Constraint Programming:

Variables:

$X[i]$: Exam shift of subject i

$$i \in \{1, \dots, N\},\ D(X[i]) = \{1, \dots, N\}$$

$Y[i][j]$: Subject i is assigned to room j

$$i \in \{1, \dots, N\},\ j \in \{1, \dots, M\},\ D(Y[i][j]) = \{0,1\}$$

$objective\ (obj)$: the total number of exam shifts

$$obj \in \{1, \dots, N\}$$

conflict: A list contain pairs of conflict subjects

Goal:

$$obj = \max(X) \rightarrow min$$

Constraints:

One subject is assigned to only one room.

$$\sum_{i=1}^{N} Y[i][j] = 1,\ \forall j \in \{1, \dots, M\}$$

Two conflict subjects are not assigned to same shift.

$$\forall (i,j) \in p \Rightarrow X[i] \neq X[j]$$

Two subjects that in the same shift can not be assigned to same room.

$$X[i1] = X[i2] \Rightarrow Y[i1][j] + Y[i2][j] \leq 1,\ \forall i1, i2 \in \{1, \dots, N\},\ j \in \{1, \dots, M\}$$

Put subjects in the room with suitable capacity.

$$\sum_{i=1}^{N} Y[i][j].c[j] \geq d[i],\ \forall j \in \{1, \dots, M\}$$