BIOLOGY INITIATIVE PROGRESS
FEBRUARY, 2015
Biology Initiative: *Overarching Goal*

- Overarching Goal: improve the quality and efficacy of biology teaching and learning and to increase the retention and academic success of a diverse group of learners interested in the biological sciences
Biology Initiative: *Target Outcomes*

- Students will progress through a coherent, coordinated curriculum that includes common introductory and foundational courses.
- Students will have timely access to required courses.
- Students, faculty, advisors, and administrators will have a clear understanding of the curricular requirements and options across departments in the biological sciences.
- Introductory and foundational courses will include effective teaching and learning practices that increase student engagement.
- Increased numbers of students, particularly students from underrepresented groups, will be retained and succeed in biology studies at MSU.
Biology Initiative: Challenges
Biology Initiative: Organizational Structure

• BI Executive Committee (Biology Board)
  • Chairs and directors
  • Responsible for collective decision making
• BI Oversight Committee (Biology Advisory Committee)
  • Faculty departmental representatives, academic staff, and core course coordinators
  • Provide guidance and feedback
• Course Committees
  • Courses taught by faculty from across departments that serve students from diverse majors
  • Evaluate and improve courses
    • Ongoing: BS161, BS162, ZOL341
    • New: ZOL355 and ZOL445
Vision for Undergraduate Biology Education at MSU

Students will integrate critical and scientific thinking skills with foundational knowledge in chemistry, mathematics, physics, and biology to analyze and solve problems, construct scientific explanations, and generate and communicate understandings in the biological sciences.
Biology Initiative: *Course Investments*

- **ZOL341: Fundamental Genetics**
  - Increased capacity
  - Reduced proportion of seniors taking the course
  - Reduced class size to facilitate increased student-instructor interactions
  - Ongoing work to develop and maintain a shared vision for the course based on common learning goals and objectives

- **PSL310 and 431**
  - Added TA support for recitation sections
  - Flipped classroom approach
  - Increased opportunities for student engagement in pedagogies associated with improved student learning
    - Group activities, clinical case studies
    - 80% of the students in PSL431 reported that recitations improved their performance in the course and enhanced their learning
BS161 Course Transformation

- Progress toward horizontal integration as number of faculty members involved in teaching the course expands
  - Regular meetings of the faculty
  - Adoption of a new textbook and on-line resources
- Reduced Section Size
- New Teaching Team Structure
- New Teaching and Assessment Approaches
- Coordination with BS162
Reduced Section Size

Source: Sarah Jardeleza
BS161 as a One Semester Course

- BS161 and BS162 comprise a two semester curriculum that addresses the big ideas in biology.
  - Many students take BS161 as a stand alone course.

- Short-term solution: Add additional section of PLB105
  - Provides full breadth of big ideas in biology in a one-semester course
  - 200 seats per semester
  - Work with Engineering and Nat Sci to encourage students with non-biology majors to fill the additional section

- Long-term: Develop PLB105 equivalent based on animals/humans in IBIO
  - Engineering and Nat Sci students with non-biology majors
  - May additionally appeal to programs such as Nursing and BLD
New Teaching Team Structure

Pre-Biology Initiative

- Faculty Instructor
- 10 h GTA
- ~400 students/section

Post-Biology Initiative

- Faculty Instructor
- 20 h GTA
- 10 h GTA
- 10 h ULA
- 10 h ULA
- 250-300 students/section

= 10 or 20 hour/week graduate teaching assistant
= 10 hour/week undergraduate learning assistant
## New Teaching and Assessment Approaches

### Pre-Biology Initiative
1. Lectures with active learning
2. Limited instructor-student interaction
3. Limited formative assessment and feedback mostly though clickers
4. Multiple Choice Exams
5. Electronic homework system
   a. Overused text, many students google answers, which are readily available on-line

### Post-Biology Initiative
1. Lectures with **increased active learning** including an emphasis on **science practices**
   a. Example: Entire class periods dedicated to students creating models based on scientific research
2. **Increased** instructor-student interaction
3. In addition to clickers, students receive **feedback on written assignments** throughout the semester
4. **Written response items** included on exams
5. New, 1st edition textbook (co-authored by Susan Singer) with innovative electronic resources
Coordination with BS162

• BI BS162 Committee chaired by Rich Triemer

• Implementing similar process as BI BS161 Committee to develop a shared vision for the course

• Spring 2015 curriculum workshop for BS161 and BS162 faculty
  • Discuss the BioSci curriculum, identify and eliminate redundancies, and coordinate learning goals and curricular materials.
Achieving the Vision: Next Steps

- Integrated and coherent curricula (ongoing)
- Evaluate alignment of majors
  - Human Biology
Source: Becky Matz
Achieving the Vision

• Integrated and coherent curricula (ongoing)
• Evaluate alignment of majors
  • Human Biology

Define the Core Curriculum
• What comprises the core curriculum? Is there a set of courses that all biology students should take?
MSU Biology- The Curriculum

• Introductory courses in chemistry, physics, and mathematics

• Introductory courses in Cell and Molecular Biology and Organismal Biology

• Core courses in biology
  • possibilities include genetics, biochemistry, ecology, evolution, physiology, and microbiology

• Advanced courses
  • Role of capstone courses/experiences
Achieving the Vision: Next Steps

• Integrated and coherent curricula (ongoing)
• Evaluate alignment of majors
  • Human Biology
• Define the Core Curriculum
  • What comprises the core curriculum? Is there a set of courses that all biology students should take?
• Develop and implement evaluation and assessment plan
  • Measure progress toward the vision
• Communicate the Vision
  • Improve communication across the biological sciences
Biology Initiative: Overarching Goal

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