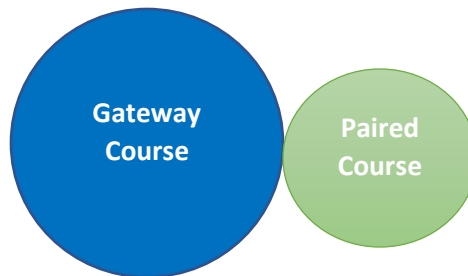


MATH CO-REQUISITE DEVELOPMENTAL MODELS
OHIO MATHEMATICS INITIATIVE SUBGROUP ON NEW & ALTERNATIVE PATHWAYS
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Researchⁱ suggests that more students successfully complete college-level math gateway courses with accelerated, co-requisite academic support compared to multiple terms of pre-requisite developmental education. Co-requisite developmental education is delivered in various forms which are categorized here into three models informed by the work of Complete College America, RAND Corporation, and an inventory of practices in Ohio public institutions:

Figure 1: Paired Course Model



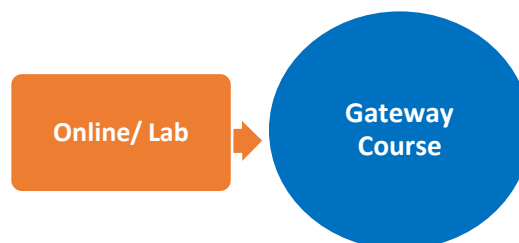
- **Paired Course Model:** Provides support skills in a separate course aligned to the learning objectives of the gateway course. The separate course is paired with the gateway course and delivered in the same semester.

Figure 2: 101 Plus Model



- **101 Plus Model:** Offers academic support as an extension of the gateway course.

Figure 3: Technology-Mediated Support Model



- **Technology-mediated Model:** Requires students to complete online lab support.

1. Paired Course Model

Students are enrolled in a course providing developmental support aligned to the learning objectives of the college-level course and the college-level gateway course simultaneously. The major variation within the paired course model relates to the integration or separation of developmental education and college-ready students in the related gateway course.

Paired Course Variations	Integrated	Exclusive
Concurrent or Consecutive within Term	Concurrent	Concurrent
Course Structure	Separate courses; may be a uniform course for registration purposes; may have separate or linked grading	Separate courses; may be a uniform course for registration purposes; may have separate or linked grading
Amount of time/credit	4-6 total credits	4-6 total credits
Student Participation	College-level course populated by developmental students and college-ready students in the same section	College-level course populated by developmental students only
Instructors	May be two different teachers or same instructor	Same instructor
Format/delivery	Co-requisite instruction is paced and synchronized with college-level course, when possible.	Co-requisite instruction is paced and synchronized with college-level course
Institutional Examples	<i>Sinclair Community College</i> Quantitative Reasoning (MAT 1445) <i>Wright State University</i> College Algebra (MTH 1280)	<i>Central Ohio Technical College</i> Statistics (MATH-130, MATH-013) <i>Shawnee State University</i> Quantitative Reasoning (MATH 1000A, 0100A)

2. 101 Plus Model

Institutions with this model design the developmental education support largely as an extension of the “101” gateway course. This may also be called the extended instructional time model. The additional support may be delivered just-in-time or front-loaded within the gateway course. It may also vary in format or the inclusion of students who were not identified as needing developmental education supports.

101 Plus Variations	Just-in-Time Developmental	Front-loaded Instruction	Supplementary Recitation or Lab	Just-in-Time for All
Concurrent or Consecutive within Term	Concurrent	Consecutive	Concurrent	Concurrent
Course Structure	Single Course	Single Course	Single Course	Single Course
Amount of time/credit	3-5 total credits	3-5 total credits	3-4 total credits	3-5 total credits

101 Plus Variations	Just-in-Time Developmental	Front-loaded Instruction	Supplementary Recitation or Lab	Just-in-Time for All
Student Participation	Developmental students only	Developmental students only	All students; Some students may qualify to opt out after a period of time	All students
Instructors	Same instructor	Same instructor	Same instructor	Same instructor
Format/delivery	Developmental support is an extension of the standard instructional time.	Developmental instruction is followed by college-level instruction.	Support is delivered in sessions driven by student questions or project-based learning.	Support is embedded within standard instructional time
Institutional Examples	<i>University of Cincinnati</i> Calculus I with Pre-calculus (MATH 1060)	<i>Cleveland State University</i> Quantitative Literacy with Basic Algebra (MTH 116)	<i>University of Toledo</i> Math with Reasoning (QR; MATH 1180)	<i>Columbus State Community College</i> College Algebra Plus (MATH 1146)

3. Technology-mediated support models/ Emporium model

In the technology-mediated support model, institutions require students to participate in developmental education supports that primarily rely on technology-mediated instruction (e.g. ALEKS) through work on computer-adaptive modules in lab settings. This is commonly called the emporium model. Iterations of this model may differ by timing in relation to the gateway course, instructor assignment, or both.

Technology-Mediated Variations	Just-in-Time Lab	Front-Loaded Lab
Concurrent or Consecutive within Term	Concurrent	Consecutive, may be offered during summer or intercession
Course Structure	Separate course/ lab	Separate course/ lab
Amount of time/credit	1-5 total credits	1-5 total credits
Student Participation	Developmental students only in lab	Developmental students only in lab
Instructors	May be same or different instructor	Typically, different from college-level instructor
Course format/delivery	Independent academic support via computer; may also have instructor support	Independent academic support via computer; may also have instructor support
Institutional Examples	<i>Youngstown State University</i> Via ALEKS while enrolled in College Algebra (MATH 1510)	<i>Youngstown State University</i> Differentiated developmental course work via ALEKS to increase placement for College Algebra (MATH 1510)

Developmental Ladders

Some institutions are experimenting with ladders that combine the models to provide two or more points of intervention with the student. In many cases, the first intervention can be a summer or intercession program between terms and not in a separate term as it would be in a traditional developmental education sequence.

The first intervention may be technology-mediated supports or academic bridge programs. Based on the students' competencies after the first intervention, they may then place the student in a paired course or extended instructional time model if they are not ready for the college-level course only.

¹ Community College Research Center, *What We Know About Accelerated Developmental Education*, New York: Columbia University, Teachers College, 2014.