



ESE-499: Research in Electrical Engineering
Electrical and Computer Engineering

Spring 2025

Course Description: An independent research project with faculty supervision. Permission to register requires a 3.00 g.p.a. in all engineering courses and the agreement of a faculty member to supervise the research. May be repeated but only three credits may be counted as an ESE elective.

Instructor: Wendy Tang, Associate Professor, Electrical and Computer Engineering

Office Hours: Rm 239 Light Engineering, (631) 632-8404

Monday 2-4 pm and **Tuesday:** 12:30-:30 pm

Or via e-mail wendy.tang@stonybrook.edu for an appointment.

Goal: The goal of the course is to provide students with an opportunity to conduct research about collaborative problem solving. CPS is the coordinated effort of a team to share their knowledge for the purpose of finding a common solution to a complex, open-ended problem. It is one of the most important 21st century skills due to the increasing complexity of present and future needs and problems. Our work aims to uncover the mystery of successful CPS teams for complex, open-ended tasks by studying the relationships between individual and team behavior and the resulting individual learning and team performance. An extensive set of novel computational methods will be devised to automatically assess individual and team behaviors and performance, so that the group coordination can be quickly improved. For assessing individual behavior and performance, we use PALS: Personalized Adaptive Learning System, a social learning network leveraging student-sourced student-verified content, to facilitate students to learn by watching, solving, teaching and evaluating contents created by their peers. For team performance, we aim to optimize team formation strategies by considering multi-dimensional team dynamics, including cognitive, social, and emotional traits.

Objectives: Students will gain insights of various CPS techniques, including the strengths and weaknesses of each technique, understand social learning networks and various team formation strategies, apply critical thinking skills in the development of innovative strategies to improve social learning networks and team formation strategies. Students will also gain teamwork experience by participating in some of the discussions with graduate students working on the topic and assisting data processing and analysis.

Assignments: The following tasks are envisioned:

- (1) literature review about social learning networks and team formation strategies - this task is about reading research papers and summarizing the pros and cons of the papers.
- (2) development of innovative strategies to improve social learning networks and team formation strategies.
- (3) data processing and analysis (optional)

Meetings: There will be approximately 7 meetings with the instructor to discuss the papers. Please see the specific meeting schedule below.

Week	Topics	Description
Week 1	Organization and Planning	Review Syllabus and
Week 2	Paper 1	First Meeting and Start Paper 1 Review (Meeting 1)
Week 3	Paper 1	Continue Review Paper 1 and Prepare Summary Presentation
Week 4	Paper 1 Presentation	Present a summary of Paper 1 (Meeting 2)
Week 5	Paper 2	Start Review of Paper 2
Week 6	Paper 2	Continue Review of Paper 2
Week 7	Paper 2 Presentation	Present a summary of Paper 2 (Meeting 3)
	Spring Break	
Week 8	Paper 3	Start Review of Paper 3
Week 9	Paper 3	Continue Review of Paper 3
Week 10	Paper 3 Presentation	Present a summary of Paper 3 (Meeting 4)
Week 11	Comparisons of 3 Papers	Meeting 5
Week 12	Innovative Combinations	Use critical thinking to combine the 3 papers (Meeting 6)
Week 13	Innovative Combination	Use critical thinking to combine the 3 papers (Meeting 7)
Week 14	Final Report	

Paper Summary: For each paper summary, the following sections are suggested:

- Goals - what the paper is trying to accomplish
- Background - what are the background information (disciplines, hypothesis, number of students, courses, etc)
- Method/Approach used - what method/approach is used to accomplish the goals

- Findings - a summary of the findings
- Pros and Cons - what are the strengths and weaknesses of the approach and findings

Written Report: The following is the format and grade distribution of the report.

1. **Introduction (10%)** - Describe the general background of CPS and team formation strategies.
2. **Summary of Papers (60%)** - Provide a summary of each paper
3. **Innovative Strategies (20 %)**: Describe some possible innovative strategies by combining the various aspects of the three papers.
4. **Conclusions (10%)** - A summary and conclusions.

Grading:

- Meeting 20%
- Written Report 80%

Americans with Disabilities Act: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, located at ECC (Educational Communications Center) Building, Room 128 (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Academic Integrity: Each student must pursue his or her academic goals honestly and be held personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, and Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

