

BIOS

Biology Intensive Orientation for Students

The Goal

To provide a solution to departments/institutions based on a proven model for helping students succeed. This model directly impacts student success in introductory level courses, retention in the major, and graduation rate. It is scalable and can be used in multiple disciplines.

Incoming students are not prepared for college and, as a result, often struggle in their introductory science courses. The BIOS program will help faculty and administrators implement a content-based intensive orientation program focused on increasing student success in key introductory science courses. These programs will be based on the BIOS model that has been successfully implemented at Louisiana State University for eight years

As a result of participation in the BIOS program students have transformed their approaches to studying and learning. They are more successful in their introductory science courses, are retained in the major at greater percentages, and are more likely to graduate in four years. This transformation not only positively impacts the students, but also departments and colleges through fewer students repeating courses.

Needs/Challenges addressed by BIOS

- Many freshmen have unrealistic expectations of college and their preparation. Introductory science courses are often particularly problematic.
- Because of difficulties that students encounter, they often change their major or take longer than 4 years to graduate.
- Summer-long bridge programs are very expensive, staff-intensive and only a few students are in position to take advantage of them.
- First semester programs provide support, but much of it comes after the students have encountered problems.

Background

The Biology Intensive Orientation for Students (BIOS) Program is designed to positively impact the success of incoming biology majors by giving them tools and strategies to succeed. The program combines content lectures and examinations for Introductory Biology, as well as learning styles assessments and informational sessions intended to provide the students with a preview of the requirements of this course, and the pace of college.

What happens if a biology major is not successful on the first try at introductory biology?

By their junior year they have a very high risk of changing major or being off-track to graduate in four years (Table 1).

Administrations of universities across the US have recognized the need for some sort of intervention to bolster student success and retention rates in specific majors. They employ combinations of different approaches, including short (less than two-week) orientation sessions; multiple-week summer programs; freshman year seminars and/or specific course loads; all the way to complete undergraduate academic intervention. However, even though these kinds of programs have proliferated in recent years, there is limited evidence, other than anecdotal, to document the effectiveness of any of them, especially one with a one-week stand-alone intensive format.

Incoming freshman science majors are increasingly unprepared for college work. Students enter

Grade	Changed Major/ Left LSU	Remained Bio Major	Bio Major On-track	Bio Major not On-track
A, B or C	49.4%	50.6%	40.1%	10.5%
D, F or W	88.2%	11.8%	0%	11.8%

Table 1. Status of original biology majors at the end of their Junior Year based on their grade in their first attempt at the introductory biology course.

college with optimistic ideas of how much they will study as well as unrealistic ideas of how much work will be expected of them by college instructors. They have been successful in high school with minimal effort and see no reason to change their study habits, or lack thereof, for university coursework. To make matters worse, there is a perception gap between high school teachers and college/university faculty in how prepared students are for college work. Over 44% of polled college faculty thought students were not well prepared for college work, while only 10% of the high school teachers questioned indicated they thought students were not well prepared.

Course failure is costly both to the university and to the student. Nationwide, college remediation is estimated to cost as much as one billion dollars a year, and duplication of coursework accounts for approximately 20-30% of the enrollment in the first course in LSU's introductory sequence (BIOL 1201) each semester.

Orientation and Bridge Programs have shown some positive influence on student success. Participation in a first-year seminar has been shown to have a statistically significant positive impact on student success. Longer-term bridge and orientation programs are common and effective in specific fields and/or for targeted groups, such as all engineering majors, minority or women engineering, and first-generation college attendees.

BIOS's one-week format is unique. It offers a quick "reality check" to students who have been successful in high school and assume they will as easily be successful in college. Whereas summer-long programs are expensive and time-consuming for university faculty and staff and freshman seminars offer help too late for the first-semester strugglers, BIOS is short, intense and inexpensive, yet very effective. Students can be required to pay a fee to participate, therefore the program becomes, for the most part, self-funded. Staffing is kept to a minimum: one or two faculty members to serve as content lecturers, an administrator to handle paperwork, and graduate and/or undergraduate students to serve as mentors and small group facilitators.

Proof of Concept

This program, developed at LSU by Drs. Bill and Sheri Wischusen, has been running for 7 years, with a total of over 1000 participants to date. The positive impacts on students include:

- BIOS students are more successful than non-participants in their introductory biology course,
- BIOS students are more successful in subsequent semesters,
- BIOS students have a higher retention rate in the major,
- BIOS students have a higher 4-year graduation rate.

Peer-Reviewed Publications on BIOS:

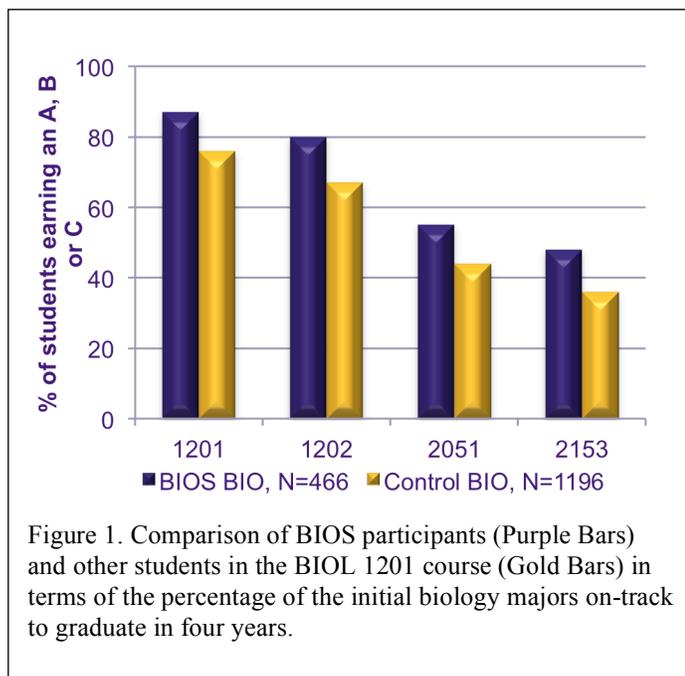
Sheri M. Wischusen and E. William Wischusen, 2007. Biology Intensive Orientation for Students (BIOS): A Biology “Boot Camp”, CBE—Life Sciences Education, 6, 172-178.

Sheri M. Wischusen, E. William Wischusen and Steven M. Pomarico, 2010. Impact of a Short Pre-Freshman Program on Retention, J. College Student Retention, Vol. 12(4) 429-441, 2010-2011

BIOS Student Success

BIOS students are more successful in their biology coursework and stay on track to graduate in significantly higher percentages than other students

BIOS participants, 2007 – 2009 cohorts, were on-track to graduate in significantly higher percentages than the other students in the course at the end of each of the first four semesters, all differences were statistically significant (Figure 1).



Retention in the Major

BIOS students are retained in the biology major at significantly higher percentages than other students

Students who participated in the BIOS program continued as biological sciences majors through the end of their fourth semester (second year) at significantly higher rates than other students (Figure 2).

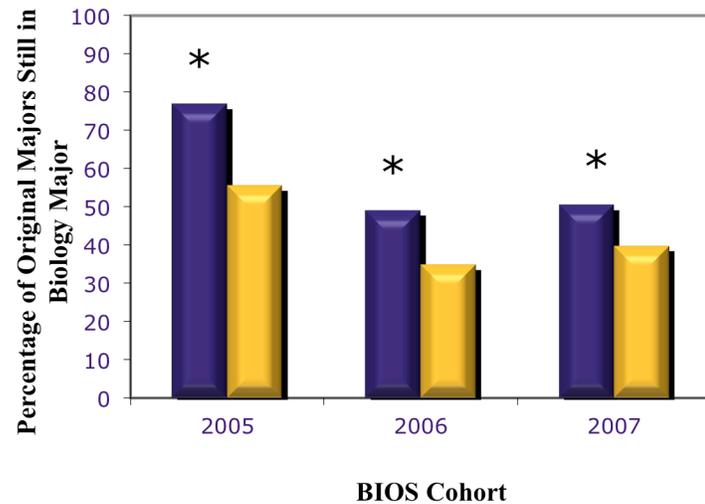


Figure 2. Comparison of BIOS participants (Dark Bars) and control students (Light Bars) based on the percentage of the initial biology majors retained as biology majors at the end of their fourth semester.

Four-Year Graduation Rate

BIOS students are more likely to graduate within four years than other students.

For the 2006 entering class the average 4-year graduation rate at LSU was 33.9% and the 5-year graduation rate was 59.2%. Students who participated in the first two BIOS workshops in 2005 and 2006 have reached the 4- and 5-year points. While biological sciences majors graduate at higher rates than the rest of LSU, BIOS participants were significantly more successful than their cohort (Fig. 3).

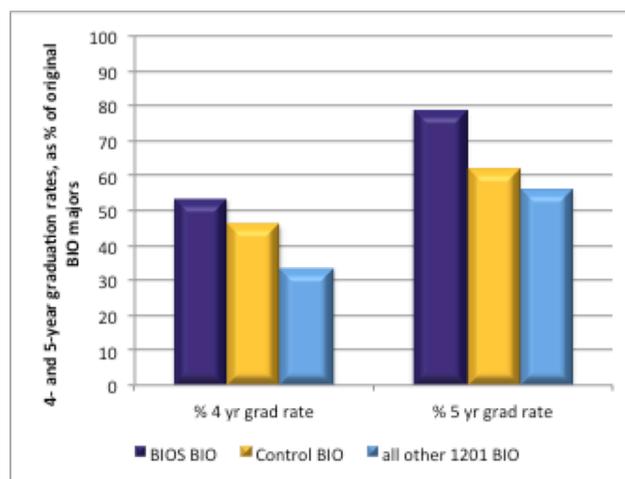


Figure 3. Percentage of biological sciences majors from each cohort graduating after four and five years. BIOS 2005 & 2006 (Purple Bars; Control = Academically matched students from the same fall BIOL 1201 course (Gold bars); BIOL 1201 = all other students in that fall course (Blue bars).

Minority Student Success in BIOS

Minority students benefit from participation in BIOS.

Although the percentage of minority students in BIOS parallels the LSU minority enrollment (10-12%), the numbers are still too small to perform statistical analyses. However the overall comparisons show benefits from participation in the boot camp (Fig. 4).

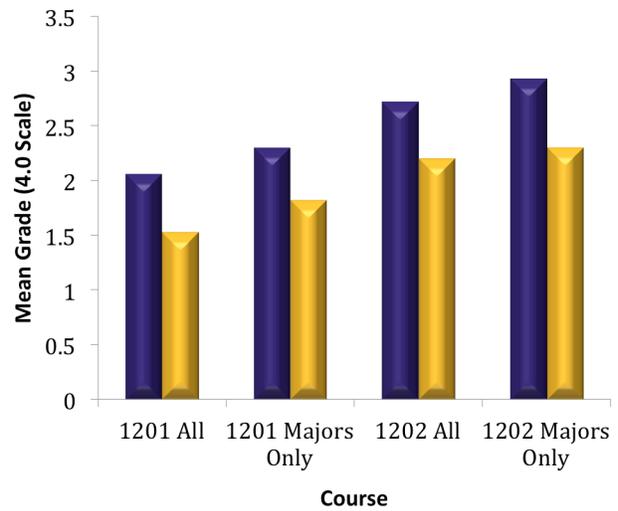


Figure 4. Mean course grades for minority students in introductory biology courses. BIOS participants (Purple bars) v. other minority students in the course (Gold bars), both those who self-identified as biological sciences majors and other majors in the courses.

The 4-year graduation rates of Black and Hispanic Biological Sciences majors are significantly higher than their peers who did not participate in BIOS and more closely mirror the rates of majority students (Fig.5).

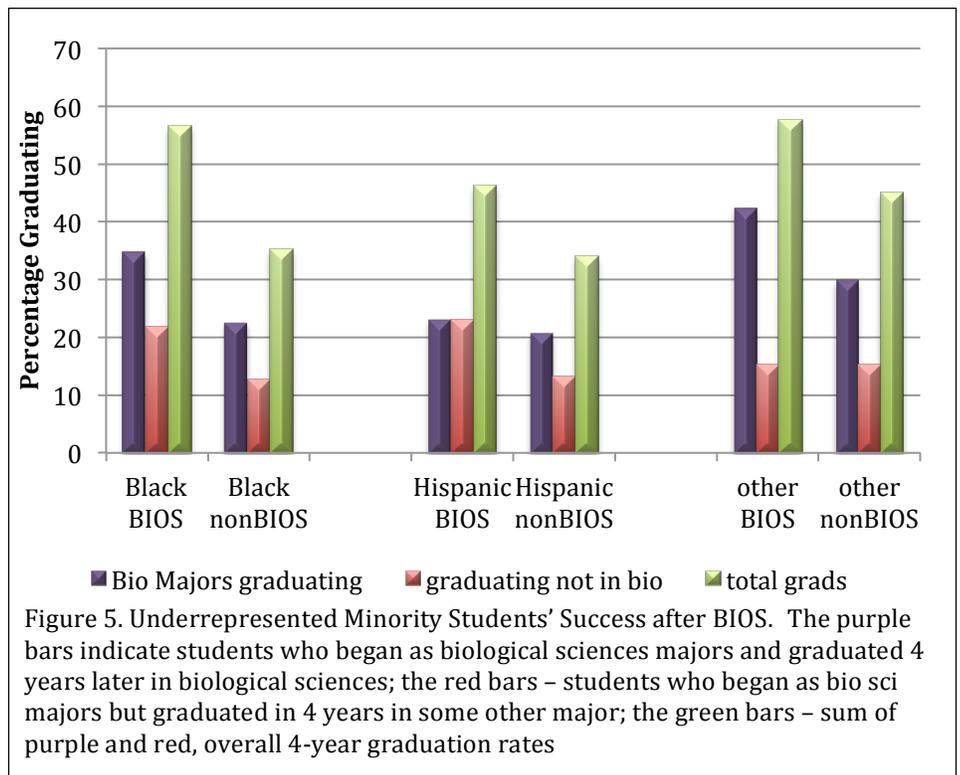
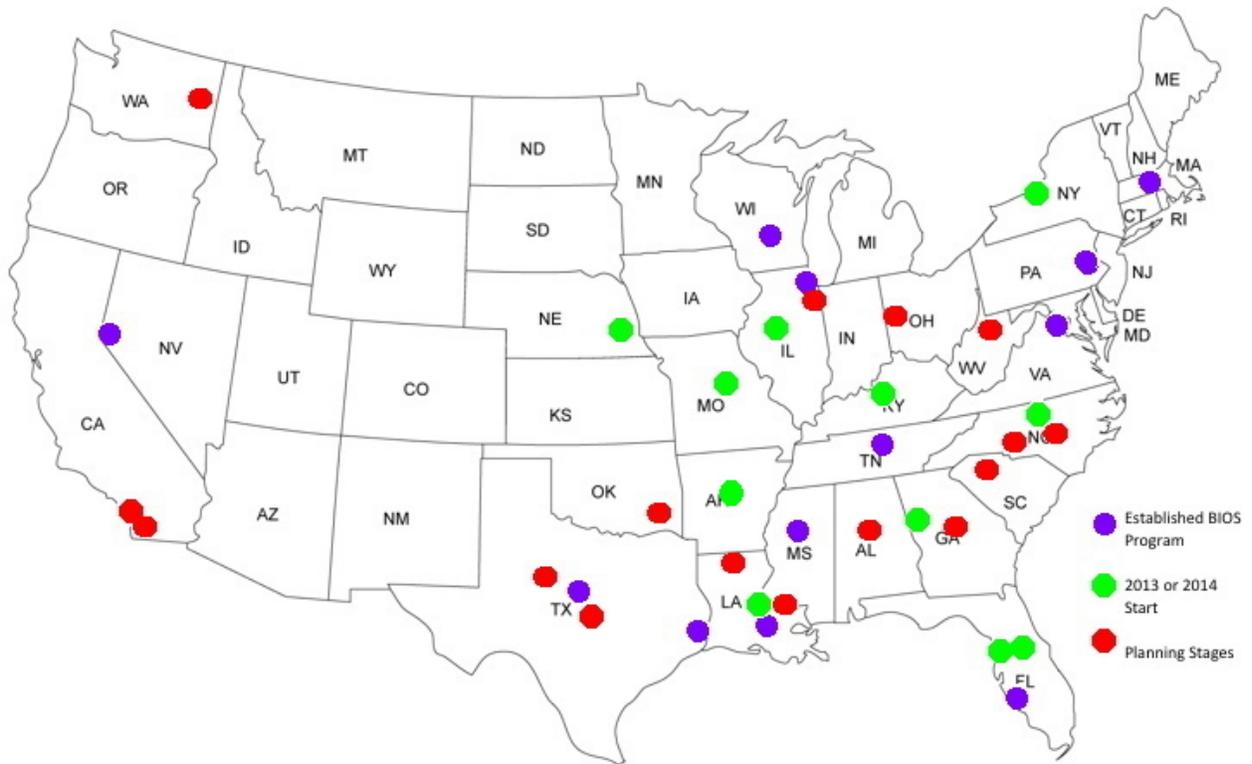


Figure 5. Underrepresented Minority Students' Success after BIOS. The purple bars indicate students who began as biological sciences majors and graduated 4 years later in biological sciences; the red bars – students who began as bio sci majors but graduated in 4 years in some other major; the green bars – sum of purple and red, overall 4-year graduation rates

BIOS Replication

Over 30 institutions have an ongoing BIOS program or are in the process of developing a program based on the LSU BIOS model.



Student Feedback

Students indicated in surveys that they learned valuable study habits and felt more comfortable about starting college than they had before BIOS. They indicated they have formed and maintained study groups, i.e. "learning communities," through their freshman year and in many cases these communities have been sustained for several years.

After the first Intro Bio exam, I am positive that BIOS was worthwhile. I have felt prepared and comfortable with the material in 1201 since the first day and have your program to thank. The study tips, orientation, and early exposure to college biology have truly proved to be extremely helpful and I appreciate all of your efforts over the summer! Thanks again,

Hi! It is funny to get your email today because I was telling my friend about the class and how much it helped. We just had our first exam on chapters one through six and I made a 98 on it. I could not have done that with out attending the Bios program. I used my notes to help study and I could focus more on the details because I already had a general idea of what was going on. I could even help other people in the class. It helped to get a feel for college before it really counted and to see what the exams were like. I would recommend continuing the program next year. I feel that it was really worth my time. Thanks for the opportunity.

I must admit, I went to BIOS mostly on my father's suggestion and was not looking forward to giving up one of my final weeks of summer before college life began, but all in all, I'm glad I did.

The BIOS program was amazing. It made the first test a lot easier and kind of broke the ice between the transfer from high school to college. I feel like the course is almost a must for biology majors and I am sure it also helps the other majors as well. Thank you so much for the experience and helping me get a 98 on my first college test.

I want to start by saying that by far the best thing I got out of BIOS initially was something y'all didn't even advertise: I met people before I started college. The first week was enormously stressful and it helped immensely already having friends from BIOS, as well as a friend from home, to fall back on. To this day, over half way through the semester, some of my best friends are the ones I made at BIOS.

I have to say that it helped me out a lot. Knowing people in my Biology class was great, and I actually have most of my science classes with other students from BIOS. I have 'aced' all of my first exams, which I give BIOS credit for, because I used the study and learning strategies provided by the Center for Academic Success. Learning the beginning chapters in Biology helped me significantly! Being comfortable with LSU's campus also helped me to know where I was! BIOS is a great program that should be continued! Thanks again.