

First 3 sems \rightarrow core so doesn't really matter.

4th Sem Onwards:

Each Sem Requirements:

6th Sem :	
1	Math Electives
1	CS Elective
1	HSA breadth
1	HSA Mudd Hum

CONSTRAINTS:

$$\begin{array}{l} \text{Math Electives} \rightarrow \\ \text{CS Electives} \rightarrow \\ \text{HSA Breadth} \rightarrow \\ \text{HSA Mudd Hum} \rightarrow \end{array} \left[\begin{array}{c} 1 \ 0 \ 1 \ 1 \ 0 \ 0 \ 0 \ 1 \ 0 \ 0 \ 1 \\ \hline - - - - - - - - - - \\ - - - - - - - - - - \end{array} \right] \left[\begin{array}{c} x_1 \\ \vdots \\ x_n \end{array} \right] \geq \left[\begin{array}{c} 1 \\ \vdots \\ 1 \end{array} \right]$$

$$\begin{array}{l} \text{Minimum Enrollment} \end{array} \left[\begin{array}{c} 1 \ 1 \ 1 \ \dots \dots \end{array} \right] \left[\begin{array}{c} x_1 \\ \vdots \\ x_n \end{array} \right] \geq [4]$$

* figure out part time classes.

$$\begin{array}{l} \text{Maximum Enrollment (w/o overloading)} \end{array} \left[\begin{array}{c} 1 \ 1 \ 1 \ \dots \dots \end{array} \right] \left[\begin{array}{c} x_1 \\ \vdots \\ x_n \end{array} \right] \leq [6]$$

$$\begin{array}{l} \text{No Course Conflict} \end{array} \left[\begin{array}{cccccc} 1 & \dots & 0 & 1 & \dots & 1 & \dots & 0 \\ 0 & \dots & 1 & \dots & 0 & \dots & 0 \\ \vdots & \dots & \vdots & \dots & \vdots & \dots & \vdots \\ \vdots & \dots & \vdots & \dots & \vdots & \dots & \vdots \\ \vdots & \dots & \vdots & \dots & \vdots & \dots & \vdots \end{array} \right] \left[\begin{array}{c} x_1 \\ \vdots \\ x_n \end{array} \right] \leq \left[\begin{array}{c} 1 \\ \vdots \\ 1 \end{array} \right]$$

One row represents the courses that are occurring at the same time.

← 8am 8:10am 8:20am →

Course Pre Reqs

$$\begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} = \begin{bmatrix} 1 & 0 & \cdots & 0 \\ 0 & 1 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & 1 \end{bmatrix} \begin{bmatrix} x'_1 \\ x'_2 \\ \vdots \\ x'_n \end{bmatrix}$$

→ Courses already taken.

Data

- ① All Course Codes .
 - ② Their PreReqs
 - ③ Their Timings
 - ④ Previous Courses Taken

all_cause { HM-Math055 01 : x₁
HM-Math155 01 : x₂
...
...
...
...

time game: { ; ; ; ; ; }

Q) Diff b/w a. set and the variables?

Variables: Classes $c_i \ i \in \{1, \dots, n\}$

Time Slots

Sets: ① Classes
② Time Slots

Constraints:

Min # of Classes: A_1

$$\begin{bmatrix} 1 & 1 & \dots & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} \geq b_1$$

at least 4 classes.

Params: ① Requirements (one row for each req)
② Time (one row for each discrete time slot.)
③ Weight (row of ones)

Max # of Classes: A_2

$$\begin{bmatrix} 1 & 1 & \dots & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} \leq b_2$$

at most 6 classes

Time Conflicts: A_3

$$\begin{array}{c} 7:00 \quad 001 \dots 010 \dots 10 \\ 7:10 \quad 1000 \dots 101 \dots \\ 7:20 \quad \vdots \\ 22:00 \quad 00100 \dots 000 \end{array} \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} \leq \begin{bmatrix} 1 \\ \vdots \\ 1 \end{bmatrix} b_3$$

Can't have two courses "happening" at the same time.

$a_{ij} = 1$ means x_j is "happening" during time t_i .

HSA Reqs Reqs: A_4

$$\begin{array}{c} \text{Req 1} \quad 01 \dots 0 \dots 1 \dots 1 \\ \vdots \\ \text{Req } m \end{array} \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} \geq \begin{bmatrix} r_1 \\ \vdots \\ r_m \end{bmatrix} b_4$$

fulfill min reqs

$a_{ij} = 1$ means x_j counts towards Req i .

$$\begin{bmatrix} A_1 \\ A_2 \\ A_3 \\ A_4 \end{bmatrix} \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix} ? \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{bmatrix}$$

OR

$A_1 x \geq b_1$ # Min Classes
 $A_2 x \leq b_2$ # Max Classes
 $A_3 x \leq b_3$ # Time Conflicts
 $A_4 x \geq b_4$ # Requirements

How do I convert this to the transportation model?

The image displays four identical, large, light green circles with thin black outlines, arranged vertically. Each circle has a small, dark green, curved shape resembling a tail or a handle extending from its top-left side.

classes