

SYLLABUS
Math 409 – WWU – Fall 2015

Seminar for the
**William Lowell Putnam
Mathematical Competition**



Instructor: Dr. Amites Sarkar
Time/Location: _____, Bond Hall 201

Do you like to puzzle over math puzzles?
Do you like to work on the hard problems in your math classes?
Do you like problems with an “aha!” solution?

If any of these are true, then you should enjoy the annual William Lowell Putnam Mathematics Competition. The Putnam competition consists of twelve questions to be solved during the course of two three-hour sessions. The challenging questions pose problems such as:

“How many zeros are at the end of $1000!$?”

“Show that $n^7 - n$ is divisible by 42 for every positive integer n .”

“Suppose the positive integers x, y satisfy $2x^2 + x = 3y^2 + y$. Show that $x - y$, $2x + 2y + 1$, and $3x + 3y + 1$ are all perfect squares.”

MATH 409: PUTNAM SEMINAR

This 2-credit seminar offers a weekly problem solving session conducted throughout the fall quarter for those students who are interested in playing with interesting mathematical problems. The seminar culminates with the competition the first Saturday in December.

DESCRIPTION OF COMPETITION

The questions test originality and technical competence. It is assumed that contestants have some training that includes more sophisticated mathematical concepts than those in minimal courses. Questions will be included that cut across the bounds of various disciplines, and self-contained questions involving elementary concepts from group theory, set theory, graph theory, lattice theory, number theory, and cardinal arithmetic may also be included.

COMPETITION GRADING

There are 12 problems worth 10 points each. The problems are difficult, and the grading is strict: partial credit is rarely given. Consequently, it is better to solve a single problem perfectly than to have partial ideas for several problems. In 1999 and 2000 the median score was 0 points (and the highest scores were 74 and 96 points respectively).

HISTORY

The competition began in 1938 and is designed to stimulate a healthful rivalry in mathematical studies in the colleges and universities of the United States and Canada. It exists because Mr. William Lowell Putnam had a profound conviction in the value of organized team competition in regular college studies. Mr. Putnam, a member of the Harvard class of 1882, wrote an article for the December 1921 issue of the Harvard Graduates' Magazine in which he described the merits of an intellectual intercollegiate competition. To establish such a competition, his widow, Elizabeth Lowell Putnam, in 1927 created a trust fund known as the William Lowell Putnam Intercollegiate Memorial Fund. The first competition supported by this fund was in the field of English and a few years later a second experimental competition was held, this time in mathematics between two institutions. It was not until after Mrs. Putnam's death in 1935 that the examination assumed its present form and was placed under the administration of the Mathematical Association of America.

PRIZES AND SCHOLARSHIPS

Prizes will be awarded to the departments of mathematics of the institutions with the five winning teams. In addition, there will be prizes awarded to each of the members of these teams. The five highest ranking individuals are designated Putnam Fellows by the Mathematical Association of America. Prizes will be awarded to each of these individuals and to each of the next twenty highest ranking contestants. The Elizabeth Lowell Putnam Prize will be awarded periodically to a woman whose performance on the Competition has been deemed particularly meritorious. This prize would be in addition to any other prize she might otherwise win.

RULES

The competition is open only to regularly enrolled undergraduates, in colleges and universities of the United States and Canada, who have not yet received a college degree. No individual may participate in the competition more than four times. A college or university with at least three registered entrants obtains a team rank through the positions achieved by three designated individual contestants. No collaboration or outside assistance is permitted during the examination. Each contestant, even if designated as a team member, must work independently on the examination questions.

CONTEST DATE

The examination will be held on **Saturday, December 5, 2015**. There are two exams of exactly 3 hours each, with a 2 hour break. The first exam will start at 8:00 am and the second will start at 1:00 pm.

PUTNAM WEBSITE

<http://math.scu.edu/putnam/index.html>

ARCHIVE OF PUTNAM PROBLEMS

<http://kskedlaya.org/putnam-archive/>