



Network for Integrating Bioinformatics into Life Science Education

NIBLSE Leadership Team

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Network for Integrating Bioinformatics into Life Science Education

Rationale

Bioinformatics is increasingly central to the life sciences and hence should be integrated into undergraduate life science education

*Established NIBLSE in 2014
with NSF RCN Incubator grant*

Overall Objectives

1. Establish network to integrate bioinformatics into undergraduate life sciences education
2. Develop set of core bioinformatics competencies for UG life science students
3. Organize & vet curricular materials and professional development resources
4. Identify assessment tools aligned with the core competencies

State of the Network

- Current membership: 140+ members
- NSF RCN-UBE grant (2015-2020)
- Networking venues:
 - Website on the QUBES platform:
<https://niblse.org>
 - National conferences (Next: October 2019)
 - Working committees (RRC, AVC, *etc.*)

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NIBLSE Core Competencies

- Rationale: Provide a framework for integrating bioinformatics into life science education
- Goal: Generate an evidence-based set of core bioinformatics competencies
- Methodology:
 - >1200 survey responses
 - Solicited syllabi
 - Expert feedback

NIBLSE Core Competencies*

1. Explain the **role of computation and data mining** in addressing hypothesis-driven and hypothesis-generating questions within the life sciences
2. Summarize **key computational concepts**, such as algorithms and relational databases, and their applications in the life sciences
3. Apply **statistical concepts** used in bioinformatics
4. Use **bioinformatics tools** to examine complex biological problems in evolution, information flow, and other important areas of biology
5. **Find, retrieve, and organize** various types of biological data
6. Explore and/or **model biological interactions**, networks and data integration using bioinformatics
7. Use **command-line bioinformatics tools** and write simple computer scripts
8. Describe and manage **biological data types, structure, and reproducibility**
9. Interpret the **ethical, legal, medical, and social implications** of biological data

* Sayres et al., 2018 PLoS One <https://doi.org/10.1371/journal/pone.0196878>

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NIBLSE Learning Resource Collection

Objective

Simplify access to learning resources for
integrating bioinformatics into the life sciences

Mediated by the Resource Review Committee

NIBLSE Learning Resource Collection

- Hosted by QUBES
- Currently 30+ vetted resources



Bioinformatics - Investigating Sequence Similarity	Adam Kleinschmit - Adams State University	The Bioinformatics - Investigating Sequence Similarity laboratory module, leads introductory biology students in the exploration of a basic set of bioinformatics concepts and tools. [Read more]	C2. Computational concepts, C4. Bioinformatics tools, C5. Data retrieval, C8. Data types	Incubated at NIBLSE
Bioinformatics / Neuroinformatics	William Grisham - University of California, Los Angeles	This Neuroinformatics module weaves together several bioinformatics tools to make a comprehensive unit. [Read more]	C1. Role of bioinformatics, C2. Computational concepts, C3. Statistical concepts, C4. Bioinformatics tools, C5. Data retrieval, C6. Model	Published in CBE-LSE

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Assessment Tools

Objective

Identify assessments that align with the core competencies

Mediated by the Assessment Validation Committee

New objective

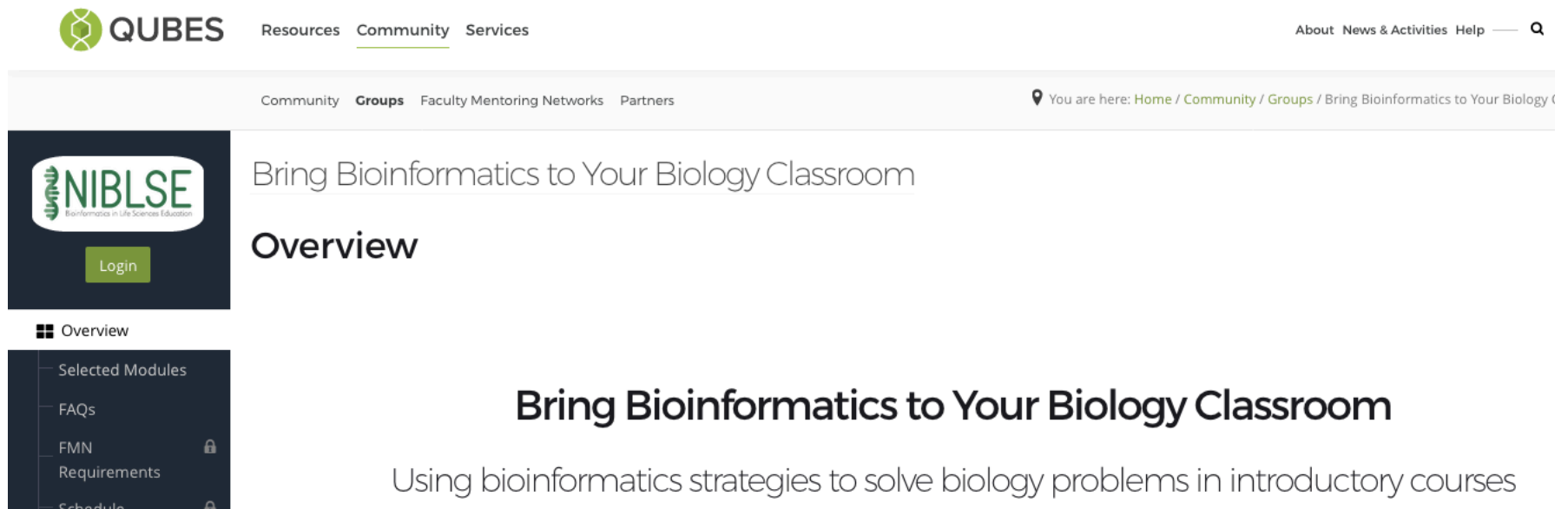
Develop assessments that align with the core competencies

Assessment Tools

- Developing assessment instruments normed and linked to the Core Competencies
- Preparing tip sheet for assessment in emerging interdisciplinary disciplines

Next Steps for NIBLSE

- Provide faculty training opportunities
 - Faculty Mentoring Network (QUBES)



The screenshot displays the NIBLSE QUBES website interface. At the top, the QUBES logo is on the left, and navigation links for Resources, Community (underlined), and Services are in the center. On the right, there are links for About, News & Activities, Help, and a search icon. Below this, a breadcrumb trail shows the path: Community > Groups > Faculty Mentoring Networks > Partners. The main content area features the NIBLSE logo with a 'Login' button and the title 'Bring Bioinformatics to Your Biology Classroom' followed by 'Overview'. A sidebar on the left contains a menu with 'Overview' (selected), 'Selected Modules', 'FAQs', 'FMN' (with a lock icon), 'Requirements' (with a lock icon), and 'Schedule' (with a lock icon). The main heading 'Bring Bioinformatics to Your Biology Classroom' is prominently displayed, with a subtitle below it: 'Using bioinformatics strategies to solve biology problems in introductory courses'.

Next Steps for NIBLSE

- Provide faculty training opportunities
 - Faculty Mentoring Network (QUBES)
- Better understand barriers to integration

Barriers to Integration

95%

of survey respondents agreed that
bioinformatics should be integrated
into the life science curriculum,

but only

36%

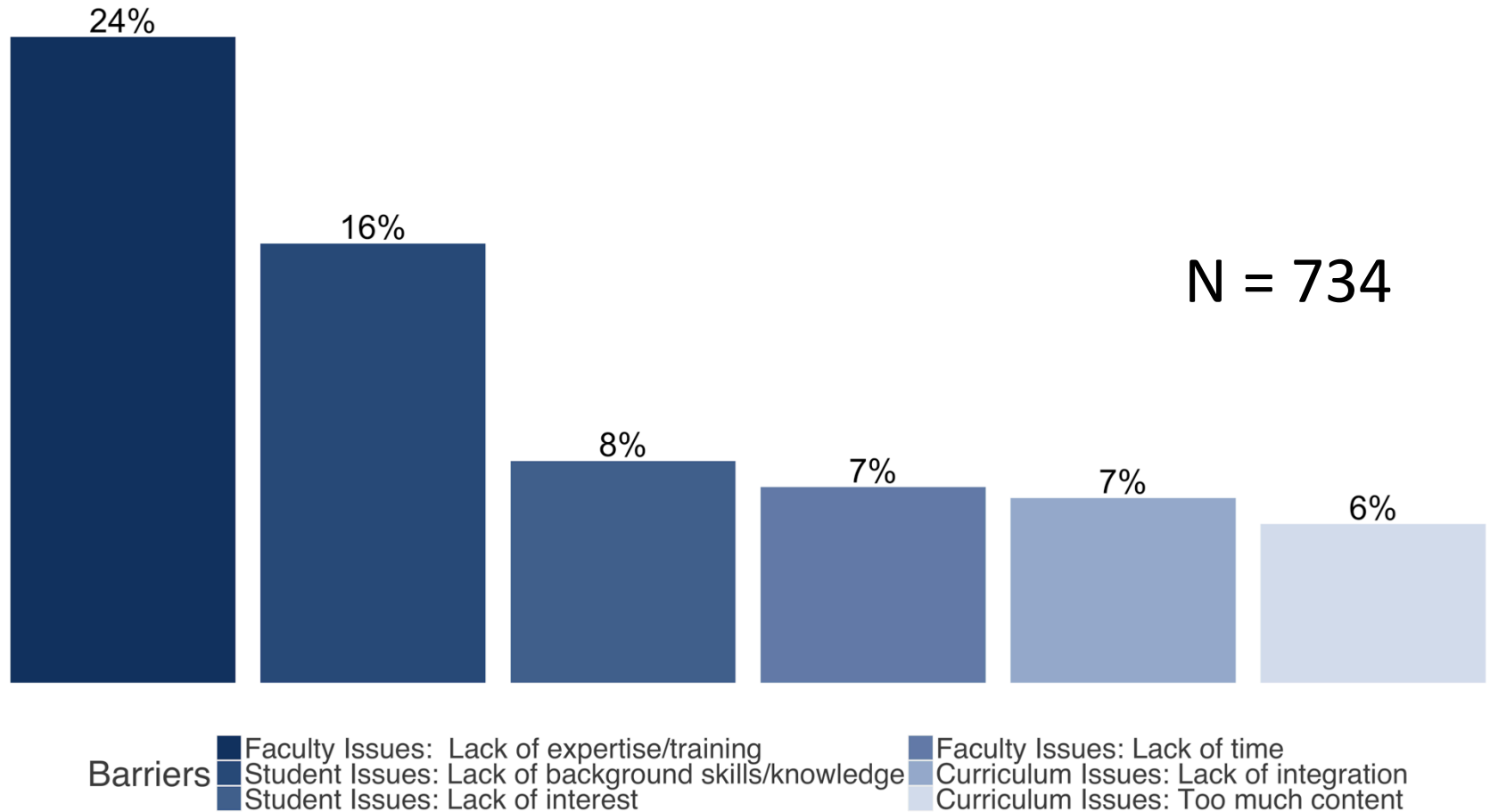
reported achieving integration

Barriers to Integration

- Original survey included several open-ended questions about barriers to integration
 - “In your opinion, what do you think are the most important challenges currently facing those educating undergraduate life scientists in bioinformatics?”

Barriers to Integration*

* Williams *et al.* bioRxiv (<http://dx.doi.org/10.1101/204420>)

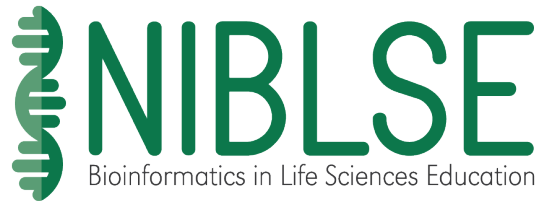


Opportunities with NIBLSE

See **niblse.org** to learn more

- Become a member
- Explore & comment on collection resources
- Contribute materials to the collection
- Help to improve a resource (Incubator)
- Join a future Faculty Mentoring Network
- Attend October 2019 Conference

Special Thanks



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