**HI5330 Introduction to Bioinformatics**

Fall, 2015
3 Semester Credit hours

**Course Description**

The course gives a comprehensive entry-level introduction to bioinformatics. The course will present bioinformatics in the context of health informatics. It covers a wide variety of topics in bioinformatics, including sequence analysis, protein structure, genome analysis, proteomics data analysis, database, transcription profiling, etc, and how they may be used in clinical practices. The potential future impact of bioinformatics in health information system will also be discussed. The goals of the course include 1) help students understand the scope, the basic concepts and the theory of bioinformatics and 2) gain experience with the use of tools for bioinformatics related data analysis. Programming skills are not necessary. Laptop computer is necessary if students want to practice bioinformatics software and tools in class.

**Learning Objectives**

Upon successfully completing this course, students will be able to:

Upon successfully finishing this course, students will be able to:

* Define bioinformatics, including basic concepts and methodologies
* Analyze biological data, including but not limited to, gene sequences, gene expression, biological networks using existing tools using existing tools
* Evaluate bioinformatics tools
* Interpret biological data, especially from high throughput experiments
* Relate bioinformatics to health information system and clinical decision support

**Prerequisite/Co-requisite**

None

**Textbook**

***Required Readings***

Due to the relatively new content, we will not assign a book as required reading material. However, you are required to read all the course material and class handouts. In addition, the recommended readings below are of great value to help students to understand the topics covered by the course, and to broaden the view of students in this fast growing field.

***Recommended Readings***

1. Discovering Genomics, Proteomics & Bioinformatics

 [http://www.amazon.com/Discovering-Genomics-Proteomics-Bioinformatics2nd/dp/0805382194/ref=sr\_1\_1\_title\_0\_main?s=books&ie=UTF8&qid=1375976286&sr=11&keywords=discovering+genomics+proteomics+and+bioinformatics](http://www.amazon.com/Discovering-Genomics-Proteomics-Bioinformatics2nd/dp/0805382194/ref%3Dsr_1_1_title_0_main?s=books&ie=UTF8&qid=1375976286&sr=11&keywords=discovering+genomics+proteomics+and+bioinformatics)

2. NCBI Bookshelf—there are many books that can be searched for concepts and descriptions.

<http://www.ncbi.nlm.nih.gov/books/>

3. Bioinformatics and Functional Genomics

 By Jonathan Pevsner

[http://www.amazon.com/dp/0470085851/ref=rdr\_ext\_tmb](http://www.amazon.com/dp/0470085851/ref%3Drdr_ext_tmb)

**Instructor Information**

**W. Jim Zheng, Ph.D.**

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**Office Hours: The instructor is available by appointment.**

*Graduate Teaching Assistant*

None

**Method of Instruction**

This online course is broken down into weekly/topical instructional units. Every week, a new instructional unit will be presented, with each unit containing a combination of the following elements:

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| --- | --- | --- |
| Week |  | Topic |
| 1 |  | Class overview: Introduction to bioinformatics and history of bioinformatics. |
| 2 |  | What is bioinformatics? Role of bioinformatics in translational research and clinical practices |
| 3 |  | Biological information-categories, acquiring biological information |
| 4 |  | Biological information analysis-Sequence analysis |
| 5 |  | Biological information analysis-Transcription profiling by different methods. Biomarker discovery  |
| 6 |  | Biological information analysis- Next generation sequence and its impact on clinical practice |
| 7 |  | Midterm  |
| 8 |  | Student presentation-proposal of class projects |
| 9 |  | Biological information analysis-Biological networks and human diseases |
| 10 |  | Biological information analysis-Guest lecture by Dr. Bhavnani-Visual analysis of biological network to understand disease |
| 11 |  | Biological information analysis-Genetic variations and personalized medicine |
| 12 |  | Biological information analysis-microbiome and human health |
| 13 |  | Biological information dissemination-Web resources and tools  |
| 14 |  | Biological information dissemination-ethics, security and practice |
| 15 |  | Student presentation-project final submission |
| 16 |  | Final |

You are responsible for reading all the course materials, actively participating in the weekly activities including the discussion/forums, and completing the weekly quizzes. A class project will be developed by individual student and be evaluated and counted toward the final grade.

The instructor will respond to student emails, monitor student responses and answer questions posted on the discussion forums, send out weekly announcements or clarifications on certain quiz questions via email.

The instructional materials and activities for this course reside in Canvas, a Learning Management System (LMS). You can log into Canvas using your UTH credentials at [**https://uth.instructure.com/login/1**](https://uth.instructure.com/login/1)

The activities for each week should take you about 6 to 9 hours depending on your study skills and previous experience with graduate education, technology, on-line learning and Canvas.  Dedicate at least 3 hours each week on the current assignment and 3 to 6 hours of work outside of the course each week.

It is expected that you will access the course on a regular basis. As the course progresses you will get a better sense for how frequently you need to access the course site to complete and submit the assignments and meet the course objectives.  Canvas monitors your access and activities in the course and the course instructor may contact you if you do not access and make reasonable progress in the course over a period of time.

Successful course completion requireshaving access to the current course resources and materials,reading the course materials, actively participating in learning activities such as discussions, group projects and completing all assignments, quizzes and exams. Completing all the assignments is required in order to receive a course grade.

The instructor will respond to student emails, monitor student progress and answer questions posted on the discussion forums, and send out weekly announcements or emails to the class.

It is your responsibility to check your UTH e-mail account regularly (at least weekly) to make sure you receive announcements and information sent out by your instructor and TA.

Instructions and expectations (rubrics) are provided for assignments and grading throughout the course. A rubric is an explicit set of criteria used for assessing a particular type of work or performance and usually includes levels of potential achievement for each criterion. A rubric may be used to indicate what should be included on an assignment and the elements that will be graded. It is critical for your success in this course to align your effort with the criteria in the rubrics when working on the assignments.

**Grading**

The following evaluation criterion will be used for determining your grade for this course. Letter grades will be assigned based on the percentage of total points received (e.g., 90-100% =A, 80-89%=B, 70-79%=C, <60=F, and I (Incomplete)). An Incomplete is given only when situations outside of the student’s control occur. School policy mandates that an Incomplete must be completed by the end of the following semester. An Incomplete that is not completed by the end of the next semester will turn into an F automatically.

Your final class grade will largely be based on the results of all the assignments and activities (e.g., online discussions, quizzes, and completion of course project) that are designed to reflect your understanding of the course content. Finishing all the assigned readings, assignments, and activities **on time** will help you to achieve the objectives for this course. Late submissions will incur penalties and affect your final grade.

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| --- | --- |
| **Requirements** | **Percentage of Total Points** |
| Class Discussions | 10% |
| Term Project Proposal | 15% |
| Term Project Progress Report | 15% |
| Mid Term | 30% |
| Final | 30% |
| **Total** | **100%** |

Note: [Poster session](https://sbmi.uth.edu/current-students/student-handbook/poster-session.htm) will be held Monday afternoon of the finals week.

**Student Feedback / Evaluation of Instruction**

At the end of the semester, you will be asked to fill out an online “Course and Instructor Evaluation” survey.

**Instructors do not receive the aggregated results until all grading is done and course grades are submitted.**

**Instructors do not have access to the identity of the survey participants when they view the survey results.**

Please take time to finish the evaluation survey since it is helpful to evaluate the instruction and provide for revisions of future course offerings.

Your feedback is encouraged throughout the course and is always welcomed.

**Technical Requirements and Support**

Please make sure that your computer meets the minimum [hardware and software requirements provided at this link](https://sbmi.uth.edu/current-students/student-handbook/computer-requirements.htm). Additional instructions may be provided in the course for accessing other technologies if needed.

Students must have the latest version of their operating system installed including latest security updates and service packs. SBMI recommends installing and using the following anti spyware, malware and virus control software:

* For real time protection:
	+ Microsoft Security Essentials

<http://www.microsoft.com/security/pc-security/microsoft-security-essentials.aspx>

* + BitDefender Antivirus Free Edition

<http://www.bitdefender.com/solutions/free.html>

* + AVG

<http://free.avg.com/>

* Other malware removal tools:
	+ Malwarebytes Anti-Malware

<https://www.malwarebytes.org/free/>

* + Panda Cloud Cleaner

<http://pandacloudcleaner.pandasecurity.com/>

Students are required to have access to the following for accessing course materials and to complete course activities:

* [Stable high-speed internet](https://sbmi.uth.edu/current-students/student-handbook/computer-requirements.htm)
* Personal computer

This course may also require:

* Webcam for proctoring of online quizzes and exams
* Headsets with microphones for voice chatting

Troubleshooting procedures for educational technologies:

* In case of technical difficulties with proctored quizzes and exams, follow the troubleshooting procedures provided to you in the course and inform the instructor and the TA.
* For Canvas related questions, use the Help button located in the upper right corner in Canvas to email, chat or call for help. Canvas provides dedicated support to UTH users 24 hours a day, 7 days a week.

* You can direct all other technology related questions to the Distance Education Team (de@uth.tmc.edu). Currently, Distance Education Team is able to provide technical support only during business hours US Central Standard Time. Requests submitted after 5pm CST may take until the next business day to resolve. Please plan accordingly for time critical activities such as quizzes, exams, and submission dates for assignments.

In the online learning realm, trying to do things last minute is a sure way to fail and miss deadlines. It is your responsibility to allocate enough time to complete online course activities on time.

**Policies**

***Excused Absence on Holy Days***

Students who wish to observe a religious holy day that interferes with classes, examinations or completion of assignments, must inform the instructor of each class to be missed and/or of the planned absence(s) not later than the fifteenth day of the semester. The notification must be in writing and may either be delivered by the student personally to each instructor, with receipt of the notification acknowledged and dated by each instructor, or mailed by certified mail, return receipt requested, to each instructor. The full policy can be found at:
<http://www.uth.edu/hoop/policy.htm?id=1448072>

***Academic Honesty***

Academic honesty is the cornerstone of the academic integrity of a university. It is the foundation upon which the student builds personal integrity and establishes a standard of personal behavior. Because honesty and integrity are such important factors, you should be aware that failure to perform within the bounds of these ethical standards is sufficient grounds to receive a grade of "F" in this course and be recommended for suspension from the SBMI.

You should submit only your own work unless group work is indicated in your assignment. To demonstrate academic honesty, you should always indicate the use of works other than your own. Plagiarism is prohibited. Remember that most instances of plagiarism can be avoided by simply citing the source for the material that is used and thus indicating that it is not your original material. Plagiarism may include

* words or ideas taken from someone else without acknowledgment
* giving incorrect information about the source
* changing the sequence or structure but using ideas without citation
* not including material in quotes if directly taken from someone else’s material and/or copying amounts of other’s material and using it in violation of fair use copyright laws

With the advent of the Web and access to materials, the need to guard against using other’s material without acknowledgment is especially important. So, when in doubt, cite. Prevention is the best deterrent and thus avoids the academic consequences that may follow.

Per the [Exam and Written Paper Monitoring Policy](https://sbmi.uth.edu/current-students/student-handbook/exam-proctoring.htm), your submitted work may be subject to evaluation from [Turnitin](http://turnitin.com/) for plagiarism and some courses may require the use of [Proctorio](https://proctorio.com), an online proctoring software that will monitor and record you when you take online quizzes and exams.

Refer to the Student handbook [Student Conduct and Discipline](https://sbmi.uth.edu/current-students/student-handbook/student-conduct-and-discipline.htm) concerning plagiarism at <https://sbmi.uth.edu/current-students/student-handbook/unacceptable-conduct.htm>. More information regarding plagiarism and unacceptable conduct may be found at: [HOOP Student Conduct and Discipline](http://www.uth.edu/hoop/policy.htm?id=1448220) and <http://www.uth.edu/hoop/186-appendix-a.htm>. If you have questions or need additional information please let your instructor(s) know.

***Copyright Policy***

Information on copyright policy issues may be found at: [HOOP Classroom and Research use of Copyrighted Material](http://www.uth.edu/hoop/policy.htm?id=1447942).

***Intellectual Property***

Information on intellectual property issues may be found at: [HOOP Intellectual Property](http://www.uth.edu/hoop/policy.htm?id=1701961).

All materials presented in a course in Canvas are copyright protected unless otherwise noted.

***Course Accommodation***

Course accommodations are made in response to individual requests for accommodation. If you need accommodation please let your instructor(s) know. Information on disability issues may be found at: [HOOP Disability Accommodation](http://www.uth.edu/hoop/policy.htm?id=1447954).

If you believe you have a disability requiring an accommodation, please contact Dr. Susan Fenton, Associate Dean for Academic Affairs at (713) 500-3591 or by email at Susan.H.Fenton@uth.tmc.edu.

For additional information, contact Renee Williams, Equal Opportunity Admin at (713) 500-3416 , or by email at Renee.Williams@uth.tmc.edu.