Minutes of Math Issues Committee
Friday, May 9, 2008
Central Connecticut State University
Marcus While Living Room

Present — Larisa Alikhanova (Three Rivers), Jean-Marc Cenet (Tunxis), Elaine Dinto (Naugatuck Valley), Paul Edelen (Manchester), Teresa Foley (Housatonic), Andre Freeman (Capital), Miguel Garcia (Gateway), Pat Hirschy (Asnuntuck), Mark Leach (Housatonic), Rachael Schettenhelm (Gateway)

The **meeting commenced** at 11:15 a.m.

Minutes from the April 18, 2008 meeting were **approved**.

Pat distributed a spreadsheet compiled by an Asnuntuck colleague, **"General Studies - Community Colleges - Appendix 3,**" as a draft summary of General Study program requirements. Math Issues Committee members may want to have a discussion concerning the math requirement of General Studies, originally set up for individual customized plans of study, versus Liberal Arts, the program designed specifically for transfer, next year.

Discussion concerning student placement —

- **Revised Accuplacer policy —** In Dr. Susen's letter dated December 18, 2007, to Z. Dzanys, of the Board of Governors for Higher Education, he outlined recommended system-wide revisions to Intermediate Algebra placement with input provided by the Math Issues Committee. Dr. Susen has requested information from the Deans regarding their implementation timeline; some colleges have already begun this spring for fall placement, some will begin in the fall for spring 2009 placement, and some, with impact rationale for delayed implementation, will begin in the spring of 2009 for fall 2009 implementation.
- A question raised in an email by Marilyn Seman, Norwalk CC, concerning revisions to the Accuplacer cut scores, led to a discussion regarding student access to the CLM subtest after completing the EA subtest. Specifically, since Gateway is lowering their EA score to comply with the new policy, should they increase the EA score which triggers turning on the CLM test? **A question that remains unanswered concerns the point at which each college's CLM test is turned on**; this should be researched by Math Issues members and information should be brought to the next meeting.
- Another important part of the implementation of the new Accuplacer policy is **continued review / assessment**; as expected in any new process, we are encountering new questions that bring up additional discussion and resolution.

Scores recommended by Accuplacer were discussed, and concern about lowering a college's score to comply with new policy was expressed. Since the 12 colleges have differed vastly in practice, and our goal is consistency, we decided to begin with a focus on current practice. It is important to remember that Accuplacer scores alone are not a great predictor of success. We need to continue to review Accuplacer scores in light of current secondary and postsecondary practice, Accuplacer documentation (generally indicating higher scores), and national professional organization recommendations, i.e. a **holistic approach to the placement process**.

Note 1: Use this link for the Accuplacer Coordinator's Guide: http://www.nv3.commnet.edu/matyconn/MathIssues/Accuplacer-CoordinatorsGuide.pdf; interpretation of math scores begins on page 15 of the guide.

Note 2: Use this link for the AMATYC Position Statement on Initial Placement of Two-year College Students into the Mathematics Curriculum: http://www.amatyc.org/documents/Guidelines-Position/Placement.htm.

- **Other discussion regarding testing**, and how well Accuplacer does as a placement instrument, ensued. Miguel asked a question that had been brought up at a recent Tech Prep, now CCP (Career College Pathways), meeting: "What would happen if all of our students were tested prior to taking any math course?" Mark talked about a 10-question pretest given at Housatonic. When similar questions are given in their common final, almost all students improve; but what they know at the end of one course differs vastly from what they know at the beginning of the next course. Age seems to be the biggest factor in predicting success. The challenge to students entering a higher mathematics course is to retain their knowledge, transfer it to the next course, and apply it to new material. Learning skills, not just content knowledge, are important to make this transition.

Report to the Board of Governors regarding Special Act 07-7: Placement Standards — Dr. Susen has asked Pat to report on the process and progress the System is making regarding the state legislation; she will do so at a meeting on May 19. On behalf of all Math Issues members, thank you, Pat!

Discussion concerning "modeling" — Larisa brought up the question of what exactly we mean by "modeling." Regarding linear data, there was agreement that students should be able to write an equation from data or from information in a given word problem, to interpret any solutions to their equation in the words of the problem, also to produce more data. Comparison of two linear models can be tied in with decision making, i.e. a critical thinking piece / outcome. Some colleges have students create quadratic or exponential models; many have students write rational equations relating to work problems. Mostly, for quadratic, exponential, rational, and radical functions, students use algebraic models already given; they simply substitute numbers into the given equation, solve, and interpret their solutions in the problem situation. **Math Issues Committee members agreed to change the wording in our grid, for all except linear functions, from "model real world applications with..." to "solve real world applications involving..."** Representatives will bring this information back to our campuses to see if it makes a difference for any college regarding information supplied in the outcomes grid.

Discussion of philosophy regarding technology use — Paul spoke on behalf of Manchester faculty who had expressed concerns about the process, as they see it, that Math Issues is using to make decisions. While Paul represents his colleagues, and reports back to them, they expressed concern that they want to be more of a part of the process, to hear what is going on prior to decisions being made. Of particular concern is the depth of technology use in intermediate algebra, and whether the outcomes grid for the completion of intermediate algebra is applicable to them. It was pointed out that faculty from all 12 colleges, especially those with concerns, are encouraged to speak at Math Issues meetings, and that all documentation, including tentative agreements made at these meetings, achieved by negotiation among college reps, goes back to individual campuses for discussion and input prior to the next meeting. **It would be helpful if Manchester faculty**

who believe that MAT* 138 differs significantly from MAT* 137 or 136 would come to the next Math Issues meeting to explain the differences; it may be the case that, while Manchester is the only college currently teaching MAT* 138, other colleges have the same philosophy regarding integration of technology.

Members expressed differing opinions on a variety of other issues relating to philosophy and practice; these concerns / questions should be taken back to campuses for further discussion.

- **Skills versus real world application of those skills —** There is a difference of opinion as to whether intermediate algebra centers on symbolic manipulation, or, on not only learning the algebraic skills but also using them to solve real world problems / applications. This may be directly related to Manchester's concern about technology use.
- **Exponential functions —** Only seven of the twelve colleges currently have outcomes involving exponential functions and / or expressions. Some believe that study of exponential functions in intermediate algebra is not only essential for the sciences, specifically physics and chemistry, but also is much more relevant to the majority of our students than extensive work with rational and radical functions. Others believe that exponential functions should be studied at the next level, e.g. in college algebra.
- **Does one variety of intermediate algebra fit all?** — Individual college curricula impacts directly on the content of Intermediate Algebra. In some colleges, intermediate algebra earns general education degree credit; in others, it does not. Students go from intermediate algebra to a variety of courses such as Math for Elementary Ed, Math for the Liberal Arts, and Statistics. The small number of students who eventually go on to calculus may take a precalculus course, or college algebra and precalculus courses, or college algebra and trigonometric functions courses, or some other variety of courses between intermediate algebra and calculus. There may be some connection between teaching material on exponential and logarithmic functions in intermediate algebra and the number of courses the college offers before calculus.
- **Discussion regarding determination of the "core" learning outcomes for the completion of intermediate algebra courses —** Based on the most recent Intermediate Algebra grid, there is a set of learning outcomes to which all 12 colleges agree. We have another set to which 10 or 11 colleges agree; these and others need further discussion. The process will be to keep going back to campuses until there is approval of the universal core. Pat suggested that we first focus on the bigger picture, then on the details of determining the 80% common core. See below for Draft #4 of the outcomes grid; it includes tentative changes in the language agreed to by Math Issues reps, including the change indicated above concerning modeling, also a **change from "solve...algebraically and graphically" to "solve...algebraically and / or graphically."** Also included are updates for Capital, Northwestern and Naugatuck Valley.

While there is disparity, some commonality and compromise are essential — Miguel noted that we must find a way to reconcile our courses across the system, and this process / procedure is at the root of our outcomes agreement. Pat will add notes concerning the existence of differences in philosophy and practice regarding skills vs. applications, use of technology, and number of courses prior to calculus, to her statement for the Board.

Continual assessment of outcomes — Assessment of learning outcomes will need to be a part of the process for determining outcomes, in conjunction with Accuplacer

documentation, national reports, and actual practice; resources will be needed. In addition, alignment with *K-12,* CSU and UConn are essential.

Future meeting dates / locations — Members agreed to meet on the same days next fall as determined by MBSCC (Math Basic Skills Committee of CT). Following are the dates and locations for the fall 2008 academic year: September 12 at Gateway CC; October 17 at Tunxis CC; November 14 at Central CT State U; December 12 at Middlesex CC. Elaine requested that we meet in a room with a computer and ceiling projector if possible, while we are continuing to work on reconciling learning outcomes.

Homework for Math Issues campus reps —

- Review the grid (Draft #4) to determine its accuracy. Be sure to keep in mind changes in the language (*solve real world applications...*; *solve...algebraically and / or graphically*).
- Bring the grid to your Department for discussion / revisions / approval; make colleagues aware of changes in the wording from the previous version. (Note: If you have a departmental "back-to-school" meeting, this may be a good time for discussion in order to collect feedback for the September 12 Math Issues Meeting.)
- Email any changes to Elaine (EDinto@nvcc.commnet.edu).
- Discuss other concerns / questions reported in these minutes with colleagues; bring feedback to the next meeting.
- Talk with your Department Chair or Placement Testing Coordinator; report back to the Committee the **score** at which a student taking Accuplacer at your college **moves from the EA subtest to the CLM subtest.**
- Invite colleagues with concerns to attend the next meeting. Specifically, faculty from Manchester are invited to attend to discuss differences between MAT* 138 and MAT* 137 and / or 136.

The **next meeting** will be at Gateway Community College, North Haven Campus, on **September 12, 2008, at 10:30 a.m**. Please note change in time.

The **meeting adjourned** at 12:50 p.m.
Have a good summer, everyone!

Respectfully submitted,

Elaine Dinto

MAT 13* OUTCOMES, DRAFT #4

At the completion of MAT 13*, the student will be able to do the following —

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
Outcomes re: linear functions and / or expressions													
Provide multiple representations of **linear** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Determine identifying characteristics of **linear** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Evaluate, simplify, and perform operations on **linear** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Solve **linear** equations and inequalities algebraically and / or graphically	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Model real world applications with **linear** expressions and / or equations	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	11
Solve systems of **linear** equations	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	11

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
Outcomes re: quadratic functions and / or expressions													
Provide multiple representations of **quadratic** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Determine identifying characteristics of **quadratic** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Evaluate, simplify, and perform operations on **quadratic** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Solve **quadratic** equations algebraically and / or graphically	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Solve real world applications involving **quadratic** expressions and functions	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	11
Solve systems of **quadratic** equations	Y						Y/N						2

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
Outcomes re: degree 3 or higher polynomial functions and/or expressions													
Evaluate, simplify, and perform operations on **degree 3 or higher polynomial** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
Outcomes re: rational functions and/or expressions													
Provide multiple representations of **rational** functions or expressions	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	10
Determine identifying characteristics of **rational** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Evaluate, simplify, and perform operations on **rational** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Solve **rational** equations algebraically and / or graphically	Y		Y	Y	Y	Y	Y	Y	Y/N	Y	Y	Y	11
Solve real world applications involving **rational** functions	Y	Y	Y/N		Y	Y	Y	Y	Y	Y/N	Y	Y	11
Solve systems of **rational** equations			Y/N				Y						2

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
Outcomes re: radical functions/ and/or expressions													
Provide multiple representations of **radical** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Determine identifying characteristics of **radical** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Evaluate, simplify, and perform operations on **radical** functions or expressions	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Solve **radical** equations algebraically and / or graphically	Y	Y				Y	Y	Y	Y/N	Y	Y	Y	9
Solve real world applications involving **radical** functions	Y	Y			Y	Y	Y		Y		Y	Y	8
Solve systems of **radical** equations													

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
Outcomes re: exponential functions and/or expressions													
Provide multiple representations of **exponential** functions or expressions	Y	Y	Y		Y		Y	Y			Y		7
Determine identifying characteristics of **exponential** functions or expressions	Y	Y	Y		Y		Y	Y			Y		7
Evaluate, simplify, and perform operations on **exponential** functions or expressions	Y		Y		Y		Y evaluate only	Y			Y	Y/N	7
Solve **exponential** equations algebraically and / or graphically	Y				Y		Y	Y			Y		5
Solve real world applications involving **exponential** functions	Y	Y			Y		Y				Y		5

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
Outcomes re: logarithmic functions and/or expressions													
Provide multiple representations of **logarithmic** functions or expressions	Y	Y						Y			Y		4
Determine identifying characteristics of **logarithmic** functions or expressions	Y	Y						Y			Y		4
Evaluate, simplify, and perform operations on **logarithmic** functions or expressions	Y/N							Y			Y		3
Solve **logarithmic** equations algebraically and / or graphically	Y							Y			Y		3
Solve real world applications involving **logarithmic** functions	Y												1

College	ACC 1	CCC 2	GWCC 3	HCC 4	MCC 5	MXCC 6	NVCC 7	NWCC 8	NCC 9	QVCC 10	TRCC 11	TXCC 12	Σ
OTHER OUTCOMES													
Provide multiple representations of degree 3 or higher polynomial functions or expressions	Y/N		Y				Y	Y	Y	Y	Y		7
Determine identifying characteristics of degree 3 or higher polynomial functions or expressions								Y	Y				2
Solve degree 3 or higher polynomial equations algebraically (factoring) and/or graphically	Y		Y				Y			Y	Y	Y	6
Solve real world applications involving degree 3 or higher polynomial functions	Y				Y		Y/N						3
Provide multiple representations of absolute value functions or expressions, identify characteristics, evaluate, simplify, solve algebraically and/or graphically	Y	Y	Y	Y				Y		Y		Y	7
Identify characteristics, graph conic sections		Y											1
Solve quadratic inequalities algebraically and / or graphically			Y				Y	Y	Y/N			Y	5
Solve systems of quadratic inequalities										Y		Y	2