Mathematics

MATH 417  **Intro to Abstract Algebra**  credit: 3 OR 4 hours.
Fundamental theorem of arithmetic, congruences. Permutations. Groups and subgroups, homomorphisms. Group actions with applications. Polynomials. Rings, subrings, and ideals. Integral domains and fields. Roots of polynomials. Maximal ideals, construction of fields. 3 or 4 undergraduate hours. 3 or 4 graduate hours. 4 hours of credit requires approval of the instructor and department with completion of additional work of substance. Prerequisite: Either MATH 416 or one of MATH 410, MATH 415 together with one of MATH 347, MATH 348, CS 374; or consent of instructor.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>39055</td>
<td>Online</td>
<td>ONL</td>
<td>ARRANGED -</td>
<td>-</td>
<td>-</td>
<td>McCarthy, R</td>
</tr>
</tbody>
</table>

Credit Hours: 3 hours
This is an online course featuring video lectures and online lecture notes through Moodle. No additional textbook has to be purchased. Students must be able to print out assignments, write out solutions, then scan their written work and upload it to Moodle to meet set deadlines. This course requires multiple paper-based exams that must be taken with an approved proctor. Exams may be taken on campus with NetMath proctoring; for off-campus options see https://netmath.illinois.edu/offcampus. Off-campus proctors must be able to scan completed exams and email them to NetMath for grading, as well as mailing the paper exam back for archival purposes. A 16-week self-paced version of this class will also be available as part of the academic year term (not summer term). Registration for the self-paced class is done through https://netmath.illinois.edu/register/college (not Self-Service). Please contact mathadvising@illinois.edu with any questions.

| 30011 | Online| ONM     | ARRANGED - | -    | -        | McCarthy, R|

Credit Hours: 4 hours
Departmental Approval Required
Restricted to Graduate - Urbana-Champaign.
This 4-hour section is restricted to graduate students only. Additional work of substance is required for this section, as assigned by the instructor. To request approval to register, please email rmccrthy@illinois.edu with "Summer Math 417 4-hour request" in the subject line, and include name, netid, UIN, and reason for needing to take the class for 4 hours.