Syllabus

This is a single, concatenated file, suitable for printing or saving as a PDF for offline viewing. Please note that some animations or images may not work.

Course Description and Overview

This module is also available as a concatenated page, suitable for printing or saving as a PDF for offline viewing.

MET CS 601

Web Application Development

This course equips students with essential front-end development skills, starting with foundational JavaScript techniques such as DOM manipulation and event handling, and advancing to interactive web technologies like HTML's Drag and Drop, Canvas, and SVG. Students are exposed to asynchronous operations including AJAX, the Fetch API, and Web Workers, and will learn to craft responsive designs using Flexbox, CSS Grid, and advanced CSS selectors. A comprehensive exploration of TypeScript and its main feature, static typing, and capabilities is also covered. The course concludes with a comprehensive dive into ReactJS, covering its core architectural concepts, component-based structure, and state management techniques.

Technical Notes

The table of contents expands and contracts (+/- sign) and may conceal some pages. To avoid missing content pages, you are advised to use the next/previous page icons in the top right corner of the learning modules.

This course requires you to access files such as word documents, PDFs, and/or media files. These files may open in your browser or be downloaded as files, depending on the settings of your browser.

Learning Objectives

By successfully completing this course, you will be able to do the following:

- Describe what happens behind the scenes on the World Wide Web.
- Explain web programming concepts.
- Develop multi-page websites.
- Integrate multimedia resources into web pages.
- Demonstrate a high level of competency with client-side technologies to include HTML, CSS, and JavaScript.
- Write valid code in accordance with the standardized grammar, vocabulary and syntax of each language.
- Understand the core concepts of TypeScript and be able to apply them for type-safe JavaScript development.
- Describe React's component-based architecture and its approaches to add functionality to web pages.
- Develop single-page applications (SPAs) using React.
- Integrate client-side code with prebuilt server-side resources.
- Build mobile friendly websites.
- Use various web development tools and resources.

Course Outline

Please continually check the Announcements area for updated information and additional resources.

- **Study Guide** – Refer to Study Guide for all due dates and live classroom dates. You will stay current by checking announcements, discussions, and emails in the course.
- **Readings** – Each module has both textbook readings and online lectures. Your professor may suggest additional readings during the running of the course.
- **Groups** – There are threaded discussions for each module. These discussions are moderated by your facilitator. Postings for each discussion should be completed by the assigned due dates. There are also general discussions boards, which are not graded, for you to use to discuss any issues with your classmates. Please see the Discussion Module on the home page for more details.
- **Assignments** – There are assignments that are due throughout the course.
- **Live Classroom sessions** – One Live Classroom session will be provided for each module during this course. Days/times can be found in the Study Guide. Students are not required to attend and recordings will be provided when possible. Material presented during these sessions may be included in the final exam.
- **Self-assessment Quiz** – There is a non-graded practice quiz for each module. You can take each quiz multiple times to practice your skills.

Module 1 – The DOM and Intermediate JavaScript

- **The Document Object Model (DOM) and Events** – You will learn about the Document Object Model and how to handle events in JavaScript.
- **Intermediate JavaScript** – We will cover client-side form validation, high order functions, callbacks, closures, and inheritance.

Module 2 – Advanced JavaScript and Asynchronous JavaScript

- **Advanced JavaScript** – You will learn more about the object-oriented programming (OOP) features of JavaScript to include namespaces, modules, drag and drop, graphics, and more.

- **Asynchronous JavaScript** – We will cover how to use JavaScript to make asynchronous requests to a server in order to change content dynamically without needing to reload the entire web page.

Module 3 – Advanced CSS

- **Building Flexible and Responsive Web Designs** – You will learn to create a responsive webpage layout using CSS layout techniques, flexbox and CSS grid.
- **Advanced CSS Selectors and Pseudo-classes** – You will learn to style webpages using advanced CSS selectors and pseudo-classes.

Module 4 – Introduction to TypeScript

- **TypeScript Syntax and Data Types** – You will learn the fundamentals of TypeScript, including its syntax, data types, control flow statements, arrays, functions, and type annotations and inference.
- **Object-Oriented Programming and Tooling** – You will learn about the object-oriented programming features of TypeScript such as objects, classes, constructors and properties, inheritance.

Module 5 – Introduction to React

- **React Basics and Core Concepts** – You will learn about the React library and its core concepts like JSX, templates, data binding, event handling, and more.
- **Components and Conditional Rendering** – You will learn how to create reusable components, manage state and props, and render dynamic content in response to user interaction.

Module 6 – React Component Communications, Routing, Hooks, and Forms

- **Routing and Component Communications** – You will learn how to create custom routes to render content and pass information between React components via props and hooks.
- **React Forms** – You will learn how to create controlled forms and uncontrolled forms and explore their unique features.

Module 7 - Prepare for and Take the Final Exam

You will prepare for and take the proctored final exam.

The course will remain open two weeks after the final exam so that you can continue ask any questions about your grades or the course. This is also a time when we enter into a dialogue where we endeavor to learn from you how we can modify the course so that it better meets your needs.

Term Project

This course also features a comprehensive term project that is due in Module 6. Instructions for the term project along with a grading rubric can be found in the Assignments area. Further details will be shared in the Live Classroom sessions throughout the course.

Instructor

Christian Hur

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Metropolitan College
Boston University

Email: mrhur@bu.edu

Office Hours: after live classroom via zoom

Christian is a multi-talented professional with over 25 years of experience in web technologies. He is an SDE, an accomplished full-stack Web instructor, author, and indie filmmaker. Christian's expertise lies in web, software, and mobile application development. Throughout his career, he has built websites and web-based applications using various web technologies. In addition to his work as an educator and industry expert, he has authored courses for several e-learning platforms, including LinkedIn Learning, Packt, Udemy, E-C Council, and MC Press. Christian, together with his wife, co-founded a

production company to produce movies and mobile apps. During his free time, he enjoys traveling, exploring new Web technologies, and contributing to Stack Overflow.

Web Applications Faculty Coordinator, Vijay Kanabar, Ph.D.

Vijay Kanabar is the original designer of this course. He is a professor at Boston University and has been consulting and teaching in the applied areas of IT and Project Management for more than 25 years in the US and Canada. He has authored two database books—*An Introduction to Structured Query Language* (Wm C Brown now McGraw-Hill) and *XBase for the True Beginner* (McGraw-Hill)—and has been recognized with awards for outstanding teaching and research. He has substantial business experience and is frequently invited to present seminars at conferences. Dr. Kanabar holds graduate degrees in Computer Science from Florida Tech and a Ph.D. in Information Systems from University of Manitoba and is a certified Project Management Professional (PMP).

Course Materials

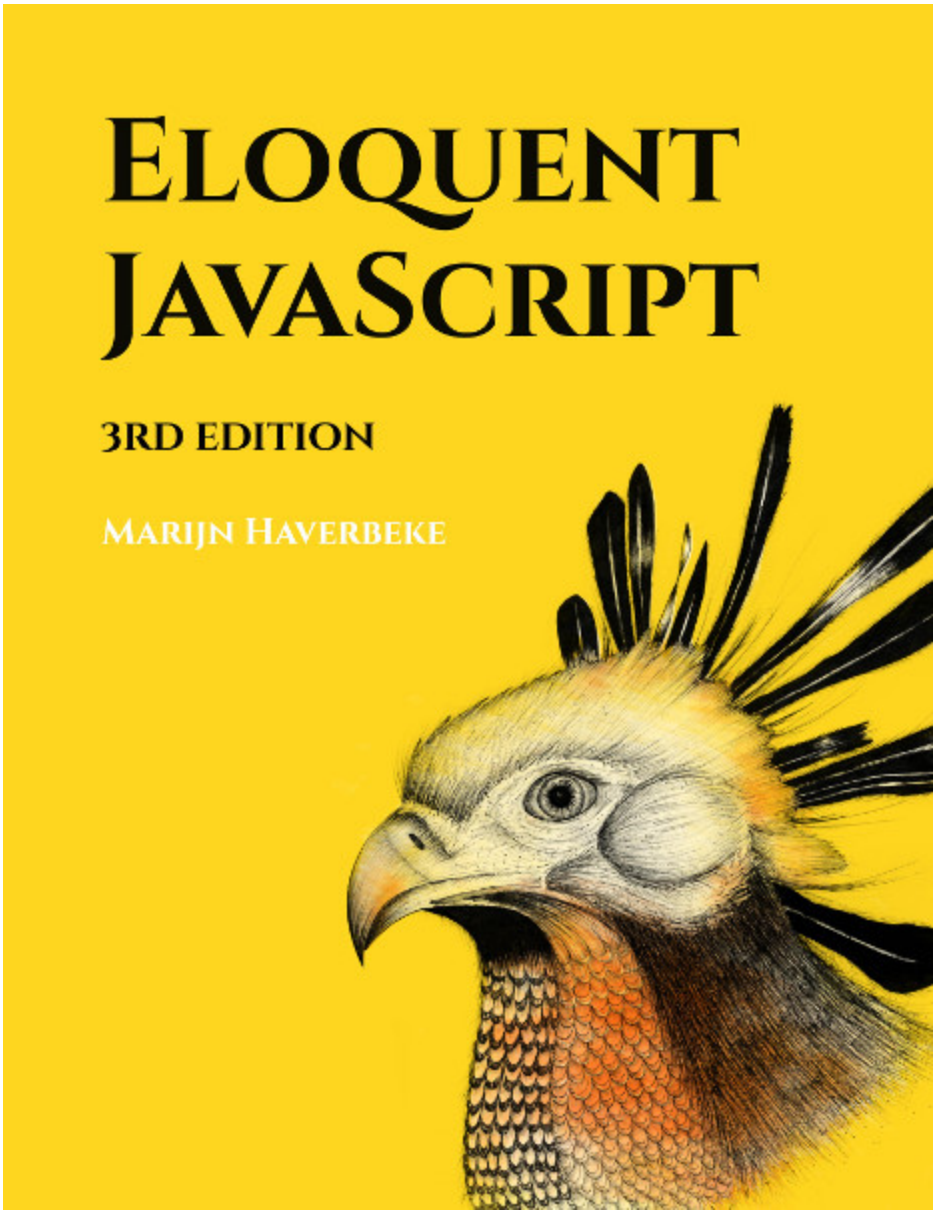
Required Texts

Haverbeke, M. (2024). *Eloquent JavaScript: A Modern Introduction to Programming* (4th ed.).

No Starch Press.

ISBN: 9781593279509

Download the free book in PDF.



Required Course Software

At a minimum, you will need a plain text editor and at least *two* different web browsers installed on your Internet connected computer. Grading will be performed by viewing student work in Mozilla Firefox.

We recommend that you use free software choices for this course. Software with a monetary cost associated with it is not necessary but may be helpful if you anticipate doing extensive web development work after this course ends.

Text Editors

The table below lists a few *plain* text editors you can use in this course (you only need one). You should *not* use a word processor such as Microsoft Word or OpenOffice Writer for writing web page content/code.

Name	Platform	Cost
Notepad	Windows	Free - built in
TextEdit	Mac	Free - built in
Vim	Windows, Mac, Linux	Free
gedit	Windows, Mac, Linux	Free
GNU Emacs	Windows, Mac, Linux	Free
Brackets	Windows, Mac, Linux	Free
EditPad.org	Online	Free
Notepad++	Windows	Free
Atom	Windows, Mac, Linux	Free
Sublime Text	Windows, Mac, Linux	Free trial

Web Browsers

The latest version of Mozilla Firefox should serve as your primary web browser for course work and navigating around Online Campus. Secondary web browsers can include the latest versions of Microsoft Edge, Apple Safari, Google Chrome, and Opera.

Recommended Software

You will find that an Integrated Development Environment (IDE) provides many benefits over a plain text editor for the work you will be completing in this course.

You may also need a FTP client if you plan to upload your assignments to a web server. We recommend FileZilla as a free FTP client.

We recommend that you utilize free software choices for this course. Software with a monetary cost associated with it is not necessary but may be helpful if you anticipate doing extensive web development work after this course ends.

Recommended IDEs are listed in the following table (you only need one):

Name	Platform	Cost
Aptana	Windows, Mac, Linux	Free
Eclipse	Windows, Mac, Linux	Free
NetBeans	Windows, Mac, Linux	Free
Komodo Edit	Windows, Mac, Linux	Free
Visual Studio Code	Windows, Mac, Linux	Free
WebStorm	Windows, Mac, Linux	$, but free for students

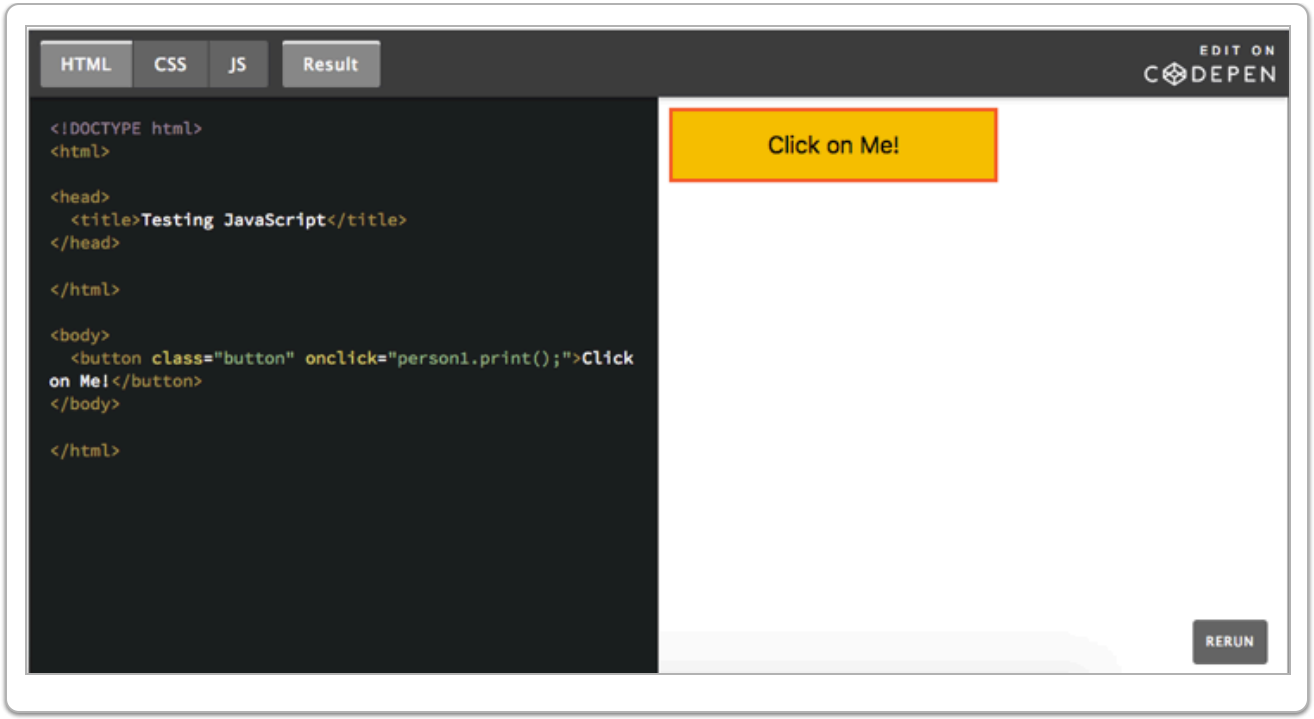
Coda 2	Mac	$

Helpful Resources on the Web

- Mozilla Developer Network (MDN) - Free web technology tutorials and documentation.
- validator.w3.org – Validate your HTML.
- https://jigsaw.w3.org/css-validator/ - Validate your CSS.
- http://jslint.com/ - Code quality tool for JavaScript.
- https://regexone.com/ - Helpful resource on learning and using regular expressions.

CodePen Examples

At the end of each module, you will find a CodePen example. This is a code editor embedded in the Blackboard page. You can modify the code and see the results in the Results window. If you reload the page, the code will return to the original. If you wish to save your changes, click “Edit on CodePen” in the upper right-hand corner. You will go to the CodePen site where you can create an account and save your own Pens. These examples are intended for you to experiment and are not required assignments.



Boston University Library Information

Boston University has created a set of videos to help orient you to the online resources at your disposal. An introduction to the series is below:

met_ode_library_14_sp1_00_intro video cannot be displayed here. Videos cannot be played from Printable Lectures. Please view media in the module.

All of the videos in the series are available on the Online Library Resources page, which is also accessible from the Campus Bookmarks section of your Online Campus Dashboard. Please feel free to make use of them.

As Boston University students, you have full access to the BU Library. From any computer, you can gain access to anything at the library that is electronically formatted. To connect to the library, use the link http://www.bu.edu/library. You may use the library's content whether you are connected through your online course or not, by confirming your status as a BU community member using your Kerberos password.

Once in the library system, you can use the links under “Resources” and “Collections” to find databases, eJournals, and eBooks, as well as search the library by subject. Some other useful links follow:

Go to Collections to access eBooks and eJournals directly.

If you have questions about library resources, go to Ask A Librarian to email the library or use the live-chat feature.

To locate course eReserves, go to Reserves.

Please note that you are not to post attachments of the required or other readings in the water cooler or other areas of the course, as it is an infringement on copyright laws and department policy. All students have access to the library system and will need to develop research skills that include how to find articles through library systems and databases.

Free Tutoring Service

Free online tutoring services by Tutor.com are available to BU online students for the duration of their eligible online course. Tutor.com is a web-based service that provides an online writing lab and access to on-demand and scheduled tutoring sessions for writing, math, business, coding languages, and other subjects. Students can submit a question to a tutor, submit a paper for feedback about writing and grammar, or schedule a live session with a tutor.

You can log in directly to Tutor.com from Blackboard Online Campus by clicking the link in the left-hand navigation menu within your online course. All activity in the Tutor.com classroom is recorded for learner review and quality control. Transcripts will be available afterward in My Account under My Locker in your Tutor.com account.

Please Note

Tutor.com services may be used only for current Boston University online courses and career services. Use of this service for purposes other than current coursework or career services may result in deactivation of your Tutor.com account.

June 4

Study Guide

Module 1 Study Guide and Deliverables

Oct 29 - Nov 4

Readings: Module 1 online notes

Eloquent JavaScript, Haverbeke

- This optional text covers supplementary and more advanced materials related to this week's topics.

Discussions: Discussion 1 postings end **Tuesday, Nov 5, at 6:00 AM ET**

Self-Assessment:	Practice Quiz 1
Assignments:	Assignment 1 due **Tuesday, Nov 5, at 6:00 AM ET**
Live Classrooms:	• **Wednesday, Oct 30, 7:00-9:00 PM ET**. Instructor office hour: right after the live classroom • Facilitator live session: TBD • Join the live sessions from “Live Classroom/Offices” on the left-hand course menu

Module 2 Study Guide and Deliverables

Nov 5 - Nov 11

Readings:	Module 2 online notes Eloquent JavaScript, Haverbeke • This optional text covers supplementary and more advanced materials related to this week’s topics.
Discussions:	Discussion 2 postings end **Tuesday, Nov 12, at 6:00 AM ET**
Self-Assessment:	Practice Quiz 2
Assignments:	Assignment 2 due **Tuesday, Nov 12, at 6:00 AM ET**
Live Classrooms:	• **Wednesday, Nov 6, 7:00-9:00 PM ET**. Instructor office hour: right after the live classroom • Facilitator live session: TBD

Module 3 Study Guide and Deliverables

Nov 12 - Nov 18

Readings: Module 3 online notes

Eloquent JavaScript, Haverbeke

- This optional text covers supplementary and more advanced materials related to this week's topics.

Discussions: Discussion 3 postings end **Tuesday, Nov 19, at 6:00 AM ET**

Self-Assessment: Practice Quiz 3

Assignments:

- Assignment 3 due **Tuesday, Nov 19, at 6:00 AM ET**

Live Classrooms:

- **Wednesday, Nov 13, 7:00-9:00 PM ET**. Instructor office hour: right after the live classroom
- Facilitator live session: TBD

Module 4 Study Guide and Deliverables

Nov 19 - Nov 25

Readings: Module 4 online notes

Eloquent JavaScript, Haverbeke

- This optional text covers supplementary and more advanced materials related to this week's topics.

Discussions:	Discussion 4 postings end **Tuesday, Nov 26, at 6:00 AM ET**
Self-Assessment:	Practice Quiz 4
Assignments:	• Assignment 4 due **Tuesday, Nov 26, at 6:00 AM ET** • Optional: Term Project mid-term review due **Tuesday, Nov 26, at 6:00 AM ET** (submit at the "Assignments" section at the left-hand course menu.)
Live Classrooms:	• **Wednesday, Nov 20, 7:00-9:00 PM ET**. Instructor office hour: right after the live classroom • Facilitator live session: TBD

Module 5 Study Guide and Deliverables

Nov 26 - Dec 2

Readings:	Module 5 online notes Eloquent JavaScript, Haverbeke • This optional text covers supplementary and more advanced materials related to this week's topics.
Discussions:	Discussion 5 postings end **Tuesday, Dec 3, at 6:00 AM ET**
Self-Assessment:	Practice Quiz 5
Assignments:	Assignment 5 due **Tuesday, Dec 3, at 6:00 AM ET**

Live Classrooms:	• **Thursday, Nov 27, 7:00-9:00 PM ET**. Instructor office hour: right after the live classroom • Facilitator live session: TBD

Module 6 Study Guide and Deliverables

Dec 3 - Dec 9

Readings:	Module 6 online notes Eloquent JavaScript, Haverbeke • This optional text covers supplementary and more advanced materials related to this week's topics.
Discussions:	Discussion 6 postings end **Tuesday, Dec 10, at 6:00 AM ET**
Self-Assessment:	Practice Quiz 6
Assignments:	• Assignment 6 due **Tuesday, Dec 10, at 6:00 AM ET** • Term Project due **Tuesday, Dec 10, at 6:00 AM ET**
Live Classrooms:	• **Wednesday, Dec 4, 7:00-9:00 PM ET**. Instructor office hour: right after the live classroom • Facilitator live session: TBD
Course Evaluation:	Please complete the course evaluation once you receive an email or Blackboard notification indicating the evaluation is open. Your feedback is important to MET, as it helps us make improvements to the program and the course for future students

Final Exam Details

The Final Exam is a proctored exam available from **Wednesday, Dec 11, at 6:00 AM ET to Saturday, Dec 14, at 11:59 PM ET**.

The Computer Science department requires that all final exams be administered using an online proctoring service called Examity that you will access via your course in Blackboard. In order to take the exam, you are required to have a working webcam and computer that meets Examity's system requirements. A detailed list of those requirements can be found on the How to Schedule page ("Proctored Final Exam Information" module at the course home page). Additional information regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment within the defined exam window.

The exam is accessible only during the final exam period. You can access it from the Assessments section of the course. Your proctor will enter the password to start the exam.

Final Exam Duration: 3 hours.

The exam is open book/open notes. It features multiple-choice, true/false, and essay questions. Some of the essay questions will require you to write code examples.

Here are the options regarding materials that can be used during the exam:

- Use of the physical and/or ebook textbook is allowed.
- Use of a standard handheld and/or desktop calculator is allowed. Online calculators are not permitted.
- Use of any printed and/or electronic materials (such as PDFs) is allowed. Electronic lecture notes from the course are permitted.
- Use of three pieces of blank scratch paper is allowed.

Course Grading Information

The course grade will be based on active class participation and discussions, weekly assignments, a proctored final exam, and a term project. Assignments are expected to be submitted by their respective due dates. Late submissions may carry a penalty.

Grading Policy

All students will be expected to demonstrate competency of the languages and concepts covered in this course.

Grading Structure and Distribution

The grade for the course is determined by the following:

Final Exam:	30%
Term Project:	30%
Assignments:	30%
Discussions:	10%

Final Course Grade

The following ranges determine the final course grade:

Letter Grade	Final Percentage Score

A	96–100
A−	91–95.99
B+	86–90.99
B	81–85.99
B−	76–80.99
C+	71–75.99
C	66–70.99
C−	61–65.99
D	56–60.99
F	0–55.99

The percentage ranges above are approximate. Your letter grade is determined by your professor as the best overall measure of how well you have demonstrated that you understand the material, taking into separate consideration your performance with the assignments, term project, discussions and final exam. The final grade *may* be curved at the discretion of the Instructor.

Assignments, Exams and Discussions

Live Classroom Lectures

Live classroom lectures will be provided during this course weekly. Days/times will be posted in the announcements area. Students are not required to attend and recordings will be provided when possible. Material presented during these sessions may be included in the final exam.

Participation

Graded Discussions – Students will be participating in discussions that will be graded on a 100-point scale: go to the Discussion Rubric. To participate discussions, go to the "My Group" section (left-hand course menu).

Assignments

Students will complete one assignment each module. Check each assignment direction and submit at the "Assignments" section (left-hand course menu).

Term Project: Online Portfolio

Students will deliver an online portfolio application built by utilizing the technologies presented in this course. Students may elect to work on a different project as long as it is approved in advance by their facilitator. Check the Term Project direction and submit at the "Assignments" section (left-hand course menu).

Proctored Final Exam

There will be a proctored Final Exam in this course. Detailed instructions regarding your proctored exam will be forthcoming from the Assessment Administrator. You will be responsible for scheduling your own appointment. Access from the "Assessments" section (left-hand course menu).

Course Expectations

Many learning activities require sharing your assignments and opinions with your classmates. For example, you may be given a set of criteria on the basis of which to evaluate other classmates' assignments, and asked to submit the results to your facilitator by a specified day of the week. It is, therefore, very important that you, as well as your classmates, submit your assignments on a timely basis. Timely submission by all will result in each of you being able to evaluate each other's assignments. Due dates will be indicated for each assignment in the Assignments section of the course.

Delays

If, for any reason, you are unable to meet any assignment deadline, contact your Course Facilitator. All times mentioned in the course (unless otherwise specified) are in Eastern Time. All assignments must be completed and must be turned in by their due dates and due times. Extensions may be granted, though only under mitigating circumstances.

Late Work Policy:

Each assignment has a strict deadline. However, you are still allowed to submit your assignment within 2 days after the deadline with a penalty. 15% of the credit will be deducted unless you made previous arrangements with your facilitator and professor. Assignments submitted 2 days after the deadline will not be graded.

Discussion Grading Rubric

Graded discussion periods are held Day 1 of each module until 6:00 a.m. ET on Day 1 of the following module. You're certainly welcome to continue a discussion past the grading period, but that additional posted material will not affect your discussion grade. The discussion grading rubric below is the guide we use to evaluate your discussion contributions.

Discussion Grading Rubric					
Criteria	**51–60**	**61–70**	**71–80**	**81–90**	**91–100**
Participation	Very limited participation	Participation generally lacks	Reasonably useful relevant participation	Frequently relevant and consistent participation	Continually relevant and consistent participation

		frequency or relevance	during the discussion period	throughout the discussion period	throughout the discussion period
Community	Mostly indifferent to discussion	Little effort to keep discussions going or provide help	Reasonable effort to respond thoughtfully, provide help, and/or keep discussions going	Often responds thoughtfully in a way frequently keeps discussions going and provides help	Continually responds thoughtfully in a way that consistently keeps discussions going and provides help
Content	No useful, on-topic, or interesting information, ideas or analysis	Hardly any useful, on-topic, or interesting information, ideas or analysis	Reasonably useful, on-topic, and interesting information, ideas and/or analysis	Frequently useful, on-topic, and interesting information, ideas and analysis	Exceptionally useful, on-topic, and interesting information, ideas and analysis
Reflection and Synthesis	No significant effort to clarify, summarize or synthesize topics raised in discussions			Contributes to group's effort to clarify, summarize or synthesize topics raised in discussions	Leads group's effort to clarify, summarize or synthesize topics raised in discussions

In addition to the rubric above, please read the Discussion Grading Guidelines below, which will be used in conjunction with the grading rubric above. The following guidelines are a bit more objective and quantifiable to understanding how your discussion efforts will be scored. The intention of sharing these guidelines is to provide some additional transparency to the grading process and to allow you to understand what some of our minimum expectations are regarding weekly discussions.

Discussion Grading Guidelines

1. Initial discussion posts by students should be *at least* one paragraph in length (four to five sentences). Posts smaller than this will not be counted towards your grade. Replies and responses to other students are not subject to this minimum length requirement, but should be *meaningful*, see

below.

2. All posts should be *meaningful*, which means:
    a. What you post should be worthwhile, don't just post something to try to meet the requirements.
    b. Posts should be well developed. The content of your post must demonstrate an understanding of the subject.
    c. You should be providing information that is helpful in facilitating discussion. Simple statements such as "Good job!" or "I agree with you" does not contribute to the discussion in a meaningful way.
    d. Give reasons for any opinions that you share.
    e. Posts should be to the point and clearly stated with correct spelling and grammar.
    f. Be sure to include outside resources if applicable.
3. **Answer, respond, and reply**. Students should post at a minimum:
    a. An original, *meaningful* **answer** to the discussion prompt
    b. A *meaningful* **response** to another student's original response
    c. A *meaningful* **reply** to another student's response to their discussion
    d. Doing only this, all on one day: 70%. Score can be lower if there are quality concerns for any of the parts a-f above.
    e. Doing only this, over two or more days: 80%. Score can be lower if quality is low for any of the parts a-f above.
    f. The original answer should be provided before midnight on Friday (EST) of each week, if not, subtract 5% from their score for late participation involvement.
4. To score higher than an 80%, students must exceed the minimum requirements outlined in parts 1-3 above. Factors that can raise a student's discussion score include:
    a. Quality of posts
    b. Number of posts
    c. Frequency of posts
    d. Posts that have resulted in a significant number of responses
    e. Above average effort (size, significant research, etc.)