

## Advanced Topics in Computer Science - On Multi-A(ge)nt Systems

סמינריון מחקר בקומבינטוריקה ותורת הגרפים - 238902  
סמסטר: אביב תשע"ט

מרצה:	פרופ' פרדי ברוקשטיין
שעות הרצאה:	יום ב' 14.30-16.30 טאוב 401
שעת תרגול:	
דרישות קדם:	
אתר הקורס:	

### תאור הקורס

The course presents a series of topics in multi agent robotic systems ,with special emphasis on the mathematics employed in their analysis.

#### Part 1: Happy Pursuits

Pursuit as a Model for Inter-agent Interaction.

Cyclic Pursuits

Chain Pursuits: why the Ant Trails look so straight and nice

Pursuit in Discrete Time and Graph Environments

#### Part 2: Come Together

Geometric gathering of Identical Agents

Discrete and Continuous Dynamic Agent Models

Agents with Unlimited or Limited Visibility Sensing

Agents with Relative Location or Direction Only Sensing

#### Part 3: The Power of Odors

Models of Pheromone Based Collaboration

Covering and Patrol Algorithms

Rotor Routers and Graph Partitioning-based Coverage

Oblivious Cooperative Cleaners

Stationary and Dynamic Environments

#### Part 4: Swarm Control

Gradient Climbing with Oblivious and Local Sensing Agents

Broadcast Control of Swarms  
Leaders and Followers  
Agents with and Without Compasses

Part 5: Self-Location and Mapping

Agents with Crude Odometric Self Location  
Encounter Based Error Reduction  
Joint Environment Mapping and Self Location

Part 6: In Sync via Local Interaction

Theories of Oscillator Synchronization  
Synchronization with Stationary Interaction Graphs  
Dynamic and Location Based Interactions  
Synchronized Motion

Part 7: Unicycles and Physical Particles

Complex Agent Motions and their Consequences  
Discretized vs Continuous Evolutions  
Interactions by Potential Fields