Out of Sequence Pre- & Corequisites
Board Policy and Level of Scrutiny

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Website ~ Resources

http://extranet.cccco.edu/Divisions/AcademicAffairs/CurriculumandInstructionUnit/Curriculum.aspx

or

http://www.cccco.edu/ → Systems Operations
→ Divisions → Academic Affairs → Program and Course Approval (in center under “Academic Affairs Division Profile”)
The Players

- Faculty
- Researchers
- Matriculation Directors
- Academic Senate
- Curriculum Committee
- Students
Review of Board Policy

Originates with the Academic Senate and follows the normal review process.
Board Policies/Procedures

• Policies can be broad enough to cover each college’s procedure to follow either content review or statistical validation

• Administrative Procedures can be used to describe the practice at each campus within a district

• See sample Board Policies (BPs) and Administrative Procedures (APs) ~ website
Rigorous Content Review

• No matter the method an institution selects, rigorous content review is expected during the content review cycle or during the proposal review for a new course.
“means a rigorous, systematic process developed in accordance with sections 53200 and 53204, approved by the Chancellor as part of the district matriculation plan required under section 55510, and that is conducted by faculty to identify the necessary and appropriate body of knowledge or skills students need to possess prior to enrolling in a course, or which students need to acquire through simultaneous enrollment in a corequisites course.”
Content Review

• Should include:
  – Evaluation of requisite skills for success
  – Dialog within the discipline of the course and between disciplines including basic skills faculty

• Local Curriculum Committees may want to review grading criteria, syllabi, and a broad range of assignments
Content Review

- Local Curriculum Committees should also evaluate the level of the course offered.
  - Is it college level? *Critical thinking is demonstrated through writing or computation.*
  - If not, is it degree applicable? Basic Skills? Noncredit?
Establishing Prerequisites

• Intermediate Algebra prerequisite for major’s preparation science classes
• Match entry skills for science course with exit skills or outcomes from Intermediate Algebra
Establishing Prerequisites

• Basic writing prerequisite for introductory chemistry
• Evaluation by the Curriculum Committee
  – Assignments
  – Writing skill level (see handout on website)
  – Impact
• Implementation
Establishing Prerequisites

• Chemistry prerequisite for physiology course
• Discipline Dialog within Biology
• Interdisciplinary Dialog with Chemistry
• Evaluation of course content and entry skills required for success
Overview ~ RP Group’s Prerequisite Validation Guidelines

• Intended to help researchers
  – Execute the statistical analyses
  – Support faculty

• Developed by the RP Group with input from: matriculation, faculty, researchers

• Incorporated information from Academic Senate and Chancellor’s office guidelines
Title 5 § 55003 (d) (2)

“the prerequisite will assure, consistent with section 55002, that a student has the skills, concepts, and/or information that is presupposed in terms of the course or program for which it is being established, such that a student who has not met the prerequisite **is highly unlikely** to receive a satisfactory grade in the course (or at least one course within the program) for which the prerequisite is being established”
The Game Plan: Pre-Implementation

- **Explore Need**
  - Are students highly unlikely to succeed in the target course without the knowledge, skills, and abilities learned in the prerequisite course?

- **Content Review**
  - Impact Analysis
  - Is the projected impact on course availability, enrollment, and success different depending on student demographics?

- **Pre-Implementation**
  - Local Option
  - Statistical Analysis
  - Do student success rates in the target course vary for those students with or without the prerequisite?
### Content Review: Sample Rating Template

<table>
<thead>
<tr>
<th>Skill: Ability to...</th>
<th>Rater</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>#1</td>
</tr>
<tr>
<td>Skill 1: Solve radical, quadratic equations.</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Skill 2: Solve logarithmic equations.</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Skill 3: Solve exponential equations.</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Skill 4: Solve a variety of problems by applying the definitions, postulates and theorems of plane geometry.</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Skill 5: Graph linear, quadratic, simple polynomial, exponential logarithmic functions and conic sections.</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

**Number of skills with a mean rating of ≥ 4.0: 4**

**Percent of skills with a mean rating of ≥ 4.0: 80%**
Sample Statistical Options for Researchers

<table>
<thead>
<tr>
<th>Tests</th>
<th>Questions Answered with Prerequisite Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>Is there a statistically significant difference between success in the target course and completion of the prerequisite course? The difference may not be substantial.</td>
</tr>
<tr>
<td>T-tests</td>
<td>Is there a statistically significant difference between the average grade points in the prerequisite and target courses? The difference may not be substantial.</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>Is there a significant relationship between grade points in the prerequisite and target courses?</td>
</tr>
</tbody>
</table>
### Options for Researchers

<table>
<thead>
<tr>
<th>Tests</th>
<th>Questions Answered with Prerequisite Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect Size</td>
<td>What is the strength of the relationship between successfully completing the prerequisite course and successfully completing the target course?</td>
</tr>
<tr>
<td>Odds Ratio</td>
<td>How likely is it that students who meet the prerequisite will succeed in the target course compared to those who do not meet the prerequisite?</td>
</tr>
<tr>
<td>2:1 Ratio</td>
<td>Do students not meeting the prerequisite succeed at a rate that is half that for students meeting the prerequisite?</td>
</tr>
<tr>
<td>Average Percent Gain</td>
<td>What is the average percent gain in success in the target course of students who met the prerequisite over those who did not meet the prerequisite?</td>
</tr>
</tbody>
</table>
Three-Pronged Approach

1. Comparison of Performance in the Target Course of Students Who Did and Did Not Meet the Prerequisite

2. Effect Size (accounts for influence of sample size) and Average Percent Gain

3. Restricted Bivariate Correlation Coefficient and Corrections for Restriction of Range
   - Pearson’s $r$ (Rule of Thumb: $r \geq 0.35$, assuming $p < 0.05$)
   - Chaffey also recalculates to correct for restriction of range
Chaffey College - Signals for Implementing or Not Implementing

- **Green** – Sufficient evidence exists to enforce prerequisite (at least two out of three measures are supported)
- **Yellow** – Although evidence exists, only one out of three measures supports enforcement of the prerequisite. Further discussion should occur within the department and the Curriculum Committee before the prerequisite is enforced
- **Red** – Data does not exist to support enforcement of the prerequisite. None of the measures explored meet pre-established criteria
- **Insufficient Data** – While evidence may point to the efficacy of the prerequisite, the sample size is too small to render a reliable decision
### Chaffey College ~ Prerequisite Data Table

The Target Course Includes the Following Semesters: Fall 2005 Through Spring 2010
The Prerequisite Course Completions and Placement Recommendations Include the Following Semesters: Fall 2001 Through Fall 2009

<table>
<thead>
<tr>
<th>Course</th>
<th>Successful</th>
<th>GOR</th>
<th>%</th>
<th>Prerequisite Course</th>
<th>Method of Eligibility</th>
<th>Successful</th>
<th>GOR</th>
<th>%</th>
<th>% of Target Course GOR Earning % Met Prerequisite</th>
<th>Success Rate in Target Course of Students Who Met the Prerequisite</th>
<th>Difference Between the Success Rates in the Target Course of Students Who Did and Did Not Meet the Prerequisite</th>
<th>Restricted Bivariate Correlation Coefficient</th>
<th>Correlation Corrected for Restricted Range</th>
<th>Meets Threshold</th>
<th>Disproportionate Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST-1</td>
<td>530</td>
<td>949</td>
<td>55.8%</td>
<td>READ-550 or Higher</td>
<td></td>
<td>8</td>
<td>17</td>
<td>47.1%</td>
<td>1.6%</td>
<td>0.442, 0.18, 7% P-Value</td>
<td>0.29, 14, 0.310, 0.49 Effect Size</td>
<td>Correlation Only</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>HIST-1</td>
<td>530</td>
<td>949</td>
<td>55.8%</td>
<td>Reading Proficient</td>
<td></td>
<td>8</td>
<td>14</td>
<td>57.1%</td>
<td>1.5%</td>
<td>0.922, 0.03, 1% P-Value</td>
<td>0.04, 12, 0.894, 0.09 Effect Size</td>
<td>Correlation Only</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>HIST-1</td>
<td>530</td>
<td>949</td>
<td>55.8%</td>
<td>READ-1 Placed</td>
<td></td>
<td>36</td>
<td>60</td>
<td>60.0%</td>
<td>6.3%</td>
<td>0.504, 0.09, 4% P-Value</td>
<td>0.04, 55, 0.777, 0.10 Effect Size</td>
<td>Correlation Only</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>HIST-1</td>
<td>530</td>
<td>949</td>
<td>55.8%</td>
<td>All Methods Combined</td>
<td></td>
<td>52</td>
<td>91</td>
<td>51.1%</td>
<td>9.6%</td>
<td>0.794, 0.03, 1% P-Value</td>
<td>0.04, 55, 0.777, 0.10 Effect Size</td>
<td>Correlation Only</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>READ-550 or Higher</td>
<td></td>
<td>70</td>
<td>93</td>
<td>75.3%</td>
<td>2.9%</td>
<td>0.000, 0.38, 15% P-Value</td>
<td>0.43, 83, 0.000, 0.46 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>Reading Proficient</td>
<td></td>
<td>130</td>
<td>194</td>
<td>67.0%</td>
<td>6.1%</td>
<td>0.003, 0.22, 9% P-Value</td>
<td>0.17, 169, 0.027, 0.46 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>READ-450 Placed</td>
<td></td>
<td>424</td>
<td>679</td>
<td>62.4%</td>
<td>21.2%</td>
<td>0.001, 0.15, 6% P-Value</td>
<td>0.12, 573, 0.004, 0.28 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>All Methods Combined</td>
<td></td>
<td>624</td>
<td>966</td>
<td>64.6%</td>
<td>30.2%</td>
<td>0.000, 0.23, 9% P-Value</td>
<td>0.12, 573, 0.004, 0.28 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>READ-550 or Higher</td>
<td></td>
<td>120</td>
<td>169</td>
<td>71.0%</td>
<td>4.1%</td>
<td>0.000, 0.30, 12% P-Value</td>
<td>0.41, 144, 0.000, 0.61 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>Reading Proficient</td>
<td></td>
<td>172</td>
<td>252</td>
<td>68.3%</td>
<td>6.1%</td>
<td>0.000, 0.25, 10% P-Value</td>
<td>0.10, 220, 0.147, 0.28 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>READ-550 Placed</td>
<td></td>
<td>981</td>
<td>1,585</td>
<td>61.9%</td>
<td>38.2%</td>
<td>0.000, 0.17, 7% P-Value</td>
<td>0.10, 1,367, 0.000, 0.17 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
<tr>
<td>READ-550</td>
<td>1,191</td>
<td>3,196</td>
<td>56.8%</td>
<td>All Methods Combined</td>
<td></td>
<td>1,273</td>
<td>2,006</td>
<td>63.5%</td>
<td>48.4%</td>
<td>0.000, 0.27, 11% P-Value</td>
<td>0.10, 1,367, 0.000, 0.17 Effect Size</td>
<td>Correlation Only</td>
<td>All 3</td>
<td>Yes</td>
<td>2 of 2</td>
</tr>
</tbody>
</table>

http://www.chaffey.edu/research/IR_PDF_Files/Research_Reports/Academic_Success/1011-History%201,%202,%20and%207%20Reading%20Prerequisite%20Validation.pdf
Statistical vs. Practical Significance

- Statistical Significance = Yes (p < .05)
- Discussion about what is “good enough”

<table>
<thead>
<tr>
<th>Group</th>
<th>ENGR-123</th>
</tr>
</thead>
<tbody>
<tr>
<td># Successful</td>
<td>Total Enrolled (N)</td>
</tr>
<tr>
<td>Successfully Completed Transfer-Level Math Prior to Enrolling in ENGR-123</td>
<td>76</td>
</tr>
<tr>
<td>Not Co-Enrolled or Did Not Successfully Complete Transfer-Level Math Prior To ENGR-123</td>
<td>809</td>
</tr>
</tbody>
</table>

There’s statistical significance but 2/3 without prereq are successful
Post-Implementation

Did the student success rates of a target course increase after the implementation of a pre-requisite?

Validated Prerequisite

Is the actual impact on course enrollment and success different depending on student demographics?
Website ~ Resources

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or

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Questions?

Thank you!