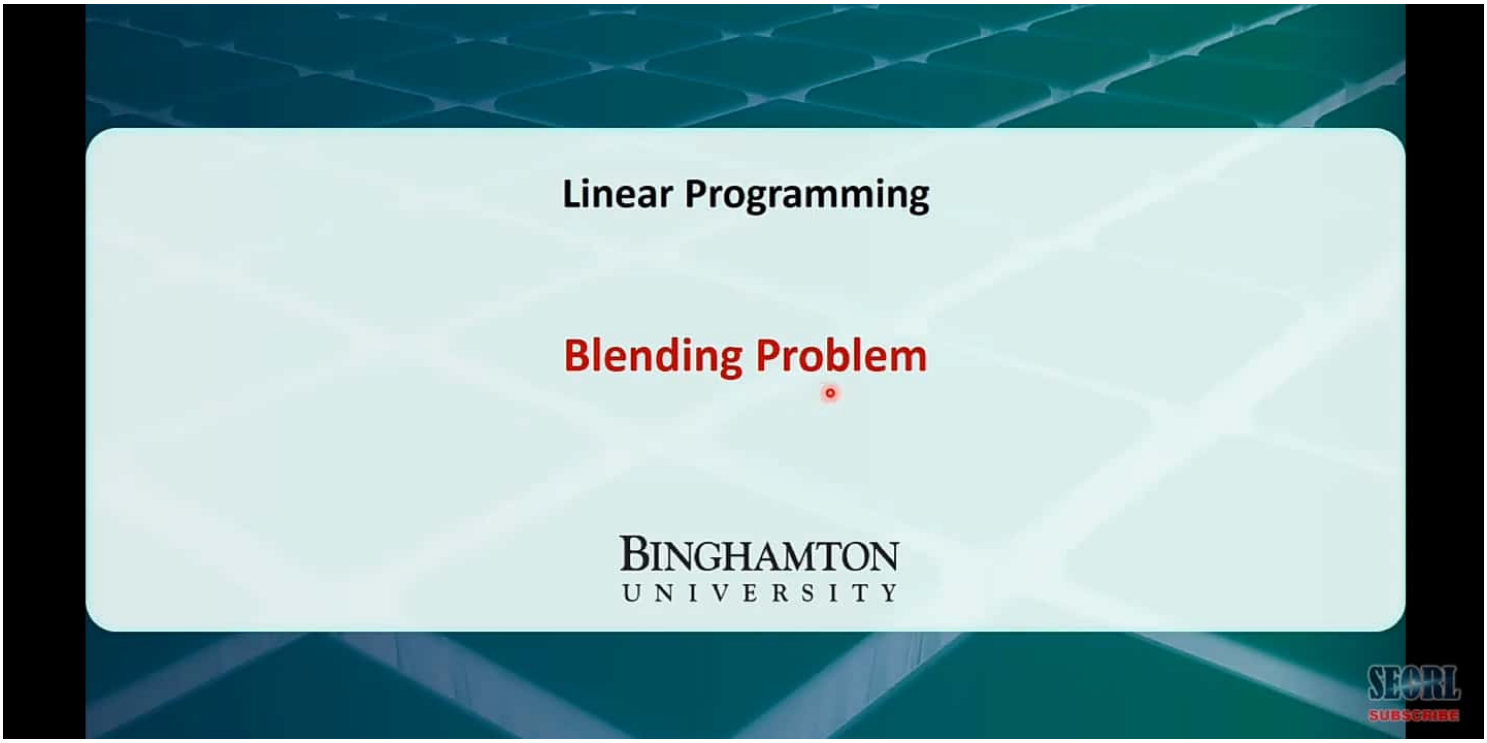

Blending Problem

- Various inputs are blended in some desired proportion to produce the final goods
  - Blending various types of crude oils to produce different types of gasoline and other outputs

  - Blending various types of metal alloys to produce various types of steels
  - Mixing different types of food ingredients to provide required nutrients

Animal Feed Mix

- An agricultural mill produces animal feed mix by combining limestone, corn, and soybeans



Price and Nutrients	Unit Contribution			Requirements
	Limestone	Corn	Soybean	
Calcium (kg/kg)	0.38	0.001	0.002	≥0.008, ≤0.012
Protein (kg/kg)	0	0.09	0.5	≥0.22
Fiber (kg/kg)	0	0.02	0.08	≤0.05
Price ($/kg)	0.1	0.2	0.4	

Problem Formulation

– Assume we only make 1 kg of feed mix
– L (kg) of Limestone needed
– C (kg) of Corn needed
– S (kg) of Soybeans needed

$$\min z = 0.1L + 0.2C + 0.4S \quad \text{(in \$)}$$

$$\text{s.t.} \quad L + C + S = 1$$

$$0.008 \le 0.38L + 0.001C + 0.002S \le 0.012$$

$$0.22 \le 0.09C + 0.5S \le 1$$

$$0 \le 0.02C + 0.08S \le 0.05$$

$$0 \le L \le 1, \; 0 \le C \le 1, \; 0 \le S \le 1$$