

## Report from the Barrier/Gateway Courses Group

### Charge from the Provost:

*"The purpose of this committee is to explore and develop recommendations to improve the success of students in courses that typically impede progress in the major. This may include strategies to improve student success in courses with high DWF rates or courses that preclude entry into majors with capped enrollments (e.g., architecture, nursing) and the potential transformation of developmental coursework to expedite degree completion. The development of alternate curriculum pathways to the major (e.g., common core requirements that allow students to switch majors without losing credits) should also be considered. Goal: reduced time to degree."*

### Process:

The Barrier/Gateway Courses group held two face-to-face meetings and maintained a regular, vibrant email discussion. The collected research, discussion, and findings are summarized on the group's website located at URL:

[http://ece.montana.edu/rmaher/barrier\\_courses/](http://ece.montana.edu/rmaher/barrier_courses/)

### Participation:

The official members of the Barrier/Gateway Courses Group are:

- Rob Maher, Group Convener (Electrical & Computer Engr)
- Joe Atwood (Ag Econ)
- Harry Benham (Business)
- Ken Bowers (Math)
- Sarah Codd (Mechanical Engr)
- Diane Donnelly (Univ Studies)
- Jack Fisher (Sociology & Anthro)
- Tom Hayes (Math)
- Steven Holmgren (Chemistry)
- Erica McKay (MSU Student)
- David Parker (Political Science)
- Omar Shehryar (Business)
- Mary Ann Sojda (Math)

Other participants and key contributors include:

- Carina Beck (Student Success)
- Chris Fastnow (Planning. & Analysis)
- Julie Rognlie (Gallatin College)

## Introduction and Background

We define a *Barrier course* to be a class that (a) is required for progress in one or more degree programs, (b) has a semester enrollment greater than 50, and (c) in many semesters has more than 25% of the enrolled students receiving a no-credit outcome, which we refer to as a *DFW*: a D or F grade, or withdrawal from the course (W).

A course with a high DFW rate that is required for a particular degree program presents a *barrier* for unsuccessful students: they must either re-take the course until they succeed, choose a different degree program that doesn't require completion of that Barrier course, or simply give up and drop out of the university.

The MSU Office of Planning and Analysis keeps track of high DFW rate courses each semester. Between Fall 2009 and Spring 2012, there were 92 different MSU courses on the watch list. Among the 92 instances there were 22 courses that appeared on the list at least four of the six semesters surveyed. These Barrier courses, and the average DFW percentages, are listed here in alphabetical order by rubric:

- AMST 101D, Intro to American Studies (27%)
- BIOB 170IN, Principles of Biological Diversity (29%), also listed as "Organismal Biology"
- CAPP 120, Introduction to Computers (36%)
- CHMY 121IN, Intro to General Chemistry (37%)
- CHMY 141, College Chemistry I (35%)
- CSCI 111, Programming with Java I (34%)
- ECNS 101IS, Economic Way of Thinking (30%)
- EGEN 115, Engineering Graphics (31%)
- EGEN 116, Engineering Graphics Lab (36%)
- EGEN 203, Applied Mechanics (46%)
- M 065, Pre-algebra (39%)
- M 096, Survey of Algebra (39%)
- M 097, Surv of Alg (Mastery Learning) (44%)
- M 121Q, College Algebra (44%)
- M 145Q, Math for the Liberal Arts (29%)
- M 151Q, Precalculus (45%)
- M 161Q, Survey of Calculus (29%)
- M 171Q, Calculus I (47%)
- M 172Q, Calculus II (43%)
- M 273Q, Multivariable Calculus (31%)
- PSCI 210IS, Intro to American Government (34%)
- STAT 216Q, Introduction to Statistics (44%)

Our committee identified three general categories for these 22 Barrier courses. The first category comprises *lower-division general core classes* taken by a broad range of students, many of whom may be

new freshmen. Category 2 contains the classes we traditionally think of as barriers, namely, *key foundational courses* required for specific majors, such as Calculus being a key requirement of most STEM fields. Category 3 includes courses that are *remedial (zero level) or of low-intensity* compared to traditional college-level courses.

### ***Category 1: Lower division general core classes taken by a broad range of students***

- AMST 101D, Intro to American Studies (no prereqs listed; 150+ students per year, avg. 27% DFW)
- ECNS 101IS, Economic Way of Thinking (no prereqs listed, but Math Level III suggested; 1,100+ students per year, avg. 30% DFW)
- M 121Q, College Algebra (prereq M 096/097 or ACT 23 / SAT 540, or MPLEX Level III; Q course for potential STEM students needing refresher or more math background; 900+ students per year, avg. 44% DFW)
- M 145Q, Math for the Liberal Arts (prereq M 096/097 or ACT 22 / SAT 520 or MPLEX Level III; required for Ag Ed, general Q class for non-STEM students; taken by 500+ students per year, avg. 25% DFW)
- PSCI 210IS, Intro to American Government (no prereqs listed; taken by 350+ students per year, avg. 34% DFW)

Because these courses have only pre-college prerequisites and are often taken by our newest students, the primary Barrier concern is to understand the needs of inexperienced students.

### ***Category 2: Lower division classes specified as required for specific majors (key prerequisites)***

- BIOB 170IN, Organismal Biology (no prereqs; required for biology, ecology, geology, paleontology, etc.; 500 students per year, 29% DFW )
- CHMY 121IN, Intro to General Chemistry (prereq placement at math Level 3; required for nursing, ag ed, sustainable food and bio, etc.; 800 students per year, 37% DFW)
- CHMY 141, College Chemistry I (prereq placement at math Level 4; required for chemistry, most engineering, physics, biology, HHD, etc.; 1100+ students per year, 35% DFW)
- CSCI 111, Programming with Java I (coreq M 151 precalc; required for CS, CpE, IE; 250+ students per year, 34% DFW)
- EGEN 115, Engineering Graphics (no prereqs; required for CE, CET; 200+ students per year, 31% DFW)
- EGEN 116, Engineering Graphics Lab (coreq EGEN 115; req. for CE, CET; 200+ students per year, 36% DFW)
- EGEN 203, Applied Mechanics (prereq physics I, corec calc II ; required for MET, CET; 120+ students per year, 46% DFW)
- M 151Q, Precalculus (prereq M 121; required for Env Des, Kinesiology, more advanced Q class; 600 students per year, 45% DFW)
- M 161Q, Survey of Calculus (prereq M 121; required for some business and life and social science majors; 800 students per year, 29% DFW)
- M 171Q, Calculus I (prereq M 151; required for STEM majors; 900+ students per year, 47% DFW)
- M 172Q, Calculus II (prereq M 171; required for STEM majors; 700+ students per year, 43% DFW)

- M 273Q, Multivariable Calculus (prereq M 172; required for most engineering, science, math majors; 500 students per year, 31% DFW)
- STAT 216Q, Introduction to Statistics (>C- in 100-level math; required for geography, ecology, sustainable food, etc.; 1600+ students per year, 44% DFW)

A DFW outcome in Category 2 classes often means a stall of at least a semester, and sometimes a year, in progress toward graduation. These courses may share some of the issues with inexperienced students mentioned for Category 1, but also reflect classes requiring students to possess (or to develop) special disciplinary problem-solving skills and abstract thinking. Category 2 course material emphasizes *how* and *why*, rather than emphasizing *what* and *when*, which would be more typical of Category 1 core courses.

### *Category 3: Remedial or low-intensity courses*

- CAPP 120, Introduction to Computers (currently discontinued on the MSU campus)
- M 065, Pre-algebra (now through Gallatin College; equivalent to M 085)
- M 096, Survey of Algebra (prereq M 065 or M 085; now through Gallatin College; equivalent to M 097)
- M 097, Survey of Algebra, Mastery Learning (prereq M 065 or M 085; now through Gallatin College)

These courses present a variety of challenges and opportunities, many of which have to do with students who are not yet "college-ready" in the traditional sense. Our committee did not address these courses.

### *Scope*

The majority of MSU students encounter a DFW during their studies. A review of recent Montana State University graduates' transcripts revealed that 65% of our baccalaureate degree students had at least one DFW, and 30% of our graduates had 4 or more DFWs. The review also showed a correlation between the number of DFW grades and the time required for degree completion: students with 4 or 5 DFW grades required on average one additional year to graduate compared to students with 3 or fewer DFW grades.

The causes of a DFW outcome are drawn from a continuum. In some cases the student is simply unprepared academically for the course or lacks the intellectual maturity to recognize the level of effort required to succeed. In other cases the student doesn't recognize the signs of poor performance and falls too far behind to catch back up, or must deal with an inexperienced, inflexible, or otherwise ineffective instructor. Still other students may have a change of heart about their choice of major, have a financial or family setback of some kind, or be faced with a physical or psychological illness that leads to the DFW. Thus, because the root causes of a DFW outcome are many and varied, we must expect that our strategies used to reduce the DFW rate will also need to be many and varied.

Additional observations, findings, and scholarly papers related to Barrier courses are available from the committee website: [http://ece.montana.edu/rmaher/barrier\\_courses/](http://ece.montana.edu/rmaher/barrier_courses/)

## Barrier/Gateway Course Committee Recommendations

### 1. Enforce prerequisites for all courses

Faculty specify course prerequisites to set the entry knowledge expectation for a course. Students who do not meet the prerequisite requirements may struggle, or cause the instructor to spend time reviewing material that the non-prereq student is actually learning for the first time.

We recommend that...

- **the registrar turn on prerequisite checking and enforcement in Banner for all MSU courses.**

### 2. Review and add prerequisites for all Barrier courses

MSU's admission standards enable students with minimal exposure to college-level expectations to join our student body, and many of these students do not yet have sufficient intellectual maturity to enter and succeed in a Barrier course in their first semester or two on campus. Some of the identified Barrier courses have only pre-college prerequisites or no prerequisites at all. Faculty responsible for these courses must review the entry expectations and add prerequisites—even something like WRIT 101 or a University Seminar Core class—unless provisions are in place to accommodate the least-experienced students.

We recommend that...

- **all Barrier courses specify a college-level prerequisite class—or at least apply a screening test to ensure students are actually prepared for the Barrier course expectations.**

### 3. Adjust MSU policies so that casual Withdrawals are discouraged

MSU's advising policies inadvertently contribute to the traditionally high DFW rates in certain courses. Students are told to enroll in 15 or 18 credits at no additional cost due to the tuition flat spot, but with the suggestion that they can simply drop a course or two if they end up struggling and still stay above the 12 credit minimum to be considered full time. Combined with our registration policy that permits students to withdraw from classes as late as the 13th week of the 15 week semester, the advice to over-enroll with a bail-out option sends the message that tentative or conditional enrollment is an acceptable academic strategy—which we do not believe it to be.

We recommend that...

- **MSU advisors no longer recommend tentative enrollment. The student needs to be advised to be committed 100% to success in *each* course, and not to over-enroll with a “wait and see” attitude.**
- **the Withdrawal date needs to be moved from the 13<sup>th</sup> week of the semester to a much earlier date, such as the end of the 5<sup>th</sup> week, so that students decide upon their scholarly load and devote appropriate time to each course for the majority of the semester.**
- **MSU establish a policy that a student earning a DFW in a particular course may repeat that same course only once more. A third attempt at a course with two prior DFW outcomes would be allowed solely by GARC petition, which would only be granted under extraordinary circumstances coupled with completion of mandatory career and aptitude counseling.**
- **a student accumulating a total of three or more Withdrawals from among the required courses for his or her major is automatically scheduled for mandatory career and aptitude counseling before being allowed to continue in that curriculum.**

#### **4. Do not set the expectation to be zero DFWs**

Although to our knowledge no one *inside* MSU has yet stated a goal of zero DFW outcomes, there may exist *outside* the university an assumption that any DFWs imply institutional weakness. Despite the implications of failure, MSU faculty know that a DFW grade can actually be a useful outcome for some students. Students who enter MSU with a preconception about their fields of study and perhaps an unrealistic expectation about the level of effort and talent necessary to succeed in that field can actually benefit from the experience leading to a DFW. It provides a strong, practical signal that the student's talents, interests, and abilities really lie in some other field. Moreover, faculty clearly expect MSU students to be engaged and committed, shouldering their own share of responsibility for academic achievement and success, and some students may not be ready to take on that shared responsibility for learning. Enrolling in a formal class may be the best way to find out his or her aptitude, although this can be at the risk of earning a DFW grade. Thus, MSU needs to make this point to those outside of the institution, particularly if there are external moves to make DFW rates a direct factor in performance-based funding.

We recommend that...

- **MSU take steps to explain to our external constituencies that while we work to reduce the causes of DFW outcomes, a modest DFW rate does *not* in and of itself represent pedagogical failure.**

## 5. Learn more about the students' perceptions of DFWs

Our assumptions about why students do not succeed academically in certain courses are largely based on subjective perceptions and accumulated anecdotes. The *student's* perception of the sequence of events leading to a DFW is hard to ascertain, either because the individual student responds with a non-specific comment ("*I was just too busy with my other classes to do well in this one*"), an unhelpful defensive remark ("*the TA hated me from the start*"), or most likely because the student's responses are not collected at all. Instructors normally sign a withdrawal sheet with little or no discussion with the student, and we feel that the withdrawal decision needs to be a more serious and less casual event.

Therefore, MSU must define best-practices for advising and discussion with students so that they know their options before reaching the DFW precipice. This must include providing a means to ensure a face-to-face conversation between a student contemplating a DFW outcome and an appropriate university representative, as well as making use of existing student survey mechanisms to help our institution better to understand the students' thought processes. The information from the face-to-face interview needs to be collected and maintained centrally.

We recommend that...

- **we ensure a face-to-face conversation between a student facing a DFW outcome and an appropriate university representative (e.g., academic advisor or designated student success coordinator), with a written exit report prepared, collected, and assessed.**

## 6. Define curriculum pathways that guide student success preparing for Barrier courses

"Tracks" advising sheets (curriculum pathways) are being developed by faculty and staff in many programs, especially those with specific math/science level entry requirements. For entering students who are not at the necessary level of proficiency, the tracks clearly indicate courses students can take based on their math level that will count for the major they've declared, as well as cover requirements for progress toward graduation.

Similarly, the Provost's Office, University Studies, and Planning & Analysis are preparing reports on the change-of-major trends for MSU students (last 6 years) to determine the most common changes. It is hoped that this information will help us advise students facing a DFW in a Barrier course about other majors in which fellow students have found success without starting over at the beginning.

We recommend that...

- **all degree programs with college-level Barrier course requirements prepare and disseminate *curricular tracks* that show a semester-by-semester sequence of how a student not meeting the entry-level requirements can take a progression of courses to gain proficiency while earning as many credits as possible that are applicable to the**

**specific major or similar majors, thereby optimizing the time required to earn the degree.**

## **7. Reconsider the role and scope of Freshman Seminar (University Seminar Core category)**

Freshman seminars are often viewed as an opportunity to help new students start on the right foot in college. Yet the philosophy of some University Seminar (US) core courses has shifted away from emphasizing specific college "survival skills" like note-taking, studying, outlining, multiple revisions, and so forth. We believe that at-risk students must develop appropriate survival skills before letting them loose into the various formal curricula, and MSU must implement strategies to identify at-risk students and ensure they are steered to specially designed and focused University Seminar courses. Just as we steer our most capable students to Texts and Critics honors seminars, we must steer our at-risk students to a freshman seminar experience specifically tailored to help and motivate them for college success.

We recommend that...

- **MSU identify or create one or more University Seminar courses specifically designed to assist at-risk students in learning and practicing college-level survival skills, and actively steer students to the appropriate opportunities.**

## **8. Faculty assistance and development for those who teach the identified Barrier classes**

Faculty and graduate teaching assistants assigned to Barrier courses may feel isolated and unprepared, and therefore could benefit from learning best-practices in teaching and learning for these classes in which many students traditionally fail. For example, the Center for Faculty Excellence should establish a "Barrier Course Instructors Group" for faculty and GTAs in the identified courses so that they can meet a few times per year for specialized training, sharing best practices, and collegial encouragement.

The cadre of Barrier Course Instructors needs to be drawn from MSU's very best instructors. We must systematically identify, groom, support and provide specific monetary and workload incentives for these specialized instructors. These instructors should primarily be those whose creative interests embrace the scholarship of teaching and learning in these essential courses. MSU must also provide institutional assistance with research-based teaching methods, supervised recitation sections, and early intervention for students at risk for DFW.



We recommend that...

- **MSU institute support mechanisms to boost faculty morale and effectiveness in Barrier courses, such as workload adjustments, monetary compensation, and incentives for instructional innovation.**
- **the Center for Faculty Excellence establish a "Barrier Course Instructors Group" for faculty and GTAs in the identified Barrier courses.**

## 9. Implement academic intervention strategies to reduce DFW outcomes

Helping students avoid DFW outcomes in Barrier courses requires thorough and effective advising *before* the student enrolls in the class, engaging students in enhanced learning opportunities such as study groups, recitation sections, and active learning programs *during* enrollment, and intervening with suitable guidance and follow-up steps *after* the course is over.

MSU's pedagogy at all levels must help students develop *productive persistence*, which is a key attribute of college-level learning. Success in Barrier courses entails perseverance and ingenuity: the first attempt to solve a problem often does not work, and the student must learn intellectual tenacity to try a sequence of alternative approaches, backtrack, look for similarities and differences with previously solved problems, cast the problem in a different context, consult an instructor or classmate for help, etc. Students who give up after the first attempt, or who think that all they need to do is memorize "a trick" that will lead to an immediate solution, will face difficulty in Barrier courses.

We recommend that...

- **there be a formal, sustainable, and strategic commitment by MSU to develop better students. MSU needs to ensure that ALL inexperienced students are guided into learning opportunities that will put them on a successful academic trajectory *before* facing a Barrier course.**
- **we provide better training for intake advisors who work with our newest and potentially at-risk students. Specifically, we all need to do a better job helping students grasp the fact that university courses are not "re-runs" of high school courses even if the course names sound similar, and helping students identify the academic level at which they will find a secure foothold.**