**IUPUI**

## SCHOOL OF INFORMATICS AND COMPUTING

### DEPARTMENT OF BIOHEALTH INFORMATICS
Indiana University–Purdue University
Indianapolis

## INFO B530
## Foundations of Health Informatics

**Department of BioHealth Informatics**
**Indiana University School of Informatics and Computing, Indianapolis**

*Credit Hours:* 3
*Prerequisites:* None

## COURSE DESCRIPTION

This course will introduce the foundation of Health Informatics. It will review how information sciences and computer technology can be applied to enhance research and practice in healthcare. The basic principles of informatics that govern communication systems, clinical decisions, information retrieval, telemedicine, bioinformatics, and evidence-based medicine will be explored.

### Extended Course Description

The purpose of this course is to examine health informatics applications as they relate to the collection, storage, retrieval, communication and optimal use of health related data, information, and knowledge.  Students will be exposed to many of the subtopics in health informatics such as cognitive and statistical decision making, computer architecture and software engineering, standards, information retrieval, evaluation, electronic health records, personal health records, clinical decision support, natural language processing, public health, clinical research, telehealth and imaging.  Students will critically read and analyze the current literature on informatics subtopics as well as develop the writing and collaboration skills critical to success in the field.

### Required Textbooks and Papers

Required and optional readings will be defined for each week and will be found in the weekly learning modules.  The weekly readings consist of journal articles, a topic mini lecture, and slides.  Additional independent readings may be recommended.

    1. **Book**: Shortliffe, E.H., Cimino, J.J. (2014).  Biomedical Informatics: Computer

Applications in Health Care and Biomedicine (4<sup>th</sup> ed.). Springer. ISBN: 1447144732
http://www.amazon.com/gp/product/1447144732

2. **Articles**: Articles are provided by the instructor in the weekly modules in Canvas.
3. **Mini lectures and slides**: Each week the slides and/or mini lecture will be posted in the Canvas module.  It is highly recommended that students read any required articles or book chapters before reviewing these items.

## Teaching and Learning Methods

- Lectures
- Readings
- Threaded topical discussions
- Professional writing
- Literature searches

## Learning Objectives

| Course Objective | AMIA functional domains | Proposed competency driven objectives | Miller's Pyramid(map) | Class activities | assessment |
|---|---|---|---|---|---|
| 1. Outline the academic discipline of health informatics and the role of clinical health care applications. | F1 | Student will be able to summarize characteristics of health informatics in academics and in clinical practices | KNOWS | Weekly readings, Quizzes, Assignments, journal clubs, CNS posts, Article critiques, discussions, News Articles or Annotated bibliography | Discussion, homework, journal club |
| 2. Describe and critically appraise current practices and business processes in health informatics. | F4 | Student will be able to identify and critically analyze current practices and business processes in health | KNOWS HOW | Weekly readings, Quizzes, Assignments, journal clubs, CNS posts, Article critiques, discussions, News | Journal club, paper, discussion |

| | | informatics | | Articles or Annotated bibliography | |
|---|---|---|---|---|---|
| 3. Be sensitive to issues of privacy and the social, ethical and policy implications of health informatics practices. | F5 | Student will be able to recognize issues of privacy and the social, ethical and policy implications in practice of health informatics | KNOWS | Weekly readings, Quizzes, Assignments, journal clubs, CNS posts, Article critiques, discussions, News Articles or Annotated bibliography | Discussion, homework |
| 4. Summarize current health informatics application challenges and opportunities and generate potential solutions. | F4 | Student will be able to identify challenges and opportunities in practical health informatics applications and propose potential solutions | KNOWS HOW | Weekly readings, Quizzes, Assignments, journal clubs, CNS posts, Article critiques, discussions, News Articles or Annotated bibliography | Journal club, homework, discussions |
| 5. Analyze the integration between research, clinical data, and theory in improving patient outcomes. | F3 | Student will be able to identify the discrepancies between clinical research, theory and practice and improve patient outcome | KNOWS HOW | Weekly readings, Quizzes, Assignments, journal clubs, CNS posts, Article critiques, discussions, News Articles or Annotated bibliography | Journal club, paper, homework |
| 6. Explain how health | F9 | Student will be able to | KNOWS HOW | Weekly readings, | Homework, journal club, |

| | | | | | |
|---|---|---|---|---|---|
| data including clinical, administrative, and financial data are used in health care applications | | differentiate the roles of clinical, administrative, and financial data used in health care applications | | Quizzes, Assignments, journal clubs, CNS posts, Article critiques, discussions, News Articles or Annotated bibliography | discussions |
| 7.Compose an Article critique and annotated bibilography | F4 | Student will be able to critique health informatics literature and compose annotated bibliography | KNOWS HOW | Weekly readings, Quizzes, Assignments, journal clubs, CNS posts, Article critiques, discussions, News Articles or Annotated bibliography | Paper |

**Principles of Graduate and Professional Learning (PGPL)**

1. Knowledge and skills mastery            Major emphasis
2. Critical thinking and good judgment      Moderate emphasis
3. Effective communication                Some emphasis
4. Ethical behavior                      Some emphasis

**AMIA Core Competencies[1] covered in this 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 literature
2. **Analyze problems**: Analyze, understand, abstract, and model a specific biomedical problem in terms of data, information and knowledge components
3. **Work collaboratively**: Demonstrate the ability to team effectively with partners from diverse disciplines
4. **Disseminate and discuss**: Communicate effectively to audiences in multiple disciplines in persuasive written and oral form
5. **Evaluation:** controlled trials, observational studies, hypothesis testing, ethnographic methods, field observational methods

6. **Ethical, Legal, Social Issues:** human subjects, HIPAA, informed consent, secondary use of data, confidentiality, privacy
7. **Fundamental knowledge:** Understand the fundamentals of the field in the context of the effective use of biomedical data, information, and knowledge, particularly translational and clinical research, healthcare, providers, consumer health, quality assurance, safety, error reduction, medical records, personal health records, information security and privacy, population health
8. **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 framing complex biomedical informatics problems in terms of data, information, and knowledge.

**Evaluation and Assessment**

Detailed instructions regarding each assignment will be provided as the course progresses. Grading rubrics will be posted with the assignment.

Attention to the instructions, clarity of expression and presentation, grammar, and evidence of critical thinking are important for all assignments.

Grading will be distributed as follows:

| | Assignment | Percent |
|---|---|---|
| 1 | Homework (6-7 assignments) | 30% |
| 2 | Journal Club | 20% |
| 3 | Papers (Article critique, Annotated bibliography) | 25% |
| 4 | Class Discussion Board | 25% |
| | Total | 100% |

**Grading Scale (IUPUI standard)**

The conversion table from numerical format to letter grades is followed:

A+ 97 – 100 Outstanding achievement, given at the instructor's discretion
A 93 – 100 Excellent achievement
A– 90 – 92.99 Very good work
B+ 87 – 89.99 Good work
B 83 – 86.99 Marginal work
B– 80 – 82.99 Very marginal work
C+ 77 – 79.99 Unacceptable work (Course must be repeated)

| | | |
|---|---|---|
| C | 73 – 76.99 | Unacceptable work (Course must be repeated) |
| 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) |

**(1) Homework:** Assignments will be posted on Canvas and are expected to be turned in by the assigned deadline. Detailed posting and due dates are available online in the course schedule. Assignments will be submitted through Turnitin for originality assessment through the Canvas website.

**(2) Journal Club:** Each student will submit three articles with summaries over the course of the semester and comment on postings by other students. Details about journal club assignments will be posted in the Journal Club Forums.

**(3) Papers:** Two papers are assigned for the semester. The first is a formal article critique (select from 5 articles posted with the assignment) due at midterm. The second is an annotated bibliography (topic of choice) due at the end of the semester. This is a good time to start thinking about your master's thesis or project and start gathering background literature.

**(4) Discussion Boards:** Participation includes punctuality, regular posting, interacting with other students, thoughtful contributions to the discussion, and demonstrating that readings were completed before the class. See the rubric for the discussion board grading evaluation criteria.


In this course, there is no requirement to memorize the content of the presented material in the class; however, understanding the content and the logical relations among topics is crucial. You are permitted to use any legitimate sources of knowledge such as the web, books, slides, and published papers to find the answers; however, plagiarism is strictly prohibited. Group work (e.g., answering the questions while working in a group), personal assistance (e.g., asking a classmate to help you finding an answer), and sharing answers (e.g., emailing the answers to the class) by any means are not permitted.


**Grading Principles & Polices**


**Evaluation Forms:** Students should review all grading forms that will be used by the instructor to grade projects, presentations, papers, and other assignments.

Grades are available in the Canvas learning system as soon as the instructor or the teaching assistant grades assignments. Canvas also has a grade forecasting feature so you can always see what you need to achieve a desired grade.


*Criteria to evaluate written assignments (see individual assignments for specific rubrics):*
Exceptional quality (not quantity): (90-100 %)

- Evident that individual has completed all requirements
- Demonstrates applied level of understanding through personal reflections
- Answer is well-developed and logically reasoned

- Provides original insights or responses; extends comments of others
- Supports and leads others in discussion; respects others and their ideas

Superior quality (not quantity): (80-89%)

- Evident that individual has completed all requirements
- Demonstrates applied level of understanding through personal reflections
- Answer is provided; logic may not be clear
- Provides original insights or responses
- Makes connections to what others say; respects others and their ideas

Satisfactory quality and quantity: (60-79 %)

- Evident that individual has completed all requirements
- Primarily consists of summary or paraphrasing of readings
- Answer is not fully developed; logic is not clear
- Contribution is primarily a response to others; minimal originality
- Is respectful of others and their ideas

Does not meet expectations: (< 60%)

- Not clear that individual has completed all requirements
- Only consists of summary or paraphrasing of readings
- Minimal effort put into answer
- Is not respectful of others and their ideas

Requirements not completed (0)

### *Late work*

Assignments are due by the date and time posted in Canvas. All late assignments (even one minute) and will receive a 10% reduction on that assignment. Assignments later than 24 hours will receive an additional 10% reduction. Assignments later than 48 hours will receive a zero.

### *Team Responsibility*

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.

### *Extensions*

Extensions may be granted in the case of exceptional circumstances. You must discuss these circumstances with your instructor at least 24 hours before the assignment is due. (Note: Discussing the situation is not the same as merely informing your instructor.) In order for a late

assignment to receive full marks, it must include a note from the instructor confirming the extension date. An instructor note, attached to your assignment, can include a printed copy of an e-mail exchange between instructor and student indicating that an extension has been granted. Medical reasons for a late assignment must be documented by a doctor's note. Under normal circumstances (according to university regulations) medical excuses must be presented promptly (within two weeks from the date of the illness).

### *Backup copies*

Please keep an electronic copy and a hard copy of your final paper and presentation.

## Plagiarism[1]

Plagiarism is defined as presenting someone else's work, including the work of other students, as one's own. 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.

(1) A student must not adopt or reproduce ideas, opinions, theories, formulas, graphics, or pictures of another person without acknowledgment.

(2) A student must give credit to the originality of others and acknowledge indebtedness whenever:

- Directly quoting another person's actual words, whether oral or written;
- Using another person's ideas, opinions, or theories;
- Paraphrasing the words, ideas, opinions, or theories of others, whether oral or written;
- Borrowing facts, statistics, or illustrative material; or
- Offering materials assembled or collected by others in the form of projects or collections without acknowledgment.

*Please refer to http://www.psych.iupui.edu/capstone/plagiarism/what_is_it.htm for some tips about how to avoid plagiarism.*

### EXPECTATIONS, GUIDELINES, AND POLICIES

### Attendance:

A basic requirement of this course is that you will participate in all class meetings, whether online or face-to-face, and conscientiously complete all required course activities and assignments.

Only the following are acceptable excuses for absences: death in the immediate family (e.g. mother, father, spouse, child, or sibling), hospitalization or serious illness; jury duty; court ordered summons; religious holiday; university/school coordinated athletic or scholastic activities; an unanticipated event that would cause attendance to result in substantial hardship to one's self or immediate family. Absences must be explained with the submission of appropriate

documentation to the satisfaction of the instructor, who will decide whether missed work may be made up. 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.

Missing class reduces your grade through the following grade reduction policy: You are allowed two excused or unexcused absences. Each additional absence, unless excused, results in a 5% reduction in your final course grade. More than four absences result in an F in the course. Missing class may also reduce your grade by eliminating opportunities for class participation. For all absences, the student is responsible for all covered materials and assignments.

**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. http://registrar.iupui.edu/incomp.html

**Deliverables:**

You are responsible for completing each deliverable (e.g., assignment, paper, discussion) by its deadline and submitting it by the specified method. Deadlines are outlined in the syllabus or in supplementary documents accessible through the learning management system (e.g., Canvas).

**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.

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 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:** 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.

   a. A student must not 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. A student must not 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. A student must not use materials from a commercial term paper company, files of papers prepared by other persons, or submit documents found on the Internet.

d. A student must not 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. A student must not use any unauthorized assistance in a laboratory, at a computer terminal, or on fieldwork.

f. A student must not steal examinations or other course materials, including but not limited to, physical copies and photographic or electronic images.

g. A student must not 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. A student must not, without authorization, alter a grade or score in any way, nor alter answers on a returned exam or assignment for credit.

2. **Fabrication:** 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.

3. **Plagiarism:** Plagiarism is defined as presenting someone else's work, including the work of other students, as one's own. 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.

a. A student must not adopt or reproduce ideas, opinions, theories, formulas, graphics, or pictures of another person without acknowledgment.

b. 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. **Interference:** 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. 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.

5. **Violation of Course Rules:** A student must not violate course rules established by a department, the course syllabus, verbal or 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.

6. **Facilitating Academic Dishonesty:** A student must not intentionally or knowingly help or attempt to help another student to commit an act of academic misconduct, nor allow another student to use his or her work or resources to commit an act of misconduct.

## OTHER POLICIES

1. **Right to revise:** The instructor reserves the right to make changes to this syllabus as necessary and, in such an event, will notify students of the changes immediately.

2. **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

3. **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 generally 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.

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

5. **Email:** Indiana University uses your IU email account as an official means of communication, and students should check it daily for pertinent information. Although you may have your IU email forwarded to an outside email account, please email faculty and staff from your IU email account.

6. **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.

7. **Administrative Withdrawal:** 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.

8. **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. http://protect.iu.edu/emergency

## 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.