# 236641 – Advanced Topics In Quantum Information And Computing

The course is given by Associate Professor Tal Mor from the Computer Science faculty.

**Course Objectives and Targets:**
In this "Advanced topics in quantum information and computing" course we will include topics 1-5, and potentially more topics from 6-10:

1. The quantum bit (qubit): Mach-Zehnder interferometer, states, measurements, and transformations.
2. Beyond a single qubit: states, measurements, transformationsת entanglement, and quantum teleportation. Schroedinger Cat.
3. Quantum information theory: Entropy, information. The no cloning principle.
4. Quantum gates and quantum computing, including complexity classes and several quantum algorithms.
5. Quantum cryptography: Quantum candies and key distribution.
6. Density matrices and mixed states; interaction with the environment; separable and entangled mixed states. Separability criteria.
7. EPR paradox and Bell's inequalities.
8. Quantum communication complexity.
9. Shor's factorization algorithm.
10. Implementations of qubits and quantum gates.