

**Math DI-02    Spring, 2010**  
**DI: Orbifold Euler Characteristics**  
**CRN: 20784**  
**Time and Location to be determined**

Instructor: Dr. Christopher Seaton  
Office: 320 Ohlendorf Hall  
Office Hours: MWF: 12:00 to 1:00pm  
TR: 2:00 to 3:30pm *or by appointment*  
Phone: x3721  
E-mail: [seatonc@rhodes.edu](mailto:seatonc@rhodes.edu)  
Web: <http://www.faculty.rhodes.edu/seaton/> and Moodle

**Course Description:**

We will investigate the Gamma-Euler-Satake characteristics of closed, orientable 3-dimensional orbifolds for different choices of Gamma. To facilitate this investigation, you will be required to read and learn related topics in finite group theory and topology.

**Goals:**

Our primary goal is to determine an explicit expression for the Gamma-Euler-Satake characteristic of an orientable 3-orbifold in terms of the number and type of point-singularities of the orbifold (i.e. dihedral, tetrahedral, octahedral, and icosahedral) for choices of Gamma to include free groups and free abelian groups. Once this has been accomplished, we will investigate the extent to which these singularities may be recovered from these invariants for different collections of closed, orientable 3-orbifolds. Our goals may change as our discoveries dictate.

**Content:**

Along with performing the computations required to determine the Gamma-Euler-Satake characteristics, you will study finite groups with a particular emphasis on counting and group actions on vector spaces. You may additionally study some aspects of 2- and 3-dimensional manifolds and some related graph theory.

**Course Prerequisites:**

The only formal prerequisite for this DI is Math 223.

**Office Hours:**

Students are **strongly** encouraged to take advantage of my office **hours and to make appointments when my office hours are not convenient**. My schedule is posted online at <http://faculty.rhodes.edu/seaton/schedule.htm> and on the door of my office. Please consult this schedule before suggesting an appointment time (particularly via e-mail).

### **Attendance Policy:**

You will be required to attend a weekly one-and-a-half-hour meeting as well as a shorter, “check-in” meeting. We will set up a regular meeting time and reschedule when necessary. If you need to reschedule a meeting, you must notify me as soon as possible, preferably 24 hours in advance.

### **Meetings:**

Sometimes, especially during the first half of the semester, the meetings will involve a short lecture. In addition, at each meeting, you will be required to discuss your progress on any exercises or computations you were assigned the previous week. The write-ups will be submitted via e-mail before the meeting (see below).

### **Grading:**

You will be given two grades at each meeting, an attendance grade based on whether you attended and a progress grade assessing the work you have completed since the previous meeting. The attendance grade will be a yes/no (i.e. 1 point), and the progress grade will be out of 10 points.

Your letter grade for the course will be based on the following scale:

A	[93, 100]	B-	[80, 83)	D+	[67, 70)
A-	[90, 93)	C+	[77, 80)	D	[63, 67)
B+	[87, 90)	C	[73, 77)	D-	[60, 63)
B	[83, 87)	C-	[70, 73)	F	[0, 60)

The total percentage will be computed as follows:

Attendance:	30%
Homework/Progress:	40%
Final Paper:	30%

### **Assignments:**

Each week, you will be assigned readings, computations, and/or exercises. You are expected to write the results of your computations and exercises using LaTeX and submit these results each week via e-mail before the meeting. At the end of the semester, you will compile your results into a single paper that will include your progress on the orbifold invariants.

### **Honor Code:**

All students are expected to conduct themselves within the guidelines of the College’s Honor Code. Please ask me if you have any questions about what is allowed. I reserve the right to reduce a student’s grade in the event of plagiarism whose intent cannot be verified.

### **Students With Disabilities:**

If you have or think you may have a documented disability, please contact me and the Office of Student Disability Services as early in the semester as possible.