Sets

T: Set of teachers, indexed in i
S: Set of students, indexed in j
DY: Set of days, indexed in d
H: Set of hours, indexed in h
L: Set of levels

Parameters

$D_{i,j}$: Distance
C_j: Student demand
O_i: Teacher supply
SL_j: Student level
TL_i: Teacher Level
$TA_{i,d,h}$: Teacher Availability in day and hour

Variables

$$x_{i,j,d,h} : \begin{cases} 1, \text{if teacher } i \text{ is assigned to student } j \text{ the day } d \text{ at hour } h \\ 0, \text{otherwise} \end{cases}$$

Model

$$Minimize \sum_{i \in T} \sum_{j \in S} \sum_{d \in DY} \sum_{h \in H} x_{i,j,d,h} \cdot 2D_{i,j}$$

s.t

Satisfy students demand

$$\sum_{i \in T} \sum_{d \in DY} \sum_{h \in H} x_{i,j,d,h} \geq C_j \qquad \forall j \in S$$

Satisfy teachers supply

$$\sum_{j \in S} \sum_{d \in DY} \sum_{h \in H} x_{i,j,d,h} \leq O_i \qquad \forall i \in T$$

Teacher cannot teach a student with higher level

$$x_{i,j,d,h} \cdot TL_i \geq x_{i,j,d,h} \cdot SL_j \qquad \forall i \in T, \forall j \in S, \forall d \in DY, \forall h \in H$$

Teacher's availability

$$x_{i,j,d,h} \cdot TA_{i,d,h} \leq 1 \qquad \forall i \in T, \forall j \in S, \forall d \in DY, \forall h \in H$$

Teachers must teach at least one class in the week

$$\sum_{j \in S} \sum_{d \in DY} \sum_{h \in H} x_{i,j,d,h} \geq 1 \qquad \forall i \in T$$

A student cannot receive more than one class in a day

$$\sum_{i \in T} \sum_{h \in H} x_{i,j,d,h} \leq 1 \qquad \forall j \in T, \forall d \in DY$$

The weekly meeting only occurs when there's no class

$$\sum_{i \in T} \sum_{j \in S} \sum_{h \in H} x_{i,j,d,h} \leq (1 - \sum_{h \in H} y_{d,h}) \cdot M \qquad \forall d \in DY$$

Only one meeting in the week

$$\sum_{d \in DY} \sum_{h \in H} y_{d,h} = 1$$

The meeting has only 1 hour duration

$$y_{d,h} + y_{d,h+1} \leq 1 \qquad \forall d \in DY, \forall h \in H \setminus \{20\}$$

Teacher's meeting only happens when all teacher can attend the meeting

$$\sum_{i \in T} y_{d,h} \cdot TA_{i,d,h} = y_{d,h} \cdot |teachers| \qquad \forall d \in DY, \forall h \in H$$

Classes don't start at 19 hours

$$\sum_{i \in T} \sum_{j \in S} \sum_{d \in DY} x_{i,j,d,h} = 0 \qquad \forall h \in H \geq 19$$

Each class has 2 hours duration

$$x_{i,j,d,h} + x_{i,j,d,h+2} \leq 2 \qquad \forall i \in T, \forall j \in S, \forall d \in DY, \forall h \in H \setminus \{19, 20\}$$

No overlapped classes

$$\sum_{j \in S} x_{i,j,d,h} + \sum_{j \in S} x_{i,j,d,h+1} \leq 1 \qquad \forall i \in T, \forall d \in DY, \forall h \in H \setminus \{19, 20\}$$

2 Classes cannot be taught at the same time

$$\sum_{j \in S} x_{i,j,d,h} \leq 1 \qquad \forall i \in T, \forall d \in DY, \forall h \in H$$