# Instructions for the PhD Qualifying Exam of Matthew Moreno

## Objective

The purpose of the qualifying examination is to assess a doctoral student's ability to perform several fundamental research related tasks including:

- reading and understanding relevant papers from the literature
- synthesizing ideas from separate papers into a coherent framework
- clearly expressing this framework in a written report
- clearly delivering this framework in an oral presentation
- identifying possible extensions of the research described in the papers

In addition, the exam should serve as a chance for committee members to assess the background of the student (and possibly suggest remedies such as future coursework). The background component will be based both on mastery of topics related to the research papers well as a mastery of a list of significant concepts presented to the student by the qualifying examination committee.

## Instructions

For this examination, you are required to select three papers from the literature in the following area:

> *Applications of evolutionary techniques to distributed problem solving*
> Topics in this area include computational experiments and mathematical theory for applying evolutionary techniques to distributed problem solving. Example applications include multi-agent system design, sensor network analysis, and distributed scheduling/optimization problems.

Each paper should have been peer reviewed and published in a journal or conference proceedings. At least two of the chosen papers should have been published within the last 10 years. The three papers should come from different research groups, and authors should not include individuals affiliated with Michigan State University.

Once you have selected the three papers on your own, please submit them to your advisor who will either approve the selected papers or reject some of them and direct you to select others. Ideally, the papers should be chosen and approved by the end of the first week of the examination period.

Once the papers have been chosen, you are to submit a written report and give an oral presentation on the selected papers, **comparing and contrasting the respective methods and results within a coherent framework** and identifying possible future directions. We recognize the specifications give you a lot of freedom to design the framework; this is intentional as we do not wish to overly proscribe the format of your paper or presentation. N**ote: it is important that your report and presentation synthesizes the three papers rather than simply be a report on three separate papers.** The written report should be 4000-5000 words in length, excluding references. With your report, please include copies of, or hyperlinks to, the selected papers. Your oral presentation should be approximately 45 minutes long, excluding time for questions. Please schedule at least 90 minutes to allow sufficient time for questioning.

While we ask you to synthesize the material in the three papers into a coherent framework, you are expected to have a solid understanding of all the main techniques and ideas described

in the papers, and you should be prepared to answer detailed questions about these topics in your oral presentation. You should also be prepared to explain why you chose these three papers. Finally, you should be prepared to answer basic questions about the following background topics:

1. Distributed problem solving
2. Evolutionary algorithms
3. Bio-inspired computing
4. Evolutionary modeling