New Approaches Explored in Intro Science and Math Courses

Structured Learning Activity (SLA) sessions led by senior undergraduates called PALs (Peer Learning Assistants).

PALs are selected competitively each semester and are paid a stipend by STREAMS. PALs benefit from training provided by the Academic Achievement Center and the opportunity work closely with an experienced faculty member.

A goal of STREAMS is to reduce the rate of students earning D, F, W or I grades in each department’s first introductory course from the current levels (in excess of 30% in every department) to under 20%. Biology 121 was the first course to fully implement changes. Dr. Jennifer Mendell and Dr. Jeffrey Bowen created a new SLA course (BIOL 150) taken by all BIOL 121 students in fall 2010. As a result of this pairing, the DFWI rate in BIOL 121 dropped from over 30% to 15%.

See reverse side for details on STEM introductory course changes.

In the Flow . . .

STREAMS Activities

- Setting up the 2011 Summer Bridge Program for incoming freshmen, seeking paid summer faculty and student research mentors.

- SLA Pilots — Physics 243 (Dr. Williams), Physics 244 (Dr. Kling), MATH 151 (Dr. Shama), & CHEM 142 (Dr. Brush) are piloting Structured Learning Assistance models.

- Recruiting students and paid Residential Mentors into Science and Math Residential Learning Community — opens fall 2011!

The percentage of students in BIOL 121 earning a grade of D, F, or W in fall 2009 (left) and fall 2010 (right).
Overview of Introductory Course Changes:

**Biology 121 & 150:** Biology for Life (BIOL-150), a 1-credit Pass/Fail co-requisite to BIOL 121 (General Biology I), met for two hours per week facilitated by a PAL in a small group environment of eight students. PALs worked with Drs. Bowen and Mendell to develop inquiry based learning activities including case studies taken from supplemental course materials and The National Center for Case Study Teaching in Science website (http://sciencecases.lib.buffalo.edu/cs/). PALs also attended lectures and served as models for the students, demonstrating proper note taking, test-preparation and reading techniques. BIOL 150 was fully implemented in fall 2010 and will continue in fall 2011.

**Chemistry 141 & 142:** Chemistry identified quantitative reasoning skills, the ability to extract information from word problems, and student survival skills as the key deficits in General Chemistry I & II. To create time to address these issues, Drs. Brush, Noda and Haefner shifted the review of lab techniques, calculations and safety from the “lab recitation” to pre-lab reading and an online discussion group. Now in lab recitation a faculty member and PAL direct student group work that focuses on practical study and “survival” skills (15 minutes), quantitative reasoning using word problems from the current lectures (25 minutes), and key questions related to the lab experiment (10 minutes). The chemistry approach takes advantage of the resources available from the American Chemical Society Division of Chemical Education. Dr. Brush is piloting this approach this spring in CHEM 142 – full implementation will begin in CHEM 141 in fall 2011. Similar changes are planned for CHEM 343 & 344 (Organic Chemistry) beginning in 2012.

**Computer Science 151:** Drs. Santore, Pavlicek, Sattar and Jung in computer science identified the lack of a “lab environment” to support the initial stages of student programming projects as the key impediment in COMP 151. They have designed a PAL-led, 1-credit, Pass / Fail cognate “lab” course that will be attached to COMP 151 sections. Programming assignments will begin in this session where students will have a chance to discuss and work in a shared environment. Additional helpful hints will be presented at these meetings as well with the PAL serving as a guide and peer programming mentor. The first pilot sections of the lab cognate will take place in fall 2011.

**Earth Science 100 & 194:** Dr. Saccocia adopted a “lecture tutorial” approach in EASC 100, the first course in the earth science major, this fall. He replaced traditional lectures with a series of brief mini-lectures followed by ungraded lecture tutorial worksheets on which students work in pairs. In EASC 194, Drs. Krol, Cicerone, and Enright developed a set of guided-inquiry problem sets focusing on quantitative analysis, critical thinking, and problem solving skills.

**Mathematics 151 / 161:** Students in calculus courses frequently struggle to see how to apply core concepts, and so Drs. Shama and Lockard have designed a 75 minute, PAL-led SLA session with model worksheets for MATH 151 (under governance review for renaming to MATH 161). The purpose of the worksheets is not only to increase the students’ exposure to course material, but also to develop the students’ critical thinking skills and encourage them to delve into course material more deeply through examples and applications. Dr. Shama is piloting SLA sections attached to one Math 151 this spring, with all Math 161 sections supported by SLA in fall 2011.

**Physics 243 & 244:** Taking advantage of space in the new building, Physics 243 and 244 will eliminate the lecture / lab split in favor of the “studio physics” model. The present model uses lab time inefficiently and does not allow for enough time to have the students engage in inquiry based learning during the lecture period. This new model will create a learning cycle with a combination of very short lectures, group problem solving, and laboratory exercises to elucidate the content just covered. The BSU Studio Physics model is based on literature from the American Association of Physics Teachers and American Physical Society New Faculty School program. Studio Physics 243 began in spring 2011 under Dr. Williams and full implementation will occur in fall 2011.

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