

**Theory of Computation (TCOM)  
CTY Course Syllabus**

		Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
<b>Week 1</b>	<b>Morning</b>		DFAs Intro to proofs Proof by contradiction	Combinatorics NFAs Problems	NFAs=Reg. exp. Proof	PDA's Problems	PDA's=CFG's proof Problems
	<b>Afternoon</b>		Pigeonhole Principle Set theory Problems	Induction DFAs=NFAs proof Problems	Pumping Lemma Problems	CFG's Problems	Selected problem solutions
	<b>Evening</b>	Course introduction Pre-assessment Survey	Problems	Regular expressions Problems	Review of binary Problems	Countable and uncountable infinities	
<b>Week 2</b>	<b>Morning</b>		Turing Machine definition Problems	Order of growth	Computer Lab: TM simulations	CFL's in P proof Definition of NP	NP-completeness Problems
	<b>Afternoon</b>		$A_{TM}$ is undecidable proof Reductions from $A_{TM}$ Problems	Post Correspondence Problem	Undecidable theories and incompleteness	Problems Problem solutions	Problems
	<b>Evening</b>	CFL pumping lemma	Problems	Problems	Order of growth review Definition of P	Problems	
<b>Week 3</b>	<b>Morning</b>		PSPACE, EXPTIME Savitch's theorem Presentation preparations	Presentations on NP- complete reductions	Catalan numbers	Final	Problem solutions
	<b>Afternoon</b>		Problems Meeting with students to prepare presentations	Class effort to show NP- completeness of various problems	Overview of other results in complexity	Approximation algorithms	
	<b>Evening</b>	Problems	Problems and presentation prep	Catalan counting Problems, including review for final	Review for final	Quantum computing	