Foundations of Health Informatics– INFO 1530

Fall

Course Info 3 Credit hours
Location Online
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.

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.
## Student Learning Outcomes

Upon successful completion of the course, students will:

<table>
<thead>
<tr>
<th>1. Outline the academic discipline of health informatics and the role of clinical health care applications</th>
<th>PGPL</th>
<th>RBT</th>
<th>Core Comp.</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1, 4, 7, 8</td>
<td>Discussion, homework, journal club</td>
</tr>
</tbody>
</table>

| 2. Describe and critically appraise current practices and business processes in health informatics. | 1, 2, 3 | 2, 4, 5 | 1, 2, 4, 7, 8 | Journal club, paper, discussion |

| 3. Be sensitive to issues of privacy and the social, ethical and policy implications of health informatics practices. | 1, 2, 4 | 3 | 1, 6 | Discussion, homework |

| 4. Summarize current health informatics application challenges and opportunities and generate potential solutions. | 1, 2, 3 | 4 | 1, 2, 3, 4, 7 | Journal club, homework, discussions |

| 5. Analyze the integration between research, clinical data, and theory in improving patient outcomes. | 1, 2 | 4 | 1, 2, 4, 7, 8 | Journal club, paper, homework, discussions |

| 6. Explain how health data including clinical, administrative, and financial data are used in health care applications | 1 | 5 | 2, 5, 7 | Homework, journal club, discussions |

| 7. Compose an article critique and annotated bibliography. | 1, 2, 3 | 5 | 1, 2, 4 | Paper |

RBT: Revised Bloom’s Taxonomy, PGPL: Principles of Graduate and Professional Learning

### 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

\(^1\) [https://www.amia.org/biomedical-informatics-core-competencies](https://www.amia.org/biomedical-informatics-core-competencies)
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.


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.

### Course Content

Course content, timing, and readings may change. Updates will be posted in Canvas Modules.

<table>
<thead>
<tr>
<th>Week #</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction &amp; Ethics</td>
<td>Ch. 1, 10</td>
</tr>
<tr>
<td>2</td>
<td>Biomedical Data &amp; Cognitive Science</td>
<td>Ch. 2, 4</td>
</tr>
<tr>
<td>3</td>
<td>Probabilistic Reasoning</td>
<td>Ch. 3</td>
</tr>
<tr>
<td>4</td>
<td>Computer Architecture &amp; Software Engineering</td>
<td>Ch. 5, 6</td>
</tr>
<tr>
<td>5</td>
<td>Standards &amp; NLP</td>
<td>Ch. 7, 8</td>
</tr>
<tr>
<td>6</td>
<td>Imaging &amp; Imaging Systems</td>
<td>Ch. 9, 20</td>
</tr>
<tr>
<td>7</td>
<td>Evaluation</td>
<td>Ch. 11</td>
</tr>
<tr>
<td>8</td>
<td>Information Retrieval</td>
<td>21</td>
</tr>
<tr>
<td>9</td>
<td>Article Critique (midterm)</td>
<td>None</td>
</tr>
<tr>
<td>10</td>
<td>EHR – Clinic Centered</td>
<td>Ch.12, 13, 14</td>
</tr>
<tr>
<td>11</td>
<td>EHR – Patient Centered</td>
<td>Ch. 15, 17</td>
</tr>
<tr>
<td>12</td>
<td>Public Health &amp; Clinical Research</td>
<td>Ch. 16, 26</td>
</tr>
<tr>
<td>13</td>
<td>Clinical Decision Support</td>
<td>Ch. 22</td>
</tr>
<tr>
<td>14</td>
<td>Thanksgiving (no class)</td>
<td>None</td>
</tr>
<tr>
<td>15</td>
<td>Telehealth &amp; Remote monitoring</td>
<td>Ch. 18, 19</td>
</tr>
<tr>
<td>16</td>
<td>Future and Policy in HI</td>
<td>Ch. 27, 28</td>
</tr>
<tr>
<td>17</td>
<td>Annotated Bibliography (final)</td>
<td>None</td>
</tr>
</tbody>
</table>

### 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:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Homework</td>
<td>30%</td>
</tr>
<tr>
<td>2  Journal Club</td>
<td>15%</td>
</tr>
<tr>
<td>3  Papers (Article critique, Annotated bibliography)</td>
<td>25%</td>
</tr>
<tr>
<td>4  Class Discussion Board</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**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.

Note: International students are strongly encouraged to have their paper reviewed prior to submission by the IUPUI Writing Center. Graduate students can receive up to three (3) 1-hour sessions each week with a mentor at the Writing Center throughout the semester to address writing skills. Students are encouraged to contact the Writing Center early in the semester to schedule time before time slots at the end of the semester are filled. English writing skills are very important to success in any career. Improper use of the English language will result in a loss of points in this course.
(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 & Policies**

**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

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](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).