Analytic Number Theory

Instructor and Class Information

Lecturer: Roman Holowinsky
Office: MW 634
Phone: 292-3941
Email: holowinsky.1@osu.edu

About Course Goals

FORMAT
The course will meet three times a week for 55 minutes each meeting. Instructions will be mainly by lecture delivered by the instructor. It may also include occasional in-class discussion as well as short student presentations, particularly, by post-candidacy students.

DESCRIPTION & GOALS
This course provides students with a solid working knowledge in the fundamentals of Analytic Number Theory. Topics include Arithmetic Functions, Dirichlet characters, Gauss and character sums, Summation Formulae, L-functions and associated properties, primes in arithmetic progression, holomorphic modular forms, sums of Kloosterman sums, elementary sieve methods and Large Sieve Inequalities. The course should be of interest to all students with research interests in Number Theory.

PREREQUISITES
Math 7121 and 6222. [see official course description]

Textbook

MAIN REFERENCE

ADDITIONAL REFERENCES


Assessments

**HOMEWORK ASSIGNMENTS**
There will be approximately 5 homework assignment sheets, which will typically contain several fully described problems as well as a list of numbers of textbook problems. Due dates of assignments will announced and set typically a week after the assignments are published.

**FINAL PROJECT**
The final project is a more extensive written assignment that will draw on techniques acquired throughout the semester. It will be published about two weeks before the end of classes and will be due at the beginning of finals week.

**CLASS PARTICIPATION AND ATTENDANCE**
Although attendance is not regularly monitored, frequent absences are likely to be noted and may factor into the grade in borderline cases.

**Grading**

**COURSE SCORE**
A course score will be computed from the above assessments. Homework assignments will count 70% towards the grade and the final project 30%.

**LETTER GRADES**
Letter grades will be determined based on the course score. The approximate minimum scores letter grades are 80% for an “A”, 73% for an “A-”, 67% for a “B+”, 55% for a “B-”, and 40% for a “C-”. The exact cut-off scores may vary depending on the difficulty of assignments.

**Weekly Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Intro to the course, Arithmetic Functions and Dirichlet series</td>
</tr>
<tr>
<td>Week 2</td>
<td>Summation Formulas: Euler-Maclaurin, Poisson summation, etc</td>
</tr>
<tr>
<td>Week 3</td>
<td>Analytic Continuation, Functional Equation and zeros of Riemann zeta</td>
</tr>
<tr>
<td>Week 4</td>
<td>Non-vanishing and Prime Number Theorem</td>
</tr>
<tr>
<td>Week 5</td>
<td>Dirichlet Characters and Gauss sums</td>
</tr>
<tr>
<td>Week 6</td>
<td>Dirichlet L-functions, Functional Equation and zeros</td>
</tr>
<tr>
<td>Week 7</td>
<td>Primes in Arithmetic Progression</td>
</tr>
<tr>
<td>Week 8</td>
<td>Classical Analytic Theory of L-functions</td>
</tr>
<tr>
<td>Week 9</td>
<td>Elementary Sieve Methods</td>
</tr>
<tr>
<td>Week 10</td>
<td>Elementary Sieve Methods (continued)</td>
</tr>
<tr>
<td>Week 11</td>
<td>Bilinear Forms and the Large Sieve</td>
</tr>
<tr>
<td>Week 12</td>
<td>Holomorphic Modular Forms</td>
</tr>
<tr>
<td>Week 13</td>
<td>Sums of Kloosterman Sums</td>
</tr>
<tr>
<td>Week 14</td>
<td>Current Trends and Open Problems</td>
</tr>
</tbody>
</table>
General Policies

ACADEMIC MISCONDUCT

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp).

DISABILITY SERVICES

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.