ED 678
MATH METHODS AND CURRICULUM DEVELOPMENT
OFF-CAMPUS

During the elementary internship year students are required to participate in university coursework with UAF faculty and in aligned internship year responsibilities in an elementary classroom with a qualified mentor teacher. The internship year follows the school district calendars for teachers (approximately 190 days per academic year) and during each school day, interns are required to be in their elementary classroom whenever they are not participating in university required coursework with their UAF instructor or UAF supervisor. There are additional evening and weekend requirements for students during the internship year.

Following the UAF formula for credit distribution, ED 678 includes approximately 27 hours of "lecture" (i.e., face-to-face instruction and individual e-mail interaction with a UAF instructor and with a UAF supervisor) and 120 hours of internship time in the assigned elementary classroom with a qualified mentor teacher. In the catalog, the credit distribution for this 3 credit class is shown as ED 678 (2+0+8). (2+0+8)

COURSE INFORMATION

Credits: 3

Prerequisites: Participating in the Internship Year or Permission of Instructor

Location:
Audio-Conference Number 1-800-570-3591 & Pin Number: 6944438
If problems are encountered please call Customer Service at 1-800-290-5900. Have the course number and instructor information available.

Blackboard: http://classes.uaf.edu
ED F478 F678 STACKED 201203 (CRN 75141, 75186) MATHEMATICS MTHDS/CRRICLM DEV

Meeting Time: Dates and times are noted on the internship year calendar

INSTRUCTOR INFORMATION

Instructor: Cindy Fabbri
Office: 714D Gruening Building
Office Hours: Following the audio-conference or by appointment
Telephone: (907) 474-1558
Fax: (907) 474-5451
Email: cfabbri@alaska.edu

MATERIALS

Tipps, Steve, Johnson, Art, and Kennedy, Leonard M. 2011. *Guiding Children's Learning of Mathematics (12th Edition)*. Wadsworth Publishing: U.S. ISBN-10: 0495810975

Burns, Marilyn. 2007. *About Teaching Mathematics: A K-8 Resource, 3rd Edition*. Math Solutions Publications: Sausalito, California.

National Council of Teachers of Mathematics Student Membership
[online] http://www.nctm.org/membership/default.aspx?id=56

Alaska State Board of Education & Early Development. 2012. *Alaska Mathematics Standards*. Alaska Department of Education & Early Development: Juneau, AK. [online] http://www.eed.state.ak.us/tls/assessment/standards/Math_StandardsJune2012.pdf

Alaska State Board of Education & Early Development. 2012. *Tools for the Transition to the New Standards for Mathematics* [online] http://www.eed.state.ak.us/tls/assessment/transition.html

Alaska State Board of Education & Early Development. 2005. *Standards: Content & Performance Standards for Alaska Students, Third Edition.* Alaska Department of Education & Early Development: Juneau, AK. [online] http://www.eed.state.ak.us/standards/

National Council of Teacher of Mathematics. 2000. *Principles and Standards for School Mathematics*. National Council of Teacher of Mathematics: U.S. [online] http://www.nctm.org/standards/content.aspx?id=26792 or http://www.fayar.net/east/teacher.web/math/Standards/document/index.htm

Math curriculum framework for your school district

Math textbook for your students/grades

Math manipulatives as appropriate (as available in your school or from online sources)

Additional readings TBA

COURSE DESCRIPTION

Study and application in the classroom of best practices from research-based strategies for the teaching and learning of mathematical concepts, content and methods for students in elementary classrooms with diverse populations. Requires development and classroom implementation of mathematics unit. Concurrent internship required. Prerequisites: Admission to the post-baccalaureate elementary licensure program; graduate standing; or permission of instructor. Stacked with ED 478. (2+0+3)

The overarching goal for this course is to prepare you to be an effective teacher of mathematics (Figure 1).

It is expected that students have acquired mathematics content knowledge in prerequisite mathematics courses and through prior life experiences with math. This includes content areas (numbers and operations, algebra, geometry, measurement, and data analysis and probability), as well as in areas that describe math processes (problem solving, reasoning and proof, communicating, connecting, and representing) (NCTM, 2000; ACEI 2007).

- **Effective teaching requires knowing and understanding mathematics, students as learners, and pedagogical strategies.**

- **Effective teaching requires a challenging and supportive classroom learning environment.**

- **Effective teaching requires seeking improvement.**

Figure 1. Important elements of the teaching principle (NCTM, Pages 17-18, 2000)

The main focus of this course is on the pedagogical content knowledge that teachers need to teach mathematics. This includes an understanding of learners and learning, teaching, curriculum, and assessment (AMTE, 2010). To achieve this goal of learning pedagogical content knowledge, the course will use the *Principles for School Mathematics* as a framework for the course (Figure 2).

- Equity
- Curriculum
- Teaching
- Learning
- Assessment
- Technology

Figure 2. Principles for School Mathematics (NCTM, 2000)

Within this framework, the aim will be to provide opportunities to learn theory and experience it through practice. Students will study and use current standards to facilitate teaching and learning in their classrooms.

Finally, as espoused by the Association for Childhood Education International (ACEI) Elementary Education Standards, students understand and apply professional practices and behaviors. This includes reflection and collaborating with families, colleagues, and community (ACEI, 2007).

STUDENT LEARNING OUTCOMES

Through study, experience, and reflection, students will gain a beginning teacher level of pedagogical content knowledge in each area identified as a Principle for School Mathematics (equity, curriculum, teaching, learning, assessment, and technology). Specific outcomes with which the student will gain familiarity are shown on the course diagnostic assessment.

INSTRUCTIONAL METHODS

To facilitate individual and group learning opportunities students will participate in a professional learning community (Figure 3).
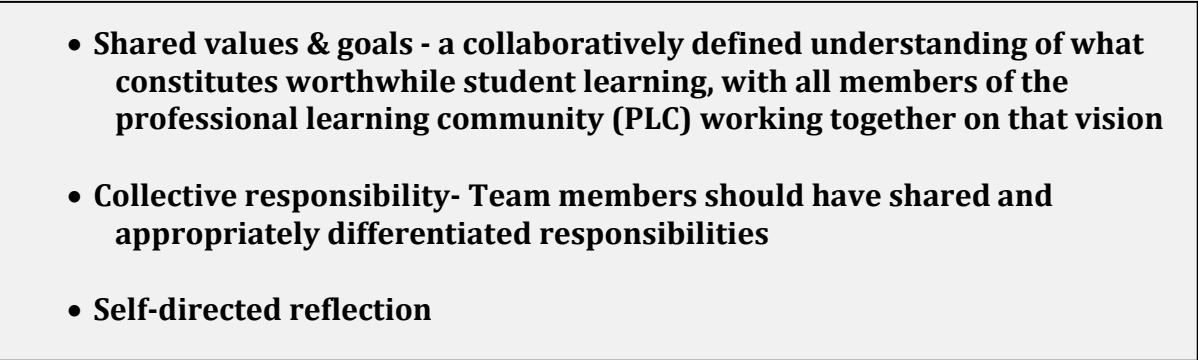
- **Shared values & goals - a collaboratively defined understanding of what constitutes worthwhile student learning, with all members of the professional learning community (PLC) working together on that vision**

- **Collective responsibility- Team members should have shared and appropriately differentiated responsibilities**

- **Self-directed reflection**

Figure 3. Principles that make a learning community effective, as relevant for a university course setting (Fulton and Britton, 2011)

With this in mind, instructional methods will include, at least:
- Collaborating and discussing mathematics teaching and learning with peers
- Reviewing case studies and reading theory/literature
- Designing and implementing mathematics learning experiences
- Analyzing and evaluating mathematics resources
- Writing papers
- Presenting knowledge and ideas
- Reflecting on work done by oneself and peers

ED 678: 1300 points possible

Audio-conference attendance and participation (70 points = 10 pts/class x 7 classes)
Each class you will receive points for attending class, being prepared and contributing to class discussions. You cannot "make-up" these points if you miss a class.

Show & Tell: Bring three mathematics resources to class (50 points = 16.67 pts/resource x 3 resources)
You will need to bring three <u>mathematics</u> resources to share with your colleagues. The resource (book, website, curricula, "app" etc.) should be something not likely to be known by everyone. You will explain a bit about the resource, <u>why it is high quality</u> and how to find it. At least one of your resources during the semester must use technology to improve math instruction/learning. Please remember to <u>post the resource in the Blackboard "Discussion Board"</u> as I will use this list to enter final grades.

Assignment 1: Write lesson plan & teach lesson (100 points; Rubric will be provided)
In consultation with your mentor teacher, select one of the activities from Burns (2007) to teach in your classroom. Decide with your mentor teacher if you will teach the lesson to the whole class or to a small group of students. Plan for teaching the activity carefully, being sure to think through classroom organization and management issues, as well as what materials and assessment will be needed, and how you will modify the activity to meet the needs of your students. You will then write up a lesson plan for this activity using the lesson plan format provided below. Please reference the Alaska Mathematics Standards (2012) for the standards section. Use the "Introduce, Explore and Summarize" (IES) format discussed in Burns (Pages 54-57) for the procedure section. After teaching the lesson, analyze what happened using the Mathematical Tasks Framework (See Stein Chapter 1). Your lesson plan and analysis combined should be 3-5 pages in length. Remember that you are adapting a Burns (2007) lesson, not creating an original lesson. Guidelines and a rubric will be provided.

Assignment 2: Week of teaching math (WOTM) (300 points; Rubric will be provided)
You will develop a full week of detailed mathematics instruction and a professional reflection as a key assignment for ED 478/678; your liaison and mentor teachers will provide you with input and evaluation on how you teach these lessons in your internship classroom. Your lesson plans for the week of math teaching will follow the format discussed in class; a total of five lesson plans are expected for the week of teaching math. A daily reflection and a summative assessment for the entire week will be submitted after the lessons are taught. When you hand in this assignment, you should also include copies of any handouts or other materials you use. You should also include copies of samples of your students' work for at least one of the five lessons with your comments; three samples, representing not meeting, meeting, and exceeding expectations, should be provided that

include your feedback to the student (students' names should be blanked out for confidentiality). Specific guidelines and grading criteria will be provided.

Assignment 3: Textbook/resource analysis (240 points; Rubric will be provided)
You will provide an analysis of the major mathematics curriculum resource (e.g. textbook) you are using in your internship placement. Your analysis will focus on reviewing the textbook as it relates to the Principles for School Mathematics and the Alaska Standards. For each principle, you will analyze your text, discuss your findings, and suggest how you might need to supplement your resource. Your final write up will be about 10 pages. Specific guidelines and grading criteria will be provided.

Assignment 4: Year-long math plan (240 points; Rubric will be provided)
You will develop a comprehensive mathematics curriculum plan for the entire school year for the grade level at which you are interning. The plan will be organized chronologically for the entire year to show, for each of the 36 weeks of the school year, how you would address Alaska Content Standard A for your grade. Specifically, you will document how you will use your text and/or other curriculum resource(s) to address Alaska Content Standard A by showing how 12 different Performance Standards of your choice are met (this will be done in 1-2 sentences with two accompanying example problems from one of the resources). Your year-long curriculum plan should provide 1-2 sentences for each week describing what you would teach, including page references from your curriculum resource; in addition, for 12 of the weeks, you will also provide the aforementioned explanation of how the six Performance Standards is addressed. Your final write up should be 12-15 pages in length.

ED 678 Graduate Student Assignment: (300 points = 75 points/paper or presentation)

Graduate students will write two short papers (3-5 pages) based on their review of resources (lessons, articles, journal papers, etc.) found at the National Council of Teachers of Mathematics (NCTM) website or from other scholarly sources. Each paper will focus on a key area of mathematics education. Papers should describe what is considered best practice in that area and give examples that illustrate the concept. Papers should use an accepted citation method.

Students will prepare two in-class presentations. Each presentation will focus on an Alaska content standard (2012). Students will use powerpoint to highlight the standard they are presenting and then will engage their classmates in activities that teach the concept.

Specific guidelines and an assignment rubric will be provided.

EVALUATION

As outlined in the UAF catalog, the grading system is as follows:

A   An honor grade, indicates originality and independent work, a thorough mastery of the subject and the satisfactory completion of more work than is regularly required.
B   Indicates outstanding ability above the average level of performance (80% or better
C   Indicates a satisfactory or average level of performance. (70% or better)
D   The lowest passing grade, indicates work of below-average quality and performance. (60% or better)
F   Indicates failure. (Below 60%)

Grades will be posted using the following scale:

A   90-100%
B   80-89%
C   70-79%
D   60-69%
F   59% or below

As one of the culminating courses of the internship year, students are required to earn a "C" or better in order to successfully complete the licensure program. In addition to obtaining minimum grade requirements, students must meet all required ESAAP competencies in order to pass the class and continue with the internship. Any student in jeopardy of failing, based on failure of competencies or failing grades, should contact the instructor immediately to discuss the options.

POLICIES

As a compressed course, a great deal of information is covered each session. For this reason, attendance at all classes is expected. If you need to miss class, please contact me immediately.

Assignments are expected on or before the stated due date. If you are unable to turn in an assignment on time, you will need to document an emergency or extenuating circumstances (beyond your control) or the assignment may not be accepted. If accepted, the instructor reserves the right to award a reduced point value for late work.

Please let me know, as soon as possible, if you are having difficulties with the coursework or workload.

Students are expected to adhere to the Student Code of Conduct (Board of Regents' Policy 09.02.01). Students are required to conduct themselves honestly and responsibly, and to respect the rights of others. Academic integrity is essential and expected from all students.

Cheating or plagiarism is not acceptable. For more information on plagiarism please see http://library.uaf.edu/ls101-plagiarism.

SUPPORT SERVICES

If you have questions, concerns, comments, or individual needs please contact me immediately. In addition, please be aware that these other forms of assistance are also available:

Kelly Mendez, Elementary Intern Coordinator
    474-7981
    ksmendez@alaska.edu

Tina Buxbaum, Elementary Intern Coordinator
    474-7981
    tmbuxbaum@alaska.edu

Rural Student Services (RSS)
    Tel: (888) 478-1452
    Email: fyrss@uaf.edu

Student Support Services (SSS)
    Tel: (907) 474-6844
    Email: sssp@uaf.edu

Tutoring Services:
    Writing Center (907) 474-5314
    Math Laboratory (907) 474-7332

DISABILITIES SERVICES

If you have a special need please notify the Office of Disability Services (474-5655, www.uaf/edu/disability/ or uaf-disabilityservices@alaska.edu) and me. I will make every effort to provide reasonable accommodations for you.

LITERATURE REFERENCED

ACEI. 2007. *Elementary Education Standards and Supporting Explanation*. [online] http://acei.org/education/ncate/

Alaska State Board of Education & Early Development. 2012. *Alaska Mathematics Standards*. Alaska Department of Education & Early Development: Juneau, AK. [online] http://www.eed.state.ak.us/tls/assessment/standards/Math_StandardsJune2012.pdf

AMTE. 2010. *Standards for Elementary Mathematics Specialists: A Reference for Teacher Credentialing and Degree Programs.* Association of Mathematics Teacher Educators: U.S. [online] *www.amte.net/sites/all/themes/amte/.../EMS**Standards**_Final_Mar2010.pdf*

Fulton, Kathleen and Britton, Ted. 2011. STEM *Teachers in Professional Learning Communities: From Good Teachers to Great Teaching*. National Commission on Teaching and America's Future. Washington, DC.

NCTM. 2000. *Principles and Standards for School Mathematics.* National Council of Teacher of Mathematics: U.S. [online] http://www.nctm.org/standards/content.aspx?id=26792

CALENDAR

Please note, that this is a tentative schedule and it may be modified. Each week we will discuss:
- One NCTM Principle for School Mathematics
- Alaska Standard(s) for Mathematical Content (2012)
- Alaska Standard(s) for Mathematical Practice (2012)
- Upcoming assignments

Students should be prepared to discuss readings and assignments that are due.   Additional readings/videos may be announced in class and will be posted on Blackboard.

Class	NCTM Principles of School Mathematics	Alaska Standards for Mathematical Content, K-8 (2012)	Alaska Standards for Mathematical Practice (2012)	Introduce Upcoming Assignment	Readings due this week (Other readings TBA)	Assignments due this week
Aug 30	Curriculum	No content standard this week Instead… Course diagnostic assessment and course syllabus	1. Make sense of problems and persevere in math	Assignment 1: Teach a Lesson	- Tipps Chapter 1 & 2 - Tipps Chapter 8	Diagnostic assessment (in class)
Sep 14	Learning	Counting and Cardinality (CC)	2. Reason abstractly and quantitatively	Assignment 2: Week of Teaching Math	- Stein Chapters 1 & 2 and Burns pages 54-57 (required for Assignment 1) - Tipps Chapter 4 - Tipps Chapter 9	Assignment 1: Teach a Lesson
Sep 28	Teaching	Number & Operations in Base Ten (NBT) Ratios & Proportional Relationships (RP)	3. Construct viable arguments and critique the reasoning of others		- Tipps Chapter 5 - Tipps Chapter 10, 11, 12 - Tipps Chapter 15	Assignment 2: Week of Teaching Math (Draft)

Oct 12	Assessment	Number and Operations - Fractions (NF) Number System (NS)	4. Model with mathematics	Assignment 3: Textbook Analysis	- Tipps Chapter 7 - Tipps Chapters 13 & 14 - Tipps Chapter - Ashlock chapter to be assigned	
Oct 15-19	Week of Teaching Math					
Oct 26	Teaching & Assessment (continued)	Operations & Algebraic Thinking (OA) Expressions & Equations (EE) Functions (F)	5. Use appropriate tools strategically		- Tipps Chapter 11 & 12 - Tipps Chapter 16	Assignment 2: Week of Teaching Math (Final)
Nov 9	Equity	Geometry (G)	6. Attend to precision	Assignment 4: Year-long math plan	- Tipps Chapter 3 - Tipps Chapter 17	Assignment 3: Textbook Analysis
Dec 7	Technology and Teaching: Professional Development	Measurement & Data (MD) Statistics & Probability (SP)	7.Look for and make use of structure 8. Look for & express regularity in repeated reasoning	NA	- Tipps Chapter 6 - Tipps Chapter 18 & 19 - Tipps Chapter 20	Assignment 4: Year-long math plan Summative Assessment