**Undergraduate Research Project**

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| **Project Name:** | Variations of Gauss circle problem and Lagrange’s four square theorem | **Number of Positions:** | 1+ |
| **Supervisor:** | Alisa Sedunova  |
| **Supervisor e-mail:** | sedunova@purdue.edu |
| **Project Description:** | Gauss circle problem estimates the number of points with integer coordinates within a circle of a given radius, i.e. counts the number of solutions to $a^{2}+b^{2}\leq x,$ while Lagrange’s four squares theorem states that every natural number can be expressed as a sum of four squares, i.e. that $n=a^{2}+b^{2}+c^{2}+d^{2}$ is solvable for any natural $n$. Our main goal is to explore certain variations of these problems when variables, i.e. $a,b,c,d$ are restricted to certain subsets of integers. The tools combine number theoretic ones along with some approaches from combinatorics, probability and analysis. An interest in primes and their intriguing properties is highly welcomed! |
| **Final Deliverables:** | A written expository report, publication possible depending on the results. |
| **Weekly Working Hours** | Depends on the student |
| **For Credits/Voluntary**  | Either |
| **Desired Qualifications**  | Required: Linear algebra, some knowledge in Calc/Analysis Preferred: MATH 495/595 Introduction to Number Theory (would be good but not necessary) |

**If you are interested in participating in this research project, please send an e-mail to the supervisor e-mail listed above together with a resume, a list of what courses you’ve taken or a copy of your transcript, and a personal statement explaining why you are interested in this project.**