

## SYLLABUS FOR MATH 412 – Spring 2009

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**Note: (1) If you are going to be absent you must notify Mrs. Stecher or Ms. Reisdorf in advance.**

**(2) Make a folder on your PC for Math 412 documents that will be e-mailed to you.**

**(3) To access resources from NIU's Center for Access-Ability Resources Office call 753-1303 or at [www.niu.edu/caar](http://www.niu.edu/caar). Let Cindy Stecher or Pat Reisdorf know what accommodations you need.**

**Department:** Mathematical Sciences

**Semester Hours:** 3

**Course Title:** MATH 412 – Methods of Instruction in the Mathematics Curriculum for Secondary School

**Course Description:** Objectives and organization of the curriculum and instructional materials for mathematics programs for secondary school with attention to methods of instruction, the needs of exceptional students, reading techniques in mathematics, and planning for multicultural learning situations. Accepted for credit toward the major or minor only for those preparing to teach. Accepted for credit as a methods course for secondary school, but not as an upper-division mathematical content course. Not used in major or minor GPA calculation except for mathematics education majors and minors. CRQ: MATH 353 and consent of department.

### COURSE OBJECTIVES

1. Learn and practice techniques used to implement the NCTM's Principles and Standards for School Mathematics (issued 2000) and the Illinois Learning Standards in Mathematics in Grades 6-12 both within the present day middle school and secondary school curriculums which are in transition to implementation of these Standards and in a curriculum which fully implements these Standards at the middle and secondary level.
2. Develop and practice ways of effectively using & adapting different methods of instruction, including cooperative learning & working with instructional aids, including technology, to meet the needs of all students in mathematics in both block & traditional schedules.
3. Learn how to develop and to adapt unit/daily lesson plans and performance based objectives, questioning and assessment techniques, motivational and classroom management strategies, and ways of incorporating manipulatives, visual aids, technology and multicultural aspects of mathematics into the classroom in accordance with the abilities, learning styles & special needs of the students in their classrooms and the performance objectives these students are trying to achieve.
4. Learn valuable teaching techniques, including ways of helping struggling students, by sharing ideas and concerns about your clinical experiences (observations/teaching) and by working together in groups on projects and by doing class presentations.
5. Constructively reflect on the progress toward the above goals and on current issues in education and to help you use the results of these reflections to become better math educators.
6. Learn about the opportunities for professional growth in mathematics education through membership and active participation in the many professional organizations for mathematics educators so that learning is seen as a life-long process.
7. Articulate how NIU's Conceptual Framework & the Illinois Professional Teaching Standards (hereafter IPTS) provide the "scaffolding" for the mathematics certification program and how these ideas are implemented in your teaching.

## CONTENT

In order to achieve the above objectives, the activities are chronologically arranged so that you will gain knowledge and experience in the various aspects of teaching mathematics according to the NCTM Principles & Standards and the Illinois Learning Standards. The first activity asks you to reflect and formalize your philosophy of math education because your philosophy will determine your perspective on the other projects.

Since lesson planning is crucial to successful teaching, you will develop both long term unit plans and daily lesson plans within that unit – first working in cooperative groups and focusing just on the unit/lesson plans themselves. As the semester proceeds you will develop more complex lesson plans with all the supplementary material, including manipulatives, visuals and technology, etc., that would be needed to teach that lesson. For your Concept Teaching Presentation you will be assigned a general topic and then design a one-day lesson on a specific aspect of that topic for class presentation on a specified date. As you teach this lesson you need to incorporate some instructional aid such as discovery activity sheets, manipulatives & models, visual aids &/or technology. In the Unit Planning Project you will develop a unit plan and then daily lesson plans for a few days, including all supplementary materials for your and your students' use and assessment instruments. **Each of the unit/daily lesson plans you create needs to indicate what NCTM Content/IL Learning Standards they address.**

Early in the semester we shall focus on formulating classroom behavior and academic expectations/procedures that are crucial to establishing a positive and productive learning environment. Each of you will then develop your own set of expectations/procedures for a particular class that you might teach. Before you do this we shall discuss many appropriate academic policies and classroom management strategies and how to implement them. To give you more ideas on which to reflect you are asked to interview an in-service teacher about their teaching and classroom management strategies.

Other activities help to provide you with the knowledge of resources, such as professional journals or meetings and the Internet, for student centered lessons & non-routine problems that will motivate and challenge your students and also give your students a sense of the historical and multicultural development of mathematics. As we explore methods of teaching the mathematics curriculum at high school levels we shall discuss and experiment with appropriate ways of incorporating various forms of technology as a tool for learning mathematical concepts and procedures.

Throughout the semester you should be assembling all the resources you are given, especially the material in the MATH 412 Packet (which contains information on all the above aspects of teaching as well as sample activities), your and your colleagues' projects in a working portfolio. This portfolio should be organized for ease of location of materials during your student teaching and first years of your teaching career.

In class as well as in the reflective questions you will be asked to reflect on the meaning of the NCTM Principles & Standards, the Illinois Learning Standards, the IPTS & the performance outcomes of the NIU Conceptual Framework & how to implement them in your classroom as well as other issues such as NCLB and ISAT/PSAE tests that affect professional educators. All of the above activities should prepare you for student teaching and your first years as a professional mathematics educator.

### COURSE REQUIREMENTS AND DISTRIBUTION OF POINTS FOR ASSESSMENT:

[Note: Before the due date for each major project a detailed rubric is distributed.]

**Evaluation:** Your grade will be determined on a "point basis" as follows:

<u>Activity</u>	<u>Points</u>	<u>Grade</u>
In-class Problem Presentation	20	(% are of pt. total)
Reflective Questions (3 x 40 points)	120	A 90%-100%
Final Exam (take-home)	100	B 80%-89%
Unit Planning Project	100	C 70%-79%
Class Assignments: (Group Project marked by *)	260	D 60%-69%
(NOTE: Items marked with "+" are to be put in Portfolio)		F 59% or below

+Philosophy of Math Education (20 pts-1<sup>st</sup> draft, 10 pts-Revisions)

\*Unit & Daily Lesson Plans (30 pts)

+Problem Solving File (20 pts)

+Analysis of Teacher Interview (15 pts)

+Report on Professional Meeting or Article or Internet Lesson (15 pts)

+Classroom Management Plan (Expectations/Procedures) (22 pts)

+Grading & Make-up Policy (18 pts)

+Alternative Assessment Project (30 pts)

Concept Teaching Presentation /Instructional Aid (Manipulatives and/or Technology, etc.) (80 pts)

Working Portfolio (Each student is responsible for assembling this portfolio but it will not be graded.)

**Total Number of Points for the Semester**

**600**

**Completion of a disposition form by the instructor is required by NCATE. Form is kept in your department file. Cindy Stecher will discuss any concerns with you.**

**Note: Late work will be accepted only with prior permission from Mrs. Stecher or Ms. Reisdorf**  
**SELECTIVE BIBLIOGRAPHY:**

**Texts:** Cangelosi, James S. (2003). Teaching Mathematics in Secondary and Middle School, An Interactive Approach – Third Edition Englewood Cliffs, NJ: Merrill/Prentice Hall.  
(available in both the University Bookstore and the Village Commons Bookstore)

MATH 412 Packet, compiled by Cindy Stecher (May be available only in the Village Commons Bookstore)

Principles and Standards for School Mathematics – An Overview. (Optional) Reston, VA: National Council of Teachers of Mathematics (2000). [Available from Mrs. Stecher for \$6.00]

#### **Optional Texts and Equipment:**

Empowering the Beginning Teacher of Mathematics – High School Reston, VA: National Council of Teachers of Mathematics (2004). Abbreviated “Empowering” in syllabus. (Available from Ms. Stecher for \$20)

Principles and Standards for School Mathematics Reston, VA: National Council of Teachers of Mathematics (2000). (Abbreviated “Standards” in syllabus). (some copies in Math Lab for use during Math Lab hours) **Also can be accessed online at [www.standards.nctm.org](http://www.standards.nctm.org).**

Classroom Management for the Secondary Classroom, Seventh Ed., Boston, MA: Allyn & Bacon, 2006 (Available through the Internet at [www.ablongman.com/catalog](http://www.ablongman.com/catalog) and type in title and ISBN number. ISBN: 0205455344 (about \$52)

Graphing Calculator (preferably a TI-83 or 83+, TI-84 or 84+, 89, or TI-Nspire) (Some TI- 83 & 83+ calculators are available in the Math Lab)

NIU Secondary Manipulative Kit, prepared by ETA/Cuisenaire. [Maybe ordered through Mrs. Stecher.]

#### **COURSE REQUIREMENTS (READ DIRECTIONS CAREFULLY)**

##### **Philosophy of Mathematics Education (Initial Draft due 1/15/09, Revisions due 4/16/09)**

Your philosophy should have 5 paragraphs: 1) the purpose of mathematics education in high school, 2) the role of the student, 3) the role of the teacher, 4) student learning strategies and 5) effective teaching strategies. Draft should be well thought out and be about one typed (single spaced) page long. Initial draft is due the second class meeting. The initial draft should address what you have learned from Math 410 & your clinical, if applicable. **The revisions should indicate what parts of your initial philosophy were re-enforced by Math 412 and also what changes you have made in your philosophy due to Math 412.** In your Revisions, for both the re-enforcements & the changes please indicate what parts of Math 412 caused you to come to this decision. **When you turn in the revisions, please also turn in the “marked up” initial draft.**

##### **In-class Problem Presentation (Dates of presentation will be determined by lottery.)**

Each student will be asked to present a non-routine problem appropriate for grades 9 – 12 (Algebra through Pre-Calculus). The problem should be written on a plain white sheet of paper in large font for class use on the Elmo. The problem and at least one solution method (not just the answer) should be run off for the other members of the class and Mrs. Stecher for distribution at the end of the presentation. On copies for distribution please include your name, date of your presentation, type of problem & level (if applicable), how problem might be used (opener, POW, etc.) & the source. Pens for class use are available from Mrs. Stecher. In order for Mrs. Stecher to run off the copies for the class the problem and at least one solution method (in final form, signed, & all in black ink or typed) must be given to Mrs. Stecher during the previous class, otherwise you will need to do this. For Spring 2008 need to make about 21 copies of problem and solution method(s). The student will present the problem, indicating for what purpose the problem could be used (opening activity, puzzle, problem of the week, etc.) and at what level, then give the other students about 8 minutes to solve the problem. At the end of the 8 minutes the student presenter should first ask if someone has solved the problem and let the student(s) who solved the problem explain his/her solution(s); explain the solution to the problem with that student's(s') help or explain the solution himself/herself. In all cases the presenter should try to involve the other students as much as possible. Students will be graded on their presentation and choice of problem. Choose a problem that will be interesting to your audience but different from any in your problem solving file. Don't use any problems which have been presented in class. Design problem so that it can be presented in class using just overhead/Elmo, calculators, and possibly manipulatives. Then both the problem and solution method can be distributed after your presentation. Total length of presentation should be no more than 15 minutes.

### Unit and Daily Lesson Plans (Due 1/22/09)

In groups of three or four students, each group will use a textbook from the Math Lab for Algebra I, Geometry, Algebra II or Trigonometry (preferably with a copyright date of 1996 or later). Each group will work with either Chapter I or Chapter II to create one unit plan and one daily lesson plan. At the beginning of the Unit Plan indicate what course the unit plan is for and give title, publisher, and copyright date of textbook used. Give the title of the Chapter you are using for the Unit Plan. For either Chapter I or II do the following:

(1) Create a unit plan (one unit plan per group), stating the title of the course and the chapter/unit, the general learning goal of the unit/chapter &, for each section (inc. # & title of section) in the chapter, give specific student performance objectives and at least one instructional method or methods. Connect method of instruction to the objective method is focused on. At top of the unit plan under the general learning goal indicate what NCTM Content Standard(s) & what IL Learning Standard(s) will be addressed in chapter. Indicate the number of days you think are needed for each section in the chapter. Use a variety of instructional methods with lots of student participation. Give the total number of days required for the entire chapter (including review and test days). Indicate within the Unit Plan when there will be quizzes (include sections covered), review days, and the chapter assessment. Your choice of the timing and coverage on the assessments may vary from textbook suggestions. It is helpful to a teacher to write items requiring advanced preparation in bold. Indicate under the instructional method(s) what special materials, if any, are needed.

(2) Pick one section (indicate title of section at top of daily lesson), not necessarily the first, that you think can be covered adequately in one day and develop a daily lesson plan for it (again one plan per group). As you create the daily lesson plan remember the NCTM Process Standards. Include the performance objective(s) [stated in student terms to be shared with students that day] for that day, the NCTM Content & IL Learning Standards addressed, materials you will need, essential pre-requisite knowledge, motivation of the lesson (Why are we studying this?), an opening activity to introduce topic/objective (possibly an application of topic), developmental activity (including some problem solving activities, application problems & “checks for understanding”), a closing or summarizing activity, and finally a homework assignment. Incorporate into daily lesson plan (at the time they would be asked) major questions you may want to ask students during the developmental activity for purposes of discovery learning or informal assessment (you may want to put questions in italics to help you locate them when teaching) and two or three sample class problems as stated above that would be typical of assigned problems. Give a rough estimate of time needed for each part of this daily plan [mentally rehearsing helps here]. When someone reads these daily lesson plans they should be able to visualize you and the students interacting as the lesson progresses. Be sure to indicate the title, publisher, and copyright date of the textbook you used. Both the unit and daily lesson plans should be handed in. Need not be typed but must be very legible and names of all group members must be on both unit and daily plans

### Analysis of Teacher Interview (Due 2/12/09):

Interview (in person, on the phone or by e-mail) an in-service middle or high school teacher, preferably but not necessarily a math teacher, about his/her philosophy of teaching, teaching methods (possibly inc. technology), assessment methods, classroom management (inc. serious situations), motivational techniques, homework checking, overall grading system, working with special needs students, professional growth opportunities, NCLB and ISAT/PSAE information. You may interview your cooperating teacher for Math 401 or ILAS 301 and use the checklist in Math 401 folder as a basis for this interview. If you are not in Math 401 you need to ask me for a copy of this checklist. In a maximum of two typed pages, discussing each of the areas mentioned, briefly present the best of that teacher's ideas. Also, you may include one or two things you disagreed with or would avoid. Ask the teacher for what courses or grade levels he/she uses each strategy or method (particularly true at the high school level). For middle school teachers indicate at top of page what grade level he/she is teaching. Also, share any strategies for dealing with more serious discipline problems (in & out of class), which may be school policies. Points will be given for clear communication of policies. Include your name but neither the teacher's name nor school name on all pages.

### Problem Solving File (Due 2/3/09):

Each student should create a file of non-routine problems/puzzles (i. e. – problem solving activities) that would be appropriate in one or more of the following settings: motivating problem for a topic (such as opening activity), problem of the day or week, problem to show application of a topic, and/or enrichment problem or puzzle. These problems may require the use of calculators or manipulatives. The number of problems required is 5, and algebraic, geometric, and general problems should all be represented and should be suitable for high school students. Problems should be taken from at least two sources. Two different issues of a math magazine or two URL's count as two sources. The INTERNET is a great source of problems for this file. All the problems should be different than regular textbook problems and should be enjoyable for the students. Don't include the non-routine problem you used or will use for your presentation.

Use a PC or a Mac and **make a separate file** for each problem. Number your problems 1-5 (on computer and hard copy) and **include your name on each problem page/file**, etc., so that I can easily comment on your file, and name the files as (*Your Last Name*) *Problem #1- Algebra (indicating what type of problem it is)*, etc. Include at least one solution method (not just answer) for each problem immediately below the problem. At least one of the problems must include graphics which should be done on computer. Include # of problem & approximate grade level with solution. Label each problem, on disk & hard copy, as geometry, algebraic, or general and indicate the source of each of your problems (say “original” if you created problem). **Put your name on the disk, label it “Problem Solving File” and indicate which word processing program you used and whether it is for a Mac or a PC.** Please use Microsoft Word for Mac or PC, or Word Perfect for PC. **Along with the disk, hand in a hard copy (with each problem, solution method and source together on a separate page and your name on each page).** These problems may be included in your first problem solving file during teaching. When I return the graded hard copies to you, I shall keep the disk in order to generate a general problem solving file

(CD) for the entire class. [Note: After I return your disk you may want to copy some of these problems onto index cards (with solution on a separate card) to be used with your students.]

### **Classroom Management Plan (Expectations/Procedures) (Due 3/3/09):**

Pick a course from General Math, Introduction to Algebra I or II, Algebra I, Basic Geometry, Geometry, or Advanced Algebra. Specify the class you chose at the beginning of your plan. Begin this document with a short welcome to your class. List your behavioral expectations (maximum of 5) for the class (including tardy and talking, etc.) and consequences, if violated. You may elaborate on the expectations after concisely stating them in list format, possibly in boldface. Also, give a short list of rewards (about 3) that you would give for positive attitude & behavior. Your expectations, consequences, and rewards should be concise and in list format so that they could be posted in the classroom. Clearly and completely state these expectations, even though you are repeating school policy. List procedures for various activities that frequently occur during a class (e. g. – beginning of class, asking questions, issuing of passes, checking/correcting homework, handing in papers, dismissal, etc.) The classroom management plan and the list of procedures should both be handed in. When you teach you probably would not post the procedures.

### **Homework, Grading and Make-up Policy (Due 3/3/09)**

For the same course as above formulate homework expectations and grading procedures, cheating policy, possibly keeping a notebook and also grading procedures for the notebook, make-up of missed work (distinguish between excused & unexcused absences), materials students need, where to get extra help, your office location & hours, general expectations for cooperative learning activities, use of technology, and use of manipulatives (you may indicate that these will be more fully developed later), and marking period grading procedures (including scales & % of grade determined by homework, etc.) and semester grading procedures (including scales and % of grade determined by first marking period, second marking period & final exam). Finally, indicate that you wish the separate “sign off” page that contains an introductory letter to students and parents (attached to the policy statement) to be signed by the student and the student's parents and returned. If you were teaching, this document and the classroom management plan would be combined and distributed very near the beginning of the school year. You probably would not distribute the list of procedures. Please specify the course and/or grade level and academic level, if necessary, you chose on your list of expectations & on your homework/grading policy.

### **Concept Teaching (Dates of presentation will be determined by lottery.) Tell me about a week in advance what your specific topic is & give me a general overview of your lesson to avoid duplication. Dress professionally for your presentation!**

Each date in the lottery will have a general topic (e.g. - parallel lines) indicated on it. You will chose a particular concept associated with that topic (measures of special angles associated with parallel lines) and design a lesson teaching this particular concept. Using a Math Lab or school textbook, your own book or an Internet resource as main resource (may use supplementary resources), write a daily lesson plan including the course and level in which you are teaching the topic, performance objective(s) as stated to the students, NCTM Content & IL Learning Standards addressed by lesson, special materials (manipulatives/technology) needed, essential pre-requisite knowledge, motivation of the lesson (may be part of the opening activity), beginning of class (homework check) (5 minutes), opening activity (about 5-8 minutes long), a development activity (about 20-25 minutes), major questions (incorporated into lesson where they would be asked), class problems that would be typical of problems on the homework assignment, and a closing activity or summary (about 5 minutes). **Lesson plan should include an application of the concept and at least two instructional strategies during the development activity.** Lesson plan should contain an estimated time for each part of the lesson. **Prepare a brief homework assignment from the previous day's lesson and distribute it during the class prior to your presentation so that your students have it completed on the day of your presentation.** You should have the opening activity (and possibly answers to homework, if appropriate) and class problems prepared on plain white paper in about size 18 font, if possible. For your lesson make or use an instructional aid (could be models, data, activity worksheets for discovery, etc.) or use some form of technology to help your students understand and apply the concept you are teaching. Use the Instructional Aid form in the Math 412 packet (L-1) to describe your aid or how the technology is to be used in this lesson. If manipulative is ready made tell how you adapted it for your lesson and how you could make it, if necessary. If it is homemade, give directions for making it. If you used worksheets explain rationale for progression of steps & questions. If you used technology give general directions as to how to use the technology to achieve your objectives. You may use a manipulative in the Math Lab or make one of your own. Please have enough materials for the entire class to participate.

**When you teach your lesson you need to have a copy of your lesson plan and the completed Instructional Aid Form for each of your colleagues and myself.** These should be distributed at the end of the lesson. Also, I shall need to collect all other materials you used (lesson plan, overheads, actual instructional aids, peer evaluations, Instructional Aid Form, etc.) after your lesson. **If possible, please give me everything in a large manila envelope with your name on it. You may wish to talk with me before you teach your lesson. After you teach your lesson, respond (about 1 page), via e-mail to Mrs. Stecher by noon of the day after your lesson, to the questions on the reflection form.** Evaluation criteria will include: the lesson plan, the appropriateness and description of the instructional/technology used, the presentation (inc. time management) of the lesson, peer evaluation and reflective response. A form for peer evaluation will ask your colleagues to list 2 good comments about your teaching and 2 areas to improve and what NCTM Standard(s) were addressed in the lesson.

In your presentation make sure your classmates understand at the beginning of your lesson which course they are in objective(s), pre-requisite knowledge and use of the instructional aid and/or technology and actually have them solve some problems using these. **Write the objective(s) on the board before the presentation.** You may use group or individual activities. Your presentation should be a maximum of 45 minutes. Dates for these presentations will be drawn by lottery.

**Really helps to rehearse lesson beforehand to judge pacing. Try to anticipate questions/trouble spots.**

### **Review of Professional Meeting or Article from a Professional Journal or Lesson/Activity from the Internet (Due 4/9/09)**

#### **Do one of the following:**

(1) Attend a meeting of a math teachers' professional organization such as NCTM, ICTM, NIATM (Northern IL Association of Teachers of Mathematics, MMC (Metropolitan Math Club), or T<sup>3</sup> (Teachers Teaching with Technology), etc. Summarize in 1-2 pages the activities you participated in at the meeting & how these activities might benefit both you and your students. State date and organization sponsoring meeting. **Join NCTM and consider joining ICTM &/or MMC.** Consider a session on technology.

(2) Read an article from a professional journal such as Math Teacher (NCTM) or an article about high school math in Illinois Math Teacher (ICTM) and in 1-2 pages summarize the article and indicate how the ideas in the article would be helpful to you and your students. State title of article and magazine and date of publication. Perhaps use an article on using technology in the classroom. Don't need to turn in article.

(3) Download a high school lesson/activity from the Internet or from Navigations by NCTM (in brown cabinet), specify at what level or for what course it might be used in. In 1-2 pages, summarize the lesson (inc. the objectives) and tell how you might use this lesson/activity in your class, what concepts it would help students learn and why you think it would help your students. Give Internet address in your review but don't need to turn in printed lesson. Possibly use a lesson that incorporates technology.

### **Future Professional Meetings**

**January 24, 2009 – MMC Conference of Workshops, go to [www.mmcchicago.org](http://www.mmcchicago.org) for details**

**February 27, 2009 – DuPage Valley Conference Math Conference** (info in e-mail I sent you)

**April 22-25, 2009 – NCTM Annual Meeting in Washington, D. C.**

Metropolitan Math Club meetings at Fountain Blue Banquets in Des Plaines (Check [www.mmcchicago.org](http://www.mmcchicago.org) for future dates) On website see section to post resumes.

**Meetings for NIATM** (Check [www.hononegah.org/hono1/NIATM/](http://www.hononegah.org/hono1/NIATM/) for more details)

**Visit [www.nctm.org/meetings](http://www.nctm.org/meetings)** (Regional Conferences and NCTM's Annual Meeting in 2008 - 2009)

Visit [www.nctm.org/academy](http://www.nctm.org/academy) for information on NCTM Academies for Professional Development

Visit [www.ictm.org](http://www.ictm.org) for announcement of Regional Meetings/Conferences

Check out [www.nctm.org/eresources](http://www.nctm.org/eresources) & [goENC.com](http://goENC.com) for lessons & activities

**Others may be announced or put on the bulletin board outside the Math Lab.**

### **Alternative Assessment Project (Due 3/26/09)**

Using several sections, that form a part of a chapter or unit, of one of the textbooks you are using in your student teaching school during Math 401, a textbook from the Math Lab, an issue of the NCTM "Mathematics Teacher," an idea from the web or a resource of your own create a brief **alternative** assessment activity (such as a project/problem/application incorporating the major concepts presented such as a practical problem in which students would need to use these concepts). Make a list of objectives that the students should achieve by completing this activity and what NCTM Principles & Standards/IL Learning Standards that are addressed. List these objectives in prioritized order from most important to least important. Give a list of the materials that students will need for the project and step-by-step student directions. Also include, if necessary, any instructions or handouts the teacher would give the students beside the student directions. [I need to be able to visualize the students doing the project/problem.] Finally, include a rubric explaining the criteria that would be used to evaluate this assessment and how the criteria will be used in the evaluation (e. g. – # of points awarded for each criteria). Rubric should be shared with the students at the beginning of the assessment activity. State source.

### **WORKING PORTFOLIO (Work on assembling portfolio throughout the semester – a great resource but not graded)**

Your portfolio should contain the following:

**Detailed table of contents listing major sections and major contents in each section** [Suggested major sections:

NCTM, Illinois Learning Standards, IPTS, NCLB & ISAT/PSAE information (all in one section), NIU's Conceptual Framework, Lesson Plan Formats, Your Discipline Plan & Expectations/Procedures, Cooperative Learning & Types of Activities, Assessment, Using Technology in the Classroom, Non-routine Problems given in class (perhaps divided by level) and include Problem Solving File CD. Material and Information on Middle School Info, General Math, Algebra, Geometry, etc. (preferably in separate major sections). Math 412 activities/handouts should be placed in appropriate section.

Initial draft of your philosophy of mathematics education (Corrected versions) and Revisions in separate section  
Analysis of Teacher Interview

Material on the mathematics topics/activities discussed/done in class (placed in appropriate sections)

A separate section for the material on your teaching activity

A section for the material from other students' teaching activities

MATH 412 Packet handouts (**separated and put in appropriate sections of the portfolio**)

Report on Professional Meeting or Article  
Classroom Management Plan (Expectations/Procedures)  
Grading & Make-up Policy  
Assessment Project

A section for Resources for Teaching & Learning Mathematics

HINT: Get a 3" or 4" three-ring binder, separator tabs, and a hole punch. **Use tabs with section title on them to indicate separate sections.** Add material to your portfolio each day. Portfolio may be used during interviews or as you teach.

**UNIT PLANNING PROJECT (Due 4/2/09): [BEGIN WORK ON THIS EARLY!]**

Select a major unit or chapter for any middle school topic thru Pre-Calculus. If you have been placed for student teaching, you might want this to be one of the courses you might be teaching during your student teaching, and you should use the text you are going to be using during student teaching (student edition is fine), if available. **Prepare a detailed chapter or unit plan, for the entire chapter or unit**, with general goal for unit, NCTM Content/IL Learning Standards addressed in chapter, specific performance objectives for each lesson (inc. for review day), , methods of instruction(s) for each lesson inc. review day, special materials, quizzes, test, and review days noted, and overall time line (including total time). **In unit plan give title of each section and indicate what activity/assessment you are using for your mini assessment and major assessment.** Then write detailed daily lesson plans with daily objectives (as stated to students), NCTM Content/IL Learning Standards addressed by that daily lesson, materials needed, essential pre-requisite knowledge, motivation of lesson, time lines, and all accompanying activities (including beginning of class [including homework check]), opening, developmental, class exercises, application problems, summary/closing activities, assignments for four consecutive days of classes (inc. mini assessment). Major assessment would be on fifth day (no lesson plan required for fifth day). Connect a lesson to the one before and the one after it. **Implement the NCTM Process Standards in your lessons and use at least one resource other than the textbook. If you are student teaching at a school that is on block scheduling then do unit plan and daily plans according to the length of the classes in your student teaching school. You will need to indicate the type of block scheduling (Block 4 or 8) and length of class. Write lessons for two consecutive classes (inc. mini assessment). Major assessment would be on third day (no lesson plan required for third day). Include a variety of instructional strategies.** Include the actual transparency (may be written on regular paper) for any overhead work you would prepare before class (such as answers to homework, opening problem, etc.) worksheets, homework quizzes, and any other handouts in the format they would be given to the students. Also include within the context of the lesson plan any major questions you plan to ask the students. You may include activities that involve the use of technology or manipulatives or applications. **In one of the four lessons or in one of the two lessons if using block scheduling include some form of differentiated instruction.** Please include, in those four days or two consecutive classes (if block), at least one short quiz -perhaps homework quiz, (5-10 minutes) and on the fifth day or third consecutive class (if block) a major quiz or formal alternative assessment (15-20 minutes). **For the major quiz/assessment make a prioritized list of performance objectives (in order of decreasing emphasis) you are assessing.** A detailed solution key showing solution method(s) for each problem and points awarded for various parts of solution method for each problem should accompany the major quiz. **Include both student copy, with space for student work, & student copy with detailed solutions (solution key) & points awarded for each part of solution.** On title page of the Unit Planning Project indicate the topic, course, grade level, academic level (if necessary), and give the title, publisher and copyright date of the textbook as well as the title of the unit or chapter. Also indicate the outside resource(s) used (if INTERNET, give URL). Turn in textbook (even if it's from the Math Lab) or photo copy of the chapter with your project. **We must be able to visualize lesson being taught.**

**FINAL EXAM (Due on Thursday, May 7, between 4:00 – 5:00 p.m. in Watson 364)**

**MATH 412 – Spring 2009  
DATE SYLLABUS**

Note: Readings from the optional texts (marked with “\*”) are optional but highly recommended.

Abbreviations: (1) Teaching - Teaching Mathematics in Secondary and Middle School  
\* (2) Standards – Principles and Standards for School Mathematics  
\* (3) Empowering – Empowering the Beginning Teacher of Mathematics – High School

**BE FLEXIBLE AS CHANGES TO THE FOLLOWING DATES MAY OCCUR!!!**

<u>Date</u>	<u>Topic</u>	<u>Assignments &amp; Readings</u> (To be completed by this date)
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1/13	Overview of the NCTM 2000 & IL Learning Standards, Tips for a Beginning Teacher Getting to Know Your Students Resources You Can Use (incl. Technology)	
1/15	Lesson Planning-Making Every Minute Count Methods of Instruction Planning for Questions & Student Involvement Planning Lessons for Block Scheduling Work on Unit & Daily Lesson Plans	Teaching: pp. v-vii, 1-21, 26-29, 130-138, 164-169 Math Packet: Section A & C Look at Lesson Plan Formats Standards Overview – Section on Principles Empowering: p. 58 <b>Initial Draft of Philosophy of Math Ed. Due</b>
1/20	Work on Unit & Daily Lesson Plans "Setting the Tone" for Your Classes (Communicating Class Expectations to Students) Cooperative Learning Techniques Writing in Math (Journals)	Teaching: pp. 148-164, 172-192 Math Packet: Section D, F-3, F-6 (you are missing F-5) Standards Overview – Section on Standards Empowering: pp. 13-16, 20 <b>Think about:</b> What should you be looking for when you observe in-service teachers teach and their students?
1/22	Cooperative Group Activities What makes a good problem? Problem Solving Strategies Using Technology for Problem Solving <b>Distribute Reflective Question #1</b>	Teaching: pp. 192-204, 207-228 Math Packet: Section E Standards (full version from now on): pp. ix – xv (Preface) Empowering: pp. 17-19, 50 <b>Unit &amp; Daily Lesson Plans Due</b>
1/27	Problem Posing "Selling Math" (Motivation, Enthusiasm & Applications) <b>Discuss NIU's Conceptual Framework &amp; IPTS Standards</b>	Teaching: pp. 21-26, 30-41, 50-63, 88-97, 118-121 Standards: pp. 3 – 8 (A Vision for School Mathematics)
1/29	Mathematical Connections & Applications Questioning Techniques (Ones to ask, ones to avoid, leading questions) Bloom's Taxonomy of Questions Evaluating Feedback from Questions (both students' and teacher's) Practice in Classroom Questioning	Teaching: pp. 254-276 Standards: pp. 11 – 19 (Equity, Curriculum, Teaching Principles) Empowering: pp. 21-24 <b>Reflective Question #1 Due</b>
2/3	Students with Special Needs Assessing Students' Performance (Informal & Formal) Keeping a Grade Book	Teaching: pp. 97-118, 121-129, 229-235 Math Packet: Section H Standards: pp. 20 – 27 (Learning, Assessment, Technology Principles) Empowering: pp. 51-58 <b>Problem Solving File Due</b>
2/5	Alternative Assessments (Portfolios, Projects, Interviews) Writing rubrics Evaluation in Cooperative Learning (participation & disposition)	Teaching: pp. 235-252, 277-301 Standards: pp. 28 – 40 (Intro to P-12 Standards, Number & Operations, Algebra Standards) Empowering: pp. 27-34
2/10	Technology in the Classroom (from Algebra to Pre-Calculus) including Computer Algebra Systems (CAS) Technology Resources (inc. websites for teachers)	Teaching: pp. 301-329 <b>Bring graphing calculator (if you have one)!!!</b> Standards: pp. 41 – 51 (Geometry, Measurement, & Data Analysis and Probability Standards) Math Packet: Section G Empowering: pp. 25-27

2/12	Group work on Technology <b>Distribute Reflective Question #2</b> <b>Teaching Concept #1</b>	<b>Bring graphing calculator</b> Teaching: pp. 346-365 Standards: pp. 52 – 63 (Problem Solving, Reasoning and Proof, Communication Standards) Math Packet: Section K <b>Analysis of Teacher Interview Due</b>
2/17	Maslow’s Hierarchy of Needs Class Management Strategies School Discipline Policies <b>Teaching Concept #2</b>	Teaching: pp. 332-346 Standards: pp. 64 – 71 (Connections & Representation Standards) Math Packet: Section F-1, F-2 and F-4
2/19	Motivation and Discipline "Discipline Role Playing" (cont'd) <b>Teaching Concept #3</b>	Teaching: pp. 41-47, 62-84 Standards: pp. 286 – 289 (Intro to 9-12 Standards) Empowering: pp. 35-42 <b>Reflective Question #2 Due</b>
2/24	Transition to Algebra (generalization of patterns, model problem situation with symbols) Making Basic & Applied Math Worthwhile	Teaching: pp. 366-375 Standards: pp. 290 – 295 (Number and Operations Standard)
2/26	Secondary School Math-Algebra (1) Variables & "Common Sense" Domains (2) Algebraic Expressions ( Subt., Mult. & Div.) (3) Rational Expressions (inc. restrictions) [Primes & Div. by Zero] <b>Teaching Concept #4</b>	Teaching: pp. 366-372, 412-416 Standards: pp. 296 – 307 (Algebra Standard)
3/3	Secondary School Math-Algebra (1) Exploring Data with Graphs (2) Absolute Value Relations <b>Teaching Concept #5</b>	Teaching: pp. 375-401 Math Packet: Section I <b>Classroom Management Plan (Expectations/Procedures) &amp; Homework, Grading and Make-Up Policy Due</b>
3/5	Secondary School Math – Algebra (1) Matrices (2) Functions & Relations [verbal, algebraic & graphic representations] <b>Distribute Reflective Question #3</b>	Standards: pp. 308 – 319 (Geometry Standard)
3/17	Secondary School Math-Algebra Polynomials & their Uses (Verbal & Geometric Problems) <b>Teaching Concept #6</b>	Standards: pp. 320 – 333 (Measurement, Data Analysis and Probability Standards)
3/19	Secondary School Math-Algebra Probability & Statistics [Permutations & Combinations] Discrete Math [Graphing sequences on the TI – 83] History & Multicultural Aspects of Math	Math Packet: Section G-7 & G-11 Standards: pp. 334 – 341 (Problem Solving Standard) <b>Reflective Question #3 Due</b>
3/24	Secondary School Math-Geometry Off to a Good Start in Geometry (finding geometry everywhere and how to make definitions more memorable) Construction & Locus Principles of Logic & the Underpinnings of Proof <b>Teaching Concept #7</b>	Teaching: pp. 401-406 Standards: pp. 342 – 353 (Reasoning and Proof, Communication Standards) Math Packet – Section J
3/26	Secondary School Math-Geometry Congruencies & Similarity [Discovery of Congruence Post.] Classification of Figures <b>Teaching Concept #8</b>	<b>Assessment Project Due</b>

3/31	Transformational Geometry Areas & Volumes <b>Teaching Concept #9</b>	
4/2	Secondary School Math-Geometry & Trigonometry What's a Radian? Trig. to Circular Functions [Applications]	Teaching: pp. 406-412, 416 Standards: pp. 354 – 365 (Connections, Representation Standards) <b>Unit Planning Project Due</b>
4/7	The Geometer's Sketchpad <b>Teaching Concept #10</b>	Xeroxed material on Geometer's Sketchpad Standards: pp. 366 – 380 (Working Together ...)
4/9	Lab on the Geometer's Sketchpad Ambiguous Case of the Law of Sines & SSA ➡	Xeroxed material on Geometer's Sketchpad Teaching: pp. 362-390 <b>Review of Professional Meeting or Article Due</b>
4/14	Analytic Geometry Complex Numbers <b>Teaching Concept #11</b>	Teaching: pp. 130-148 Empowering: pp. 1-12
4/16	Secondary School Math - Pre-Calculus Vectors Natural Logs & Exponential Functions [ Inverse Facts, Applications] Polar Graphs [Connection to Graphs of Circular Facts.]	<b>Revisions of Math Ed Philosophy Due</b>
4/21	Calculus Limits & Derivatives	
4/23	Catch Up Day	
4/28	Catch Up Day	
4/30	Catch Up Day	
5/7	<b>Final Exam (Take-Home)</b>	<b>Due between 4:00 – 5:00 p.m. in Watson 364</b>