Edition)

Author: John Rhoton

Publisher: Recursive Press

ISBN: 978-0956355607

11.0 VARIATIONS WITHIN A COURSE

All sections of a course (Day and CE sections) will follow the same course outline and will use the same course delivery methods, methods of evaluation, and grading schemes. Any deviations will be posted on D2L Brightspace once approved by the course coordinator.

12.0 OTHER COURSE, DEPARTMENTAL, AND UNIVERSITY POLICIES

- For more information regarding course management and departmental policies, please consult the ‘**Appendix of the Course of Study**’ which is posted on the Ted Rogers School of Information Technology Management website, <http://www.ryerson.ca/content/dam/itm/documents/cos/Appendix.pdf>. This appendix covers the following topics:
 - 12..1 Attendance & Class Participation
 - 12..2 Email Usage
 - 12..3 Request for Academic Consideration
 - 12..3.1 Ryerson Health Certificate
 - 12..3.2 Academic Accommodation for Students with Disabilities

- 12..3.3 Religious, Aboriginal or Spiritual Observance
 - 12..3.4 Re-grading and Recalculation
 - 12..4 Examinations & Tests
 - 12..4.1 Period of Prohibition from Testing
 - 12..4.2 Make-Up of Mid-Term Tests, Assignments and Other Assessments
 - During the Semester
 - 12..4.3 Make –Up of Final Exams
 - 12..4.4 Missing a Make-Up
 - 12..5 Late Assignments
 - 12..6 Standard of Written Work
 - 12..7 Academic Grading Policy
 - 12..8 Academic Integrity
 - 12..8.1 Turnitin.com
 - 12..9 Student Rights