High Risk Course Action Plan

Course Name & Number: CHEM 1411

History of PGR & Retention Averages for Courses

Semester/Year	*PGR*	*Retention (within Semester)*
FALL 2014	68 %	85 %
SPRING 2015	52 %	74 %
2014-2015 ACADEMIC YEAR	61 %	80 %
FALL 2015	64 %	83 %
SPRING 2016	56 %	78 %
2015-2016 ACADEMIC YEAR	59 %	81 %
FALL 2016	63 %	88 %

Please attach Sectional PGR and Retention data to this form.

Semester of Implementation: Spring 2016

The Action Plan:
(For example, this could include professional development, curricular changes, pedagogical changes, student academic support changes, etc.)

We will continue implementing our early assessment coupled with topic specific refreshers. We will evaluate the plan and proceed based on its success.

Rationale for Plan:
(Include how this plan interfaces with any previous action plans for this course.)

We started this early assessment in Spring of 2016. We have seen a slight improvement in the PGR numbers but also managed to familiarize students with the Science Learning Centers and start their homework earlier in the semester.

1. **Review the attached high risk course spreadsheet that tracks Fall 2012-Fall-2016. Evaluate the Fall 2016 course percentage within the context of course success rates since Fall 2012. You can filter the spreadsheet by subject and course number to only see your specific high risk course over the time period of fall 2012-fall 2016. What specific reasons might account for this fall's success rate? I would also consider why a course that was at risk last spring has moved out of the high risk category. Similarly, several high risk courses demonstrate an increase in success rate over time. To what might this be attributed? You might also want to include discipline-specific state and/or national benchmarks for "high risk" courses to provide additional context for assessing the fall figures.**

General Chemistry lecture and lab used to be separate courses. At PAC starting in the Fall of 2014, CHEM 1311 (lecture) and CHEM 1111 (lab) were combined into CHEM 1411 (lecture and lab).
Our Fall 2016 success rate in the CHEM 1411 courses was 63%, which was slightly higher than the previous two years. The district success rate for Fall of 2015 and Fall of 2016 was also 63%. Given the national averages (between 60% and 65%) our success rate while it merits improvement, is not entirely unexpected. While our PGR has fluctuated, it has increased over the two previews years and we have been trying to address the issue.
Unlike other disciplines, in Chemistry often times one needs a correct answer or explanation, and therefore instructors have little room for extra credit, especially when students do not explicitly show their work. Additionally, unlike some disciplines where perhaps a student can choose to focus on a book or assignments midway in the semester, in Chemistry the sequence of chapters is necessary, since a student builds on an edifice of understanding from the ground up. For example, a student first needs to balance compounds before balancing reactions with compounds. Therefore gaps that are not addressed early on, can lead to further comprehension issues.
Though writing papers (the students need to write 2 papers in CHEM 1411), understanding and manipulating complex concepts, and handling equipment and interpreting laboratory data can often overwhelm the students, we have been trying to identify key bottlenecks in knowledge and understanding that seem to stop students from successfully completing the course.
We have identified three distinct such bottlenecks: basic math skills, nomenclature, and stoichiometry.
Specifically in the Fall of 2015, we established a Chemistry early math assessment, which we started administering in the Spring of 2016 on the first day of class in all our entry level Chemistry courses.
It has been evident that a lot of students are unprepared in the basic math skills. While technically fulfilling the math requirements over the years, it is clear that lack of basic math concepts is a real bottleneck to students successfully completing the course. SAC has been faced with the exact same issue and in recent communications, they have established that the prerequisite Math course grades are "fake" and have moved towards a math pre-assessment. This was almost the same time we worked on our Math assessment. Early math assessments were given in the past by instructors, but after collaboration we came up with a litmus test that would allow us to identify what specific math issues a student might have (i.e. conversions, using a calculator, finding averages etc.)
The second day of class students that performed poorly on the assessment are informed to visit with the instructor or attend tutoring meetings at the Science Learning Center. As part of this effort, we have recruited the Science Learning Center to perform refreshers on these 3 bottleneck topics over the course of the semester. Some instructors can choose to give extra credit for attending these custom made refreshers to make sure that students correct their mistakes early on, before these gaps cause further setbacks. We plan to continue with this metric, as catching and mitigating some of these early, is key in not having the students lost over more complicated concepts. It is possible that this extra measure has contributed to the slight PGR increase over this last semester.

2. Identify any additional support – other than a lower class size - that may be needed to improve course success rates. Support might be for students (e.g., tutoring, equipment, workshops, etc.) or for faculty (e.g., professional development in a particular teaching strategy as the "flipped classroom" or discipline specific professional development).

Increasing tutoring hours for two nights a week (and perhaps some Saturday morning hours) might allow some of the students to attend the Science Learning Center refreshers and visit with tutors for general questions. Providing opportunities for students to become TA's in a lab that they have taken in the past would benefit both the student TA and the lab students and may make it easier to understand some concepts by placing them on every day terms. In the past we have hired students through a grant for such positions and one of them is now a current tutor in one of the Science Learning Centers.

Chemistry is a hands on science and a lot of the more abstract concepts can be easier understood with hands on demonstrations or hands-on experiments. Such hands-on experiences also tend to motivate and inspire students. Providing students with better equipment and overall lab support is key to their understanding. Professional development by attending Chemistry specific conferences (ACS) or other pedagogical conferences where conferences on how to teach students specific topics (i.e. nomenclature) or more general teaching methodology (active and collaborative learning) would also help improve success rates. Students work in group projects both in class and in lab and proper methodology is key in setting students to a successfully complete group projects. The following items have been identified that would render some of the hard to visualize concepts more approachable to students.

Item Description	Vendor	Catalog#	per item	QTY	total
H atoms 1 hole	Flinn	AP6243	6.95	4	27
O atoms 4 hole	Indigo instruments	60402E	0.67	30	20
C atoms 4 hole	Flinn	AP6245	6.95	4	27
mole box	eNasco	SB50534M	9.50	3	28
mole sets	eNasco	SB44448M	23.35	4	93
Fire syringe	Educational Inovations	FIR-150	17.95	1	17.
knob	Educational Inovations	FIR-155	4.95	1	4.
TLC	Flinn	AP9095	20.10	4	80
TLC jar and lic	Flinn	AP7532	6.95	3	20.
Polypropylene Beaker 5 L	Flinn	AP5331	48.00	1	
Poly density kit	Educational Inovations	DEN-460	19.95	1	19.
steel sphere demo	Educational Inovations	HS-8	28.95	1	28.
51 bulb pro UV light	Educational Inovations	UV-651	79.95	2	159
Eddy Current Tubes 18	Educational Inovations	ED-100	39.95	1	39.
Eddy Current Tubes 61	Educational Inovations	ED-140	99.95	1	99.
Diffusion Mist	Educational Inovations	HS-7	17.95	1	17.
FLIR C2 Compact Thermal Imaging System	PASCO	SE-7128	499.00	1	4
Instant Light	Flinn	AP9118	12.25	2	24
Energetic Light	Flinn	AP8978	24.75	2	49
Chemistry, 2nd Edition	TheGreatCourses	1012	374.95	1	374.
Calculators (10)	eNasco	TB18507M	154.00	6	9
					2608.

3. **Review and revise your high risk course action plan to indicate actions that will be implemented this semester. If you feel that the your previous action plan needs more time to be fully implemented and evaluated, then indicate you wish to continue with the current action plan for this semester. I have attached the course action plan to complete.**