Memo of Understanding between CLAS Dean's Office and Department of Mathematics
PCKET Workload Agreement for Mathematics Education Courses

To: Mathematics Department
From: Dean Fred Antczak Frederick J. Antczak
Date: 20 May 2020

Summary: This Memo of Understanding (MOU) updates a workload agreement for mathematics education courses, implemented in 2003, in order to reflect programmatic changes brought about by the implementation of the new elementary certification major: Pedagogical Content Knowledge for Elementary Teachers (PCKET). The CLAS Dean agrees to continue the Mathematics department's existing arrangement and extends it to the new mathematics education courses proposed for the PCKET major. These programmatic changes were necessitated by Michigan's adoption of new elementary education program standards for PK-3 and 3-6 grade bands. Mathematics education faculty will receive 4 teaching credits for MTH 226, MTH 326, and MTH 328 and continue to receive the agreed upon workload credits for any mathematics education class that will be offered as part of our certification programs (see Table 2).

Purpose and Overview of History of MOU: In March 2003, the Department of Mathematics and CLAS approved a workload agreement summarized in Table 1. This MOU updates that agreement to reflect curricular changes and the creation of new courses resulting from the adoption of the new PCKET major, created in response to Michigan's adoption of new elementary education program standards for PK-3 and 3-6 grade bands. In particular, the 2003 agreement applies to the following mathematics education courses: MTH 221, 222, 223, 229, 322, 323, 324, and 329. Each of those courses is categorized as part Lecture/Discussion, part Laboratory (2 hours). Per the 2003 agreement, faculty have received one credit teaching for each hour of the course listed as lecture/discussion and laboratory (Table 1) for all courses except MTH 221 (which is now being sunset). This MOU extends the agreement to include the following new courses in the PCKET major: MTH 226, MTH 326, MTH 328. See Table 2.

Table 1: MTH education course workload agreement (approved: March 2003)

Course	Name of course	Student Cr. Hrs	Faculty Workload Credit
MTH 221	Math for elementary teachers I	4	4 1/3
MTH 222	Math for elementary teachers II	3	4
MTH 223	Math for elementary teachers III	5	6
MTH 229	Math activities for sec. teachers	3	4
MTH 322	Geometry for elementary teachers	3	4
MTH 323	Probability & statistics for elementary teachers	3	4
MTH 324	Algebra for elementary teachers	3	4
MTH 329	Teaching middle grades math	3	4

Table 2: Updated workload agreement for MTH education and EDI courses (proposed)

Course	Name of course	Student Cr. Hrs	Faculty Workload Credit
~~MTH 221~~	~~Math for elementary teachers I~~	4	4 1/3 (only until sunset)
~~MTH 222~~	~~Math for elementary teachers II~~	3	4 (only until sunset)
~~*MTH 223*~~	~~Math for elementary teachers III~~	5	6 (only until sunset)
MTH 226	**Math for PK-6: Whole number and operations**	3	4
MTH 229	Math activities for sec teachers	3	4
MTH 322	Geometry for elementary teachers	3	4
MTH 323	Probability & statistics for elementary teachers	3	4
MTH 324	Algebra for elementary teachers	3	4
MTH 326	**Math for PK-6: Fractions, decimals, and proportional reasoning**	3	4
MTH 328	**Early childhood math (PK-3)**	3	4
MTH 329	Teaching middle grades math	3	4

KEY for Table 2:

- **Bold: New courses in PCKET major**
- ~~Strike~~: Course being sunset due to PCKET curriculum changes

Rationale for Workload Adjustment:

The affected mathematics education courses are all categorized as part Lecture/Discussion, part Laboratory (2 hours lab). Since 2003, faculty have received one credit teaching for each hour of the course listed as Lecture/Discussion and Laboratory. Consequently, a 3-credit course meets for 4-hours per week, and faculty workload is tabulated accordingly.

There are four main reasons for this:

1. Integration of school-based field experiences
2. Integration of lecture, discussion, and laboratory
3. Ongoing development of course materials
4. Individualized assessment

Each will be discussed in turn, below.

Integration of School-based Field Experiences

In each of these courses, theory and practice are integrated and include field work (as is emphasized in the new Michigan Teacher Preparation Standards). We have designed each course so that our future teachers

engage in a significant field component where they work directly with K-12 learners in a supervised and structured setting where they may apply their theoretical knowledge and develop necessary mathematical teaching skills. The syllabus of record for each of the three newly proposed courses allocates 3 weeks of class time to the integrated field experience component. In our mathematics education courses, faculty structure and oversee the field experiences, which may include GV students preparing and/or creating activities or unit-plans and then teaching these activities to groups of elementary, middle school, or high school students (depending on the course), and then reflecting and receiving feedback about these experiences. In most cases, GV students travel to the partner school to teach these lessons during scheduled class-time, and the additional hour of laboratory meeting time helps make these whole class field experiences feasible. Faculty work in support of GV students in these lessons includes: reviewing and providing feedback on lesson/activity plans during the planning stages; coordinating with host teachers and administrative staff at the partner school; traveling to the school to observe, support, and assess the GV students during the activities; and providing feedback afterwards. The additional time needed to manage these field experiences amounts to 15-30 hours per semester, depending on the course.

For courses that have the CBL (Community Based Learning) designation, courses are embedded at local schools where GV students and faculty meet directly at the partner school to observe lessons and apply their learning by working directly with K-12 students, often facilitating small or whole group lessons. GV students meet for the full class period at the school in order to maximize the learning opportunity and to have sufficient time to immediately reflect/debrief about the teaching enactment of the day; a crucial part of the learning cycle that future teachers need in order to unpack their experiences, solidify their learning, and develop skills for reflective practice. In these cases, faculty spend considerable time outside of the scheduled course managing and nurturing the partnership as they work directly with the partner teachers (and administrators) to plan and coordinate the field experience and ensure it also meets the ongoing learning needs of the partner teachers and their students.

Integration of Lecture, Discussion, and Laboratory

All of the mathematics education courses taught by the Department of Mathematics completely integrate laboratory activities with lecture/discussion—the activities we create and use serve as the basis for learning the mathematical and pedagogical content of the course. Please note that by laboratory activities, we mean: GV students are engaged in actively exploring mathematics concepts embedded in activities using various manipulatives or equipment; GV students are engaged in actively exploring mathematical pedagogical content knowledge; or GV students are engaged in teaching practices necessary for teaching mathematics, typically with K-12 learners.

The instruction in these courses closely models mathematics teaching suggested in current professional standards including: the National Council of Teachers of Mathematics (NCTM)'s *Principles and Standards for School Mathematics* (2000), the NCTM's *Principles to Actions: Ensuring Mathematical Success for All* (2014), and the Association of Mathematics Teacher Educators' S*tandards for Preparing Teachers of Mathematics* (2017). In particular, faculty use a discovery-based, problem-solving model for the learning of mathematical content that promotes mathematical reasoning, connections between mathematical concepts and other disciplines, and communication of ideas. In this setting, students actively engage in guided, hands-on, cooperative problem-solving exploration of a topic. For learning to take place, this exploratory phase is followed by a full-class discussion in which the instructor facilitates reflection and synthesis of the explored content. Students are also expected to collectively discuss and analyze their own learning experience as they explore mathematical concepts via discovery-based learning.

Since these courses integrate the study of pedagogy, faculty also spend time in these courses exploring and analyzing teaching practices that are effective for meaningful learning of mathematics, using practice-based methods to immerse our GV students in the artifacts and work of teaching. In addition, GV students in all of these courses are expected to read relevant research on K-12 learners' thinking and learning; based on readings and observations/experiences in course field experiences, GV students analyze K-12 learners' mathematical thinking (mathematics examined depends on the course) including learners' preconceptions, misconceptions, challenges, and ways they think about mathematical ideas. As future teachers of mathematics, they also need to identify and analyze key patterns in learners' thinking and different approaches of mathematical thinking and then respond appropriately.

Ongoing Development of Course Materials

Since there is a seamless integration of activities and discussion/reflection, instructors are continually preparing for each of these courses by designing, creating, and updating appropriate activities. In addition, faculty must also choose and find relevant (and current) research about pedagogy and K-12 learners' thinking about a given mathematical topic, incorporate problems from current K-12 curricula, prepare materials, including finding video and other examples of what effective mathematical teaching entails as well as relevant examples of K-12 learners' mathematical thinking, and design discussion and reflection questions that will enable our GV students to reflect deeply about all of the different components of mathematical knowledge needed for teaching. In addition, faculty design field experiences to integrate with coursework and to build GV students' pedagogical knowledge and teaching practice skills and that also meets partner school objectives. Faculty teaching these courses cannot follow an undergraduate textbook because available texts do not typically integrate pedagogy and content together. (Our approach is consistent with current reforms but many schools have not "caught up" and still teach separate math content and math pedagogy courses for their prospective teachers, and so the texts have not changed in their overall approach.) As a result, faculty members are continually creating, adapting, and updating curriculum in order to meet the goals of these classes.

Individualized Assessment

In each of these courses, faculty members spend many extra hours (as compared to other courses) providing individualized feedback to GV students on major assignments that relate to the teaching and learning of mathematics for understanding. For many assignments and projects in these courses, instructors cannot "get into the rhythm" of grading because each GV student submits a completely different project in which the instructor must do considerable analysis for each item submitted before assessment. The type of individualized feedback differs depending upon the course but, for example, can range from offering feedback about particular lesson plans, units, or problem-solving activities (where each GV student or group of GV students prepares a different item) or offering feedback about how a GV student interacted with and then analyzed a different learner's mathematical knowledge based on some type of assessment (where each GV student analyzes a different learner's work so the instructor must first analyze the particular learner's understanding, in order to assess the GV student's analysis). Our GV students need experiences in analyzing K-12 learners' mathematical thinking, decomposing and enacting teaching practices, and in analyzing mathematics curricula, all foundational for effectively teaching mathematics. However, in order to provide these types of meaningful experiences for our GV students, instructors must be committed to spending extra time providing individualized feedback that will be constructive and helpful for the prospective teachers' growth and development as a teacher.