

Summary Report of Second Year Goals Mathematics & Science Department

Strategic Goal #1: Streamline the mathematics curriculum to better meet students' needs.

Participants: Kathy Davis, Joe Sedlacek, Phil Koopman, Kory Swart, Olga Stephens, Diane Bean

Strategies:

- Specify course objectives for College Algebra, College Algebra with Limits, Trigonometry and Analytic Geometry, and Calculus for the Life Sciences.
- Examine internal and external course requirements.
- Determine course content for the above courses.
- Select textbooks and develop supplementary materials that meet the specified criteria.
- Communicate the curriculum changes to appropriate departments of the college.

Results for Calculus for the Biological Sciences: Connie Marberry communicated with Weimin Han at University of Iowa. She obtained a copy of the syllabus. Connie and I chose to use the same textbook and cover the same material so that UI would accept the course. It is equivalent to UI's 22M:016. Connie did the articulation agreements. This course is designed for students who only need up through Calculus I. If they are planning to take above that, then they need to take the regular calculus sequence. This track allows a student to take College Algebra with Limits and then the four-hour Calculus for Biological Sciences. They do not have to take the additional pre-calculus class, Trig/Geometry. This cuts down on the number of hours they will need to take to finish Calculus I. We cover the trig portion that is needed within the Calc for Bio class itself. We hope to have enough students enrolled to offer this class in the spring--one in CR and one in IC. ---Diane Bean

Results for Pre-Calculus I and Precalculus for Business: These courses were streamlined into one course called College Algebra with Limits. This course is intended to prepare students for Business Calculus, Calculus for the Biological Sciences, and Trigonometry with Analytic Geometry. Liberal Arts students wanting a college level algebra class, but not required to take Calculus, may take College Algebra. Advising of students has also been streamlined so that all students (Business, Biological Sciences, or Engineering) deficient in college-level algebra and needing a Calculus course are advised to take College Algebra with Limits. – Joe Sedlacek

Strategic Goal #2: Start the Biotechnology Program for Fall, 2007

Participants: Joe Christopher, Cynthia Fabor, Amy Rehnstrom, Jill Scott, Cate Sheller, Bob Heyer, Lisa Sweeney, and Greg Petersen

Goal: Develop curriculum for individual courses relating to the Biotechnology program.

- Schedule bimonthly meetings to discuss curriculum
- Visit established/successful Biotechnology programs
- Identify and attend National and Regional conferences related to Biotechnology
- Maintain open communication with possible employers to help define important concepts for employees to understand

Goal: Student Recruitment

- Brochures
- Teacher training to create excitement at the High School level

Goal: Establish equipment needs and create a purchasing plan

- Communication with possible employers
- Make contacts with company reps for equipment and request quotes
- Determine requirements for Licensure through the Department of Education.

The 2006-2007 academic year has been successful for the Biotechnology program. Curriculum was developed for four new courses that will offered for the Biotechnology AAS program. They are Introductory Biotechnology, Lab Methodology, Molecular Biology Techniques I and II. We are currently working on marketing the program to pre-health majors and will outreach to area high schools during the 2007-2008 academic year. Informational meeting were held for interested pre-health students on August 7th and 8th, 2007. Thirty interested students were in attendance at these meetings.

Greg Petersen and Bob Driggs attended the International Biotechnology meeting in Boston where information pertaining to the overall field of Biotechnology was gained. Greg Petersen also attended a conference held by Bio-Link, the national clearinghouse for Biotechnology. Topics discussed pertained to community college training programs.

A proposal for a Biotechnology AAS program was submitted and approved by the State of Iowa Department of Education.

Currently two sections of Introductory Biotechnology will be offered for the Fall 2007. Introductory Biotechnology, Lab Methodology and Molecular Biology Techniques I will be offered Spring 2008.

Other notes of interest:

- Advisory committee of area industry representatives was created and met with to help develop curriculum outcomes for the program specific coursework.
- International and national conferences were attended to obtain more information on Biotechnology and programs offered around the country.
- Proposal for an AAS degree program in Biotechnology was submitted and approved by the State of Iowa Department of Education.
- A variety of equipment was purchased for the enhancement of current coursework and for the creation of the program specific coursework.---- Greg Petersen

Strategic Goal #3: Develop a new course for the Engineering Program: “Mechanics of Deformable Bodies”

Participants: Mario Meza, John Elliff, Mick Arnett

Strategies:

- Justification for a new course and identified the fields of engineering that require this course
- Obtain Syllabi from Univ. of Iowa and ISU.
- Compare different textbooks
- Define course objective, learning outcomes, list of activities to support learning and assessment of student learning
- Formal presentation for review and approval of the new course to the Advisory Committee and the Dean of Math & Sci. Dept.
- First offer the course
- Teaching the course for the first time

Results: The course "Mechanics of Deformable Bodies" has been offered in Fall and Spring terms since Fall 2006. The course has been articulated with the two colleges of engineering: the University of Iowa accepted our EGR-380 as 57:019, Mechanics of Deformable Bodies; and Iowa State University accepted our EGR-380 as EM 324, Mechanics of Metals. The course EGR-380 is now in Class I, as a new course/temporary status and it should be move to Class II, permanent status. – Mario Meza

Strategic Goal #4: Develop the Biology Readiness

Participants: Gary Donnermeyer, Brenda Clark, Jill Scott, Barbara Harvey

Strategies:

- Develop test bank of questions in Perception format.
- Test run exam (biology faculty).
- Administer trial exam to all Biology I students. Each student will answer all 109 test bank questions.
- Compare difficulty values among questions to identify outliers that may need to be dropped or modified in the test bank.
- Administer an abbreviated exam with randomly selected questions from the test bank to all Biology I students.
- Correlate readiness test scores to grades for the course and identify cut score for entry.

Results: All the following strategies were completed except determining cut scores. Cut scores will be determined during the Fall 2007 semester. The project will continue into the next year by 1) meeting with all players at Kirkwood to determine implementation strategy; 2) administering the test to students who plan on taking General Biology I for Spring 2008; 3) Placing students into Basic Biological Concepts or General Biology; 4) writing new questions that can be tested during administration to students; and 5) continuing to analyze question data for difficulty and discrimination statistics. --- Gary Donnermeyer

Strategic Goal #7: Develop an outreach program for STEM students

Participants: Nick Sagan, Johanna Kruckeberg, Mario Meza

Strategies:

- Investigate availability of “engaging educational equipment” for Kirkwood.
 - a. Plastination of human specimens
 - b. Engineering “toys”
- Develop an outreach program for area science high school classrooms.
- Investigate opportunities for Kirkwood science faculty to give presentations about science to: area high schools, science meeting, science fairs, etc. This will promote science and Kirkwood.
- Explore marketing ideas to promote outreach program.
- Share and learn from each other from past experiences of working with high school groups and recruiting STEM students.
 - a. Nick – cadaver tours
 - b. Mario – Engineering fair
 - c. Johanna – summer teaching to area high school students
- Investigate funding resources for the educational equipment, area presentations, and the outreach program. (Grow Iowa Values Fund, NSF)

The M/S department applied for and received a GIVF grant for \$68,000. The purpose of the grant is to enrich the Human Anatomy and Physiology program at Kirkwood. A second purpose is to develop an outreach program for STEM students. Hopefully this will increase the number of STEM students that are interested in, entering into, and successfully completing a health related college program. --- Nick Sagan

Strategic Goal #8: Learning Technology

Participants: Cate Sheller, Barbara Harvey, Joe Christopher, DJ Hennager

Goal: All math/science classrooms will be equipped with a standard set of learning technology tools that work effectively to enhance instruction; provide a degree of autonomy in configuration for those instructors who need it; and are supportable and maintainable using existing IT resources.

- Investigate the use of laptops/tablet PCs as replacements for faculty desktop machines
 - Determine cost / availability of hardware needed to use the same (portable) computer in the office and in any classroom
 - Investigate how portable PCs are already being deployed and used at Kirkwood and similar institutions
- Goal: Existing computer lab classrooms will be replaced by more flexible classroom spaces with the capability of functioning as conventional classrooms and/or computer labs using laptops and wireless technology.
- Experiment with and monitor performance of wireless network in classroom locations
 - Develop proposal for implementation of portable labs, including costs(new equipment, maintenance, etc.) and storage / security issues
 - Investigate funding sources
 - Develop grant proposals

Goal: Find “bang-for-your-buck” technology upgrades; investigate methods that may improve teaching instruction for a minimal cost. Possible examples are wireless mice that will allow the instructor to move about the classroom and recording microphones that will facilitate the creation of podcasts.

- Form a committee to brain-storm possible bang-for-your-buck upgrades.
- Design and send out an email survey to science and math faculty to probe for further technology suggestions.
- Secure funds on a case-by-case/room-by room basis.

Results: Our group took on the following projects:

- *Experimenting with the use of a Tablet PC for both in-office and in-class work (Cate Sheller). This experiment has been a rousing success thus far; among the benefits realized have been:*
 - *Availability and correct configuration of software necessary for classes, both in and out of class*
 - *Use of tablet/pen technology to create notes and examples on the fly in class, and subsequently post them to a class web page*
- *The use of laptops on carts in class to eliminate the need for rooms full of computers for hands-on practice (Cate Sheller, John Elliff). Despite technical glitches at the outset, and an ongoing process of learning how best to communicate with the IT department to get our needs met, the laptops have been an excellent*

addition to our set of classroom tools. We are able to move smoothly from lecture presentation to practice without the time/space disruption of changing rooms or only having the use of equipment on specific days.

- *Piloting the use of clicker technology for classroom assessment (Cate Sheller, Barbara Harvey). We tried two different clicker types and found one to be far superior; we are working with a an ad hoc committee of faculty from other departments on final selection of a clicker technology that will be deployed campus-wide as early as Spring 2008. – Cate Sheller*

Strategic Goal #9: Preliminary look at the implications of enforcing prerequisites in Mathematics for Decision Making.

Participants: Susan Harthun, David Keller, John Weglarz

Strategies:

- Collect compass placement test scores from all students enrolling in their first math course at KCC.
- Develop a pretest to measure the prerequisite skills of MDM.
- Administer pretest to all MDM students on the first day of the course.
- Develop a posttest to measure learning in MDM.
- Administer posttest as part of final exam to all MDM students.
- Collect course grades at the end of the Spring 2007 semester.
- Data analysis and dissemination.

*Results: For Spring 2007 the prerequisites for Math & Society were **enforced** for the first time. The prerequisites are successful completion of Intermediate Algebra or Survey of Math or appropriate placement score. Did enforcing the prerequisites improve the success rate in Math & Society? The following table summarizes data comparing Spring 2006 (when the prerequisite was **not** enforced) to Spring 2007 (when prerequisite enforcement began).*

	Number of Students	Retention Rate Grades A – F	Pass Rate Grades A – D	Success Rate Grades A - C
Spring 2006	446	76.7%	72.4%	61.9%
Spring 2007	277	74.0%	71.1%	64.6%

By enforcing the prerequisites enrollment dropped by over 1/3 (38%). However, the Success Rates (Grades A – C) were basically the same. So we are left with the question of is it worthwhile to enforce prerequisites. This data will be used as the Math Department continues its discussion on prerequisite checking.

Data was also collected on success in Math & Society (MAT 115) and Statistical Ideas (MAT 155) based on path. Students could have gotten into these classes by taking Survey of Math or Intermediate Algebra or by a placement score. The following table summarizes the data.

	Number of Students	Retention Rate Grades A – F	Pass Rate Grades A – D	Success Rate Grades A - C
Survey of Math	399	74%	68%	57%
Intermediate Algebra	401	74%	70%	64%
Met Placement Score	359	82%	79%	74%
Did Not Meet Placement Score	784	77%	71%	62%
No Placement Score	564	68%	63%	54%

Items to Note:

- *Students who pass a placement exam are more successful.*
- *A large number of students do not meet the cutoffs but decided to take the course anyway. These students are comparable to those who took Intermediate Algebra.*
- *The group of students who are the least successful are those for whom we have absolutely no placement information.*

Strategic Goal #10: Increase the Number of Successful STEM majors.

Participants: Susan Ludwig, Gary Donnermeyer, Bob Driggs, Dave Bunting

Strategies:

The STEPs to Bridge the Way grant team developed and implemented a cluster of strategies to realize the goal of increasing the number of students successfully completing STEM majors.

The strategies have been implemented at three educational levels: secondary, community college, and transfer institutions. The continued success of the grant can be attributed to the implementation of three broad strategies:

- Greater Teacher Involvement in STEM Major Success
- Improved Support for STEM Majors
- Institutional Support for STEM Majors

Results: We are pleased to report significant increases in the number of STEM Majors (13%), STEM Graduates (24%) , and STEM Transfers (216%) over the 2003-2004 base year data. These numbers are especially significant because the overall college numbers in the past three years have been holding steady. As a result of the implementation of the three strategies, the following successes were realized.

- *Direct STEM workplace learning experiences were provided for high school teachers, college teachers, and Kirkwood students.*
- *Increased project revenue with a companion Grow Iowa Values Grant.*
- *Nineteen students were recruited into the Summer Bridge Program for each of the first three years of the grant. The Summer Bridge Program was revised for this third year of the grant, with students able to choose a STEM class from the Kirkwood course of studies.*
- *Project Lead the Way's engineering curriculum is in place at six area high schools (Benton Community, Clear Creek Amana, Iowa City-West, Iowa City High, Linn Mar High School, Cedar Rapids Jefferson, with additional schools slated to begin this program in 2007-2008.*
- *STEM career pathways, an advising tool, were developed in 11 area high schools.*
- *Thirty-seven high school teachers, counselors and administrators took part in STEM Professional Development Workshops this past summer.*
- *Through our work at Kirkwood and with high school STEM teams over the past year, we oversaw the creation of enriched STEM academic and career awareness experiences for over 6,600 STEM majors and prospective STEM majors.*
- *Twelve area high schools have been actively implementing strategies to increase the number of students who become STEM majors in college. --- Bob Driggs*