

# INFO-I 425

## Web Services in Information Systems

Department of Human-Centered Computing

Indiana University School of Informatics and Computing, Indianapolis

Summer 2019

**Credit Hours:** 3 lecture hours

**IT Building Location:** Informatics & Communications Technology Complex,  
535 West Michigan Street, Indianapolis, IN 46202 [\[map\]](#)

**Canvas Web Site:** <http://canvas.iu.edu>

**Supplemental Web Site:** <http://www.iupui.edu/~i425/>

**Instructor:** Louie Zhu, Ph.D.

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**Office hours:** by appointment

## Course Description

This course examines how cloud computing and service-oriented architecture contribute to solutions for Informatics problems in areas such as business, health care, and life sciences. Students will develop an understanding of why, when, and how organizations utilize Web services to manage data, as well as the skills to design, implement, and deploy Web services applications.

## Prerequisites

This course assumes prior knowledge and experience with procedural and object-oriented programming in PHP, designing information systems with the MVC pattern, and developing dynamic, data-driven web applications with server-side technologies and relational databases. Prior to taking this course, students are expected to complete INFO I211 Information Infrastructure II with a C or better grade or have acquired equivalent experiences.

## Course Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Explain technologies that support service-oriented architectures
2. Define RESTful and SOAP Web services
3. Design and develop RESTful APIs capable of executing CRUD operations
4. Secure RESTful APIs using Bearer, JSON Web Token, and OAuth2 authentication approaches
5. Use advanced JavaScript techniques to handle HTTP requests and responses
6. Create Single Page Applications to consume RESTful API data
7. Map OOP objects to database data with Eloquent Object-relational Mapping (ORM)
8. Develop information systems rapidly with the Slim PHP framework

## Program-level Learning Outcomes

Please visit <https://soic.iupui.edu/undergraduate/degrees/informatics/learning-outcomes/> to view the complete list of the program-level learning outcomes for B.S. in Informatics. This course is designed to mainly demonstrate the following PLOs:

- B3. Create computer programs in one or more programming languages
- D1. Apply fundamental concepts of software architecture
- D2. Define terms and explain principles essential to design of IT and computing systems
- D4. Design dynamic and data-driven web applications
- D5. Design large complex multilayered information systems with software design patterns
- D6. Design web service consumers and producers in service-oriented architectures

**Program-level and course learning outcomes map:**

<b>Program-level Learning Outcomes</b>	<b>Level of Knowledge*</b>	<b>Course Learning Outcomes</b>	<b>Profiles of Learning for Undergraduate Success</b>	<b>Assessment</b>
B3. Create computer programs in one or more programming languages	M	C5, C6	P3.2. Innovator: Creates/designs	Lab 2
D1. Apply fundamental concepts of software architecture	M	C7	P2.3. Problem Solver: Analyzes, synthesizes, and evaluates	Lab 1
D2. Define terms and explain principles essential to design of IT and computing systems	R	C1, C2	P1.1. Communicator: Evaluates information	Lab 3
D4. Design dynamic and data-driven web applications	R	C3, C6	P1.4. Communicator: Conveys ideas effectively	Lab 4
D5. Design large complex multilayered information systems with software design patterns	M	C4	P2.1. Innovator: Creates/designs	Lab 5
D6. Design web service consumers and producers in service-oriented architectures	I	C3	P3.2. Innovator: Creates/designs	Lab 6

\*Indicators of level of knowledge: I – Introduce; R – Reinforce; M – Master

## Recommended Books

- An introduction to APIs, free eBook: <https://zapier.com/learn/apis/>
- Building Restful Web Services with PHP 7: <https://www.packtpub.com/application-development/building-restful-web-services-php-7>
- PHP Web Services, 2nd Edition: <http://shop.oreilly.com/product/0636920042860.do>

## Video Courses from LinkedIn.com/leaning (was Lynda.com)

Please search for these titles in LinkedIn.com/learning.

- Programming foundations: web services
- Learning REST APIs
- Designing RESTful APIs
- REST API Basics
- WordPress REST API

## Equipment Needed

- A reliable laptop computer running Windows, Mac OS, or Linux operating system. Please visit <https://soic.iupui.edu/technology/laptop> for information on the Laptop Initiative for Informatics majors.

## Software Needed

- XAMPP: You can download it from <http://www.apachefriends.org/en/xampp.html>. For Mac users, please install XAMPP for OS X. Do not install XAMPP-VM (virtual machine).
- PhpStorm: You can download it from <https://www.jetbrains.com/phpstorm/>. To apply for a free license, please visit <https://www.jetbrains.com/student>.
- Postman: You can download it from <https://www.getpostman.com/downloads/>.
- Composer: Installation instructions can be found at <https://getcomposer.org/download/>.

## Tentative Weekly Schedule

Week #	Topics
1	<ul style="list-style-type: none"><li>• Welcome to I425</li><li>• Introducing Web services</li><li>• Providing Web services</li></ul>
2	<ul style="list-style-type: none"><li>• Providing Web services</li></ul>
3	<ul style="list-style-type: none"><li>• Providing Web services</li></ul>
4	<ul style="list-style-type: none"><li>• Securing Web services</li></ul>

5	<ul style="list-style-type: none"> <li>Consuming Web services</li> </ul>
6	<ul style="list-style-type: none"> <li>Consuming Web services</li> </ul>
7	<ul style="list-style-type: none"> <li>Finishing the course project</li> </ul>

## Grading Plan and Policy

Activity	% of Total
Class participation (attendance, attitude, investment in course)	10
Course project/Lab exercises	60
Quizzes	30
<b>Total</b>	<b>100</b>

The table below shows the minimum percentage for each letter grade. Please note percentages will not be rounded up when grades are determined.

Letter Grade	Minimum %	Interpretation
A+	97.0	Professional level work, showing highest level of achievement
A	93.0	Extraordinarily high achievement, quality of work; shows command of the subject matter
A-	90.0	Excellent and thorough knowledge of the subject matter
B+	87.0	Above average understanding of material and quality of work
B	83.0	Mastery and fulfillment of all course requirements; good, acceptable work
B-	80.0	Satisfactory quality of work
C+	77.0	Modestly acceptable performance and quality of work
C	73.0	Minimally acceptable performance and quality of work
C-	70.0	Unacceptable work (course must be repeated for credit)
D+	67.0	Unacceptable work (course must be repeated for credit)
D	63.0	Unacceptable work
D-	60.0	Unacceptable work
F	0	Unacceptable work

## Homework Assignments

1. **Reading:** Reading materials from various sources will be assigned for each study unit. Although they will not be collected and graded, they are critical to your success in this course.
2. **Course project and lab exercises:** This is a comprehensive, group project that lasts as long as the summer session II. This project requires students to design and develop multiple systems that either provide or consume RESTful web services. The project is divided into multiple phases and each phase makes a lab that requires deliverables. The project is worth 60% of your final class grade.

## Quizzes

There will be several short quizzes throughout the class. Quizzes are designed to assess your understanding of materials covered in lectures and homework assignments. They may consist of multiple choices, true/false, and fill-in-blank questions.

## Expectations, Guidelines, and Policies

### Assignment Policy

This course may be difficult and may involve concepts and terms you've never encountered. Budget your time accordingly. To ensure fairness to all students, no extra work, extra credit, or anything outside the regular homework and quizzes will be assigned.

Lab exercises will be typically made available on Wednesday and due Wednesday of the following week. Exact due date and time will be included in the assignment instructions. Students are responsible for the deadline. Since you will turn in your labs by uploading files in Canvas, make sure you allow enough time for your files to travel to the Canvas server from your local computer. Following rules will apply to all assignments:

- a. To receive full credits, an assignment must be turned in by its deadline.
- b. A late assignment is acceptable if it is not more than one hour later than the deadline. A 40% penalty will be applied.
- c. Any work turned in more than one hour late is not acceptable.
- d. Partially completed work is accepted for partial credits.

### Quiz Policy

Except the syllabus quiz, all quizzes are timed. They must be completed in class within given minutes. Quizzes are closed note. There will be no makeup quizzes and no early quizzes under any circumstances. If you miss a quiz, you will get a zero for the quiz.

### Attendance and Participation Policy

IUPUI policy is that attendance is mandatory for all undergraduate classes. A basic requirement of this course is that you will attend all class meetings, arrive on time, and participate in all class activities. Class attendance is required for this course. It entails being present and attentive for the entire class period.

The instructor is required to submit to the Registrar a record of student attendance, and action shall be taken if the record conveys a trend of absenteeism

Learning is not a passive process. All learning requires active participation. You will be doing collaborative learning activities in every class. You will learn not only from your instructor and the course materials but also from one another. Students may be organized into learning groups. Even though sometimes working in groups can be difficult, working in teams and learning to communicate and listen are key skills to develop and improve and they are part of the course objectives. Expectations of your class participation include:

- a. Engagement: Proactively and regularly volunteer, contribute to class discussion, ask relevant questions, or respond to others' questions.
- b. Attention: Actively and respectfully listen to your instructor and peers and maintain full engagement throughout class.
- c. Behavior: Never display disruptive or inappropriate behavior in class and never use smart phone or laptop to conduct course unrelated activities.

Class attendance and participation together are worth of 10 points, which account for 10% of your final grade. You earn attendance and participation credits by attending classes and participating in learning activities. The following table shows how attendance score is calculated from your attendances.

<b>Number of attendances</b>	<b>Number of absences</b>	<b>Attendance score</b>
13	0	10
12	1	8
11	2	4
10	3	0
9 or less	4 or more	FN

Absence, unless it can be excused due to one of the following reasons, reduces your attendance score and your final course score. Missing more than three classes results in a final course grade of F. Missing class may also reduce your participation score and course grade by eliminating opportunities for class participation. For all absences, you are responsible for all covered materials and assignments.

Only the following are acceptable excuses for absences:

- Death in the immediate family
- Hospital stay, serious illness, accident
- Jury duty; court ordered summons
- Religious holidays
- University/school coordinated athletic or scholastic activities
- An unanticipated, life event that severely impacts the student and/or immediate family

To be excused, an absence must be approved at least one week before the class date. You must explain your absence with the submission of appropriate documentation to the satisfaction of the instructor. If

the absence is due to some unanticipated event, documents must be submitted to the instructor within one week after you return to class after the absence. Absences that do not satisfy the above criteria are considered unexcused. To protect your privacy, doctor's excuses should exclude the nature of the condition and focus instead on how the condition impacts your attendance and academic performance.

Please note a minor illness such as cold or flu is not considered a valid excuse for missing a class. If you have a serious illness, a psychological disorder, or a chronic health condition, consider going through the Adaptive Educational Services (AES) office.

### **Signing in to class**

In each class, you must sign in using the sign-in application at <https://www.iupui.edu/~i425/signin> to record your attendance. You may also access the sign-in app via a link in the Canvas course site. If you do not sign in while in class, you shall be marked absent. If one signs in then leaves, the sign-in record will be deleted, and the class shall be marked absent. Leaving a class early must get approval from the instructor or the class shall be marked absent. When you sign in, your sign-in time and IP address of the computer you use to sign in are recorded. After you sign in, your attendance report displays. This attendance report is the only official document of your attendance.

### **Tardy Policy**

Regular tardiness disrupts the class and affects the learning of other students. All students are expected to be on time in each class. Punctuality is a measure of responsibility. An accumulation of regular tardiness could reduce your overall course grade. The tardy policy is structured as follows:

- Tardy (< 5) minutes = the grace period
- Tardy (5 – 30) minutes = 1 tardy
- Tardy (> 30) minutes = 1 absence
- 3 tardies = 1 absence

### **Correcting Errors in Scores and Attendances**

If a score or attendance is incorrectly recorded in Canvas or in the attendance report, correction must be made within a week of the item posted. One week after an item is posted, it will not be changed. Requests for correcting such errors must be submitted in writing (e.g. emails) and must be accompanied with proper proofs. If your request gets approved, the correction will be made; if the request does not get approved, you will receive an explanation why the request cannot be approved.

A maximum of two "I-forgot-to-sign-in" errors in the entire semester may be fixed. To have an "I-forgot-to-sign-in" error fixed, you must provide proper evidence to the satisfaction of the instructor. Proper evidence must be able to show you attended the class in question. Examples of evidences may include the work you completed in class, or emails from at least two classmates who could vouch and explain your attendance. If you are vouching someone's attendance, you need to explain and provide appropriate evidences.

### **Honor Code**



Passcode or password is used to ensure closed book quiz, exam, or sign-in is completed in class. Leaking a password or passcode to allow someone to take a quiz or to sign in outside class is against the course policies and a violation of Students Conduct code.

You may discuss your homework and projects with your classmates. Studying others' code samples to help you figure out what to do with your own code is also permitted. However, all submitted work must be your own. In the case of a group assignment, you must document who you worked with and describe the nature of your collaboration. Presenting other people's work as your own without properly crediting the actual source constitutes fraud.

Plagiarism undermines the academic integrity of Indiana University. Plagiarism will not be tolerated. Anyone detected as having been plagiarizing will be disciplined according to the IUPUI Student Code of Conduct. Multiple incidences of plagiarism may result in an F of the course grade. Academic misconduct will be reported using this form: <http://studentaffairs.iupui.edu/doc/student-rights/academic-misconduct-reporting-form.pdf>

### **Course Communications**

Communication for this course will be administered via Canvas. All announcements, assignments, grades, emails, etc. will take place in that medium. Please refrain from relying on direct email for course-related questions to the instructor or TA if avoidable. The instructor or TA should respond to emails within 48 hours, excluding weekends and holidays, and announce periods of extended absence in advance.

### **Incomplete**

The instructor may assign an Incomplete (I) grade only if at least 75% of the required coursework has been completed at passing quality and holding you to previously established time limits would result in unjust hardship to you. All unfinished work must be completed by the date set by the instructor. Left unchanged, an Incomplete automatically becomes an F after one year. For more information, please visit <http://registrar.iupui.edu/incomp.html>.

### **Use of Personal Electronic Device**

"Personal electronic device" means any device that electronically communicates, sends, receives, stores, reproduces, or displays voice and/or text communication or data. It includes, but is not limited to, cellular phones, pagers, smart phones, music and media players, gaming consoles, tablets, laptops, and personal digital assistants. Using such a device distracts the student using the device, his/her neighbors, and the professor. Additionally, this usage is viewed as disrespectful to all others. The quality of the learning experience suffers when these discourteous distractions occur. Therefore, use of such a device is strictly prohibited when a class session is undertaking. They shall be kept out of sight and powered off or silenced during a class meeting. If such a device must be kept on due to a special medical circumstance for self or family member, prior approval by the instructor shall be obtained. Use a tablet or laptop may be permitted if it is for taking notes or conducting instructional activities. Students should check with the instructor about permissible devices in class. Smart phones are only permitted for login to IU Central Authentication Service (CAT).

## Right to Revise

The instructor reserves the right to make changes as necessary to this syllabus. If changes are necessitated during the term of the course, the instructor will immediately notify students of such changes and the nature of change(s) in Canvas.

## Other Policies

**IUPUI Course Policies:** A number of campus policies governing IUPUI courses may be found at the following link: [http://registrar.iupui.edu/course\\_policies.html](http://registrar.iupui.edu/course_policies.html).

**Classroom Civility:** To maintain an effective and inclusive learning environment, it is important to be an attentive and respectful participant in lectures, discussions, group work, and other classroom exercises. Thus, unnecessary disruptions should be avoided, such as ringing cell phones, engagement in private conversations and other unrelated activities. Cell phones, media players, or any noisy devices should be turned off during a class. Texting, surfing the Internet, and posting to Facebook or Twitter during class are not permitted. Laptop use may be permitted if it is used for taking notes or conducting class activities. Students should check with the instructor about permissible devices in class. IUPUI nurtures and promotes “a campus climate that seeks, values, and cultivates diversity in all of its forms and that provides conditions necessary for all campus community members to feel welcomed, supported, included, and valued” (IUPUI Strategic Initiative 9). IUPUI prohibits “discrimination against anyone for reasons of race, color, religion, national origin, sex, sexual orientation, marital status, age, disability, or [veteran] status” (Office of Equal Opportunity). Profanity or derogatory comments about the instructor, fellow students, invited speakers or other classroom visitors, or any members of the campus community shall not be tolerated. A violation of this rule shall result in a warning and, if the offense continues, possible disciplinary action.

**Administrative Withdrawal Policy:** A basic requirement of this course is that students participate in all class discussions and conscientiously complete all required course activities and/or assignments. If a student is unable to attend, participate in, or complete an assignment on time, it is the student’s responsibility to inform the instructor. If a student misses more than half of the required activities within the first 25% of the course without contacting the instructor, the student may be administratively withdrawn from this course. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full refund period, and a student who has been administratively withdrawn from a course is ineligible for a tuition refund. Contact the instructor with questions concerning administrative withdrawal. For more information, please visit <http://registrar.iupui.edu/withdrawal-policy.html>.

**Code of Conduct:** All students should aspire to the highest standards of academic integrity. Using another student’s work on an assignment, cheating on a test, not quoting or citing references correctly, or any other form of dishonesty or plagiarism shall result in a grade of zero on the item and possibly an F in the course. Incidences of academic misconduct shall be referred to the Department Chair and repeated violations shall result in dismissal from the program. The Code of Academic Misconduct is available at <http://www.iu.edu/~code/code/responsibilities/academic/index.shtml>.

**Accommodation Statement:** Students needing accommodations because of a disability need to register with Adaptive Educational Services (AES) office and complete appropriate forms issued by AES before accommodations will be given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling 274-3241.

If you need any special accommodation, please talk to the instructor in the first or second week of the semester. Requests for post-event accommodations will not be approved. In other words, if you do not request accommodations prior to a test or the deadline of an assignment, you may not after the fact get accommodations such as changing a grade, dropping a test, retaking the test, or extending the deadline of the assignment. In addition, only the accommodations listed on the AES forms will be provided. The instructor will not approve requests for any accommodations that are not listed on the AES forms.

For more information, please visit the official web site of the IUPUI Adaptive Educational Services office at <http://aes.iupui.edu/>.

**Emergency Preparedness:** Safety on campus is everyone’s responsibility. Know what to do in an emergency so that you can protect yourself and others. For specific information, visit the emergency management website at <http://protect.iu.edu/emergency>.

**Bringing children to class:** To ensure an effective learning environment, children are not permitted to attend class with their parents, guardians, or childcare providers.

## Mission Statement

The Mission of IUPUI is to provide for its constituents excellence in

- Teaching and Learning;
- Research, Scholarship, and Creative Activity; and
- Civic Engagement.

With each of these core activities characterized by

- Collaboration within and across disciplines and with the community;
- A commitment to ensuring diversity; and
- Pursuit of best practices.

IUPUI’s mission is derived from and aligned with the principal components—Communities of Learning, Responsibilities of Excellence, Accountability and Best Practices—of Indiana University’s Strategic Directions Charter.

## Statement of Values

IUPUI values the commitment of students to learning; of faculty to the highest standards of teaching, scholarship, and service; and of staff to the highest standards of service. IUPUI recognizes students as partners in learning. IUPUI values the opportunities afforded by its location in Indiana’s capital city and is committed to serving the needs of its community. Thus, IUPUI students, faculty, and staff are involved in the community, both to provide educational programs and patient care and to apply learning to community needs through service. As a leader in fostering collaborative relationships, IUPUI values collegiality, cooperation, creativity, innovation, and entrepreneurship as well as honesty, integrity, and support for open inquiry and dissemination of findings. IUPUI is committed to the personal and professional development of its students, faculty, and staff and to continuous improvement of its programs and services.