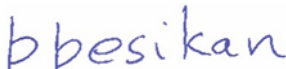# Course Outline

School:	Eng. Tech. & Applied Science
Department:	Information and Communication Engineering Technology (ICET)
Course Title:	Web Application Development
Course Code:	COMP 229
Course Hours/Credits:	56
Prerequisites:	COMP 123, COMP 125
Co-requisites:	N/A
Eligible for Prior Learning, Assessment and Recognition:	Yes
Originated by:	Joanne Filotti
Creation Date:	Fall 2005
Revised by:	Patrick GIgnac, Tom Tsiliopoulos
Revision Date:	Winter 2022
Current Semester:	Fall 2022
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

Web Application Development is the third course in a sequence of web courses, following COMP213 and COMP125. In this course, students will learn how to design, code, and test a full-stack web application.

The major topics covered in COMP229 include frontend and backend development, connecting to various databases or data stores to query or manipulate data and display the results in the browser, securing and deploying complex web applications on production servers.

Students will apply various open-source frontend and backend frameworks to build a web application and API.

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 Colleges and Universities 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. Examine the major features and required software configuration settings for a Web server and proxy server.
2. Implement server-side web application functionality and apply appropriate design patterns.
3. Design, create and configure web application projects.
4. Create and process data models, views, routes, templates and middleware.
5. Retrieve data from a database or data store and manipulate or display the information in Views
6. Secure and deploy a web 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.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.
7. Analyze, evaluate, and apply relevant information from a variety of sources.
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
N/A

Methods of Instruction
Lecture,

demonstrations and

hands-on exercises,

class discussions

Text and other Instructional/Learning Materials
Text Book(s):

Reference books

Amos Haviv, MEAN Web Development - Second Edition, Pact Publishing, ISBN 139781785886300,2016. Available on Safari IT Books online.

Lim, Greg. Beginning Angular with Typescript (updated to Angular 9). 2020

Lim, Greg. Beginning Node.js, Express & MongoDB Development. 2019.

Vasan Subramanian, Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Publisher: Apress, Release Date: May 2019, ISBN: 9781484243916

Eddy Wilson Iriarte Koroliova, MERN Quick Start Guide, Publisher: Packt Publishing, Pub. Date: May 31,2018, Print ISBN-13: 978-1-78728-108-0, Web ISBN-13: 978-1-78728-004-5

Shama Hoque, Full-Stack React Projects, Packt Publishing, 2018, ISBN 978-1-78883-553-4

Burak Kanber, Hands-on Machine Learning with JavaScript, Publisher: Packt Publishing; 1 edition (May 29, 2018), Publication Date: May 29, 2018

Online Resource(s):

posted in e-centennial on a weekly basis

Classroom and Equipment Requirements

MS Visual Studio Code (current version)

MongoDB (current version)

Angular (current version)

Git (current version)

NodeJS (current version)

Evaluation Scheme

⇨ Assignment 1: Create a portfolio site with NodeJS and ExpressJS

⇨ Assignment 2: Add Authentication to Portfolio Site, User CRUD.

⇨ Test 1: NodeJS, ExpressJS, MVC

⇨ Project Part 1: Team Contract - Team Forming

⇨ Project Part 2: First Runnable Release, Basic Functionality, Proof of Concept, Pitch, Peer Review 1, Weekly Report 1

⇨ Project Part 3: Authentication, Full CRUD, Peer Review 2, Weekly Reports 2 and 3

⇨ Project Part 4: Final Release, Peer Review 3, Weekly Reports 4 and 5

⇨ Project Part 5: Final Presentation

Evaluation Name	CLO(s)	EES Outcome(s)	GCE Outcome(s)	Weight/100
Assignment 1	1, 2	1, 7		15
Assignment 2	1, 2, 5	4, 5		15
Test 1	1, 2, 3, 4	1, 5		15
Project Part 1	1	1, 4, 5, 9, 10		5
Project Part 2	1, 2, 3	1, 4, 5		10
Project Part 3	1, 2, 3, 4, 6	1, 4, 5, 9, 10, 11		10
Project Part 4	3, 4, 5, 6	1, 4, 5, 9, 10		15
Project Part 5	3, 4, 5, 6	1, 9, 10		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 Centennial College photo identification or they may be refused the right to take the test or test results will be void.

Tests or assignments conducted remotely may require the use of online proctoring technology where the student's identification is verified and their activity is monitored and/or recorded, both audibly and visually through remote access to the student's computer and web camera. Students must communicate in writing to the instructor as soon as possible and prior to the test or assignment due date if they require an alternate assessment format to explore mutually agreeable alternatives.

Student Accommodation

The Centre for Accessible Learning and Counselling Services (CALCS) (http://centennialcollege.ca/calcs) provides programs and services which empower students in meeting their wellness goals, accommodation and disability-related needs. Our team of professional psychotherapists, social workers, educators, and staff offer brief, solution-focused psychotherapy, accommodation planning, health and wellness education, group counselling, psycho-educational workshops, adaptive technology, and peer support. Walk in for your first intake session at one of our service locations (Ashtonbee Room L1-04, Morningside Room 190, Progress Room C1-03, The Story Arts Centre Room 285, Downsview Room 105) or contact us at calcs@centennialcollege.ca, 416-289-5000 ext. 3850 to learn more about accessing CALCS services.

Use of Dictionaries

- Any dictionary (hard copy or electronic) may be used in regular class work.
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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

Academic honesty is integral to the learning process and a necessary ingredient of academic integrity. Forms of academic dishonesty include cheating, plagiarism, and impersonation, among others. Breaches of academic honesty may result in a failing grade on the assignment or course, suspension, or expulsion from the college. Students are bound to the College's AC100-11 Academic Honesty and Plagiarism policy.

To learn more, please visit the Libraries information page about Academic Integrity https://libraryguides.centennialcollege.ca/academicintegrity and review Centennial College's Academic Honesty Module: https://myappform.centennialcollege.ca/ecentennial/articulate/Centennial_College_Academic_Integrity_Module_%202/story.html

Use of Lecture/Course Materials

Materials used in Centennial College courses are subject to Intellectual Property and Copyright protection, and as such cannot be used and posted for public dissemination without prior permission from the original creator or copyright holder (e.g., student/professor/the College/or third-party source). This includes class/lecture recordings, course materials, and third-party copyright-protected materials (such as images, book chapters and articles). Copyright protections are automatic once an original work is created, and applies whether or not a copyright statement appears on the material. Students and employees are bound by College policies, including AC100-22 Intellectual Property, and SL100-02 Student Code of Conduct, and any student or employee found to be using or posting course materials or recordings for public dissemination without permission and/or inappropriately is in breach of these policies and may be sanctioned.

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.

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Semester:	Fall 2022	
Section Code:	All	
Meeting Time & Location:	See timetable in mycentennial for your section	

Professor Name:	Various
Contact Information:	As per instructor contact info on eCentennial

Topical Outline (subject to change):

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
1	Course Intro, Course Outline, Setup and Installation, VS Code JavaScript Review, ES6+, IIFE, Fat Arrow Functions, Version Control	Chapter 1, ppt slides	Explain the advancements in JavaScript. Explain Module pattern. Use ES6+ classes, arrow functions, new keywords for symbol declaration, and new features related to function parameters. Define JavaScript closures. Explain MEAN and MERN stack architecture. Install and run MongoDB. Install and run Node.js	Lecture Demonstration Lab Session		
2	Intro to MEAN Stack & NodeJS, Comparison of Solution Stacks, Build simple NodeJS server, nodemon NodeJS Core Modules (http, fs, path) and npm, Yarn	Chapters 2, ppt slides	Explain Node.js runtime execution environment. Define event-driven programming with Node.js. Describe Connect web framework and Connect's middleware pattern.	Lecture Demonstration Lab Session	Assignment 1 Assigned	
3	Intro to Express (brief history), how it extends Node. Build simple Express Server Express Generator, build file structure hierarchy for a Express site. Create 5 page site (Home, Products, Services, About Us, Contact Us). Express Partials	Chapter 3, ppt slides	Explain Express and emerging alternatives. Create a new Express Application. Configure the Express application. Implement MVC pattern.	Lecture Demonstration Lab Session		

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
4	Express MVC Structure, Express Routing, REST API, GET, POST, request, response, server round trip, html forms, heroku Intro to MongoDB, installation & setup, basic cli commands, Mongoose	Chapter 4, ppt slides	Define NoSQL. Examine MongoDB's document model, query language, and deployment architecture. Work with MongoDB shell. Explain Mongoose schemas and models. Explain Schema indexes, modifiers, and virtual attributes.	Lecture Demonstration Lab Session	Assignment 2 Assigned	Assignment 1 Due
5	MongoDB continued, Express CRUD Intro - Create & Read, mLab MongoDB continued, Express CRUD Update, Delete	Chapter 5, ppt slides	Use the model's methods and perform CRUD operations. Verify your data using predefined and custom validators. Use middleware to intercept the model's methods.	Lecture Demonstration Lab Session		
6	Restructure for true MVC. Routes are decoupled with Controllers Authetication, passport, passport-local-mongoose, mLab & heroku revisited	Chapter 6, ppt slides	Explain Passport strategies. Integrate Passport into your users' MVC architecture. Use Passport's local strategy to authenticate users. Use Passport's JWT strategy. Explain OAuth providers.	Lecture Demonstration Lab Session	Assignment 2 Due	Assignment 2 Due
7	Review and Test	N/A	N/A	practice exercises	Test 1	Test 1 Due
8	Intro to Frameworks (Angular, React, VueJS, Svelte), Groups Assigned, Project Options Discussed, Project Tracking, Version Control Revisited Framework Installation & Setup, MVC Structure with	ppt slides reference textbook	Differentiate between front-end frameworks and UI libraries. Describe most popular UI frameworks/libraries. Compare emerging frameworks/libraries.	Lecture Demonstration Lab Session	Group Project Assigned Project Part 1 - Team Contract Due	Project Part 1 - Team Contract Due

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
	Framework					
9	Intro to TypeScript Convert Express into an API for Framework	Online materials	Understand the key concepts of TypeScript for web programming Create an API Framework for use with Express	Lecture Hands on demonstration	Project Part 2 - First Release	Project Part 2 - First Release Due
10	Framework (MEAN, MERN, etc) CRUD Framework Authentication with JWT - Part 1, Express Authorization Revisited	Online Materials	Create the Framework to work with a data store Implement JWT with a Framework	Lecture Demonstration Lab Session		
11	Framework Authentication with JWT - Part 2 Replacing MongoDB with Firebase (Serverless DB)	Online Materials	Integrate a web application with Firebase	Lecture Demonstration Lab Session	Project Part 3 - Authentication Release	Project Part 3 - Authentication Release Due
12	Firebase Authentication QA the Application	Online Materials	Understand the advantages and disadvantages of authentication technologies Use techniques to test and approve application functionality	Lecture Demonstration Lab Session		
13	Special Topics Pitch Clinic	Online Materials	Understand the implementation of sockets.io, Firebase for example Learn tecnniques to pitch your application and highlight your applications functionality	Lecture Demonstration Lab Session	Project Part 4 - Final Release	Project Part 4 - Final Release Due
14	Project Demonstrations	N/A	N/A	Class demonstrations	Project Part 5 - Demonstration	Project Part 5 - Demonstration Due