



PennState  
College of Information  
Sciences and Technology

## IST 402

Emerging Issues and Technologies

Section: 004

Credits: 3

Semester: Spring 2021-22

<https://oer.hax.psu.edu/bto108/sites/edtechjoker>

### Course Information

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#### Contact Information

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#### Instructor Availability & Communication

I work at the university full time but office hours are by appointment. We will be establishing a Slack group as part of this class so I will be available there regularly, otherwise university email address is fine. My office phone is connected but it's not an effective way of reaching me.

#### Course Overview

##### Micro Frontend Development

The term "Micro frontends" was coined to describe how modular front end components could lead to the parallel development of modular backend components via microservices. This approach allows for large organizations to deliver resilient applications and repurposed front end pieces that automatically setup backend microservices to match. Giants like Uber, Netflix and Comcast then leverage these micro frontend libraries to build future applications faster similar to how front-end component architecture unifies design work.

This course will be team driven, full stack development using real-world projects that require microservice architecture to appropriately envision. We'll review how people are starting to envision micro-front ends, how they work in real world company project, why some view them as a pipedream, as well as ethical implications of how one deploys and envisions these solutions. This course will delve into API design and development needed to make things work between front-end and back-end, docker / container based deployment of the micro backend, and web components (a W3C Javascript standard) for user interaction / visual front-end.

In the end teams will deliver fully working, well documented, test driven prototypes of different micro frontend projects. Open source, front-end development fundamentals, and philosophy of ethical technology design will also be covered to ensure quality, real world final project solutions.

This is a hands-on, group project based, software development intensive course leveraging UX, Programming and Enterprise System Architecture concepts. While not requiring programming, experience with programming will lead to more realistic end projects.

## Course Goals

By the end of this course, students will be able to...

- Have working knowledge of the technologies underlying much of the web
- Be able to develop reusable web components using OpenWC tooling
- Understand tooling and its reuse in other frameworks
- Understand the entire web component development life cycle from idea to publishing and distribution on NPM and reuse in other projects
- Understand the difference between monolithic design and microservice architecture
- Be able to write Swagger / OpenAPI 3.0 spec documents and understand them
- Deploy code to Github and create a pipeline to Heroku and Vercel
- Build a working micro frontend

## Course Topics / Pacing

The current topics and pacing are my initial concept for this course. This schedule will evolve organically based on progression the first several weeks. If we move faster than this I will add additional detailed coding exercises, if we need additional time to better understand others then we'll pause and take more time.

The course is broken into four main themes:

1. NPM, Github, Tooling and the web ecosystem built on JavaScript
2. Modern Front end web development
3. API Development and planning
4. Backend Development and deployment of a microservice

## . WEB FUNDAMENTALS

- Week 1-2: Course fundamentals, understanding tooling and debugging
  - Welcome to class, what we'll do here
  - Install all dependencies for the course
  - Learning about fundamentals of JS ecosystems and the web surrounding it
  - What makes good tooling?
  - Using, installing and understanding what OpenWC gives you
- Week 3-4: Where the web was vs where it's going
  - Monolithic vs Microservice design
  - Working with a monolith to model data
  - Understanding "Headless" development
  - Reviewing industry usage of microservices at a high level
  - 11ty / static site generation tech
- Week 5-6: Envisioning and documenting an API
  - What makes a good API
  - How do we document things with OpenAPI spec
  - How we can model data in local development / testing phases
  - Building a simple backend using Vercel and web components
- Week 7-8: Docker, Vercel, Heroku, build pipelines
  - Building and reusing web components to solve problems
  - Building a basic boilerplate PWA
  - We'll start into the final project planning phase prior to break
- Week 9: Spring Break
- Week 10-14: Final project work
  - Lectures in this block will involve targetted examples of different technologies as well as using group output as examples
  - There will be weekly check ins to ensure your group is on task
  - As a group you'll select, investigate, work towards a solution, document and ultimately submit a pull request to our team's repository in order to improve online courses for future students
  - You'll be pitching a solution as well as building a working prototype for a frontend web component / components that talk to a backend that is deployed to Vercel
  - Class time will be spent reviewing code, answering questions as a class, and doing group check ins
- Week 15: Final project presentations / open code review
- Week 16 (Finals week): Final project, due

### *Prerequisites*

IST 210 and IST 220. Past programming experience highly encouraged.

### Materials

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### Required Materials

There are no books required for this course but there is a required environment and free tools that must be installed so that we can work throughout the semester.

## Reserve Materials

**None.**

## Course Technology

Much of the course will revolve around slack, github, dev.to blogging, and installing <https://open-wc.org/> which has many on-system dependencies that need setup in order to operate. You must have access to install low level system dependencies like NodeJS in order to take this course. You need admin access to your machine and be willing to learn how to run CLI commands.

## Web Materials Links

Online materials and lessons for this course are available at the course website:  
<https://oer.hax.psu.edu/bto108/sites/edtechjoker>

## Technical Requirements

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A laptop with admin right so that you can install command line dependencies.

A modern web browser is required to access the course website as well as to complete lab assignments. Screen casting requires headphones or a microphone input in order to record your voice while speaking over top of the web material we'll review.

All work is to be done out in the open and on open platforms. Meaning publicly accessible websites, video hosting platforms, etc. If you do not want to have your work turned in an open manner **please contact me and we can make other accommodations**. Open submission is primarily for your benefit via SEO and job recruiting / profile.

## Student Expectations

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### Participation

Students are expected to attend class in order to practice, then complete the assigned work either individually or as a group each week. We will take attendance and participation will also be expected as part of keeping the discussions in class going. Discussions and work will be started during class time and then completed as homework if not finished by the end of class.

During class I'll often ask for answering questions to help keep the conversation moving forward and understanding the topics we're reviewing. I will also assign out of class blog posts, web resources, videos and tutorials which I will expect you to engage in before the next class so we're able to have discussions of highly technical concepts together.

### Weekly Cadence

A suggested weekly path consists of the following:

- Tuesday - attend the **lecture** and start into the discussion topics and projects
- Thursday – Additional refinement of the concept
- Sunday by 11:59pm – Homework is due for the week
  - o Homework will vary week to week between individual and group projects
  - o Some homework will involve blogging / reflection for comprehension of concepts
  - o You will be expected to maintain a github repo for documenting accomplishments, challenges, blog posts read, blog posts generated, and other artifacts produced throughout the course
  - o Post a link to your articles on the associated conversation in the **#edtechjoker** channel in our slack group

## Student Responsibilities

Students are expected to attend classes, participate in discussions as groups, ask questions, and seek to produce the highest quality work they can. Not all developers are the same, so this course seeks personal growth and understanding of various web API concepts. Students are expected to meet and work in pairs or teams outside of class based on the assignments as assigned that week.

## Assessments

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### Assessment Plan

#### *Assignments*

There are 8 labs that make up the first 8 weeks of the course prior to spring break. These labs are intended to cover topics that surround the micro frontend landscape. Labs are a window into full areas of study and careers potentially. They are intended to help give you ideas about that aspect of the industry but also ideas for your final project. Labs are graded primarily on completeness. Evidence of completing labs involves writing a blog post, typically using the lab and any repos you made as a backdrop. Some labs have a screencast component.

#### *Final project*

A final project will be the focus of class after spring break. You'll have approximately 5 weeks to take the ideas and concepts that we practiced through labs and then put them into practice to design and develop your own micro frontend. The projects are selected from issues in the HAXTheWeb issue queue. As this is highly experimental functionality, these prototypes will help form the basis for the community forging a path ahead with adopting micro frontend architecture into the core of the HAXcms platform. This project gives you and your teammates a real world problem, using the concepts we've discussed in class during labs with which to solve it. There will be weekly check ins, reviews and open critique of work in class so that teams can get additional feedback from other teams as well as the instructor.

### Examinations

There are no exams in this course. There will be development challenges or code samples given in class that try to mirror some gotchas thrown at people on coding interviews. These will not be announced ahead of time and are part of class participation to solve that week.

## Grading

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Assignment Category	Weight
Labs	30%
Attendance	30%
Final Project	40%

### Grading Scale

Letter Grade	Percentage
A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	70%
D	60%
F	< 60%

### Late and Missing Submission Policy

This is a highly participatory course. Missing class discussions and exercises will significantly hurt the experience you will receive but also set back your pair and group project work. Feedback will not be given to late work and code samples for review from peers will be chosen based on quality and timeliness. There is a 30% late penalty for missing deadlines without prior excuse.

## Bonus Policy

There might be some out of class bonus opportunities in the form of tackling issues in queues or joining discussions in our community. These will be brought up as they take place.

## Rubric Criteria

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The purpose of this course is to better understand modern web development and grow as a developer. The rubrics for the individual projects will be released when the projects are introduced though this is **primarily a participatory endeavor when it comes to code quality**. There are multiple ways of writing code based solutions. Solutions that are not valid will be judged accordingly, but if effort is exhibited will receive at least partial credit.

## Additional Policies

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### Disability Accommodation

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) website provides [contact information for every Penn State campus](http://equity.psu.edu/sdr/disability-coordinator) (<http://equity.psu.edu/sdr/disability-coordinator>). For further information, please visit Student Disability Resources website (<http://equity.psu.edu/sdr/>).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: [See documentation guidelines](http://equity.psu.edu/sdr/guidelines) (<http://equity.psu.edu/sdr/guidelines>). If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

### Counseling and Psychological Services

Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional well-being. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

- [Counseling and Psychological Services at University Park \(CAPS\)](http://studentaffairs.psu.edu/counseling/) (<http://studentaffairs.psu.edu/counseling/>): 814-863-0395
- Counseling and Psychological Services at [Commonwealth Campuses](http://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/) (<http://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/>)
- Penn State Crisis Line (24 hours/7 days/week): 877-229-6400  
Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

### Educational Equity/Report Bias

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the [Report Bias webpage](http://equity.psu.edu/reportbias/) (<http://equity.psu.edu/reportbias/>).

## Academic Integrity

Academic integrity—scholarship free of fraud and deception—is an important educational objective of Penn State. To learn more about academic integrity at Penn State, please visit the Penn State Academic Integrity site. Academic dishonesty can lead to a failing grade or referral to the Office of Student Conduct.

Academic dishonesty includes but is not limited to:

- cheating,
- plagiarism,
- fabrication of information or citations,
- facilitating acts of academic dishonesty by others,
- unauthorized prior possession of examinations,
- submitting the work of another person or work previously used without informing the instructor and securing written approval,
- tampering with the academic work of other students,
- copying from other students, answer keys, or solutions sets, and
- having a tutor complete an assignment

### *How Academic Integrity Violations Are Handled*

In cases where academic integrity is questioned, the Policy on Academic Integrity indicates that procedure requires an instructor to notify a student of suspected dishonesty before filing a charge and recommended sanction with the college. Procedures allow a student to accept or contest a charge. If a student chooses to contest a charge, the case will then be managed by the respective college or campus Academic Integrity Committee. If a disciplinary sanction also is recommended, the case will be referred to the Office of Student Conduct.

All Penn State colleges abide by this Penn State policy, but review procedures may vary by college when academic dishonesty is suspected. Information about Penn State's academic integrity policy and college review procedures is included in the information that students receive upon enrolling in a course. To obtain that information in advance of enrolling in a course, please contact us by going to the Contacts & Help page.

### *For More Information on Academic Integrity at Penn State*

For the university and specific college information visit one of the following sites:

- Penn State Senate Policy on Academic Integrity

## Course Copyright

All course materials students receive or to which students have online access are protected by copyright laws. Students may use course materials and make copies for their own use as needed, but unauthorized distribution and/or uploading of materials without the instructor's express permission is strictly prohibited. University Policy AD 40, the University Policy



Recording of Classroom Activities and Note Taking Services addresses this issue. Students who engage in the unauthorized distribution of copyrighted materials may be held in violation of the University's Code of Conduct, and/or liable under Federal and State laws.

Course content is licensed under Creative Commons Attribution-NonCommercial-ShareAlike

## **CC BY-NC-SA**

## **Help Resources**

If you need technical assistance at any point during the course, please reach out on Slack or via email.

## **Student Responsibilities and Conduct**

1. Students are responsible for online course content, taking notes, obtaining other materials provided by the instructor, taking tests (if applicable), and completing assignments as scheduled by the instructor. As a general rule, students should plan on spending at least three hours per course credit per week on the course.
2. Students are responsible for keeping track of changes in the course syllabus made by the instructor throughout the semester.
3. Students are responsible for monitoring their grades.
4. Students must contact their instructor (and teammates when working on any collaborative learning assignments) as soon as possible if they anticipate missing long periods of online time due to events such as chronic illnesses, death in the family, business travel, or other appropriate events. The instructor will determine the minimal log on time and participation required in order to meet course responsibilities. In the event of other unforeseen conflicts, the instructor and student will arrive at a solution together.
  - a. Requests for taking exams or submitting assignments after the due dates require documentation of events such as illness, family emergency, or a business-sanctioned activity.
  - b. Conflicts with dates on which examinations or assignments are scheduled must be discussed with the instructor or TA prior to the date of the examination or assignment.
5. Students are responsible for following appropriate netiquette (network etiquette) when communicating with their instructor and classmates. For reference:
  - a. [Email and Communication Strategies](#)
6. Behaviors that disrupt other students' learning are not acceptable and will be addressed by the instructor.
7. For severe and chronic problems with student disruptive behavior, the following will be applied for resolution:
  - a. Senate Committee on Student Life policy on managing classroom disruptions: [Office of Student Conduct](#)
  - b. [Penn State Principles](#)

## **Military Personnel**

Veterans and currently serving military personnel and/or spouses with unique circumstances (e.g., upcoming deployments, drill/duty requirements, disabilities, VA appointments, etc.) are welcome and encouraged to communicate these, in advance if possible, to the instructor in the case that special arrangements need to be made.

## Netiquette

The term "Netiquette" refers to the etiquette guidelines for electronic communications, such as e-mail and bulletin board postings. Netiquette covers not only rules to maintain civility in discussions, but also special guidelines unique to the electronic nature of forum messages. Please review Virginia Shea's "[The Core Rules of Netiquette](#)" for general guidelines that should be followed when communicating in this course.

## Subject to Change Statement

Please note that this Course Syllabus is subject to change. Students are responsible for abiding by such changes. See course website for latest schedule (<https://oer.hax.psu.edu/bto108/sites/edtechjoker/>) and Canvas (<https://canvas.psu.edu>) for assignment drop boxes.