February 13, 2004

University Research Council
University of Wisconsin-Whitewater

Letter of nomination for **Professor Malvina F. Baica** for the University Outstanding Research Award.

Dear Colleagues:

It is my pleasure to nominate Professor Malvina F. Baica of the Mathematical and Computer Sciences Department for the UW-Whitewater Award for Outstanding Research.

Dr. Baica is a prodigious researcher who has produced 43 different books and papers in her career, including 22 within the last five years. She has courageously tackled problems of great significance and prominence within the field, and has withstood the storm of controversy that followed. She has demonstrated breadth of scholarship in covering diverse areas ranging from algebraic number theory to the mathematical analysis of the ecology of thermonuclear power plants. Hers has been a career devoted to the pursuit of knowledge, making her a worthy recipient of this award.

As part of her research, Dr. Baica has chosen to attempt to solve some of the oldest and most challenging puzzles known to the mathematical community. Most mathematicians dream of winning recognition for such work, but few have the courage to attempt the battle. Because of their historical significance, these problems carry a mystique that can cloud the otherwise pure character of mathematical research. In order to understand the role that Dr. Baica's research plays, it is important to have some background on the nature of mathematical research.

Mathematics is a field unlike any other, and mathematical research differs from research in most other disciplines. The world of mathematics is built from absolute truths, and most research focuses on a search for those truths. It is the absolute character of the truths that distinguishes mathematical results from those of other disciplines. Conjectures are not confirmed with the weight of experimental evidence or statistical probability, to be overturned at some future time by better conjectures carrying greater weight. Instead, when a researcher believes she has found a mathematical truth, she must demonstrate through force of logic that the truth does indeed follow from the bedrock foundations of mathematics. Since such demonstrations are rarely trivial or easy, peer review serves to validate the original logic of the researcher. This review can span decades or centuries.

Even the world's greatest minds have been known to fail in such ventures. The problem known as Fermat's Last Theorem (FLT) is particularly well known for the long list of great mathematicians who have tried and failed to find a solution. While mathematicians universally believe the theorem to be true, no one has yet produced a proof that has withstood the test of time.

The last decade of the 20th century saw two noteworthy attempts to solve FLT, one based on the work of Andrew Wiles and the other mounted by Dr. Baica. Andrew Wiles approach, based on a solution of the more modern Taniyama-Shimura conjecture, is the version most widely recognized by mathematicians today. Even though Wiles announced his proof in 1993, errors were discovered and it was not until 1995 (Wiles/Robert Taylor, and also Gerd Faltings) that complete proofs appeared in print.. Dr. Baica's approach (1994), based on her well-established Generalized Euclidean Algorithm (GEA), is still the subject of debate. However, it must be emphasized that, although her solution is less-well known, no one has yet been able to demonstrate a flaw in her mathematical logic. Only time can tell if either approach is entirely correct, but of the two, Dr. Baica's approach is certainly the most elegant.

Dr. Baica's research has shown that her original GEA can be used as a very versatile tool for tackling a broad range of problems. Using this result, she has been able to present answers to open mathematical questions such as Hermite's problem, Dirichlet's problem, Hilbert's 10th problem, and a host of others.

In addition to her recent work based on the GEA, Dr. Baica has also significantly extended the known results for Goldbach's conjecture, another well-known, fascinating and as yet unsolved problem. And in a completely different area, she has done volumes of work with M. Cardu, modeling the ecology of thermonuclear facilities.

Taken all together, Dr. Baica's research opus is of stunning richness and complexity.

A researcher is an explorer, venturing forth into uncharted waters in the search for new knowledge. While it may be decades before we know the true significance of her work, even those of us who do not understand it can applaud her for making the journey. I enthusiastically support her nomination for the university's research award.

Sincerely,

Bennette R. Harris, Chair
Mathematical and Computer Sciences

♦ ♦ ♦ ♦