MATH 5326: Structure of Patterns and Algebra

Section 001, Summer I 2012, CRN: 60797

I. COURSE INFORMATION

Instructor: Joe Champion, Ph.D.
E-mail: joe.champion@tamucc.edu
Webpage: http://math.tamucc.edu/~jchampion
Office location: Center for Instruction #359
Office phone: 361-825-3165
Office hours: Mon - Thurs 12:30 - 1:30 p.m.; also by appointment

Meeting place: Center for Sciences 110
Meeting times: 8:30-11:30 on June 11-14, June 18-22, & June 25
8:30-4 on June 15

II. COURSE DESCRIPTION

As suggested by the catalog description (below), this course provides an advanced perspective on the concepts in school algebra. Content focuses on problem solving in an algebraic context.

Algebraic reasoning incorporating the use of technology. This course includes investigations of patterns, relations, functions, and analysis, with a focus on representations and the relationships among them.

Note: This section is specially designed to leverage connections to high school mathematics.

III. PREREQUISITES for the COURSE

Graduate status.

IV. REQUIRED TEXTBOOKS and OTHER MATERIALS

- Fostering Algebraic Thinking, Driscoll, Heinemann, 1999
- A graphing calculator
- Regular access to high speed internet

V. STUDENT LEARNING OUTCOMES

Upon successful completion, students in the class will:

1. **Algebraic Reasoning**: Be able to describe the three habits of algebraic thinking and recognize examples of each in multiple contexts.
2. **Algebraic Structures**: Perform computations and analyze properties of operations in previously unfamiliar algebraic structures.
3. **Patterns**: Translate patterns and sequences among multiple representations, including pictures, tables, words, numbers, and algebraic symbols.
4. **Functions**: Recognize and describe the processes of doing and undoing functions, relations, and algorithms in a variety of contexts.
5. **Linear Change**: Recognize linear change in multiple forms and be able to find the equation of a linear relationship presented in numerical, graphical, verbal, or symbolic form.

6. **Families of Functions**: Identify linear, quadratic, exponential, and other common families of functions when represented in patterns, graphs, equations, and tables.

**VI. INSTRUCTIONAL METHODS and ACTIVITIES**

The course will be a combination of instructional presentation of new material and concepts, whole-class discussion, individual investigations of mathematics, and optional one-on-one discussion time between students and the instructor outside of class. Students may be required to give individual or group presentations. All participants are expected to engage in group and whole class activities by contributing knowledge and thoughtful evaluation of others’ contributions.

**VII. MAJOR COURSE REQUIREMENTS and ASSESSMENTS**

Final course grades will be a weighted average of mean scores using the following weights:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classwork</td>
<td>30%</td>
</tr>
<tr>
<td>Projects</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
</table>

Final weighted grades exceeding 90% will result in a letter grade of A. Those exceeding 80% will result in at least a B; ≥ 70% will result in at least a C; ≥ 60% will result in at least a D; below 60% will result in an F.

**Classwork** – participate in inquiry tasks, whole-class discussion, and group work activities during regularly scheduled class time. Homework may require high speed internet access and word processing software.

**Projects** – (1) select a challenging concept in school algebra and prepare a report on research-based approaches for teaching the concept, and (2) modify an inquiry-based algebra activity for classroom teaching. See the respective project guidelines for assessment details.

**Quizzes** – demonstrate your mastery of select student learning outcomes during 30-45 minute individual assessments.

**Final Exam** – complete a comprehensive summative evaluation of your knowledge through a post-test. The final exam cannot be made-up if missed. If you have a conflict with the scheduled final exam time, please contact me at least one week prior to discuss scheduling options.

» The final exam is scheduled for **Monday, June 25 at 8:30 - 11:30am**.
VIII. COURSE OUTLINE (subject to change)

<table>
<thead>
<tr>
<th>Day</th>
<th>TOPIC</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon, 6/11</td>
<td>Algebraic Reasoning</td>
<td>Pretest, The 3 Habits, The Farmer</td>
</tr>
<tr>
<td>Tue, 6/12</td>
<td>Patterns and Sequences</td>
<td>Toothpick Patterns, Tiling Gardens</td>
</tr>
<tr>
<td>Wed, 6/13</td>
<td>Linear Change</td>
<td>Tiling Gardens, Toothpick Patterns, Going to School</td>
</tr>
<tr>
<td>Thu, 6/14</td>
<td>Quadratics</td>
<td>Window Problem, Continued Fractions, Quiz #1</td>
</tr>
<tr>
<td>Fri, 6/15</td>
<td>Algebra in the Schools</td>
<td>ME by the SEa Conference (8:30-4)</td>
</tr>
</tbody>
</table>

Two days of RICE (rest, ice, compression, elevation) and homework.

<table>
<thead>
<tr>
<th>Day</th>
<th>TOPIC</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon, 6/18</td>
<td>Representations</td>
<td>Area Model, Algebra Tiles, Quadratic Models,</td>
</tr>
<tr>
<td>Tue, 6/19</td>
<td>Exponentials</td>
<td>Requesting a Reward, Lily Pads, Due: Project #1</td>
</tr>
<tr>
<td>Wed, 6/20</td>
<td>Nonlinear Change</td>
<td>Polygonal Numbers, Quiz #2</td>
</tr>
<tr>
<td>Thu, 6/21</td>
<td>Equations</td>
<td>Putting on the Pounds, Balancing Act</td>
</tr>
<tr>
<td>Fri, 6/22</td>
<td>Algebraic Structures</td>
<td>Symmetry Group of the Triangle</td>
</tr>
</tbody>
</table>

A nice weekend to relax and work on homework.

<table>
<thead>
<tr>
<th>Day</th>
<th>TOPIC</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon, 7/25</td>
<td>(Comprehensive)</td>
<td>Final Exam, Due: Project #2</td>
</tr>
</tbody>
</table>

IX. CLASS POLICIES

Attendance/Tardiness. Since the course duration is limited, you’re expected to attend every class session, arrive on time, and complete all in-class activities. If you need to miss part or all of a class session, please contact me before class or as soon as possible. Email is usually best.

Late Homework. Homework will usually be due the next class, but may be submitted later if the student requests an extension prior to the deadline. The instructor may enforce strict deadlines on some assignments by announcing a “hard deadline.” Partial credit on late submissions will be assigned at the instructor’s discretion.

Cell Phones/Electronic Devices. Please silence electronic devices during class and step out of class to use them. You may not use any personal electronic device during exams.

Written Work. Good writing skills are important in this class. Please type and proof-read your written assignments. The Writing Center is available for help with written assignments.

In-Class Discussion. Everyone in the class is encouraged to express personal views with an emphasis on evidence-based claims. Through maintaining a spirit of mutual respect and acknowledgement, the hope is that classroom discussion will be inviting, lively, and informative.
Dropping a class. I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance & participation WILL NOT automatically result in your being dropped from the class.

Academic integrity. University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a minimum of a 0 on the assignment or test.

Disability services. The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Driftwood 101. If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

Grade appeals process. As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at tamucc.edu/provost/university_rules. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

Classroom Behavior. Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

Changes. The instructor may amend the syllabus at any time prior to the final exam by announcing the changes in class.