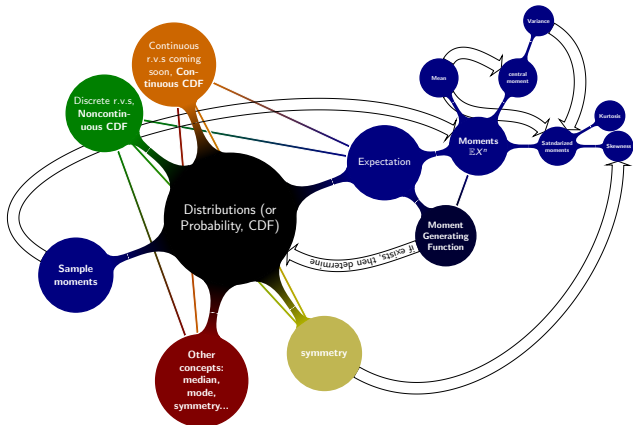


# Probability Theory for EOR

Essential things you need to know from the course

From random outcomes, we have learned basic probability language:  
sample space, random events, (conditional) probability, ...

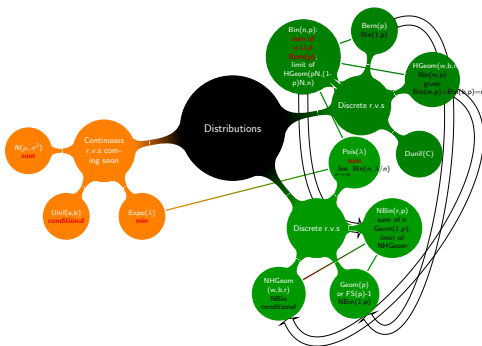
Once we have r.v.'s and their distributions, there are many derivative concepts:



We have learned many commonly used distributions with background stories for intuitions.

(1) We look at their CDFs, PDF/PMFs, MGFs (means, variances, modes, medians);

(2) Some of their transformations (**sum**, **min**, conditional...) and relations (e.g., from Pois to Expo).



It never harms to learn a bit more, but here are essential things that you need to know to pass this course.

Be able to make use of the following concepts:

1. Quantify uncertainty using a coherent framework for probability.  
probability, sample space, outcomes, random events, random variables (indicator random variables)...
2. Understand the concept of a conditional probability and use conditional probability as a problem solving tool.  
conditional probability, LOTP, Bayes' rule, independence.
3. Understand the concept of a random variable and derive properties of well-known discrete and continuous random variables.  
random variables, and distributions (CDF, PMF/PDF), and some specific random variables and their properties (**Bin, Pois, Expo, Normal, Unif**).
4. Calculate the expected value of discrete and continuous random variables.  
From expectations (determined by distributions) we have mean, variance, moments and MGFs. The MGFs(if exist) determine distributions.
5. Simulate and visualize the outcomes of chance experiments on your computer.  
Simulations are experiments, which help us to uncover some interesting results.