

Just in Time Co-remediation in Mathematics



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Scope of this presentation

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- PSCC approach to co-remediation for two of three entry-level math courses
 - MATH 0010 supports college-level MATH 1010 (Survey of Mathematics)
 - MATH 0530 supports college-level MATH 1530 (Introductory Statistics)
 - Both deliver remediation “just in time” for its use in each unit of the linked college-level course. This allows the MATH 1010 and 1530 classes to be heterogenous, including students college-ready in math.
- We are not addressing MATH 0030, which supports college-level MATH 1030 (Introduction to College Mathematics)
 - Too much of MATH 1030 content depends on too much of MATH 0030 content, so “just in time” structure was not considered appropriate.
 - PSCC’s MATH 1030/0030 combo classes are homogenous.

PSCC Co-Remediation in Math

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- **Goal of co-remediation:** Provide student with remediation support expressed in the context in which the foundational concepts and skills apply to the college-level course
- **Pilot year (2014-15):** MATH 0530 pilot an option at most campuses for eligible students (MATH ACT 16-18, READ \geq 19)
- **Rollout year (2015-16):** MATH 0530 or 0010 or 0030 co-req required for all eligible students (MATH ACT $<$ 19, READ \geq 19)
- **Ramp-up year (2016-17):** Exploring concepts for enhanced tutoring support and Growth Mindset workshops for 0530

Results from roll-out year (2015-16)

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	0010 15F	0530 15F	0010 16S	0530 16S
Co-req students enrolled	244	311	176	225
Passed Co-req	149	188	123	123
% passed	61%	60%	70%	55%
Passed Co-req & college-level	144	186	120	113
% (of those passing co-req) who passed college-level	97%	99%	98%	92%
Passed college-level	158	204	126	127
% (of all co-req students) who passed college-level	65%	66%	72%	56%

Co-requisite implementation

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- Structure
- Materials
- Assessment
- Co-req class day

Just-in-time co-req instruction (1010/0010)

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Week of:	Monday	Tuesday	Wednesday	Thursday	Friday
Sept 12	Review	Lab 1 and 2 complete?	Test Unit One	Proficiency Exam Unit One	3A: Uses and Abuses of percentages
Sept 19	3B: Putting numbers in perspective	Multiply and divide decimals	3E: How numbers can deceive	Convert between fractions, decimal and percent	4A: Taking control of finances
Sept 26	4B: Compound interest	Simplify expressions involving integer exponents using rule for exponents; Multiplying and dividing in scientific notation	4C: Savings and investments	Evaluate expressions involving powers and roots; Real world application problems	4D: Loans, credit cards and mortgages
Oct 3	4E: Income taxes (optional)	Solving literal equations; Lab 3 and 4 complete?	Review	Proficiency Exam Unit Two	Test Unit Two

Just-in-time co-req instruction (1530/0530)

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	1530 Topics	0530 Topics	Notes
Week 3 9/7 – 9/11 *Labor Day	Unit Exam 1 , Basic concepts of probability, addition and multiplication rules	Probability as fractions/decimals, operations (subtraction, addition, multiplication) with fractions	Lab 3E Prof. Exam 1 is due this week.
Week 4 9/14 – 9/18	Random variables and probability distributions, binomial probability distributions	Adding/subtracting decimals, order of operations, evaluating expressions when given values for variables, inequality expressions	Lab 4E
Week 5 9/21 – 9/25	Unit Exam 2 , Standard normal distribution	Order/magnitude of real numbers, writing inequality and probability statements, area of basic shapes and probability	Lab 5E Prof. Exam 2 is due this week.

Structure of co-req class

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	MATH 0010	MATH 0530	Both
Class hours plus required weekly lab hours	2 class hours plus 2 required lab hours (3 CR)	1 class hour plus 2 required lab hours (2 CR)	Student self-schedules lab hours
Organized in units	4 units phased with MATH 1010 units	5 units phased with MATH 1530 units	Student can work ahead of class
Prerequisite		Dept recommends ACT MATH < 16 should take 1010/0010	ACT READ at college level ACT MATH < 19 or waiver
Corequisite	MATH 1010 (3 CR)	MATH 1530 (3 CR)	Same instructor for linked co-requisite and college-level course

Why recommend 1010/0010 for MATH ACT < 16?

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- Most math courses build from one unit to the next
 - Students who struggle with first unit may never catch up
- MATH 1010 is a survey course
 - Its units are more independent from each other
 - Students who struggle with first unit have a chance to reset and succeed in the remaining units
- Once these students succeed in MATH 1010/0010, those who need MATH 1530 or an algebra sequence
 - can then take the standalone college-level course
 - will be more familiar with math tutoring resources on campus

Materials for co-req class

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	MATH 0010	MATH 0530	Both
Web-based instructional software course	Linked to MATH 1010 course	Linked to MATH 1530 course	1 access kit covers combo course
Co-req workbook	Required starting Spring 2017	Required starting Fall 2016 (c. \$26.95)	Developed by PSCC math faculty

Web-based co-req instructional software

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- PSCC teams
 - modified copies of existing college-level questions to address co-req content with added scaffolding
 - created additional questions for co-req specific content
 - repurposed additional questions from other courses to meet co-req needs
- Benefits to student
 - pay minimal cost for additional materials
 - similar college-level questions in college-level course
- Costs: Instructor-created/modified questions
 - lose most Question Help options (so team made supplemental captioned videos)
 - present all parts of the question at once

0010 LAB

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Note: This Web-publication version omits the sample exercise in the original presentation, taken from an 0010 LAB, intended to check student's use of order of operations rules in substituting values and evaluating expressions.

The exercise was built by modifying a college-level question that simply asked for the account balance in a compound-interest exercise. Unlike the college-level question, the co-req question states the relevant formula to be evaluated, then takes the student step by step through identifying which operation to evaluate next, and finally asks the student for the resulting account balance.

The co-req question provides scaffolding for the student to understand and interpret what the formula is asking the student to calculate, before the college-level version expects the student to identify and evaluate the appropriate formula in one visible step.

Note: This Web-publication version omits the sample exercise in the original presentation, taken from an 0530 LAB that used the formula for standard deviation to check student's use of order of operations rules in substituting values and evaluating expressions.

The exercise was built by modifying a college-level question that simply asked for the range, variance and standard deviation for a small dataset. Unlike the college-level question, the co-req question states the relevant formula to be evaluated, then takes the student step by step through finding the mean of the dataset, the difference of each data value from that mean, the square of each difference, the sum of those squares, and finally using those result values in evaluating a formula for the standard deviation. The co-req question also asks the student to think critically about the ideal standard deviation for a dataset where every value should be measuring the same actual quantity.

The co-req question provides scaffolding for the student to understand and interpret what the formula is asking the student to calculate, before the college-level version expects the student to identify and evaluate the appropriate formula in one step.

Workbooks for co-req courses

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- Workbooks contain co-requisite instructional material and additional exercises
 - In-class lessons
 - Qualification for testing/retesting
 - Supplemental instruction
 - Other uses at instructor's discretion
- We are not here to sell workbooks
- If you are interested in either workbook, contact Terry Brennan, Sr. Acquisitions Editor
Kendall-Hunt Publishing Co., Nashville, TN 37221
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Assessment

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	MATH 0010	MATH 0530	Both
Proficiency exams demonstrate mastery of content	4 exams = 65% of 0010 grade Pass each exam with 80% to make next exam accessible	5 exams = 60% of 0530 grade Pass each LAB with 80% to enter next LAB Pass relevant LAB to make corresponding exam accessible	Proctored in Testing Centers Pooled questions from LABs Retests allowed with instructor permission; highest score counts
Projects demonstrate fifth competency	2 projects @ 10%	1 Capstone = 25% (1 section per 1530 chapter covered)	Usually completed in college-level course; % for that course may differ
Lab time 2 hrs/week	15%	15%	
Grading scale	A 94-100%, B 87-93%, C 80-86%, F <80%		No Ds!

Different purposes for projects

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- 0010 Projects emphasize ability to present mathematical reasoning to persuade or inform a reader
 - Various topics drawn from consumer math, geometry, logic, probability and statistics
- 0530 Capstones emphasize using technology to apply statistical reasoning to large databases
 - Youth Smoking
 - Firefighter Bias (an actual US Supreme Court case)
 - Appalachia (tied to our Common Book for that year)
 - Careers (income levels, education required, current and projected demand)
 - Police Involved Deaths
 - Presidents
 - Guns
 - Instructors may develop their own Capstone or equivalent assessment for the fifth competency, with department approval

Co-req class day - instructor's discretion

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- Review Weekly Progress report with individual students
- Provide mini-lesson on content of next LAB
- Work exercises in workbook
- Share insights / alerts about quirks of instructional software
- Tutor individuals and small groups who need further support for a college-level or co-requisite topic
- Support students as they work in instructional software, workbook, or projects
- Review a Proficiency Exam with a student