IUPUI

SCHOOL OF INFORMATICS
AND COMPUTING

DEPARTMENT OF BIOHEALTH INFORMATICS
Indiana University–Purdue University
Indianapolis

INFO-B481 - Health Information Standards & Terminology

Spring 2018

Course Info	3 Credit Hours	On-campus and Online
Instructor	Samar Binkheder
Office	TBA
Email / **Phone**	sbinkhed@iu.edu
	Please add "B481" in the email's subject
Office Hours	By appointment
Prerequisites:	None

1. COURSE DESCRIPTION

This course gives an overview of the established standards for health care data interchange, and for the rapidly evolving field of biomedical informatics. The course will expose the principles and methodologies underlying most standards and also introduce the student to practical issues of reading and understanding specifications, implementing, and translating between standards.

2. EXTENDED COURSE DESCRIPTION

Health information is captured as data of various formats and types. If health data is to improve patient care or if research data from different sources need to be joined together health information standards are needed. Health information standards exist for data types and structures for messages, databases and documents as well as for the nomenclature of the myriad conceptual entities that are relevant for the biomedical domain (terminologies).

3. TEXTBOOKS, PAPERS AND REQUIRED TECHNOLOGY

It is suggested that students get their own copy of the textbooks. Each week, students will be asked to complete assignments based on the textbook and additional reading material that is shared on canvas. Please refer to the weekly schedule below for details about topics covered in the lectures and the book chapters that are essential reading for the course. Additional software tools will be made available through online resources that need to be downloaded or will be shared through canvas. You need to be able to install these on your personal machines.

3.1 GENERAL GUIDELINE ABOUT THE SYLLABUS

Students are responsible for familiarizing themselves with the syllabus. The instructor is responsible for being responsive to the diverse needs of the enrolled students and for making necessary modifications to this syllabus, which is to be treated as a living document.

3.2 TEXTBOOKS:
REQUIRED TEXT

Title:	Principles of Health Interoperability – SNOMED CT, HL7 and FHIR
Author:	Tim Benson, Graham Grieve
Copyright:	3rd Edition, 2016
Publisher:	Springer
Link:	http://www.springer.com/br/book/9783319303680

ADDITIONAL TEXT

Title:	Hacking Healthcare
Author:	Fred Trotter, David Uhlman
Copyright:	2013
Publisher:	O'Reilly
Chapters:	1, 2, 8, 10, 12, 11
Link:	http://shop.oreilly.com/product/0636920020110.do

3.3 SOFTWARE:

1. oXygen XML Editor 18.0 (XML editor): **[**available on IU workstations and IUWare downloads**]**
The oXygen XML Editor is a cross-platform application for document development using structured mark-up languages such as XML, XSD, Relax NG, XSL, and DTD. The intuitive Graphical User Interface of the XML Editor is easy-to-use and provides robust functionality for editing, project management and validation of structured mark-up sources. Coupled with XSLT and FOP transformation technologies.

2. Chrome with Postman addon (a web browser): [Installation at no cost]
A powerful GUI platform to make your API development faster & easier, from building API requests through testing, documentation and sharing. Chrome browser should be installed on all classroom machines. We will use the Chrome browser addon.

4. LEARNING OUTCOMES AND METHODS

a. Principles of Undergraduate Learning (PULs)

1. Core Communication and Quantitative Skills *Some emphasis*
2. Critical Thinking Moderate emphasis
3. Integration and Application of Knowledge *Major emphasis*
4. Intellectual Depth, Breadth, and Adaptiveness
5. Understanding Society and Culture
6. Values and Ethics

b. Core Competencies:

The following AMIA biomedical informatics core competencies[1] are covered in the course:

1. **Acquire professional perspective**: Summarize and explain the history and values of the discipline and its relationship to related fields while demonstrating an ability to read, interpret, and critique the core literatures.

2. **Analyze problems**: Analyze, understand, abstract, and model a specific biomedical problem in terms of data, information and knowledge.

3. **Articulate the rationale**: Defend the specific solution and its advantage over competing options

4. **Work collaboratively**: Demonstrate the ability to team effectively with partners from diverse disciplines

5. **Representation**: Understand and apply representations and models that are applicable to biomedical data, information, and knowledge

6. **Typology:** Explain and analyze the types and nature of biomedical data, information, and knowledge

7. **Procedural knowledge and skills**: For substantive problems related to scientific inquiry, problem solving, and decision making, analyze and critically evaluate solutions based on biomedical informatics approaches, particularly - Analyze, select, apply, and evaluate biomedical informatics methods

c. Teaching and Learning Methods

We all hope to have a wonderful time during this course. The most important point is that you want to enjoy the course material and also respect the others' right to enjoy the course by maintaining a suitable class atmosphere during the course. The course material, assessments, discussion and project management is done using Canvas LMS.

Active Learning (AL), Project-based learning (PBL), Team-based learning, Lecture by instructor – slides and audio-video aids.

4.1 LEARNING OUTCOMES:

Upon completion of this course, students will be able to:	RBT	PGPL	Core competencies	Assessment
1. Discuss the principles of data and knowledge structures in healthcare.	2	2	3, 1	Discussion, assignments, Quizzes
2. Analyze the underlying design of applications in healthcare and explain how data is interchanged	4	2, 3	2, 5, 6	Assignments, discussion, Quizzes
3. Demonstrate how standards are implemented technically and organizationally	3	1, 2	2, 7	Assignments, Quizzes
4. Defend and judge the appropriate use of a standard and terminology for interoperability	5	2, 1	3, 4, 5, 7	Discussion, Final project
5. Assemble standards and showcase interoperability between two disparate healthcare systems.	6	1, 2	2, 4, 5, 7	Assignments, Discussion

RBT: Revised Bloom's Taxonomy; PUL: Principles of Learning

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[1] https://www.amia.org/biomedical-informatics-core-competencies

5. WEEKLY SCHEDULE (HH=Hacking Healthcare; PHI=Principles of Health Interoperability; CD=class discussion; A=assignment; Q=Quiz)

Week	Papers and Reading	Assessment	Date
1	HH. Chapter 1: Health IT in USA; Chapter 2: Anatomy of medical practice; Chapter 8: Meaningful use overview;	Team formation	
2	HH. Chapter 10: Ontologies	A1 – measures CD: Case studies (PHI Chapter 1)	
3	HH. Chapter 11: Interoperability, till pg. 173; Chapter 12: HIPAA	A2 - i2b2 web client CD: Ontologies vs terminologies Q1	
4	PHI: Chapter 2: Why is interoperability hard?; Chapter 3: Models	CD: XML formats Q2	
5	PHI: Chapter 4: UML, BPMN, XML, JSON	A3 - XML, JSON Problem analysis Q3	
6	PHI: Chapter 5: Information Governance; Chapter 6: Standards Development Organizations;	CD: Discuss SDOs, data gathering Q4	
7	PHI: Chapter 7: Clinical Terminology; Chapter 8: Coding and classification systems;	A4: Terminology hierarchies CD: The chocolate teapot Q5	Feb22
8	PHI: Chapter 9: SNOMED CT; Chapter 10: SNOMED CT Concept model.	Dictionary mapping and final project proposal Q6	Mar1
9	PHI: Chapter 11: Implementing terminologies;	CD: Aggregating from dictionary Q7	Mar8
10	PHI: Chapter 12: HL7 v2; Chapter 13: HL7 v3 RIM;	HL7 RIM model Q8	Mar22
11	PHI: Chapter 14: Constrained information model; Chapter 15: Clinical Document Architecture	A5: validate XML CD: XML transform Q9	Mar29
12	PHI: Chapter 16: HL7 dynamic modeling; Chapter 17: Document sharing IHE XDS;	Q10	Apr5
13	PHI: Chapter 18: Principles of FHIR; Chapter 19: The FHIR RESTful API;	A6: RESTful API Deploy database Q11	Apr12
14	PHI: Chapter 20: FHIR Resources	Q12	Apr19
15	PHI: Chapter 21: Conformance and terminology; Chapter 22: Implementing FHIR	Final Project	Apr26

6. EVALUATION AND ASSESSMENT

As outlined above, each week students will read the chapters from the textbooks and any additional readings that are shared on Canvas. Attendance will be based on activities in the discussion forums. The class discussion is group work (assigned during the first class) to discuss a section from the reading material in depth. Assignments are usually an extension of the readings and material provided on the slides. These are tasks that should be performed individually by each student to showcase their understanding of the previous

lecture. The quizzes are conducted online in Canvas to evaluate assimilation and integration of knowledge. Quizzes are open book. Teams should discuss the topic for their final project and submit their final project proposal in the eighth week of the semester. Students will write a paper on a medical standard that is in use today. It's history, development, utilization, and why/why not it has survived.

6.1 COURSE GRADE BREAKDOWN
- Class participation (Discussions) …….………….…………………….. 10%
- Assignments (6 total) ………....………….………………………. 30%
- Quizzes. ……………………..…………………………………… 30%
- Final project. ……………….……………………………………. 30%

Grading Scale:

A+	97 – 100	Outstanding achievement, given at the instructor's discretion
A	93 – 100	Excellent achievement
A–	90 – 92.99	Very good performance and quality of work
B+	87 – 89.99	Good performance and quality of work
B	83 – 86.99	Modestly acceptable performance and quality of work
B–	80 – 82.99	Acceptable performance and low quality of work
C+	77 – 79.99	Marginal acceptable performance and low quality of work
C	73 – 76.99	Marginal acceptable performance and low quality of work
C–	70 – 72.99	Unacceptable work (Course must be repeated)
D+	67 – 69.99	Unacceptable work (Course must be repeated)
D	63 – 66.99	Unacceptable work (Course must be repeated)
D–	60 – 62.99	Unacceptable work (Course must be repeated)
F	Below 60	Unacceptable work (Course must be repeated for credit)

ATTENDANCE

Administrative Withdrawal [University Policy]

a. A basic requirement of this course is that you will participate in all class meetings (in this case assignments and discussions) and conscientiously complete all required course activities and/or assignments. Keep in touch with the instructor if you are unable to attend, participate, or complete an assignment on time.

b. If you miss more than half of the required activities within the first 25% of the course without contacting the instructor, you may be administratively withdrawn from this course by the instructor. For example: *This course meets once per week; thus, if you miss more than two classes in the first four weeks*, you may be withdrawn by the instructor. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full refund period, and if you are administratively withdrawn from the course you will not be eligible for a tuition refund.

c. If you have questions about the administrative withdrawal policy at any point during the semester, please contact the instructor. See campus policy in detail here: http://registrar.iupui.edu/withdrawal-policy.html

ASSIGNMENT DEADLINES

1. Late Assignments
   a. All project stages and assignments have due dates and times. All late assignments (even one minute) will receive a 10% reduction on that particular assignment. Assignments later than 24 hours will receive an additional 50% reduction. Assignments later than 48 hours will receive a zero.

2. Team Responsibility
   a. If a late assignment is due to the action of one team member, the entire team will reap the negative results. Only in extreme cases, unless tangible evidence suggests otherwise, will the late assignment policy be deferred. For this reason, it is imperative that team members establish a self-monitoring system that includes regular communication via email, text or phone. If a team has a team member who is not acting responsibly, the team may petition the instructor for a solution.
   b. If a student misses class on the day of their presentation, they will need to give a separate presentation without their team at another time within one week or receive a zero for that assignment.

CODE OF CONDUCT
1. 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.
2. All students are responsible for reading, understanding, and applying the *Code of Student Rights, Responsibilities and Conduct* and in particular the section on academic misconduct. Refer to *The Code > Responsibilities > Academic Misconduct* at http://www.indiana.edu/~code/. All students must also successfully complete the Indiana University Department of Education "How to Recognize Plagiarism" Tutorial and Test. https://www.indiana.edu/~istd
3. You must document the difference between your writing and that of others. Use quotation marks in addition to a citation, page number, and reference whenever writing someone else's words (e.g., following the *Publication Manual of the American Psychological Association*). To detect plagiarism instructors apply a range of methods, including Turnitin.com. http://www.ulib.iupui.edu/libinfo/turnitin

ACADEMIC MISCONDUCT

1. Cheating
   a. Cheating is considered to be an attempt to use or provide unauthorized assistance, materials, information, or study aids in any form and in any academic exercise or environment.
2. A student must not:
   a. Use external assistance on any "in-class" or "take-home" examination, unless the instructor specifically has authorized external assistance. This prohibition includes, but is not limited to, the use of tutors, books, notes, calculators, computers, and wireless communication devices.
   b. Use another person as a substitute in the taking of an examination or quiz, nor allow other persons to conduct research or to prepare work, without advanced authorization from the instructor to whom the work is being submitted.
   c. Use materials from a commercial term paper company, files of papers prepared by other persons, or submit documents found on the Internet.

d. Collaborate with other persons on a particular project and submit a copy of a written report that is represented explicitly or implicitly as the student's individual work.
e. Use any unauthorized assistance in a laboratory, at a computer terminal, or on fieldwork.
f. Steal examinations or other course materials, including but not limited to, physical copies and photographic or electronic images.
g. Submit substantial portions of the same academic work for credit or honors more than once without permission of the instructor or program to whom the work is being submitted.
h. Without authorization, alter a grade or score in any way, nor alter answers on a returned exam or assignment for credit.

3. **Plagiarism**
   a. Plagiarism is defined as presenting someone else's work, including the work of other students, as one's own.
   b. Any ideas or materials taken from another source for either written or oral use must be fully acknowledged, unless the information is common knowledge. What is considered "common knowledge" may differ from course to course.
   c. A student must not adopt or reproduce ideas, opinions, theories, formulas, graphics, or pictures of another person without acknowledgment.
   d. A student must give credit to the originality of others and acknowledge indebtedness whenever: 1) Directly quoting another person's actual words, whether oral or written; 2) Using another person's ideas, opinions, or theories; 3) Paraphrasing the words, ideas, opinions, or theories of others, whether oral or written; 4) Borrowing facts, statistics, or illustrative material; or 5) Offering materials assembled or collected by others in the form of projects or collections without acknowledgment

4. **Fabrication**
   a. A student must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citation to the sources of information.

5. **Interference**
   a. A student must not steal, change, destroy, or impede another student's work, nor should the student unjustly attempt, through a bribe, a promise of favors or threats, to affect any student's grade or the evaluation of academic performance.
   b. Impeding another student's work includes, but is not limited to, the theft, defacement, or mutilation of resources so as to deprive others of the information they contain.

6. **Facilitating Academic Dishonesty**
   a. Any student who intentionally or knowingly helps (or attempts to helping) another student to commit an act of academic misconduct (as outlined in this syllabus) or who allows another student to use his or her work or resources to commit an act of misconduct will face immediate academic discipline.

7. **Violation of Course Rules/Policies/Instructions**
   a. Student are strongly encouraged to adhere to all course rules, policies, and instructions as outlined in the course syllabus, verbal/written instructions, or the course materials that are rationally related to the content of the course or to the enhancement of the learning process in the course.

OTHER POLICIES

1. **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

2. **Classroom civility**:
   a. 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).
   b. 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.
   c. The School of Informatics and Computing holds that 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, either face-to-face or electronically. Texting, surfing the Internet, and posting to Facebook, Twitter, or other social media during class are generally not permitted.
   d. Students are strongly encouraged to switch their cell phones to vibrant during class time. If students receive what they believe to be an urgent call, they may quietly leave the classroom to address the matter.

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

4. **Disabilities Policy:** In compliance with the Americans with Disabilities Act (ADA), all qualified students enrolled in this course are entitled to reasonable accommodations. Please notify the instructor during the first week of class of accommodations needed for the course. Students requiring accommodations because of a disability must register with Adaptive Educational Services (AES) and complete the appropriate AES-issued before receiving accommodations. The AES office is located at UC 100, Taylor Hall (Email: aes@iupui.edu, Tel. 317 274-3241). Visit http://aes.iupui.edu for more information.

MISSION STATEMENT & STATEMENT OF VALUES

1. The Mission of IUPUI is to provide for its constituents excellence in: Teaching and Learning; Research, Scholarship, and Creative Activity; and Civic Engagement.
2. 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.
3. 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.
4. 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.