Co-requisite Design

Purpose
Support mathematics faculty in designing the structure of co-requisite courses.

Audience
Math faculty and departmental administration who are leading math pathways work.

Using this webinar
This webinar is designed to convey information and support discussion, reflection, and action.
View this webinar individually or use it with a group to structure discussion and planning. Periodically, there will be prompts for activities, including:

- Discussion/reflection
- Practice
- Plan for action

For each webinar, pause at these points as long as you wish.
Outcomes

Participants will:
• Build on the backmapping work accomplished during and after the previous webinar.
• Understand the additional steps needed in planning the support content for a co-requisite (rather than a prerequisite) support course.
• Understand and plan for the decisions that need to be made in designing the support course structures.

Dana Center Mathematics Pathways

Dana Center Principles for Pathways

Mathematics pathways are structured so that:
1) All students, regardless of college readiness, enter directly into mathematics pathways aligned to their programs of study.
2) Students complete their first college-level math requirement in their first year of college.

Students engage in a high-quality learning experience in math pathways designed so that:
3) Strategies to support students as learners are integrated into courses and are aligned across the institution.
4) Instruction incorporates evidence-based curriculum and pedagogy.
Quick Recap: Defining Content

Backward mapping to define content

The needs of "metamajors" → Type and content of gateway mathematics courses → Learning outcomes of support courses for underprepared students

Backward mapping to define content

For prerequisite course structures, consider carefully which skills may need to be reinforced in the college-level course or may even be best saved for initial introduction in the college-level course.
Implementing Co-requisite Supports

Activity: Discussion/reflection

Take a few minutes to discuss with your colleagues or reflect individually:

What information did you find that resonates with you? What questions do you have?

When you are finished, proceed to the next section.
Implementing Co-requisite Supports

- Consideration 1: Existing campus supports
- Consideration 2: Co-requisite model
- Consideration 3: Co-requisite content
- Consideration 4: Cultural shifts
Activity: Discussion/reflection

Take a few minutes to discuss with your colleagues or reflect individually:

- What existing campus supports do you need to learn more about? What will you need to tell them about the co-requisite support courses?
- Which cultural shifts resonate with you? Which, if any, concern you?

When you are finished, proceed to the next section.

Implementing Co-requisite Supports

- Consideration 1: Existing campus supports
- Consideration 2: Co-requisite model
- Consideration 3: Co-requisite content
- Consideration 4: Cultural shifts

Implementing Co-requisite Supports

- Consideration 1: Existing campus supports
- Consideration 2: Co-requisite model
  - Placement
  - Structure
- Consideration 3: Co-requisite content
- Consideration 4: Cultural shifts
Mathematics Pathways with Co-requisites

Advising and Assessment
Choose Meta-major
Social Sciences
STEM
Fine Arts
Humanities
Gateway Math in 1st year
State
College
Pre-Major Advising
Choose Major
Math
Stats
Fine Area
Social Sci.
College Algebra
Adapted from Complete College America 2016

End Use of Traditional Placement

Remediation
Gateway
Percent of Students
70%
30%
Student Placement Data
~ Complete College America 2014

With Co-requisite, Most Students in College-Level

Percent of Students
10%
60%
30%
Student Placement Data
~ Complete College America 2014
Roane State Community College

Leaky Remediation Pipeline at Roane State prior to 2016

- Students with ACT ≤ 19: N=805
  - Remedial Course: Withdraw/Fail 63%, Stay enrolled 37%
  - Catch-up Remediation: Withdraw/Fail 50%, Stay enrolled 50%
  - College-Level Math: Withdraw/Fail 12%
Revised Model: The Co-requisite Approach

Students with ACT < 19

N = 564

Success! 58%
Withdraw/Fail 42%

MATH 1530 & MATH 0530

The Co-requisite Approach: Placement

- All high school students in Tennessee take the ACT test.
- This test is used for placement purposes.
- ACT Scores or <19 in math (or equivalent Accuplacer score) are required to take Co-requisite course

<table>
<thead>
<tr>
<th>College Course</th>
<th>Co-requisite Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1530 Probability and Statistics (3 cr.)</td>
<td>MATH 1530 Probability and Statistics (3 cr.)</td>
</tr>
<tr>
<td>MATH 0530 Statistical Principles (3 cr.)</td>
<td></td>
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</tbody>
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The Co-requisite Approach: Doubly Blended Model

- Each section of the college-level "Probability and Statistics" course contains students with and without learning support needs (blended approach).
- Students with remedial needs choose any section of the co-requisite support "Statistical Principles" course (doubly blended approach).

- Each section of either course may be taught by different faculty.
The Co-requisite Approach: Grading

Students earn separate grades in the two courses. Each course uses different assignments.

**Probability and Stats**
- 4 Tests
- 1 Final Exam
- Homework

**Statistical Principles**
- Quizzes
- Homework
- Calculator Exercises
- Class Participation

The Co-requisite Approach: Curriculum & Instruction

- The two courses proceed in lockstep.
  - A common course calendar prescribes which topics to cover in each class period.
- Topics in the Statistical Principles learning support section are timed and structured to provide the learning support exactly when needed.
- Statistical Principles instructors are provided with a lesson plan for a mini-lecture, worksheet and guided assignments in MyMathLab

The Co-requisite Approach: Challenges

- Faculty acceptance
- Keeping all sections in lockstep
Activity: Discussion/reflection

Take a few minutes to discuss with your colleagues or reflect individually:

- What did you hear that you want to capture in your notes?

When you are finished, proceed to the next section.

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Accelerated Co-Requisite Cohort

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Traditional Model: No Acceleration

Fall 2015 – Fall 2016
Two Developmental Math Courses:

- Introductory Algebra
- Intermediate Algebra

- College Algebra: 3331 students, 59% passing
- Statistics: 243 students, 79% passing
- Quantitative Reasoning: 24 students, 63% passing
**New Model: Accelerated Co-requisite Cohort Approach**

Fall 2015 – Fall 2016

- **No Independent Developmental Math Course**
  - **Accelerated College Algebra (AIM)**
    - 920 students
    - 74% passing
  - **Accelerated Statistics (ASAP)**
    - 96 students
    - 75% passing
  - **Accelerated Quantitative Reasoning (AQR)**
    - 87 students
    - 90% passing

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**What is an “Accelerated Co-Requisite Cohort”?**

- Accelerated Quantitative Reasoning

- **Developmental Math Course**
  - **Math 0332**

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**What is an “Accelerated Co-Requisite Cohort”?**

- Accelerated Quantitative Reasoning

- **Quantitative Reasoning**
  - **Math 1332**
What is an “Accelerated Co-Requisite Cohort”?

Accelerated Quantitative Reasoning (AQR)

Two Courses – Two Teachers
(Support included “Just in Time”)

Accelerated Quantitative Reasoning (AQR)
Math 0332 & Math 1332
Developmental Students
Not College Ready
(Determined by State Placement Exam)

Complete BOTH Courses (Remedial and Academic) in ONE Semester

Co-requisite: Accelerated Quantitative Reasoning
Curriculum and Instruction

Scissor Game
Watch/Observe
Listen
Participate
Collaborate

Course Structure
Videos/Demos
Presentations
Activities
Community
Co-requisite: Accelerated Quantitative Reasoning
Curriculum, Instruction & Assessment

Co-requisite: Accelerated Quantitative Reasoning
Curriculum

1. Sets & Logic
2. Probability
3. Math Finance
4. Geometry & Art
5. Statistics

Co-requisite: Accelerated Quantitative Reasoning
Instruction

Variety of presentation types
- Presentations/Lectures/Videos – by teachers/students/internet
- Discovery lessons/flipped experiences
- Technology – Excel; Graphing calculators
- Active learning – reading writing, discussing, problem solving, experiments, etc.
Co-requisite: Accelerated Quantitative Reasoning

Instruction and Assessment

Variety of presentation types
- Presentations/Lectures/Videos – by teachers/students/internet
- Discovery lessons/flipped experiences
- Technology – Excel; Graphing calculators
- Active learning – reading writing, discussing, problem solving, experiments, etc.

Assessments – formative and summative
- Module Projects
- Homework from textbook
- Module Exams/Final Exam
- Tickets in/out the door
- Capstone Project for the Course

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Co-requisite: Accelerated Quantitative Reasoning

Challenges

Students
- Motivation
- Learning disabilities/Math anxiety
- FT = Face-2-Face and PT = Hybrid

Teachers
- Support/Instruction – everyday
- Keep the goal of success in front – everyday
- It takes a village – so create one
- Two are better than one but not absolute necessity

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Activity: Discussion/reflection

Take a few minutes to discuss with your colleagues or reflect individually:

- What did you hear that you want to capture in your notes?
- What did you hear from Markus and Sharon that resonated with you? What questions do you still have?

When you are finished, proceed to the next section.
Implementing Co-requisite Supports

- Consideration 1: Existing campus supports
- Consideration 2: Co-requisite model
  - Placement
  - Structure
- Consideration 3: Co-requisite content
- Consideration 4: Cultural shifts

Vocabulary – Student Structures

**Co-mingling:** Mixing college-ready and underprepared students in the same class.

**Cohorting:** Designating certain sections of college-level courses exclusively for underprepared students.

Activity: Structure Pros and Cons
Activity: Discussion/reflection

Take a few minutes to discuss with your colleagues or reflect individually:

- What are the pros and cons of creating cohorts of underprepared students?
- What are the pros and cons of co-mingling college-ready and underprepared students?

When you are finished, proceed to the next section.

Vocabulary – Calendar Structures

- Just-in-time supports
- Support courses: Separate, structured support courses that run before, after, or on opposite days to the college-level courses.
- Embedded supports: College-level classes with the developmental content embedded.
- Mandatory tutoring: Required attendance in a tutoring lab for a specified number of hours per week.
  - Prerequisite supports + college-level; one semester
- Boot camp: First 3-5 weeks of the semester are remediation, followed by the college-level content.
- Compressed courses: Developmental prerequisite class is compressed into 8 weeks, and then the college-level class is compressed into 8 weeks, so that both classes are completed in one semester.
  - Just-in-time supports; two semesters
- Stretch courses: College-level classes with the developmental content embedded and stretched over two semesters (e.g. Statway model).

Activity: Discussion/reflection

Take a few minutes to discuss with your colleagues or reflect individually:

- What are the pros and cons of each calendar structure?

When you are finished, proceed to the next section.
Implementing Co-requisite Supports

- Consideration 1: Existing campus supports
- Consideration 2: Co-requisite model
- Consideration 3: Co-requisite content
- Consideration 4: Cultural shifts

Backward mapping to define content

For prerequisite course structures, consider carefully which skills may need to be reinforced in the college-level course or may even be best saved for initial introduction in the college-level course.

Planning Co-requisite Content
Activity: Discussion/reflection

Take a few minutes to discuss with your colleagues or reflect individually:

- What do you notice about the Roane State calendar?
- What questions do you have?

When you are finished, proceed to the next section.

Planning Co-requisite Content

Activity: Plan for action

Create a plan for designing the structures of support courses for underprepared students. Plan for how you will:

- Move forward to address the four considerations and the subcategories within each.

When you are finished, proceed to the next section.
Resources available

The Dana Center Mathematics Pathways Resource site, www.dcmathpathways.com:
- Learn About: Essential ideas and resources targeted for essential stakeholders
- Take Action: Action steps and resources for institutional and classroom implementation
- Resources:
  - The Case for Math Pathways
  - The Program of Study Briefs
  - Videos of student and faculty sharing their experiences

Contact information

- General information about the Dana Center
  www.utdanacenter.org
- Dana Center Mathematics Pathways Resource Site
  www.dcmathpathways.org
- To receive monthly updates about the DCMP, contact us at dcmathpathways@austin.utexas.edu

About the Dana Center

The Charles A. Dana Center at The University of Texas at Austin works with our nation’s education systems to ensure that every student leaves school prepared for success in postsecondary education and the contemporary workplace.

Our work, based on research and two decades of experience, focuses on K-16 mathematics and science education with an emphasis on strategies for improving student engagement, motivation, persistence, and achievement.

We develop innovative curricula, tools, protocols, and instructional supports and deliver powerful instructional and leadership development.