Introduction to Informatics (INFO-I 501) | Spring 2017

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

Course Information:
3 Credit Hours | Room: IT 257 | Mondays, 6 PM to 8:40 PM

Instructor:
Stuart Morton | smmorton@iupui.edu

Office Hours: By appointment

Teaching Assistants:
TBD

Prerequisites:
None (Not an extension of any undergraduate or graduate course)

General Guidelines to use 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 make necessary modifications to this syllabus, which is to be treated as a living document.

Course Description:

This course covers basic information representation and processing, namely organization and storage of data, data extraction, and data analysis. The focus of this course is an intensive introduction to the most central technical tools of Informatics in the context of Human-Computer Interaction (HCI).

Extended Course Description:

Understand the interaction by conducting experiments, collecting data, and analyzing the stored data. Such investigations crucially depend on the rigor of data collection, data extraction, and data analysis methods. This introductory course offers an inventory of basic data-centric tools and techniques that can be used towards any data-driven pursuits in human-computer interaction.

Texts

It is recommended that students get a personal copy of the required course text. Other course materials will be provided by the instructor.


Software
**phpMyAdmin (a GUI to practice MySQL):** This is not a web programming course, and we will not cover client-server programming. phpMyAdmin is a free software tool written in PHP, intended to handle the administration of MySQL over the Web. Students will be able to access their database account on the school’s server using their IU Network ID, and run queries. In a real-world scenario, either for a standalone application or a web application, one would write a program to automatically run database queries to collect/retrieve data (where the written program communicates with the phpMyadmin s/w). We will not cover that in this course. Students will learn how to formulate and directly run simple queries to store and retrieve data using the phpMyAdmin user interface.

**RStudio / RCommander:**

R is an integrated suite of software facilities for data manipulation, calculation and graphical display. The R commander (Rcmdr) program enables analysts to access a selection of commonly used R commands using a simple interface that should be familiar to most computer users. It also serves the important role of helping users to implement R commands and develop their knowledge and expertise in using the command line – an important skill for those wishing to exploit the full power of the program. Students are free to use any other GUI for R, or just use the command line for the R programming language.

**KNIME**

KNIME® Analytics Platform is the leading open solution for data-driven innovation, helping you discover the potential hidden in your data, mine for fresh insights, or predict new futures. Our enterprise-grade, open source platform is fast to deploy, easy to scale and intuitive to learn.

With more than 1000 modules, hundreds of ready-to-run examples, a comprehensive range of integrated tools, and the widest choice of advanced algorithms available, KNIME Analytics Platform is the perfect toolbox for any data scientist. ([KNIME](https://www.knime.org))

If you are unable to install the required s/w in your machine, please consider contacting the [UIITS](https://www.uits.indiana.edu). R is also available at most IUPUI computing labs.

**Class Schedule (Tentative)**

Readings are due before the corresponding lecture. Students are encouraged to use the lecture to pro-actively get their doubts cleared and questions answered.

Each class (6 PM - 8:40 PM) will essentially constitute of the following:

- **Lecture (45 - 60 minutes)**  
- **Break (15 minutes)**  
- **Lab (1 hour 25 minutes)**

During labs, students will engage in hands-on exercises covered during the corresponding lecture. Labs will also be used to advise students on their final projects during the second half of the course.

Articles marked with ** will be discussed in class as well as tested on the quiz. Discussions will be an opportunity to clarify doubts before students take the quiz. Posting discussion points on Canvas is not required, but can be used toward extra credit.

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<th>Week</th>
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<table>
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<td>1</td>
<td>1/9/2017</td>
<td>Course Introduction and Student Introductions</td>
<td>Syllabus</td>
<td>Course Technology. Chapter 1. Database systems.</td>
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Syllabus:
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<td>6</td>
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- R Intro Quiz  
- Final Project Update |
Chapter 4: Lists  
Chapter 5: Data frames Jordan, M., & Pfarr, N. (2014). Forget the Quantified Self: We Need to Build the Quantified Us. Opinion piece, WIRED. | R Data Structure Quiz  
Final Project Update |
Final Project Update |
| 10| 3/20/2017  | Spring Break                                                         |                                                                           |                                            |
Final Project Update |
Final Project Update |
Assignments

All assignments in this course are individually graded. Collaborative learning is strongly encouraged, but students should ultimately aim to master the technical skills.

Quizzes (30%):

- Quizzes will be due by **Friday 12 AM** following the Wednesday lecture. (Please check Canvas for any updated due date)
- Quizzes will be posted about one week before the due date and will remain open for one week following the original post date
- Quizzes aim to evaluate students' mastery on assigned weekly readings and technical topics covered in the lecture

Labs (10%):

- Labs are in-class activities. Students will use these exercises to practice the skills discussed in class. The instructor and the TAs will actively assist them in class. Labs will not be graded formally. Labs will be graded as following:
  - Did not submit: 0
  - Partially completed: 1
  - Satisfactorily Completed: 2
- The purpose of these labs is not to evaluate students' mastery of skills, but to give them an opportunity to acquire the skills hands on. Students are strongly encouraged to take this opportunity to not only get advice from the instructor and the TAs, but also to collaborate with their
Midterm Exam (20%):

Midterm examination will cover the theory of databases and SQL. Exam will be open book and open notes. Exam will be online, timed, and objective (MCQ-type). Students will take the exam in class.

Final Project (40%):

- The final project will span 10 weeks of this course and provide students an opportunity to work through a data-analytic problem in Three weeks will be used toward a database problem.
- Rest of the weeks will be used toward solving data analysis
- Weekly updates of the final project will not be graded. They are an opportunity for the students to get feedback from the instructor and the TAs and steadily progress toward the successful completion of the project. Part of the lab time will be used for final project updates.
- Final project will be graded as each group will make a 15 minute presentation on the final day of the semester. During the presentation, students will demonstrate their solutions to the class by executing the code and walking them through their solution to their research question. The objective of this exercise is to evaluate students' knowledge skills, ability to demonstrate their thought process, and verify the correctness of their code. The teams will also provide a 3-4 page report that will discuss their research question, provide some current research references on that question and conclusions about their work.

Extra Credit Opportunities

May add some extra credit opportunities during the semester

Learning Outcomes

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

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<td>Quiz, Midterm exam</td>
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<tr>
<td>Knowledge and skills mastery, Critical thinking and good judgment</td>
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Describe the significance of Informatics, specifically data centric tools and techniques, toward designing Informatics applications.

Inform the design of Informatic applications from user data by storing and manipulating large amounts of data in a relational database. In that context, they will design a relational database, namely: - Define attributes, tuples, relations, domains, schemas, and keys in a relational database management system (RDBMS) - Apply relational model constraints - Apply relational algebra operations - Model real-world objects into relational tables - Identify problems and minimize redundancy in an RDBMS -
Identify data dependencies and incorporate them into the relational database design - Refine relational tables to have the most optimal database design using normalization.

Investigate specific research questions, such as the most popular feature of a mobile application, or the number of user errors in a text-entry field, design and apply SQL (and MySQL) queries and, specifically: - Define a relational database schema in SQL - Manipulate data with SQL - Apply relation operations with SQL - Generate SQL sub-queries

Plot the user data captured using graphs in R, to visually analyze trends and patterns, such as users’ time on the Internet decreased with age, or a certain website is more popular with females than males.

Conduct basic statistical tests in R and make some recommendations about visualizations to demonstrate the analysis of a dataset

Knowledge and skills mastery, Critical thinking and good judgment, Ethical behavior, Effective communication

Quiz, Final Project

Quiz, Final Project, Final Exam

Quiz, Final Project

Assessment & Evaluation

- Lab submission (Equivalent to class participation) 10%
- Quizzes(On reading material) 30%
- Mid-Term exam 20%
- Final Project 40%
- Total 100%
- Extra Credit Opportunity: TBD

Each week students will have assigned readings from course texts and supplementary articles (not more than 50 pages). Students should actively read the material and understand the concepts. This course will introduce two programming languages: SQL and R. Students with no (or little) programming background are encouraged to go through the supplementary materials (videos/ manuals/articles) that will be posted on Canvas or the course page. Four measures will be used to assess the learning competency from the course materials:

- Weekly quizzes on the readings will be given to assess learning and comprehension, as well as to determine whether students are doing the readings. Quizzes will be available on Canvas around one week prior to their assigned lesson. Students will have about one minute per question, and will be notified of errors after submission of the quiz. Quizzes will remain open for
review one week after their assigned. After this time, the quizzes will be closed, and late submissions will not be possible.

- A midterm examination (around 7th week of the class) will be given on the theory of databases and Exam will be open book and open notes.
- A final project involving data collection, data storage, data extraction, and data analysis will be assigned to assess the students’ overall learning of the course material.

Grading Scale:

**Attendance, Assignment Deadlines, and Late Policy:**

- Students are allowed a maximum of two However, missing class does NOT excuse them 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. If students have used up their first two absences, then have a serious event that forces them to miss class they will still receive a 10 point reduction in their grade. For this reason, we strongly recommend you do not miss class at all, unless for unusually serious reasons. These policies are in place to protect student and team morale, as well as to apply fairness to all students across the class.
- All assignments are due by the date and time posted on There is a late policy in this class, but it ONLY applies to quizzes. Late assignments (up to 1 day past the due date) will receive a 10% reduction on that particular assignment. Assignments later than 24 hours will receive an additional 10% reduction. Assignments later than 48 hours will not receive a grade. If you will not be able to meet an assignment deadline for any unavoidable circumstances, you are encouraged to contact the instructor in advance with a request for extension. However, a request does not guarantee an extension, and will only be given at the discretion of the instructor if allowed by the university policies.

Supplementary Materials

This course aims at assisting students to achieve an intermediate level of mastery in data-centric technical skills. Because some of the enrolled students often have minimum exposure to technical skills before this class, this section of the syllabus lists some additional material helpful to be successful in this course. This is a fast-paced course, and students are strongly encouraged to proactively use these materials (freely available online) and get familiarize with the contents of the class

Expectations, Guidelines, and Policies

**Attendance.** Class attendance is required for classroom-based courses. It entails being present and attentive for the entire class period. 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. 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. Illness or a death in the immediate family is usually the only acceptable excuse for absence from class. Absences must be explained to the satisfaction of the instructor, who will decide whether omitted work may be made up. To protect your privacy, doctor’s excuses should exclude the nature of the condition and focus instead on how the condition effects on your coursework.

Missing class reduces your grade through the following grade reduction policy: You are allowed two excused or unexcused absences. Regardless of the reason, a third absence results in a 5% reduction in your final grade and a fourth absence results in a 10% reduction. Further absences result in an F in the course. Missing class may also reduce your grade by eliminating opportunities for class participation.
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. [Source: http://registrar.iupui.edu/incomp.html]

Deliverables. You are responsible for completing each deliverable (e.g., assignment, quiz) by its deadline and submitting it by the specified method. Deadlines are outlined in the syllabus or in supplementary documents accessible through Canvas. Should you miss a class, you are still responsible for completing the deliverable and for finding out what was covered in class, including any new or modified deliverable. In fairness to the instructor and students who completed their work on time, a grade on a deliverable shall be reduced 10%, if it is submitted late and a further 10% for each 24-hour period it is submitted after the deadline.

Academic Misconduct. 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.

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 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. 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. 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. 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. A student must not use any unauthorized assistance in a laboratory, at a computer terminal, or on fieldwork. A student must not steal examinations or other course materials, including but not limited to, physical copies and photographic or electronic images. 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. 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.
**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.

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

**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.

**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.

**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.

**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.

**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. Texting, surfing the Internet, and posting to Facebook or Twitter during class are generally not permitted. 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.

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

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.

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](http://aes.iupui.edu) for more information.

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.

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](http://protect.iu.edu/emergency).

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.