

## **CS 452 Backend Web Development**

### **School of Technology & Computing**

5 Credits, Undergraduate Course

Grading Type: Decimal

Pre-requisite, Co-requisite: None

Fall 2022

*Access to the Internet is required.*

*All written assignments must be in Microsoft-Word-compatible formats.*

*See the library's APA Style Guide tutorial for a list of resources that can help you use APA style.*

## Faculty Information

Professional experience information for instructors can be found under Content → Syllabus, Schedule, and Course Team → Meet Your Instructor in the online course menu.

## Contact Information

Contact information for instructors can be found in the online course menu. Additional contact information regarding the TA for the course, the Program Manager, Program Director and Dean is also shared in the same location. Hyperlinks in the contact page direct students to the responsible parties weekly office hours.

**Email:** [first name] [last name]

**Phone:** [xxx-xxx-xxxx]

**Office Hours and Response Time:** [I am available through MS Teams <day> and <day> between <xx>-<xx> pm PTS. I will respond within 24 hours. I will grade within 3 business days after the due date.]

**Bio:** (keep images under 300px wide)

## Course Description

This course introduces the fundamental concepts and models of backend web application development. Topics include development of server-side application systems, including server-side controllers, routers, business processes, and access to the database components. Students leave understanding the underlying processes related to building functioning applications and the complexity of full-stack web application development using the latest tools and applications in backend frameworks.

## Course Resources

Required and recommended resources to complete coursework and assignments are found on the course [Reading List](#). The reading list can be found under Course Information in Blackboard as well as from the library homepage.

Note: Required resources that must be purchased by the student are tagged “Purchase from a vendor of your choosing.” Required resources with a direct link, “Available through CityU Library”, are available at no cost to students.

Students in Canada will see required resources they need to purchase tagged “Purchase from the Canadian Bookstore.” Students outside the U.S. and Canada should contact their advisor or textbook coordinator for additional information.

## Course Outcomes

As a result of this course, students will be able to:

1. Understand the back-end framework and components, and the full-stack architecture.
2. Apply full-stack architecture to backend applications.
3. Integrate back-end applications as part of full-stack development.
4. Evaluate technologies for backend applications.
5. Design a back-end application.
6. Develop a back-end application utilizing full-stack technologies.

## Grading Scale

The grades earned for the course will be calculated using City University of Seattle's decimal grading system, found in the current University Catalog (<https://www.cityu.edu/catalog/>).

Grading rubrics with details on how each assignment will be graded are located under *Assignments* and/or in *My Grades* in the online course menu. Students should review each assignment's rubric before completing their work to understand how it will be assessed.

| OVERVIEW OF REQUIRED ASSIGNMENTS                | % OF FINAL GRADE | POINTS  |
|---|------------------|---|
| <b><i>Instructor Determined Assignments</i></b> | <b>30%</b>       |   |
| The Muddiest Point (MP)                         | 5%               | 50 = 5 points * 10 modules  |
| Concept Test (CT)                               | 5%               | 50 = 5 points * 10 modules  |
| Discussion Board (DB)                           | 10%              | 100 = 10 points * 10 modules  |
| Knowledge Check (KC)                            | 10%              | 100 = 10 points * 10 modules  |
| <b><i>Major Assignments</i></b>                 | <b>70%</b>       |   |
| Hands-On Practice (HOP)                         | 20%              | 200 = 20 points * 10 modules  |
| Programming Exercise (PE)                       | 30%              | 300 = 30 points * 10 modules  |
| Team Project (TP)                               | 20%              | Proposal: 30 points<br>Progress: 70 points<br>Final Report: 70 points<br>Final PPT: 30 points<br>Subtotal: 200 points |
| <b>TOTAL</b>                                    | <b>100%</b>      | <b>1,000 points</b>   |

## Course Assignments and Grading

The instructor grade assignment based on the grading rubrics that will provide more detail as to how this assignment has been graded.

### The Muddiest Point (MP)

Before class, students are required to submit the Muddiest Point (MP) activity. The purpose of this activity is to stimulate student engagement. The instructor uses the MP to assess how students understood the back-end framework, development, and the full-stack architecture. The instructor also uses the MP to customize the lecture scope to implement Just-in-Time Teaching (JiTT). The MP consists of writing a brief reflective essay (<= 50 words) identifying the most confusing part (i.e., the MP) of the content covered in the upcoming module. If a student understood all concepts, the student needs to explain the most exciting aspect. There is one multiple-choice question from the required reading to demonstrate that the student understood the required readings.

| <b><i>MP Criteria</i></b> | <b><i>% of Grade</i></b> |
|---------------------------|--------------------------|
| Participation             | 80%                      |
| Correctness               | 20%                      |
| <b>TOTAL</b>              | <b>100%</b>              |

### **Concept Test (CT)**

The instructor poses a problem based on key concepts of the backend framework, and the full-stack architecture in backend applications. After reflecting on the problem, students submit their response and the instructor review them without providing a correct answer. Students discuss their thought process and solution with a peer. Students then commit to an answer and re-submit their responses. The instructor reviews the responses and thought processes with the correct answer.

| <b><i>CT Criteria</i></b> | <b><i>% of Grade</i></b> |
|---------------------------|--------------------------|
| Engagement                | 100%                     |
| <b>TOTAL</b>              | <b>100%</b>              |

### **Discussion Board (DB)**

A student posts an answer to a weekly discussion topic in Discussion Board. The student also posts a response to two other students' posts by the end of each module related to the fundamental concepts of full-stack applications. Comments and questions should be clear and thoughtful, with correct grammar, spelling, and punctuation. The instructor will grade the quality of your discussion postings on both content and response.

Although the tone of your DB postings can be informal, your instructor will expect the content to be on a professional level. Your comments and questions for discussion should be clear and thoughtful, with correct grammar, spelling, and punctuation. As with written assignments, the quality of your discussion postings will be graded on both content and presentation.

| <b><i>DB Criteria</i></b> | <b><i>% of Grade</i></b> |
|---------------------------|--------------------------|
| Participation             | 50%                      |
| Writing                   | 50%                      |
| <b>TOTAL</b>              | <b>100%</b>              |

### **Knowledge Check (KC)**

Weekly quizzes measure knowledge checking if students understand key concepts of the back-end framework, it's development, and full-stack architecture. Questions focus on the underlying principles and concepts rather than memorization to solve the quizzes.

| <b><i>KC Criteria</i></b> | <b><i>% of Grade</i></b> |
|---------------------------|--------------------------|
| Correctness               | 100%                     |
| <b>TOTAL</b>              | <b>100%</b>              |

### **Hands-On Practice (HOP)**

Students pair up and practice Hands-on Practice (HOP) exercises to learn specific programming languages, application programming interfaces (APIs), or tools for applying the full-stack architecture to backend applications related to the programming assignments or virtual labs.

| <b><i>HOP Criteria</i></b> | <b><i>% of Grade</i></b> |
|----------------------------|--------------------------|
| Practice Exercise          | 80%                      |
| Engagement                 | 20%                      |
| <b>TOTAL</b>               | <b>100%</b>              |

### **Programming Exercise (PE)**

The students must individually perform the programming exercise that apply the fundamental concepts of the full-stack architecture to evaluate different technologies and design a backend application. Programs must be executable and robust. Non-executable programs will not receive any credits. Programs should deliver correct answers on all valid input and produce comprehensible error messages on invalid input. Programs also run correctly on all test data given within a reasonable amount of time. Students should write programs that are easy for other people to read.

| <b><i>PE Criteria</i></b> | <b><i>% of Grade</i></b> |
|---------------------------|--------------------------|
| Program Execution         | 40%                      |
| User Requirement          | 40%                      |
| Program Documentation     | 20%                      |
| <b>TOTAL</b>              | <b>100%</b>              |

### **Team Project (TP)**

#### **Project Description: Developing a Back-end Application**

Each team of three to four students will design and develop a back-end application which is an integral part of full-stack development. Back-end responsible for the logic and infrastructure of a web site. For example, students will develop back-end to a bookstore web site or a simple chat messaging app using what they learned through hands-on practices activities and the programming exercises. By designing and developing the back-end application using APIs and current software such as the MEAN stack, project teams will demonstrate their ability to analyze full-stack-development requirements and integral parts required for a back-end web-based

application. The final project is the culmination of analyzing and evaluating required software, applied research, and instructor led activities throughout the quarter. Students will gain the experience in finding solutions full-stack development encountered in industry.

As in any scholarly writing, students should not merely copy information from another author. Students should use evidence to support the contentions they have drawn from their findings and critically analyze related literature. In essence, each paper needs to be an analytical paper, not a summary of readings.

Students are expected to use the assigned readings, videos, and other materials throughout the quarter. Students will need to utilize additional sources that were not assigned by the professor. While stylized after an industry report, nonetheless, students are expected to employ APA formatting of citations, footnotes, and bibliography. Students must cite the sources of all ideas, facts, and information used that are not their own, even if they have put the information into their own words. Failure to do so is plagiarism, although the oversight is unintentional. To avoid plagiarism, check "[Avoid Plagiarism.](#)"

#### Rubric for TP01 and TP02

| <i><b>TP01&amp;02 Criteria</b></i> | <i><b>% of Grade</b></i> |
|------------------------------------|--------------------------|
| Structure                          | 20%                      |
| Content                            | 30%                      |
| Writing                            | 30%                      |
| Reference                          | 10%                      |
| Collaboration                      | 10%                      |
| <b>TOTAL</b>                       | <b>100%</b>              |

#### Rubric for TP03

|  | <i><b>Criteria</b></i>  | <i><b>Outcome</b></i>  | <i><b>% of Grade</b></i> |
|--|-------------------------|--|--------------------------|
| Backend Web Development Principles and Practices (20%) |                         |  |                          |
| 1  | Backend Web Development | Apply concepts, integration, and management of key components of full-stack development with emphasis on backend.  | 20%                      |
| Critical Thinking (60%)                                |                         |  |                          |
| 2  | Issue                   | Issue is stated and described thoroughly so that it is understood fully.   | 20%                      |
| 3  | Evidence                | Information is taken from source(s) appropriate to the scope with enough interpretation and evaluation to develop a comprehensive analysis or synthesis, and expert opinions are thoroughly scrutinized. | 10%                      |
| 4  | Context and Awareness   | Thoroughly analyzes assumptions and biases, carefully evaluating contextual relevance when presenting a position.  | 20%                      |

|                            |                                  |   |             |
|----------------------------|----------------------------------|---|-------------|
| 5                          | Conclusions                      | Conclusions are logical and reflect an informed evaluation of evidence and perspectives in priority order.  | 10%         |
| <b>Collaboration (20%)</b> |                                  |   |             |
| 6                          | Teamwork                         | Works effectively on diverse, global and/or distributed teams.  | 10%         |
| 7                          | Knowledge of Cultural Frameworks | Demonstrates sophisticated understanding of the complexity of elements important to members of another culture in relation to its history, values, politics, communication styles, economy, or beliefs and practices. | 5%          |
| 8                          | Openness to Cultural Differences | Demonstrates sophisticated understanding of the complexity of elements important to members of another culture in relation to its history, values, politics, communication styles, economy, or beliefs and practices. | 5%          |
| <b>TOTAL</b>               |                                  |   | <b>100%</b> |

### TP Presentation

The student will report the research outcomes, development, or other project efforts to an academically appropriate committee in a public forum. The nature of the presentation content will determine the specific makeup of the audience. The student will choose the format of the presentation in consultation with the advisor. The layout and design must be appropriate and adequate to represent the outcomes of the effort. While students must make some form of a visual presentation, the presentation of the results may include publishing in a refereed publication, publication in a trade or popular magazine or journal, broadcast in an appropriate medium, or, in exceptional cases, limited dissemination within a closed community.

Each presenter will have 15 minutes for presentation and 5 minutes for questions and answers. Each presenter must keep the total presentation time limit strictly.

| <b>Criteria</b>             | <b>% of Grade</b> |
|-----------------------------|-------------------|
| Structure                   | 20%               |
| Visual Presentation         | 30%               |
| Verbal Quality & Engagement | 30%               |
| Collaboration               | 20%               |
| <b>TOTAL</b>                | <b>100%</b>       |

## Course Policies

Course policies on topics such as Late Assignments, Participation, and Professional Writing are found Content -> Syllabus, Schedule, and Course Team -> Course Policies in the online course menu. Students are responsible for reviewing and applying these policies while enrolled in this course.

## University Policies

Students are responsible for understanding and adhering to all of City University of Seattle's academic policies. The most current versions of these policies can be found in the [University Catalog](#) that is linked from the CityU Web site.

### Antidiscrimination

City University of Seattle and its staff and faculty are committed to supporting our students. We value equity, diversity, and inclusion as a way of life as well as the educational opportunities it provides. City U will not tolerate any form of discrimination based on race, color, ethnicity, sexual orientation, gender identification, socioeconomic status, or religious values. If you have experienced any discrimination based on any of the above, we encourage you to report this to the University. Please report this to your instructor. If you do not feel safe reporting this to your instructor, please report to Dr. Scott Carnz, Provost or to the Vice President of Student Affairs, Melissa Mecham.

### Non-Discrimination & Prohibition of Sexual Misconduct

City University of Seattle adheres to all federal, state, and local civil rights laws prohibiting discrimination in employment and education. The University is committed to ensuring that the education environment is bounded by standards of mutual respect and safety and is free from discriminatory practices.

In the U.S., the University is required by Title IX of the Education Amendments of 1972 to ensure that all of its education programs and activities do not discriminate on the basis of sex/gender. Sex include sex, sex stereotypes, gender identity, gender expression, sexual orientation, and pregnancy or parenting status. Sexual harassment, sexual assault, dating and domestic violence, and stalking are forms of sex discrimination, which are prohibited under Title IX and by City University of Seattle policy. City University of Seattle also prohibits retaliation against any person opposing discrimination or participating in any discrimination investigation or complaint process internal or external to the institution. Questions regarding Title IX, including its application and/or concerns about noncompliance, should be directed to the Title IX Coordinator. For a complete copy of the policy or for more information, visit <https://my.cityu.edu/titleix> or contact the Title IX Coordinator.

In Canada, in compliance with the British Columbia Human Rights Code, the Alberta Human Rights Act, WorksafeBC, and the Workers' Compensation Board of Alberta, the University believes that its environment should at all times be supportive and respectful of the dignity and self-esteem of individuals. Discrimination, harassment and bullying conduct, whether through person to person behaviour or via electronic communications such as email or social

media is not acceptable and will not be tolerated. As an educational institution, it is our responsibility to cultivate an environment of excellence, equity, mutual respect and to recognize the value and potential of every individual. The University will take all necessary steps to meet or exceed the requirements of the law to prevent discrimination, harassment and bullying. The Respectful Workplace Policy for the prevention of discrimination, harassment and bullying policy and procedure can be found at <https://www.cityu.edu/discover-cityu/about-cityu/> under the Policies section or at <https://www.cityuniversity.ca/about/>.

### **Title IX Statement**

City University of Seattle and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If students have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage them to report this to the University. If a student speaks with a faculty member about an incident of misconduct, that faculty member must notify CityU's Title IX coordinator and share the basic fact of the experience. The Title IX coordinator will then be available to assist students in understanding all of the options and in connecting students with all possible resources on and off campus.

To view CityU's sexual misconduct policy and for resources, please visit the [Title IX](#) and [Campus Safety](#) pages in the my.cityu.edu portal.

### **Religious Accommodations**

Washington state law requires that City University of Seattle develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The University's policy, including more information about how to request an accommodation, is available in the University Catalog. Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request Form found on the student dashboard in the my.cityu.edu student portal.

### **Academic Integrity**

Academic integrity in students requires the pursuit of scholarly activity that is free from fraud, deception and unauthorized collaboration with other individuals. Students are responsible for understanding CityU's policy on academic integrity and adhering to its standards in meeting all course requirements. A complete copy of this policy can be found in the [University Catalog](#) under *Student Rights and Responsibilities* on the page titled *Academic Integrity Policy*.

### **Attendance**

Students taking courses in any format at the University are expected to be diligent in their studies and to attend class regularly.

Regular class attendance is important in achieving learning outcomes in the course and may be a valid consideration in determining the final grade. For classes where a physical presence is required, a student has attended if they are present at any time during the class session. For online classes, a student has attended if they have posted or submitted an assignment. A complete copy of this policy can be in the [University Catalog](#) under *Student Rights and Responsibilities* on the page titled *Attendance*.

**Final Assignments Due Date**

Final assignments for each class at CityU must be due on or before the final date of the course as indicated in the university's course information system. Due dates that extend beyond the final date of the course may negatively impact tuition funding for students.

## Support Services

**Disability Services Accommodations Statement**

Students with a documented disability who wish to request academic accommodations are encouraged to contact Disability Support Services to discuss accommodation requests and eligibility requirements. Please contact Disability Support Services at [disability@cityu.edu](mailto:disability@cityu.edu) or 206.239.4752 or visit the [Disability Support Services](#) page in the my.cityu.edu portal. Confidentiality will be observed in all inquiries. Once approved, information about academic accommodations will be shared with course instructors.

**Library Services**

CityU librarians are available to help students find the resources and information they need to succeed in this course. Contact a CityU librarian through the [Ask a Librarian](#) service, or access [library resources and services online](#), 24 hours a day, seven days a week.

**Smarthinking Tutoring**

CityU students have access to free online tutoring offered through Smarthinking, including writing support, from certified tutors 24 hours a day, seven days a week. Contact CityU's Student Support Center at [help@cityu.ed](mailto:help@cityu.ed) to request a user name and password.