Balanced Course Assignment Problem
Description

- At the beginning of the semester, the head of a computer science department D have to assign courses to teachers in a balanced way. The department D has m teachers $T=\{1, 2, ..., m\}$ and n courses $C=\{1, 2,..., n\}$.

  - Each teacher $t \in T$ has a preference list which is a list of courses he/she can teach depending on his/her specialization. The preference information is represented by a 0-1 matrix $A_{m \times n}$ in which $A(t,c) = 1$ indicates that teacher t can teach the course c and $A(t,c) = 0$, otherwise

  - We know a set B of pairs of conflicting two courses that cannot be assigned to the same teacher as these courses have been already scheduled in the same slot of the timetable.

  - The load of a teacher is the number of courses assigned to her/him. How to assign n courses to m teacher such that each course assigned to a teacher is in his/her preference list, no two conflicting courses are assigned to the same teacher, and the maximal load among teachers is minimal.

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- Example

Course	0	1	2	3	4	5	6	7	8	9	10	11	12
credits	3	3	4	3	4	3	3	3	4	3	3	4	4

Teachers	Preference Courses
0	0, 2, 3, 4, 8, 10
1	0, 1, 3, 5, 6, 7, 8
2	1, 2, 3, 7, 9, 11, 12

Conflicting courses

0	2
0	4
0	8
1	4
1	10
3	7
3	9
5	11
5	12
6	8
6	12

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credits	3	3	4	3	4	3	3	3	4	3	3	4	4

Teachers	Preference Courses
0	0, 2, 3, 4, 8, 10
1	0, 1, 3, 5, 6, 7, 8
2	1, 2, 3, 7, 9, 11, 12

Teacher	Assigned courses	Load
0	2, 4, 8, 10	15
1	0, 1, 3, 5, 6	15
2	7, 9, 11, 12	14

Conflicting courses

0	2
0	4
0	8
1	4
1	10
3	7
3	9
5	11
5	12
6	8
6	12

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