Math 103: Cultural Views of Mathematics

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Textbook: Marcia Ascher, Ethnomathematics, and other readings as posted on Moodle. Students are expected to check such assignments on Moodle. When new readings are posted, they will be announced in class or by email.

Email: Some course material may be distributed by email, and it is assumed that students check their email regularly (i.e., at least every 2 days). The Moodle email list defaults to using your Beloit email accounts, e.g. name@stu.beloit.edu. If you prefer to use another email account, such as gmail, hotmail yahoo, etc., it is your responsibility to change the email account Moodle uses for you. (Log in to Moodle, click on your name, then "Edit Profile").

Course Structure: In general, class goes straight through for 1hr 45 min (ending 15 minutes before the hour), with an interlude about half way through where we work on some type of worksheet, practice problems, etc. for about 15 minutes. In those cases where I feel the need to lecture straight through, there will be a 10 minute break half-way through, but class will last about 5 minutes longer.

Attendance: Daily attendance is expected. In general, daily quizzes (5-10 minutes) will be given over assigned readings regularly (but not quite daily), and these cannot be made up. If three students are absent from class when class begins, that guarantees there will be a quiz.

Course Evaluation:
The percents below are approximate, and may vary slightly.
The final course grade will be out of approximately 1000 points.

Quizzes & Worksheets (10%): This grade includes worksheets done during class (see “Course Structure”), and daily quizzes (see “Attendance”.)

Problem sets (30%): Weekly homework sets, which are due every Tuesday at the start of class. On the problem sets, I ask you to be responsible about joint work. My policy is that it is good to talk with other people about doing a problem set, but it is not good to let someone else think for you, and it is dishonest to copy someone else’s work or let them copy yours. Often, students try to figure out how to do a problem together, and they share their “scratch” work. But, each student should write up their final assignments on their own. You certainly should never copy the final work of a student you worked with, and the safest way to ensure that is to simply not share your final written work with someone else.

Exams (10%, 10%, 15%): There will be two mid-term exams and a final. The final will focus mostly on the final third of the course, but will include some problems that are overview and some that will refer to earlier material. Thus the final is partly cumulative.

Term Project (25%): A major term project is required—a 25 page paper or the equivalent amount of work (e.g. with credit for creation of artifacts, research beyond the expectations, etc.). The project will normally investigate a mathematical idea as it appears in a particular culture or related cultures. A project is a good chance for full cooperative learning. I encourage projects from pairs or small teams of students. Written term projects should normally be written in Microsoft Word (or submitted in .rtf format). Papers must be spell-checked and grammar-checked. Partial credit on the term project will be earned at various milestones along the way, and points lost on those milestones cannot be made up by the final paper.
**Math 103 vs. IDST 103:** This course can be taken either as Math 103, in which case it counts towards your Division I distribution requirement, or as IDST 103, in which case it counts for your IDST requirement. *You cannot count it both ways!* There is no difference in the work expected for students taking the course under the two designations.

**Using Math 103/IDST 103 for Minors:** This course may count towards interdisciplinary minors in Asian studies, African studies, Latin American studies, Native American studies, or various self-designed minors. It can support (intellectually, but not for credit) teaching certification or programs in linguistics, museum studies, or gender studies. To use the course for a minor, your term project must support that minor. In general, I strongly recommend developing a term project that complements your major/minor or other academic work. See me for ideas on how to do this.

**Course content:**

This course investigates particular areas of mathematics in which significant investigations have been done by a variety of non-European cultures. Each area will be the focus of approximately 3-4 weeks of course material. The areas, not necessarily in the order we will study them, are:

- **Number Systems.** We investigate several different number systems. While the ideas are not mathematically “deep”, the goal is to realize that other systems can be natural, and that other approaches are as “obvious” as the one we use. We look at base systems for numbers other than base 10, other ways of recording numbers than “symbols”, and systems whose languages have different names for different “kinds” of threes (for example). We look at some of the cultural factors that resulted in such number systems. *Specific emphasis is placed on cultures of the Maya, Inca, North American Indians, Pacific Islanders, and other Asian cultures.*

- **Mathematical Games & Logic Puzzles:** Many culture-specific games and puzzles have strong mathematical foundations. Playing these games well often involves a form of “mathematical intuition”, even though the games may arise in cultures with no formal “mathematics”. We will investigate several of these games, and analyze some of the mathematics behind them. *Specific emphasis is placed on cultures of Africa, Native Americans, and the Maori (New Zealand).*

- **Symmetry:** The ideas of geometric symmetry occur in many forms in a tremendous number of cultures throughout the world. In this section of the class we focus on the “classical Western” concepts of symmetry, and then in the sections on Art Patterns and Drawing Graphs we look at different ways in which such symmetries are used by different peoples. *Examples in this section come from a wide variety of cultures, including American, European, Egyptian, and others.*

- **Drawing Graphs:** Many cultures have developed “games” in which they try to trace a picture with no repeated edges, and without “jumping” from one point to another. This mathematical puzzle is sometimes part of storytelling, sometimes part of religion, and sometimes just a game. We will look at different approaches to this problem and the mathematical foundations behind the drawing techniques used in certain cultures. Most of these patterns include strong symmetry elements within the drawings, and we will incorporate our symmetry ideas in this investigation. *Specific emphasis is placed on cultures of South-Western Africa (Bushong & Chokwe), India, and Pacific Islanders.*

- **Patterns in Art:** Many cultures use strong geometric, repeating patterns in artwork. Such artwork often implies their own interpretations of symmetry. The ways in which their artistic sense of symmetry differs from the traditional Western views of symmetry is often culture-specific. *Examples are taken from many cultures. Particular emphasis is placed on the cultures of the Inca and the Maori.*