
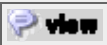


1. Explain the role of computational science in biology Descriptors: -Introduce the importance of computational science in biology -Introduce the history and application of computational science in biology – give specific examples (e.g., Bird Flu pandemic, SARS, oil spills, drug resistance and development, protein modeling, etc.) -Introduce the terminology associated with the field -Discuss future trends and potential issues (e.g. bioethics) in the field

		Response Percent	Response Count
Agree		86.7%	13
Disagree		6.7%	1
Not enough experience with topic to agree or disagree	the overall agenda for competency should be to ensure basic competency for computational search retrieval analysis and synthesis of biological knowledge	6.7%	1
	 If you chose "disagree", please specify what it is you disagree with on this competency.		1
		answered question	15
		skipped question	0

2. Demonstrate the use of database search engines and information retrieval methods Descriptors: -Reinforce the use of NCBI databases (e.g., OMIM, Books, GenBank, etc.) -Reinforce retrieval of research literature (e.g., PubMed) -Illustrate the use of a specific database with a biological example (e.g., inherited disease, etc.) -Reinforce biological concepts and terminology (e.g., transcription, translation, mutations, etc.)

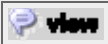
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		Response Percent	Response Count
Agree		93.3%	14
Disagree		6.7%	1
Not enough experience with topic to agree or disagree	This is important, but should be an expected prerequisite as regards the literature. More of a case could be made for OMIM, etc.	0.0%	0
 If you chose "disagree", please specify what it is you disagree with on this competency.			1
		<i>answered question</i>	15
		<i>skipped question</i>	0

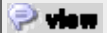
3. Demonstrate sequence analyses Descriptors: -Introduce computational concepts and terminology associated with sequence analyses and manipulation (e.g., BLAST, ClustalW, etc.) -Reinforce biological concepts and terminology associated with sequence analyses and manipulation (e.g., amino acid translates into protein, etc.) - Search and align a simple pair-wise sequence (e.g., microbial drug resistance, etc.) -Introduce sequence analysis techniques (e.g., PAM scoring matrix)

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	ent	nt
Agree	80.0 %	12
Disagree	13.3 %	2
Not enough experience with topic to agree or disagree	6.7%	1
<p>There has to be some biology prereq. These should be available, perhaps, as self-study modules, but describing translation seems way to basic for a serious bioinfo curriculum. On seq analyses, most emphasis should be on strengths and weaknesses of the approaches, and less on how to use the websites.</p> <p>Disagree in that the examples are not comprehensive enough but agree in principle</p>		
<p> If you chose "disagree", please specify what it is you disagree with on this competency.</p>		2
answered question		15
skipped question		0

4. Demonstrate basic phylogenetic tree construction, manipulation and analysis Descriptors: -Introduce computational concepts/methods and terminology associated with phylogenetic trees (e.g., maximum parsimony, etc.) -Reinforce biological concepts and terminology associated with phylogenetic trees (e.g., evolution, mutation, etc.) -Using selected data introduce the construction of a phylogenetic tree (e.g., chimps vs. orangutans, etc.) with a specific method and software package (e.g., MEGA3, MP, ML, ME and Bayesian) -Analyze results generated from tree construction (e.g., branch lengths, bootstrap number, etc.) -Edit and manipulate generated tree and analyze new results -Compare new results with original data

		Response Percent	Response Count
Agree		80.0%	12
Disagree		6.7%	1
Not enough experience with topic to agree or disagree	I am not this should be at such level. It sounds like at the graduate level.	13.3%	2
 view If you chose "disagree", please specify what it is you disagree with on this competency.			1
		<i>answered question</i>	15
		<i>skipped question</i>	0

5. Discuss basic protein structure and function Descriptors: -Reinforce biological/chemical concepts (e.g., primary, secondary, tertiary, hydrophobicity) and terminology associated with proteins (e.g., amino acid translates into protein, etc) -Introduce the basics of computational science in modeling protein structure (e.g., NCBI Cn3D viewer – using a selected plant amino acid sequence, translate data into protein sequence, then visualize 3D structure of protein sequence) -Reinforce the structure/function relationship (e.g., explain or illustrate that structural differences may lead to functional differences) -Introduce the basics of computational science in modeling protein function (e.g., growing industrial areas such as drug discovery)

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Agree		93.3%	14
Disagree		0.0%	0
Not enough experience with topic to agree or disagree	Amino acid translates into protein seems to be questionable. I agree with the primary descriptor but would like it to be revised into RNA translates into protein.	6.7%	1
	 If you chose "disagree", please specify what it is you disagree with on this competency.		1
		answered question	15
		skipped question	0

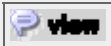
6. Discuss the fields of proteomics and genomics Descriptors: -Define the terminology associated with the fields of proteomics and genomics -Define tools (e.g., databases, such as microarray bioinformatics database at MIT and NCBI; show students how to plot and analyze this data using EXCEL) and basic approaches used in proteomics and genomics (e.g., DNA Microarrays, cluster analysis and visualization of data) -Using selected microarray data, construct a XY scatterplot, fit data to a straight line, analyze data for outliers -Discuss interpretation of results

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Agree		93.3%	14
Disagree		6.7%	1
Not enough experience with topic to agree or disagree	While this should discuss Proteomics and Genomics the focus is on microarray techniques. We need to mention the basic fields of proteomics as well. add pathway analysis, emphasize the uselessness of defining "significance" by fold change in microarrays	0.0%	0
	 If you chose "disagree", please specify what it is you disagree with on this competency.		2
		answered question	15
		skipped question	0

7. Introduce field of computational biomodeling Descriptors: -Define and discuss the terminology/concepts associated with the field of biomodeling (e.g., biological systems such as immunology, organs systems, cell function, etc.) and ecological systems modeling (e.g., predator/prey, global warming, etc.) -Illustrate the use of a biomodel by doing a research project • Select a model • Learn to manipulate the model • Predict outcome of action • Gather data generated by model • Analyze data • Interpret results • Demonstrate working model • Report results in written format


7. Introduce field of computational biomodeling Descriptors: -Define and discuss the terminology/concepts associated with the field of biomodeling (e.g., biological systems such as immunology, organs systems, cell function, etc.) and ecological systems modeling (e.g., predator/prey, global warming, etc.) -Illustrate the use of a biomodel by doing a research project • Select a model • Learn to manipulate the model • Predict outcome of action • Gather data generated by model • Analyze data • Interpret results • Demonstrate working model • Report results in written format

		Res pon se Perc ent	Res pon se Cou nt
Agree		73.3 %	11
Disagree		13.3 %	2
Not enough experience with topic to agree or disagree	<p>Thinking of an order of introduction of these, competencies 1 through 6 may be part of first one or two courses, in other words, "core/basics". While 7 is a bit more "applied" (in the sense that working knowledge of either physiology or ecology should be assumed) and thus can be labeled as "advanced".</p> <p>Again, I am not sure this is appropriate for an undergraduate. Although I am not sure if this is done in a Bioinformatics major or just an add on to other majors. It would be "Agree" to bioinformatics majors.</p> <p>Many bioinformatics courses do not include the modeling part. It might be considered as a competency of computational biology</p>	13.3 %	2
	 If you chose "disagree", please specify what it is you disagree with on this competency.		3
		<i>answered question</i>	15
		<i>skipped question</i>	0

8. Please indicate any other bioinformatics competencies you think we have missed.

<p>1. High dimensionality data exploration and analysis</p>	<p>Wed, 5/14/08 2:05 PM</p>	<p>Response Count</p>
<p>2. statistical foundations of bioinformatics computer programming database design, programming and management supercomputing (use and programming) motif discovery genetics simulators</p>	<p>Fri, 5/9/08 3:36 PM</p>	
<p>3. These are topics under category "advanced" – and may be field-specific: A) large-scale analysis of genomic sequences and other genomic data – and that would encompass (1) tools and approaches of feature prediction in prokaryotic and eukaryotic genomes, such as gene prediction, regulatory regions prediction, genome annotation etc (this in itself may be a fun course to offer), (2) introduction to genetic diversity data (Single Nucleotide Polymorphisms). B) And even more "advanced" - introduction to systems biology concepts (networks – regulatory, developmental etc).</p>	<p>Fri, 5/9/08 11:00 AM</p>	
<p>4. Uses of the different computer languages, basic scripting, when different types of machines are appropriate (e.g., parallel)...</p>	<p>Fri, 5/9/08 10:15 AM</p>	
<p>5. construction of databases, how information is received, filed, retrieved, etc. security issues etc.</p>	<p>Fri, 5/9/08 10:10 AM</p>	
<p>6. Data minning and database construction: Taking advantage of the exponential growth of biological data, this skill is essential.</p>	<p>Fri, 5/9/08 9:19 AM</p>	
<p>7. A concern I have is that the topics will be covered too superficially if too many are included. Also, the issue of who will cover each topic is of importance to ensure that experts in the field extract what is really central for participants. We must also consider carefully whether everybody should get the same in depth training, or perhaps we could have tracks/specializations and identify existing venues that could be exploited. For example, being at the MBI (OSU), I found that there is a significant strength there in modelling of biological systems taht I don't think we have anywhere else in the state - how will those resources be made part of the curriculum? Perhaps taking advantage of some of their tutorials and workshops would be a way to benefit everybody.</p>	<p>Fri, 5/9/08 9:07 AM</p>	
<p>8. The role of parallelism and heuristics.</p>	<p>Wed, 5/7/08 9:13 AM</p>	
<p>9. 1. biological facts discovery using text mining techniques 2. integrating different bioinformatic techniques to solve problems in biology</p>	<p>Wed, 5/7/08 8:41 AM</p>	
<p>10. programming, data models, clustering and pattern analysis, network representation, conditional relationship simulations, meta-analysis</p>	<p>Wed, 5/7/08 8:30 AM</p>	
<p style="text-align: right;"> view</p>		<p>10</p>
<p style="text-align: right;"><i>answered question</i></p>		<p>10</p>
<p style="text-align: right;"><i>skipped question</i></p>		<p>5</p>

9. Please list what other courses you think should be included in the statewide curriculum to ensure that graduates from all programs have the same skills. For each course, please provide a short description of the nature of the materials that should be covered in the course.

<ol style="list-style-type: none"> 1. Undergraduate pattern recognition (clustering, data visualization, basic classification, perhaps data mining) Intro to statistics and probability Discrete math! 2. programming for bioinformatics statistical foundations of bioinformatics 3. Internship/Research experience – to start and finish project in bioinformatics, with presentation, written report and developed tools or routines delivered at the end. 4. NOTE: In my comments I'm assuming a graduate level curriculum. Some of the items I felt were inappropriate COULD be appropriate for an undergrad curriculum. In retrospect, it would have helped to separate the two (or specify which was intended). Still, it's essential that this not be a limited curriculum designed to train people in use of existing websites, as assessed by multiple choice exams. 5. Statistical skills of the students. This component is largely missing in biology majors. To make sense of the sea of data, and meaningful interpretation of the results, statistical skill is critical. At the minimum level, how to communicate with statisticians (which is not easy!) is required. 6. Parallelism and Heuristics in bioinformatics. 7. programming, data models, statistics, clustering, and pattern and meta-analysis network representation, conditional relationship simulations 	<p>Wed, 5/14/08 2:05 PM</p> <p>Fri, 5/9/08 3:36 PM</p> <p>Fri, 5/9/08 11:00 AM</p> <p>Fri, 5/9/08 10:15 AM</p> <p>Fri, 5/9/08 9:19 AM</p> <p>Wed, 5/7/08 9:13 AM</p> <p>Wed, 5/7/08 8:30 AM</p>	Response Count
		
<i>answered question</i>		7
<i>skipped question</i>		8