Course Outline

School:	Eng. Tech. & Applied Science
Department:	Information and Communication Engineering Technology (ICET)
Course Title:	API Engineering and Cloud Computing
Course Code:	COMP 306
Course Hours/Credits:	56
Prerequisites:	COMP 212
Co-requisites:	N/A
Eligible for Prior Learning, Assessment and Recognition:	Yes
Originated by:	Ilia Nika
Creation Date:	Fall 2015
Revision Date:	Summer 2018
Current Semester:	Fall 2018
Approved by:	ppesikan c/o

Chairperson/Dean

Students are expected to review and understand all areas of the course outline.

Retain this course outline for future transfer credit applications. A fee may be charged for additional copies.

This course outline is available in alternative formats upon request.

Acknowledgement of Traditional Lands

Centennial is proud to be a part of a rich history of education in this province and in this city. We acknowledge that we are on the treaty lands and territory of the Mississaugas of the Credit First Nation and pay tribute to their legacy and the legacy of all First Peoples of Canada, as we strengthen ties with the communities we serve and build the future through learning and through our graduates. Today the traditional meeting place of Toronto is still home to many Indigenous People from across Turtle Island and we are grateful to have the opportunity to work in the communities that have grown in the treaty lands of the Mississaugas. We acknowledge that we are all treaty people and accept our responsibility to honor all our relations.

Course Description

Building on .NET programming and database courses, this course expose the students to the cloud computing technologies, RESTful API and Serverless technologies. Coursework will emphasize on how to create/package/run scalable application on PaaS, how to develop/deploy/manage/consume/manage RESTful APIs, and how to build Serverless applications. Students will also explore some components of specific cloud platforms, such as Compute Engine, Cloud storage, API management tool etc.

Program Outcomes

Successful completion of this and other courses in the program culminates in the achievement of the Vocational Learning Outcomes (program outcomes) set by the Ministry of Advanced Education and Skills Development in the Program Standard. The VLOs express the learning a student must reliably demonstrate before graduation. To ensure a meaningful learning experience and to better understand how this course and program prepare graduates for success, students are encouraged to review the Program Standard by visiting http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/. For apprenticeship-based programs, visit http://www.collegeoftrades.ca/training-standards.

Course Learning Outcomes

The student will reliably demonstrate the ability to:

1. Have a comprehensive understanding of cloud computing concepts and architecture
2. Describe the characteristics of different data storage in the cloud
3. Select appropriate cloud storage to meet client's requirements
4. Implement C# application to manage the data stored in the cloud
5. Explain the key components of service level agreement,such as availability, scalability
6. Implement/publish C# Web application in the cloud
7. Have solid understanding of RESTful API
8. Implement/publish RESTful API using C#
9. Use API management platform to manage/monitor RESTful API
10. Implement C# application to consume RESTful API
11. Have a solid understanding of Serverless architecture
12. Implement Serverless application

Essential Employability Skills (EES)

The student will reliably demonstrate the ability to*:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.
6. Locate, select, organize, and document information using appropriate technology and information systems.
7. Analyze, evaluate, and apply relevant information from a variety of sources.
8. Show respect for diverse opinions, values belief systems, and contributions of others.
9. Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
10. Manage the use of time and other resources to complete projects.
11. Take responsibility for one's own actions, decisions, and consequences.

**There are 11 Essential Employability Skills outcomes as per the Ministry Program Standard. Of these 11 outcomes, the following will be assessed in this course.*

Global Citizenship and Equity (GC&E) Outcomes

The student will reliably demonstrate the ability to*:

1. Identify one's roles and responsibilities as a global citizen in personal and professional life.
2. Identify beliefs, values and behaviours that form individual and community identities and the basis for respectful relationships.
4. Analyze the use of the world's resources to achieve sustainability and equitable distribution at the personal, professional, and global level.
6. Support personal and social responsibility initiatives at the local, national or global level.

**There are 6 institutional Global Citizenship & Equity outcomes. Of these 6 outcomes, the following will be assessed in this course.*

Methods of Instruction

The course material is imparted in a lecture-lab format. The lectures are interactive, Lecture Materials and assignments will also be provided through the course’s eCentennial site.

Text and other Instructional/Learning Materials

Text Book(s):

1. Zaigham Mahmood, Thomas Erl, Ricardo Puttini, May 2013, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, ISBN: 9780133387568
Available at https://www.safaribooksonline.com/library/view/cloud-computing-concepts/9780133387568/

2. Vipul Tankariya & Bhavin Parmar, May 2017, AWS Certified Developer- Associate Guide,Packt publisher, ISBN: 978-1-78712-562-9
Available at https://drive.google.com/file/d/14eOnThM0-5dHdzcEKpp1cAqZax--wy-w/view

3. Yohan Wadia and Udita Gupta, August 2017, Mastering AWS Lambda, Packt publisher, ISBN: 978-1-78646-769-0
Available at https://drive.google.com/file/d/0B81TNkQfgbpERlBFdlNIT0ZxY00/view

Peter Sbarski, April 2017, Serverless Architectures on AWS With examples using AWS Lambda, Manning Publication Inc. ISBN: 9781617293825

Available at http://www.allitebooks.com/serverless-architectures-on-aws/

Online Resource(s):

Additional readings from handouts, Web sites such as https://aws.amazon.com/documentation/ and online research be assigned or recommended.

Material(s) required for completing this course:

1. Access to computers with proper software installed
2. Have an account of AWS platform

Custom Courseware:

Extensive lecture slides serve as course notes

Classroom and Equipment Requirements

A computer laboratory with proper hardware/software.

Evaluation Scheme

- Assignment 1: Be familiar with AWS platform
  Demonstrate solid understanding of difference between IaaS and PaaS
- Assignment 2: Implement C# application to manipulate the data stored in the cloud storage
- Assignment 3: Implement C# Web application and publish it to the cloud
- Test 1: Evaluate students' understanding of all contents that have been covered so far in this course
- Group project: 1. Project proposal 5%
  2. Implement/publish/manage/monitor RESTful API, implement a client to consume RESTful API 25%
  3. Presentation 10%
- Assignment 4: Implement Serverless application

Evaluation Name	CLO(s)	EES Outcome(s)	GCE Outcome(s)	Weight/100
Assignment 1	1, 2, 3	1, 5, 6, 7, 11	4, 6	10
Assignment 2	3, 4	4, 5, 6, 7, 11	1, 4, 6	10
Assignment 3	1, 3, 4, 6	4, 5, 6, 7, 11	1, 4, 6	10
Test 1	1, 2, 3, 5, 7	11	1	25
Group project	1, 3, 7, 8, 9, 10	1, 2, 4, 5, 6, 7, 8, 9, 10, 11	1, 2, 4, 6	30
Assignment 4	11, 12	4, 5, 6, 7, 11	1	15
Total				100%

If students are unable to write a test they should immediately contact their professor or program Chair for advice. In exceptional and well documented circumstances (e.g. unforeseen family problems, serious illness, or death of a close family member), students may be able to write a make-up test.

All submitted work may be reviewed for authenticity and originality utilizing Turnitin®. Students who do not wish to have their work submitted to Turnitin® must, by the end of the second week of class, communicate this in writing to the instructor and make mutually agreeable alternate arrangements.

When writing tests, students must be able to produce official College photo identification or they may be refused the right to take the test or test results will be void.

Student Accommodation

Students with permanent or temporary accommodations who require academic accommodations are encouraged to register with the Centre for Students with Disabilities (CSD) located at Ashtonbee (L1-04), Progress (C1-03), Morningside (Rm 190), and Story Arts Campus (Rm 284). Documentation outlining the functional limitations of a disability is required; however, interim accommodations pending receipt of documentation may be possible. This service is free and confidential. For more information, please email csd@centennialcollege.ca.

Use of Dictionaries

- Any dictionary (hard copy or electronic) may be used in regular class work.
- Dictionaries may be used in tests and examinations, or in portions of tests and examinations, as long as they are non-electronic (not capable of storing information) and hard copy (reviewed by the invigilator to ensure notes are not incorporated that would affect test or examination integrity).

Program or School Policies

N/A

Course Policies

N/A

College Policies

Students should familiarize themselves with all College Policies that cover academic matters and student conduct.

All students and employees have the right to study and work in an environment that is free from discrimination and harassment and promotes respect and equity. Centennial policies ensure all incidents of harassment, discrimination, bullying and violence will be addressed and responded to accordingly.

Academic honesty is integral to the learning process and a necessary ingredient of academic integrity. Academic dishonesty includes cheating, plagiarism, and impersonation. All of these occur when the work of others is presented by a student as their own and/or without citing sources of information. Breaches of academic honesty may result in a failing grade on the assignment/course, suspension or expulsion from the college.

For more information on these and other policies, please visit www.centennialcollege.ca/about-

centennial/college-overview/college-policies.

Students enrolled in a joint or collaborative program are subject to the partner institution's academic policies.

PLAR Process

This course is eligible for Prior Learning Assessment and Recognition (PLAR). PLAR is a process by which course credit may be granted for past learning acquired through work or other life experiences. The PLAR process involves completing an assessment (portfolio, test, assignment, etc.) that reliably demonstrates achievement of the course learning outcomes. Contact the academic school to obtain information on the PLAR process and the required assessment.

Topical Outline (subject to change):

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
1	Introducing Cloud Computing and AWS Platform	Online	. Explain cloud computing . Differentiate IaaS, PaaS, SaaS . Understand different types of cloud service: public cloud, private cloud & hybrid cloud . Understand the essence of cloud computing: elasticity, availability and scalability .Become familiar with different services provided by AWS .Understand EC2	Lecture Demonstration Lab Session	Assignment#1	
2-3	Storage	Online	. Understand and use Simple Storage Service(S3) .Understand Amazon Elastic File System (EFS) and Amazon Glacier .Understand and use Amazon RDS – Relational Database service . Understand and use Amazon DynamoDB, Amazon NoSql database service	Lecture Demonstration Lab Session	Assignment 2	
4-5	Build/Deploy/Publish Web Apps for AWS Elastic Beanstalk	Online	. Understand AWS Elastic Beanstalk architecture and different components . Be able to set up working environment . Implement/Deploy/Manage Web Apps	Lecture Demonstration Lab Session	Assignment 3	
6	Scalability & Availability	Lecture Handout	. Understand Service Level Agreement(SLA) . Understand availability models . Understand how load balancer works	Lecture Demonstration Lab Session		
7 - 8	ASP.NET Web API	Lecture Handout	. Understand REST (Representational State Transfer) . Understand REST architectural constraints . Understand ASP.NET Web API . Understand ASP.NET MVC . Implement RESTful API	Lecture Demonstration Lab Session	Test 1 Group Project	
9	Consume RESTful API	Online	. Implement app to consume RESTful API	Lecture Demonstration Lab Session		
10	API management Platform	Online	. Understand the full life cycle of RESTful API . Manage/monitor the usage of RESTful API by using Amazon API Gateway	Lecture Demonstration Lab Session		
11	MicroService	Lecture Handout	.State the features of Microservice .Indicate the difference between Microservice	Lecture Discuss		

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
			.Indicate the difference between Microservice and Monolithic framework	Discuss		
12	Lambda Functions	Online	. Understand AWS Lambda . Write/test Lambda functions	Lecture Demonstration Lab Session	Assignment 4	
13- 14	Event-Driven Model	Online	. Understand Event-driven architecture . Understand events and AWS Lambda . Become familiar with Lambda mapping with different events . Build and deploy Serverless applications with AWS Lambda	Lecture Demonstration Lab Session	Project presentation	