**GEORGE MASON UNIVERSITY**
**COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT**
**ELEMNTARY EDUCATION**

**EDCI 547**
**Integrating Technology in Elementary Classrooms:  Mathematics (1 credit)**
**Fall, 2009 [Section 002]**

| | |
|---|---|
| Instructor | Dr. Christopher Johnston |
| Office Phone | (703) 993-4789 |
| | |
| Office | Commerce II, Suite 200A, 4085 University Dr., Fairfax, VA |
| Email | cjohnst2@gmu.edu |
| Class Meets | Thursdays, 7:30 – 10 p.m. [9/3/09, 9/10/09, 9/17/09, 9/24/09, and 10/1/09 only] |
| | Robinson A350 |
| | |
| Office Hours | Wednesdays, 11 a.m. – 1 p.m. |
| | Also by appointment |

**COURSE DESCRIPTION:**
   A. Prerequisites:  Admission to the Elementary Licensure Program.
   B. Corequistites:  Enrollment in EDCI 552.
   C. Course description from the university catalog:  This course studies the development and integration of technology in the Elementary Education Mathematics curriculum.

**NATURE OF COURSE DELIVERY:**
Students in this course will participate in individual and group activities that focus on the integration of technology by using computers in class.  Students will also participate in large group discussions led by the instructor and in small group discussions and activities with their classmates. Students will also be required to use asynchronous (Blackboard) postings to reflect upon their own learning.

**LEARNER OUTCOMES:**
This course is designed to enable teacher candidates to:
   1. plan interdisciplinary learning experiences that enable elementary students to integrate knowledge, skills, and methods of inquiry within the Mathematics curriculum;
   2. identify how students differ in their approaches to learning and create instructional opportunities that are adapted to diverse learners;
   3. select appropriate materials, tools, and technologies to achieve instructional goals with all learners.

**PROFESSIONAL STANDARDS:**  This course addresses the following National and State Standards:
INTASC

6. The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.

Other INTASC Standards identified on rubric are addressed in the companion method course.

The Virginia State Technology Standards for Instructional Personnel:
1. Instructional personnel shall be able to demonstrate effective use of a computer system and utilize computer software.
2. Instructional personnel shall be able to apply knowledge of terms associated with educational computing and technology.
3. Instructional personnel shall be able to apply computer productivity tools for professional use.
4. Instructional personnel shall be able to use electronic technologies to access and exchange information.
5. Instructional personnel shall be able to identify, locate, evaluate, and use appropriate instructional hardware and software to support Virginia's Standards of Learning and other instructional objectives.
6. Instructional personnel shall be able to use educational technologies for data collection, information management, problem solving, decision making, communication, and presentation within the curriculum.
7. Instructional personnel shall be able to plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.
8. Instructional personnel shall demonstrate knowledge of ethical and legal issues relating to the use of technology.

International Society for Technology in Education (ISTE) National Educational Technology Standards:

1. TECHNOLOGY OPERATIONS AND CONCEPTS - Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:
    1. demonstrate introductory knowledge, skills, and understanding of concepts related to technology (as described in the ISTE National Educational Technology Standards for Students).
    2. demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.
2. PLANNING AND DESIGNING LEARNING ENVIRONMENTS AND EXPERIENCES - Teachers plan and design effective learning environments and experiences supported by technology. Teachers:
    1. identify and locate technology resources and evaluate them for accuracy and suitability.
3. PRODUCTIVITY AND PROFESSIONAL PRACTICE - Teachers use technology to enhance their productivity and professional practice.  Teachers:
    1. use technology resources to engage in ongoing professional development and lifelong learning.

2. continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.
3. use computer-based technologies including telecommunications to access information and enhance personal and professional productivity.
4. apply technology to increase productivity.
5. use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning.

## REQUIRED READINGS:

Drier, H. S. (2000). Investigating mathematics as a community of learners. *Teaching Children Mathematics, 6,* 358-363.

Garofalo, J., Drier, H., Harper, S., Timmerman, M.A., & Shockey, T. (2000). Promoting appropriate uses of technology in mathematics teacher preparation. *Contemporary Issues in Technology and Teacher Education* [Online serial], *1* (1). Available: http://www.citejournal.org/vol1/iss1/currentissues/mathematics/article1.htm

Kafai, Y., Franke, M., & Battey, D. (2002). Educational software reviews under investigation. *Education, Communication & Information*, *2*, 163-180.

These articles are available on the GMU Library website, via: http://library.gmu.edu/phpzone/ej.php. If you are using a non-campus computer, you will need to log in with your GMU email account information.

Also required for this course is access to Blackboard, available at http://courses.gmu.edu.

## COURSE REQUIREMENTS, PERFORMANCE-BASED ASSESSMENT, AND EVALUATION CRITERIA:

A. Requirement #1:  Students will evaluate three Illuminations lesson plans which incorporates a technology tool. Students will evaluate the lesson plans based on the manner in which technology is integrated (based on the five guidelines for technology integration, as discussed in class) and offer suggestions for modifications.   Students will use an evaluation form to complete this assignment. (30%)
B. Requirement #2:  Students will evaluate an existing spreadsheet activity for use with elementary students. The resources will be selected from http://eusesconsortium.org/edu/problems.php. Students will use an evaluation form to complete this assignment. (10%)
C. Requirement #3: Students will post, on Blackboard, one journal article which focuses on the use of technology in elementary mathematics education. The article should be linked as a PDF, and students should write a two- paragraph summary of how the article will impact their own future teaching of a particular mathematical topic with technology as a support. Suggested journals include: *Teaching Children Mathematics, Mathematics Teaching in the Middle School, School Science and Mathematics, Journal of Technology and Teacher Education, Computers in Schools, Contemporary Issues in Technology and Teacher Education.* (10%)

**D.** Performance-based assessment: Students will use PowerPoint or another multimedia tool to create a game that teaches a Mathematic concept. The game should be interactive and use multimedia functions in an appropriate manner. The game would be evaluated based on originality, creativity, and correctness of the mathematic concepts. (40%)

**E.** Class participation and attendance. (10%)

During each class session, students are expected to attend class and arrive on time. Exceptions (due to extreme circumstances) must be discussed with the instructor.

| ELEMENT | LEVEL | OF | PERFORMANCE | |
|---|---|---|---|---|
| | *Distinguished (9 – 10 points)* | *Proficient (8 points)* | *Basic (6 - 7 points)* | *Unsatisfactory (1 - 5 points)* |
| Attendance & Participation | The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence. The student actively participates and supports the members of the learning group and the members of the class. | The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence; the student makes active contributions to the learning group and class. | The student is on time, prepared for class, and participates in group and class discussions. The student attends all classes and if an absence occurs, the procedure outlined in this section of the syllabus is followed. | The student is late for class. Absences are not documented by following the procedures outlined in this section of the syllabus. The student is not prepared for class and does not actively participate in discussions. |

**Criteria for evaluation:** Since this is a graduate level course, high quality work is expected on all assignments and in class. Points for all graded assignments will be based on the scope, quality, and creativity of the assignments. All assignments are due at the beginning of class. Late assignments will not be accepted without making arrangements with the instructor.

**Grading scale**: 94-100 = A  90-93 = A-  86-89 = B+  80-85 = B
70-79 = C  below 70 = F

**COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT OF EXPECTATIONS:**

All students must abide by the following:

Students are expected to exhibit professional behavior and dispositions. See http://gse.gmu.edu/facultystaffres/profdisp.htm for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#Anchor12 for the full honor code.

Students must agree to abide by the university policy for Responsible Use of Computing.  See http://www.gmu.edu/facstaff/policy/newpolicy/1301gen.html.
Click on responsible Use of Computing Policy at the bottom of the screen.

Students with disabilities who seek accommodations in a course must be registered with the GMU Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See http://www.gmu.edu/student/drc/ or call 703-993-2474 to access the DRC.

**ATTENDANCE POLICY**

Students are expected to attend the class periods of the courses for which they register.  Although absence alone is not a reason for lowering a grade, students are not relieved of the obligation to fulfill course assignments, including those that can only be fulfilled in class.  Students who fail to participate (because of absences) in a course in which participation is a factor in evaluation, or students who miss an exam without an excuse, may be penalized according to the weighted value of the missed work as stated in the course syllabus (GMU University Catalog, pg. 32).

# PROPOSED CLASS SCHEDULE

| Class Session | Topic/Learning Experiences | Readings and Assignments (due this class session) |
|---|---|---|
| 1 (9/3) | Introduction to class<br>Review syllabus<br>Exploration on PowerPoint and its various functions | |
| 2 (9/10) | Appropriate uses of technology in mathematics education<br><br>Introduction to Illuminations resources<br><br>Create storyboard for Math Game | Brainstorm ideas for Math Game<br><br>Read Garofalo, et al. (2000)<br><br>Post article and two-paragraph reflection - due (Assignment C) |
| 3 (9/17) | Continue working on Math Game* | Evaluation of Illuminations Lesson Plan Due (Assignment A)<br><br>Complete storyboard |
| 4 (9/24) | Introduction to Spreadsheets<br><br>Evaluation of Spreadsheet Activities (Assignment B – in class)<br>http://eusesconsortium.org/edu/problems.php<br><br>Reviews of Educational Software<br><br>Continue working on Math Game | Read Drier (2000)<br><br>Read Kafai, et al. (2002)<br><br>Continue working on Math Game |
| 5 (10/1) | Share Math Games<br><br>Course Evaluations | Math Game Due (Assignment D) |

*This entire class session will be devoted to working on your Math Game.

Integrating Technology in Elementary Classrooms:  Mathematics
## *Mathematic Game Rubric (PBA)*

Name: _____ Date:  _____

| | **No Evidence** <br> 0 | **Beginning** <br> (Limited evidence) <br> 1 | **Developing** <br> (Clear evidence) <br> 3 | **Accomplished** <br> (Clear, convincing, substantial evidence) <br> 5 | **SCORE** |
|---|---|---|---|---|---|
| **Is the game an original idea?** <br> Standard 4 | The game is not an original idea.  It duplicates a game already designed by teachers or a game format that lacks creativity (i.e. just Drill and Practice) | The game is not an original idea, but does incorporate some unique features. | The game is an original idea.  Although it may incorporate some features of other games, attempts have been made to integrate these in a unique way. | The game is a completely unique idea.  It demonstrates creativity on the part of the designer. | |
| **Does the game present an accurate Mathematic concept?** <br> Standard 1 | The game does not present an accurate Mathematical concept.  It does not address a Math concept. | The game does not present an accurate Mathematical concept.  Although Math is included, the concept presented is incorrect or incomplete. | The game does present an accurate Mathematical concept.  The concept is accurate and complete.  However, no explanation of the concept is provided to the user. | The game does present an accurate Mathematical concept.  The concept is accurate and complete.  An explanation of the concept is provided to the user. | |
| **Is the game grade appropriate?** <br> Standards 1,2 | The game is not grade appropriate.  The game structure is too advanced or too easy for the stated grade. | The game is not grade appropriate. The Math concept is too advanced or too easy for the stated grade | The game is grade appropriate.  The Math concept and structure is applicable to the stated grade. | The game is grade appropriate.  The Math concept is adjustable and applicable to a range of grades. | |
| **Is the game interactive and engaging?** <br> Standards 2, 6 | The game is not interactive or engaging. The user merely clicks the mouse to move forward. | The game is may be interactive, but it is not engaging. It does not hold the users attention for long. | The game is interactive and engaging.  User's attention is maintained until game is completed.  User's are not likely to return to the game once completed. | The game is interactive and engaging.  User's attention is maintained until game is completed.  User's are likely to return to the game once completed in order to play again. | |

| | | | | |
|---|---|---|---|---|
| **Does the game take advantage of multimedia features?** Standard 6 | Game does not take advantage of multimedia features. Sound, music, video, etc. are not included. | Game does not take advantage of multimedia features. Some features are included, but not fully integrated into the game. | Game does take advantage of multimedia features. Features are included and integrated into the game. Some features distract from game play. | Game does take advantage of multimedia features. Features are included and fully integrated into the game. Such features enhance the gaming experience. | |
| **Are the screens well designed and easy to read?** Standard 6 | Screens are not well designed. Color schemes make it difficult to read the screens. The screens are too busy. The text is too small. Graphics are not included or are distracting. | Screens are not well designed. At least two of the four aforementioned problems exist. | Screens are well designed. Only one of the aforementioned problems exists. | Screens are well designed. None of the aforementioned problems exist. It is clear that the designer considered color choices and the amount of text to include. Graphics enhance the game. | |
| **Is feedback encouraging?** Standard 9 | No feedback or negative feedback is provided. | Feedback provided encourages user to choose an incorrect answer. | Feedback is encouraging and positive. However, the correct answer is given too soon or not enough explanation of how to obtain the correct answer provided. | Feedback is encouraging and positive. Users are scaffolded to learn the Mathematical concept in order to be successful at obtaining the correct answer. | |
| **Is the game inquiry-based and promotes higher thinking skills?** Standards 2, 4 | The game is not inquiry-based and does not promote higher thinking skills. It is a drill-and-practice or tutorial game. | The game is inquiry-based, but does not promote higher-thinking. | The game is inquiry-based and does promote higher-thinking. However, the game may be too easy for some learners and is not easily modified. | The game is inquiry-based and does promote higher-thinking. Because the game can be modified, it is easy to differentiate instruction for all learners. | |
| **TOTAL** | | | | | (out of 40) |

Comments: