

An Entire Math Degree Online

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Abstract

This article details how a small public institution developed an online degree completion program in Mathematics. It discusses some best practices in enrollment management, retention and course management.

Context

Online courses have become the medium of choice for students who cannot otherwise attend in a traditional classroom setting. Online distance education allows students to take courses in the convenience of their home or office, at their leisure, free of the distractions of campus life, without commute, while at the same time being provided with almost instantaneous access to the instructor and an abundance of online resources. A number of universities across the nation have taken to offering degree programs online, but only very few of them offer degree in Mathematics. The present article describes how Indiana University East has started with offering a few select online classes and created an online degree completion program for a B.A. in Mathematics.

The Institution

Indiana University East is a regional campus of Indiana University. Located in Richmond, Indiana, it serves a rural area in East Central Indiana and West Central Ohio. This area has a slight decline in population, and has historically low educational aspirations. The campus is a commuter campus, so recruitment of students for brick-and-mortar classroom instruction is limited to the immediate geographic vicinity. During the last decade, the campus has seen some dramatic changes. After a precipitous decline in enrollment in 2005, the campus had less than 2000 students. The prospect of financial exigency and associated consequences had many faculty fearing for their jobs.

Out of this fear grew a faculty-driven effort to offer classes online, thereby increasing the reach of the institution beyond its geographic coverage. Between 2005 and 2012, Indiana University East created online classes in just about any discipline in its catalog, ranging from Accounting to Zoology. This includes classes that rely on more than just communication by email, including classes in Public speaking, foreign languages and lab sciences. Due in large part to the added online programs, Indiana University East's enrollment grew to 3700 students in 2012.

With the expertise in developing online classes, the academic schools at the campus started creating online degree completion programs. To date, the campus offers one online graduate certificate, and six baccalaureate degree online completion programs, including one in Mathematics.

The Mathematics Degree

Indiana University East offers a Bachelor of Arts in Natural Sciences and Mathematics with a concentration in Mathematics. This degree program is intended to be a liberal arts degree, and includes 36 credit hours of General Education, two semesters of a foreign language and 30 credits of Mathematics, beginning with Calculus I. Prior to 2010, this program did not attract many students. There were never more than a handful of students enrolled in the program. Since its inception, only 10 students graduated with a degree. The program was able to survive in conjunction with the Teacher Education program, which supplied most of the students for the math courses. But even the combination of these two programs could not sustain the continued offering of upper-division math classes with low enrollment. Classes had to be cancelled, which delayed students' graduation, leading to attrition of students, and consequently even lower enrollment.

Some relief came from offering upper-division mathematics classes entirely online. We selectively created online classes in notoriously undersubscribed courses, including Real Analysis, Modern Algebra, Topology and Bridge to Abstract Math. Just offering these classes online nearly doubled the enrollment.

Building on the experience with online classes, the broad availability of online classes on campus, and the collective expertise with online programs, the math faculty decided to develop an online degree completion program. The basic premise for this program was that the program should be as rigorous as the on-campus program, and should offer a student similar opportunities for electives. We also felt that the degree completion program should be predictable, so that students could be advised on math classes at the first advising appointment.

Indiana University East was given permission to offer the online math program in 2011. This degree program admitted four students in Spring 2011 and 18 in Fall 11. Currently, there are 28 students in the program. We expect the first students to graduate in May 2012.

The next sections will discuss some features of the program that are believed to make it successful:

Design of the Program

The program is designed for students who have already completed 60 credit hours, including all their general education and foreign language requirements. In reality, most students who apply for the program do not meet this criterion: Regardless of the number of transferring credit hours, most students require at least one general education course, usually a second writing or public speaking course. Also, the number of transferring credits and the number of previously taken math classes vary widely. Some students have a significant background in mathematics, and

need to complete only a few courses in order to meet the residency requirements. Other students come with significantly less than 60 credit hours and need to begin the program with the first Calculus course, and must take significant elective credit in order to complete the degree. Finally, many of the online students have significant family or professional obligations and can only commit to taking two courses each semester.

In designing the program, we strived to accommodate all these situations. The department of mathematics has committed to a fixed rotation of classes: Required classes are offered every year, while elective classes within the major are offered on a two-year rotation. The school carefully calibrated this rotation so that student can progress through the completion program at a pace that matches their needs.

Administering the Program

While many best practices in administering academic programs remain the same, regardless whether the program is offered online or on-site, there are some aspects that need additional discussion.

Identity of the Students

A point of contention for many faculty is the security of online programs: How do we know that the student is doing the work? The faculty at IU East decided to create several safeguards for this: Students are expected to contribute several times each week to each online course. In many courses, students are expected to agree to a telephone interview several times during the semester. The combination of the two makes it difficult for an imposter to follow through with all the class assignments, and to convince the faculty member of being the student.

Further, all students are required to take an oral capstone exam at the end of the program. This exam is done in the form of a video conference, and students are required to provide positive identification before this exam. Passing the capstone exam is a requirement for the program, and students who paid someone else to do the coursework will find themselves in an interesting position during this capstone exam.

Retention

Many online classes have a higher non-completion rate than their corresponding face-to-face classes. Reasons for this include less discipline on behalf of the students and a misconception among students that online classes require less time and are easier than traditional face-to-face classes. Similar misconceptions persist for online programs. For this reason, the department has chosen to implement several retention strategies to help students persist through the program:

- An online orientation seminar. This is a two week not-for credit course that orients students to working online. It emphasizes working in groups, collaboration, staying in contact with faculty members, and reinforces the concept of submitting homework before the deadline for the assignment. In addition, the seminar guides students to the student

services of the university and acquaints them with the course management system and with MyMathLab.

- **Advising.** The faculty found that advising students into the correct classes at the beginning of the program is critical. It is not uncommon for the advisor to spend one hour evaluating a newly admitted student's transcript, and discussing the best course of action with the student. We have found that for this initial advising, a telephone conversation is the best format. The advisor checks on students' enrollment status and verifies that they enroll (and remain enrolled) in the classes as discussed.
- **Regular Communication.** In order to keep students focused on their studies, the department has found it useful to keep in regular contact with all students. For this, the advisor contacts students to weeks before the beginning of the new semester to remind them to obtain their textbooks, and follows up at several additional times during the semester. The purpose of these contacts is to identify problems early, to guide encourage students who feel they are falling behind, and to assist with withdrawing if needed.
- **Building Community.** Students who attend a brick-and-mortar college will not exclusively take classes. They will make friends with their peers, will get to know some of their professors and will at some level connect with the campus. These factors are a significant building block for retention of students in traditional program. With some adaptations, these strategies can also be employed for online programs. The Math Department at Indiana University East offers virtual hangouts for students for discussion of classes, software, or any other topic they wish to engage in. In the near future, we will create a facebook site to complement this virtual hangout.
- **Offer personal interaction.** Students take online classes for a reason: They cannot come to campus on a regular basis. However, many students are willing to participate in field trip classes that require a one-week commitment. For example, the university offers a cross-listed course in Mathematics and Anthropology. This course requires participation in a one-week field trip to southeastern Utah, for camping, hiking, and exploring Indian cliff dwelling. The mathematics portion of the course includes a project to determine whether availability of solar heat was a significant factor in siting of the cliff dwellings. While this class is open to all students, we specifically encourage students in the online programs to take this class, so that they have the option to interact with their professor in a face-to-face setting.

Summary

The online math program at Indiana University East is growing. The faculty have already built on the success of the online B.A. completion program and have created a B.S. online completion program. We can't wait to report on the progress of both programs.