CIS 3308 Web Application Programming (Upper Level CS Elective)

Fall 2020: Instructor Sally Kyvernitis (key-ver-NEE-tees)

Course Description

In this course students will learn how to design and implement web applications – both server side and client side code. We use open source (free) development tools such as the Netbeans Bundle (includes NetBeans sensitive editor / compiler as well as Apache Web Server and Glassfish JSP application server), MySQL (Database Management System) and MySQL Workbench (GUI to help you create SQL to interact with a database). In this course, students write code in the following languages:

- HTML (structure and content of web page),
- CSS (styling of web page),
- JavaScript (web page functionality)
- Java/JSP (server side code that we use to create Web APIs that provide database access using SQL within Java).
- SQL (to create and modify data).

In this course, students shall:

- Create a web application UI (User Interface) using HTML and CSS. Use JavaScript for client side functionality.
- Create their own MySql database and populate it with data.
- Publish their web applications using the sftp protocol.
- Test their web applications using the https protocol.
- Create Web APIs (server side Java/JSP code that access their database) that output produce data in the JSON web format which is easily converted to JavaScript objects (client side) and to Java objects (server side).
- Write client side code (JavaScript/AJAX) to invoke the Web APIs.
- Use server side objects such as out, request, and session (out is how you write to the page, request contains URL input parameters, session is what we use for log in).
- Implement log on and learn about web application security.
- Apply software design patterns such as MVC (Model-View-Controller), SRP (Single Responsibility Principle), DRY (Don’t Repeat Yourself), and Dependency Injection (if consumer code calls provider code, provider code shall not access any aspect of consumer code – except for whatever consumer code passed to provider code).

Although each student’s web application will employ HTML/CSS to provide some aesthetic appeal, web design is not the major thrust of this course. Instead, this course focuses on designing and implementing client side and server side code to create a reliable, secure, extensible and maintainable web application. We will focus on the enduring basics of web development (HTML, CSS, JavaScript, Server Side Programming), but we will also learn a bit about ReAct which is (at this moment) a popular JavaScript Single Page Application Framework. Students must recognize that frameworks come and go but the basics are enduring.
Syllabus for CIS 3308  Web Application Programming

Course Prerequisites

- Grade of C- or better in CIS 2107 Computer Systems and Low-Level Programming
- Grade of C- or better in CIS 2168 Data Structures

The only assumption is that students have knowledge and skills obtained in the pre-requisite courses listed just above. All other topics will be introduced as new material, even though some students may already have had some exposure. *Students with more experience can add extra functionality to their weekly assignments (if they wish), as long as they meet all homework requirements and submit on time.*

FALL 2020 – This course is being offered online.

- You’ll need a computer (to install your IDE), a reasonable internet connection, and a web cam and (for taking tests). I’d suggest a PC/MAC laptop with at least 8 gigs of RAM (16 would be better if buying a new laptop). I suggest SSD instead of a mechanical hard drive (256 gigs or 512 would be better). SSD makes your laptop run faster and consume less battery.
- Synchronous Zoom classes may be recorded. If you do not wish your image to be shown to other students, you do not have to enable your Zoom video. If you do not wish your words to be heard by other students, you can send your course input to the instructor via email.
  
  Any recordings permitted in this class can only be used for the student’s personal educational use. Students are not permitted to copy, publish, or redistribute audio or video recordings of any portion of the class session to individuals who are not students in the course or academic program without the express permission of the faculty member and of any students who are recorded. Distribution without permission may be a violation of educational privacy law, known as FERPA as well as certain copyright laws. Any recordings made by the instructor or university of this course are the property of Temple University.
- Zoom, Proctorio or a similar proctoring tool may be used to proctor exams and quizzes in this course. These tools verify your identity and record online actions and surroundings. It is your responsibility to have the necessary government or school issued ID, a laptop or desktop computer with a reliable internet connection, Chrome software with Proctorio extension installed, a webcam or built-in camera and microphone, and system requirements for using Proctorio, Zoom, or a similar proctoring tool.
- Limited resources are available for students who do not have the technology they need for class. Students with educational technology needs, including no computer or camera or insufficient Wifi-access, should submit a request outlining their needs using the [Student Emergency Aid Fund](#) form. The University will try to meet needs, such as with a long-term loan of a laptop or Mifi device, a refurbished computer, or subsidized internet access.
- Be available during the times that the course is scheduled - for synchronous activities like tests and group learning.
- If you have a DRS accommodation for extended time to take tests, make sure you have the extra time that you need – either before or after your scheduled lecture time.
TEMPLE AND COVID-19  Temple University’s motto is Perseverance Conquers, and we will meet the challenges of the COVID pandemic with flexibility and resilience. The university has made plans for multiple eventualities. Working together as a community to deliver a meaningful learning experience is a responsibility we all share: we’re in this together so we can be together.

Instructor Office Hours Via Zoom: https://temple.zoom.us/s/5168459269

- Wednesdays  11:30 am – 1pm
- Fridays 10 am – 11:30 am
- And by appointment (email me at sallyk@temple.edu to set up a time).
- Zoom screen sharing is a very effective way to assist students with programming/technical problems.
- You can see instructor office hours as well as Lab Assistant office hours listed in Canvas listed by date when you click on the Syllabus link from the left nav bar.

Textbook and Course Materials/Delivery

- There is no text book. Web references and other materials will be posted online. This is the course web site.
- A Canvas course will contain various assignments (with due dates). You’ll upload your work and receive your grades through Canvas. You’ll also publish your web application code to a Temple Web Server.

Course Format

- Synchronous Zoom Lectures. We’ll use the “flipped classroom” approach. Students will study material, watch pre-recorded videos, and (usually) answer discussion questions prior to the synchronous Zoom meetings (which occur during the scheduled lecture time). In the Zoom meetings, we’ll engage in active learning activities such as going over discussion responses, answer questions, take polls, and have breakout sessions.
- Homeworks. Almost every week, there will be a programming assignment that is highly related to lecture topics. For your homework, you will:
  - Write code (implementing what’s indicated in the Homework Requirements document), test it locally. Then, publish it and test what you published.
  - Perform a self assessment by checking through the deductions at the end of the HW.
  - Upload a zip file of your WHOLE web application (NetBeans project) into Canvas. In case of a question about a Homework grade, we go by the code that you uploaded into Canvas.
  - Homeworks are cumulative, not separate. Your project’s functionality will grow with each HW.
  - If you have not completed your homework by the due date, you can still submit it within the following week (with a -20% penalty). After that, homeworks are not accepted, but you still have to complete the work to avoid further deductions on your project grade.
- Project. Your project is the culmination of all your labs (all combined into a SINGLE, regression tested, web application). Your project grade is based on functional testing plus a code review of all your source code. So, each week, be sure to keep your code well designed/organized, bug free, and properly indented, with self documenting names and comments.
• **Lab Activities.** Almost every week, there will be a graded Lab Activity which is a short, scripted exercise, usually involving sample code. Lab Activities are typically designed to give you the skills you need to get started on your homework – often you’ll complete a subset of the homework assignment.
  o Before the Lab Activity becomes unavailable, you must:
    ▪ Publish your work to your “Lab Activity” web folder (on cis-linux2). You have two folders so that your Lab Activity (a more temporary and more focused project) does not “clobber” your homework/project code that’s published in your “regular” web folder.
    ▪ Upload a zip file of your whole project folder into Canvas – if there’s every a question about the grade for a Lab Activity, we will resolve it based on the code submitted into Canvas.
  o There is no late submission policy for lab activities. If you don’t meet the deadline, you don’t get a grade for the lab activity. (However, if a student has a long term documented illness, let the instructor know – perhaps an accommodation can be reached.)
  o To account for unexpected problems, your lowest Lab Activity grade will be dropped.

• **Formative Quizzes.** “Formative quizzes” are designed to help you absorb and retain new concepts. Formative quizzes will not be timed or proctored, you’ll have many days to do them, and you’ll probably get two attempts to take them. I’ll provide formative quizzes when you are learning something new, e.g. for topics like HTML, CSS, JavaScript, AJAX/JSON, Databases, Web APIs (Server Side code).

• **Tests.** The tests in this course are designed to see if you really understand the programming techniques that you have been studying (in sample code) and submitting (for homework). Tests will be given at a specific time and proctored (by Proctorio software that uses AI to ensure that you are doing your own work without help from other people, other software, or the internet). ***The only way to do well on the Tests is to experiment a lot with sample code and homework code*** (and don’t accept too much help doing your homework). There will be **NO final exam** during the final exam period.

• **Tutorial Option.** Students who want to write extensive code some code from scratch should select the Tutorial option, picking from a wide array of topics. The tutorial involves writing extensive JS code (consumer/provider style), explaining the code, and presenting to the class. Those who select the Tutorial Option will not have to do the Insert Homework.
  o In order to get a course grade better than B you must select the Tutorial Option. This assignment demonstrates mastery of the course material.
  o To select the Tutorial Option, you must submit a Tutorial Proposal (worth 0 points) by its due date.
  o If you are struggling with homeworks, it may be best not to select the tutorial option because it is a very open ended assignment with no sample code.
Syllabus for CIS 3308 Web Application Programming

- **Weekly Routine.** In Canvas, if you click on the Syllabus link, you’ll see a list of all class assignments, organized by due date. The weekly routine will typically be:
  
  - **Monday-Tuesday (complete before Tuesday 3:30 when class starts):** Open the “Before Lecture” entry (find it listed by due date from the Canvas syllabus). See what materials to study, what videos to watch, and usually what (graded) discussion question you should answer.
  
  - **Tuesday (3:30):** Connect to the Zoom meeting during the scheduled lecture time (a “synchronous” meeting). In class, you’ll engage in learning activities, interacting with other students and asking questions. Hopefully you will come away understanding the concepts you’ll need to begin your Lab Activity, which is usually a subset of the homework. Your attendance and participation will be noted.
  
  - **Tuesday Night / Wednesday:** You can start the Lab Activity early. You are not required to connect to the Zoom Meeting that’s held by your Lab Assistant during lab time, but you can do so if you have a question. Complete your Lab Activity (publish and submit) by 5pm Wednesday. Late submissions are not accepted. Lab Activities are easy (should take < 2 hours) and scripted (e.g., download sample code, make minor changes). They should give you the skills you need to begin the week’s homework.
  
  - **Before Thursday 3:30:** Open the “Before Lecture” entry for this lecture and see what you are being asked to do prior to class (study materials, watch videos, answer discussion questions).
  
  - **Thursday 3:30:** Connect to the Zoom meeting during your scheduled lecture time and participate in class activities. By the end of the class, you should feel confident to complete your homework for the week. Your attendance and participation will be noted.
  
  - **Friday-Monday:** Complete, publish, and submit your homework, applying knowledge you got from watching videos and experimenting with the sample code. It’s best to complete the homework before preparing for the next module (e.g., finish by Monday night), but the homeworks are not due until Wednesday at 12:45 (before the start of your next lab). Take any formative quizzes that may be part of the module.
Syllabus for CIS 3308 Web Application Programming

Attendance Protocol and Your Health. Since CIS 3308 will be offered online in the fall, some of this does not really apply, but I was asked to include it in the syllabus.

If you feel unwell, you should not come to campus, and you will not be penalized for your absence. Instructors are required to ensure that attendance is recorded for each in-person or synchronous class session. The primary reason for documentation of attendance is to facilitate contact tracing, so that if a student or instructor with whom you have had close contact tests positive for COVID-19, the university can contact you. Recording of attendance will also provide an opportunity for outreach from student services and/or academic support units to support students should they become ill. Faculty and students agree to act in good faith and work with mutual flexibility. The expectation is that students will be honest in representing class attendance.

If you should fall ill, please email me as soon as you can so that we can work out an arrangement for you to complete course requirements.

Tentative (and approximate) Grade Weights

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Activities, must be completed in lab (about 11, drop lowest)</td>
<td>10%</td>
</tr>
<tr>
<td>Class Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Includes Discussion responses, Synchronous Class Attendance and Activities</td>
<td></td>
</tr>
<tr>
<td>Programming Homeworks (about 9)</td>
<td>20%</td>
</tr>
<tr>
<td>OR if Tutorial selected (about 8 HWs plus Tutorial)</td>
<td></td>
</tr>
<tr>
<td>Project (culmination of all Homeworks plus code review)</td>
<td>20%</td>
</tr>
<tr>
<td>Formative Quizzes (not timed, not proctored, usually you get two tries)</td>
<td>10%</td>
</tr>
<tr>
<td>2 Tests (timed, proctored using Proctorio software)</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

EXCEPTIONS:

- If the average of your Test grades is less than C-, your course grade will also be less than C- (and you need at least C- to be able to count this course towards CS major requirements). This is to ensure that you are actually studying sample code and experimenting with it (not just copy/pasting it and getting help from others to complete your homework).
- To get a course grade higher than B, you must select the Tutorial Option.

Temple Grade Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100: A</td>
<td>83-86: B</td>
</tr>
<tr>
<td>90-92: A-</td>
<td>80-82: B-</td>
</tr>
<tr>
<td>87-89: B+</td>
<td>77-79: C+</td>
</tr>
</tbody>
</table>
Syllabus for CIS 3308 Web Application Programming

Tentative Course Schedule - To see actual dates click on “Syllabus” from your Canvas Course.

Each homework usually takes one week to complete (except as listed below).

- Homework 1: **Home Page** (HTML and CSS)**
- Homework 2: **JavaScript User Interface** (JavaScript**, Drop Down Menus and Routing)
- Homework 3: **Database**
- Homework 4: **Data Display** (AJAX and JSON**, more about JS Software Design)
  - Tutorial Proposal due for students who will pick the Tutorial Option
- Homework 5: **Web APIs**
  - The first homework that uses server side programming. Must begin using enhanced instructions for installing sample code, debugging, and publishing.
- Homework 6: **Log On** and Web Application Security *(2 weeks)*
  - First Comprehensive Test
- Homework 7: **Insert** Homework or **Tutorial** *(2 weeks)*
  - Lab Activity on React, a JavaScript Single Page Application Framework.
- Homework 8: **Update** *(2 weeks)*
  - Student Tutorial Presentations
- Homework 9: **Delete**
  - Second and Last Comprehensive Test

** planning to have formative quizzes when introducing this new material.

---

Coverage of Concepts in the Homework Assignments

<table>
<thead>
<tr>
<th>#</th>
<th>Homework Name</th>
<th>HTML CSS</th>
<th>JS</th>
<th>Database Design and SQL</th>
<th>AJAX</th>
<th>JSON</th>
<th>Server Side Programs: JSPs/Web APIs, tunneling in</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Homepage</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>JavaScript UI (Drop Down Menu &amp; Routing)</td>
<td>√</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Database</td>
<td></td>
<td></td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Display Data</td>
<td>√</td>
<td>√√</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Web APIs</td>
<td>√</td>
<td>√√</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Log On</td>
<td>√</td>
<td>√√</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Insert</td>
<td>√</td>
<td>√√</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Update</td>
<td>√</td>
<td>√√</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Delete</td>
<td>√</td>
<td>√√</td>
<td>√√</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Miscellaneous

- **Set up your development environment on your PC/MAC ASAP** so you can work from home. The CIS 3308 Web Page has instructions to help you with this (google “SallyK Temple”, click on Teaching – CIS 3308).

- **Communication:** Please contact me as soon as possible if you think you are running into difficulties. Ask me, or your lab instructor, or another student for help AS SOON AS POSSIBLE.

- **Attendance:** All “lectures” will be recorded and available for students to watch at their convenience but students need to be available during scheduled class times for synchronous activities like tests. *If you have a DRS accommodation, make sure you have enough time either before or after your scheduled lecture time.*

- **Disability Disclosure:** Any student who has a need for accommodation based on the impact of a disability should contact me privately to discuss the specific situation as soon as possible. Student must provide me with a note from the office of Disability Resources and Services (100 Ritter Annex, 215-204-1280). Please bear in mind that COVID-19 may result in a need for new or additional accommodations.

- **Academic Honesty and Ethics:** You are expected to observe the highest ethical standards. When working in the lab or on your project, you may consult others, but the work you submit must be your own. Never share your answers with others. Never accept answers from others. All violations of academic honesty will be handled according to university policy.

- **Student Support Services** (Note: additional information about how students can access support services will be available later in the summer. There will be a color-coded system on Tuportal indicating which services are virtual or in-person.) The following academic support services are available to support you:
  
  - Student Success Center
  - University Libraries
  - Undergraduate Research Support
  - Career Center
  - Tuttleman Counseling Services
  - Disability Resources and Services

If you are experiencing food insecurity or financial struggles, Temple provides resources and support. Notably, the Temple University Cherry Pantry and the Temple University Emergency Student Aid Program are in operation as well as a variety of resources from the Office of Student Affairs.

**Fall 2020 IMPORTANT DATES:**

- Monday 8/24: Start of semester
- Tuesday 9/8: Last Day to Drop (you don’t pay for the course and it will not appear on your transcript).
- Monday 3/12: Mid Term Ratings end.
- Tuesday 10/20: Last Day to Withdraw (you pay for the course, W stays on your transcript, no effect to GPA).
- Monday 11/23 – Friday 11/27: Fall Break (includes Thanksgiving)
- Monday 12/7: Last day of classes