Illinois Mathematics and Science Academy  
A Pioneering Educational Community  

Comprehensive Course Syllabus for  
Bioinformatics Fall 2015  

Instructors

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<td>Office Hours</td>
<td>I Days, 12-2 PM or by appointment</td>
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Meeting Information

Location: Tel-labs or B108

Meeting Times: 100 minutes 2x/week

Course Description

The bioinformatics seminar is focused on developing an understanding of the principles behind genomic analyses, developing skills using the different available bioinformatics programs, and becoming aware of the past developments and current research avenues that are benefited by these types of analyses.
The following IMSA Standards of Significant Learning are essential content that guide the choice of biological concepts found in Organisms and Ecosystems. As indicated in the list (FA = formal assessment; IA = informal assessment; and NA = not assessed), assessment is driven by them as well.

SSLs and Associated Assessed Outcomes

IA. Students are expected to demonstrate automaticity in skills, concepts, and processes that enable complex thought by:
   ➢ Completing homework activities and assigned reading to support content (IA),
   ➢ becoming adept at identified lab skills (NA),
   ➢ demonstrating competence on quizzes and (FA), and
   ➢ applying content knowledge in alternative scenarios and new problems (FA).

IB. Students are expected to construct questions, forge connections and deepen meaning
   ➢ informally in discussion groups, during set up and analysis of labs, and when observing data from experiments (IA), and
   ➢ in formal assessments (FA).

IC. Students are expected to precisely observe phenomena and accurately record findings
   ➢ through lab experiments and assessments (FA/IA), and
   ➢ through analysis of data generated from experiments (FA/IA).

ID. Students are expected to evaluate the soundness and relevance of information and reasoning
   ➢ by evaluating sources for research papers (FA),
   ➢ through analysis of experiments completed in lab (FA), and
   ➢ through explanation of models of phenomena in biology (FA).

IIA. Students confront misconceptions
   ➢ by completing a pre-assessment for the evolution unit (NA),
   ➢ processing information on the nature of science (FA),
   ➢ discussing the results in class (IA), and
➢ completing a follow-up assessment to determine extent of resolution of misconceptions (IA).

IIIA. Students use appropriate technologies as extensions of the mind
➢ through daily use of computers, including web sources and videos (NA),
➢ by using the course website as a resource (NA),
➢ by using computers to create graphical representations and perform other analyses of laboratory data (FA/IA/NA), and
➢ through use of standard laboratory equipment (NA).

IIIB. Students recognize, pursue, and explain substantive connections within and among areas of knowledge
➢ by studying the chemistry behind the biology (FA), and
➢ by studying the connections between sub-sections within biology (IA).

IIIC. Students recreate models and systems in biology, such as cell theory, evolution, DNA synthesis, as well as structures and functions of the cell and DNA, etc.,
➢ in classroom discussion and activities (IA),
➢ as well as in formal assessments (FA).

VB. In order for students to make reasoned decisions which reflect ethical standards, and act in accordance with those decisions, students
➢ are made aware of what plagiarism is, its ethical implications, and repercussions of plagiarizing (IA),
➢ are made aware of the scientific and ethical significance of accurately representing data (vs. not skewing data to fit expectations) (IA), and
➢ are assessed for the authenticity of written work and the efficacy of analysis of lab experimentation (FA).

Conceptual Content
Genomics Past & Future
Sequencing and Genome Mining
Introduction to NCBI usage
Primer Design
Sequence Alignment
Structure Predictions
Gene Expression

Textbook
There is no required textbook for this course, as we wish for students to create their own “book” from their course notes, the work they do with the material outside of class, and the worksheets and handouts provided to them. However, a variety of bioinformatics related textbooks will be available as references.
**Assessment**
Assessments will mostly be comprised of presentations, writing assignments, and projects. Students will be expected to demonstrate understanding and use of bioinformatics tools and analyses in a variety of ways, though traditional quiz or exam type assessments would be minimal, if included at all.

Grading generally falls along the following scale:
- 90% and above = A
- 80-89% = B
- 70-79% = C
- Below 70% = D

**Course Policies**

**Late work**
Students will have one “free pass” for late work, where they will be allowed to turn in an assignment within **24 hours** for no loss of credit, but only applicable to assignments approved by the instructor. Once the teacher hands back the assignment to anyone, students will no longer be able to submit their work for credit. If students indicate they want to use this opportunity, but then fail to turn in the assignment within the time indicated, the free pass is still considered used and void.

After the free pass has been used, **late work will not be accepted**, and will earn a grade of 0. If students are struggling to complete work, they should speak with their instructor in advance of the due date. Extensions may or may not be granted based on circumstance and rationale.

**Attendance**
See the IMSA handbook for official attendance policy. If you have a counselor excused absence, or an unexcused absence, you will not be able to make up the missed.
If you have an excused absence, be sure to contact your teacher to find out what you will miss. If that is not possible, you should see your teacher as soon as possible to discuss your absence. It is your responsibility to follow up on what you missed in class.

**Plagiarism**

Plagiarism is unacceptable and will be dealt with as per IMSA policy on academic dishonesty. Plagiarism includes, but is not limited to, knowingly using another person’s work – whether it is a student or a research paper – as your own, improper citations and bibliographic information, improper use of secondary sources, or any other behavior that is deemed dishonest.

**Contacting Your Teacher**

If at all possible, see your teacher in person! If that is not possible, send an email message, but be aware that it may take some time for your teacher to get back to you, particularly if you send a message after normal school hours. If you fail to get a response, go see your teacher when you can, or send another message.