



IUPUI

**SCHOOL OF INFORMATICS
AND COMPUTING**

DEPARTMENT OF BIOHEALTH INFORMATICS

Indiana University–Purdue University
Indianapolis

Health Information Standards & Terminology- INFO-B581

Spring

Course Info	3 Credit hours
Location	Classroom & Online
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 Graduate and Professional Learning (PGPL)

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|--|--------------------------|
| 1. Knowledge and skills mastery | <i>Moderate emphasis</i> |
| 2. Critical thinking and good judgment | <i>Major emphasis</i> |
| 3. Effective communication | <i>Some emphasis</i> |
| 4. Ethical behavior | |

b. Core Competencies:

The following AMIA biomedical informatics core competencies¹ 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 has two sections combined, with online but synchronous class using Zoom, and face-to-face classroom participation. 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	Class discussion, assignments, midterm exam
2. Analyze the underlying design of applications in healthcare and explain how data is interchanged	4	2, 3	2, 5, 6	Project work, lab work, class discussion
3. Demonstrate how standards are implemented technically and organizationally	3	1, 2	2, 7	Assignments, lab work
4. Defend and judge the appropriate use of a standard and terminology for interoperability	5	2, 1	3, 4, 5, 7	Class discussion, lab work, project work, midterm exam
5. Assemble standards and showcase interoperability between two disparate healthcare systems.	6	1, 2	2, 4, 5, 7	Project work, lab work

RBT: Revised Bloom's Taxonomy; PGPL: Principles of Graduate and Professional Learning

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)

Week	Papers and Reading	Assessment
1	HH. Chapter 1: Health IT in USA; Chapter 2: Anatomy of medical practice; Chapter 8: Meaningful use overview; Lab: Calculating outpatient and inpatient MU guideline measures	A1 - measures CD: Case studies (PHI Chapter 1) Project: team formation
2	HH. Chapter 10: Ontologies Lab: i2b2 project intro, i2b2 query and analysis tool	A2 - i2b2 web client CD: Ontologies vs terminologies Project: use-cases for ontology
3	HH. Chapter 11: Interoperability, till pg. 173; Chapter 12: HIPAA Lab: HIPAA flowchart	A3 - Doc NPI
4	PHI: Chapter 2: Why is interoperability hard?; Chapter 3: Models Lab: Install oXygen and Postman	A4 - XML, JSON CD: XML formats
5	PHI: Chapter 4: UML, BPMN, XML, JSON Lab: XML in oXygen and JSON using REST	A5: XML to/from JSON Project: problem analysis
6	PHI: Chapter 5: Information Governance; Chapter 6: Standards Development Organizations;	CD: Discuss SDOs Project: data gathering
7	PHI: Chapter 7: Clinical Terminology; Chapter 8: Coding and classification systems; Lab: ICD browser, SNOMED browser	A6: Terminology hierarchies Mid-term exam CD: The chocolate teapot
8	PHI: Chapter 9: SNOMED CT; Chapter 10: SNOMED CT Concept model. Lab: SNOMED CT hierarchies	Project: Dictionary mapping and final project proposal
9	PHI: Chapter 11: Implementing terminologies; Chapter 12: HL7 v2; Lab: OpenMRS dictionary management	A7: Form and terminology management CD: Aggregating from dictionary
10	PHI: Chapter 13: HL7 v3 RIM; Chapter 14: Constrained information model; Lab: HL7 v2 import/export	A8: creating and importing patient records Project: HL7 RIM model
11	PHI: Chapter 15: Clinical Document Architecture Lab: XML validation	A9: validate XML CD: XML transform
12	PHI: Chapter 16: HL7 dynamic modeling; Chapter 17: Document sharing IHE XDS; Lab: XML transform	A10: write XSLT
13	PHI: Chapter 18: Principles of FHIR; Chapter 19: The FHIR RESTful API; Lab: Deploying a FHIR server	A11: RESTful API Project: Deploy database
14	PHI: Chapter 20: FHIR Resources Lab: Postman GET patient records, POST patient records	A12: Retrieve data from
15	PHI: Chapter 21: Conformance and terminology; Chapter 22: Implementing FHIR	Project demos Project presentation

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 needs to be marked on canvas, before the start of each class. 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 lab work or 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 mid-term exam is a class test of 30 mins that is conducted as a canvas quiz and evaluates assimilation and integration of knowledge. It is an open book exam. The project is assigned to the project teams after the second class, on an interoperability use-case, where each member has to perform a specific task for the team. Project work is to be divided by the team, but the topic is assigned by the instructor and teaching assistant.

6.1 COURSE GRADE BREAKDOWN

- Class participation (CD, attendance) 10%
- Assignments (12 total) 40%
- Mid-term exam 20%
- Project30%

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	Marginal acceptable performance and quality of work
C+	77 – 79.99	Unacceptable work (Core course must be repeated for credit)
C	73 – 76.99	Unacceptable work (Core course must be repeated for credit)
C–	70 – 72.99	Unacceptable work (Course must be repeated for credit)
D+	67 – 69.99	Unacceptable work (Course must be repeated for credit)
D	63 – 66.99	Unacceptable work (Course must be repeated for credit)
D–	60 – 62.99	Unacceptable work (Course must be repeated for credit)
F	Below 60	Unacceptable work (Course must be repeated for credit)

ATTENDANCE

1. Basic Policy

- All attendance and assignment deadline policies are in place to protect student educational rights, maintain grading equity, and promote team morale.
- Attendance shall be taken in every class. If you do not sign the attendance sheet while in class, you shall be marked absent. Signing the attendance sheet for another student is prohibited.
- Students are allowed a maximum of two absences. However, missing class does NOT excuse any student from weekly assignment deliverables. On the third absence, a student’s final grade will be reduced by 10-points. And on the fourth absence an additional 10-points will be subtracted from the final grade, and so on.
- If a student uses up their two absences, then has a serious event (forcing them to miss class), they will still receive a 10-point reduction in their grade. For this reason, we strongly recommend that students do not miss any classes, unless for unusually serious and documented reasons.

2. Administrative Withdrawal [University Policy]

- A basic requirement of this course is that you will participate in all class meetings 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.
- 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.
- 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.