

An Application of Graph Optimization

Alankrit Singh, Divyanshu Singh
Manan Jain

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Our aim is to provide solutions to a real-world problem in the context of our college. The problem is of constraint satisfaction and in order to find satisfying solutions we will perform graph-optimization mainly using the algorithm of "Backtracking Search" which will be described in detail later on.

The problem is to create a program such that it can, given an input of preference lists from different professors with certain available loads, return back a set of assignments that satisfy the given constraints without any biasing to any certain profiles of professors.

where

FDCDC: First Degree Core Discipline Course

FDELE: First Degree Elective

HDCDC: Higher Degree Core Discipline Course

HDELE: Higher Degree Elective

1 The Problem

Within a department, there are "n" faculty members categorised into three distinct groups: "x1," "x2," and "x3." Faculty in each category are assigned different course loads, with "x1" handling 0.5 courses per semester, "x2" taking 1 course per semester, and "x3" managing 1.5 courses per semester.

In this system, faculty members have the flexibility to take multiple courses in a given semester, and conversely, a single course can be assigned to multiple faculty members. When a course is shared between two professors, each professor's load is considered to be 0.5 courses. Moreover, each faculty member maintains a preference list of courses, ordered by their personal preferences, with the most preferred courses appearing at the top. Importantly, there is no prioritisation among faculty members within the same category.

The primary objective of this research problem is to develop an assignment scheme that maximises the number of courses assigned to faculty while aligning with their preferences and the category-based constraints ("x1," "x2," "x3"). The challenge lies in ensuring that a course can only be assigned to a faculty member if it is present in their preference list.

This problem is unique due to the flexibility it offers regarding the number of courses faculty members can take, distinct from typical Assignment problems. Potential modifications may include adjusting the maximum number of courses "y" for each category of professors, instead of requiring exact adherence, or extending the number of professor categories beyond the existing three to devise a more generalised solution.

The aim is to achieve a good degree of optimization on this constraint satisfaction problem through enforcing node consistency, arc consistency and utilizing techniques like backtracking search.

1.1 The Preference List

The preference list filled up by the professors in which they have entered their preferred courses in descending order of preference. Each professor's preference list contains 4 FDCDCs, 4 FDELEs, 2 HDCDC and 2 HDELE.

2 Methods Used

We have used Backtrack Search along with Node Consistency and Arc Consistency that provide us with satisfying solutions.

2.1 Some Important Definitions

2.1.1 Neighbour

Each node represents one professor and we have defined two nodes to be neighbours if they have overlap in preference list.

2.1.2 Search List

This is the "list" that contains every professor who has non-zero available course load.

2.2 Node Consistency

Node consistency refers to updating the node to which an assignment is made according to assignment made. In our program, whenever an assignment of a course is made to one professor, the corresponding available course load is decremented from the assigned professor and the course is removed from the professor's domain. The professor is removed from the search list if available course load reaches 0.

2.3 Arc Consistency

Arc consistency refers to updating nodes which are neighbours to the assigned node according to assignment made. Here, whenever an assignment of a course is made, if the course is completely assigned the course is removed from the domain from all neighbours of the assigned professor. If the course is partially assigned it's corresponding value is decremented from the domain of assigned professor's neighbours.

2.4 Backtracking Search

It is a recursive function that attempts to continue assigning values as long as they satisfy the constraints. If constraints are violated, it tries a different assignment. If the available course load for all faculties becomes 0, the program returns the assignment. If the domain of the professor to be assigned next is empty the program backtracks to the previous assignment and assigns it the next preference. If the preferences of the previous assignment run out then it backtracks further one step and so on.

2.5 Heuristics

2.5.1 Minimum Remaining Values (MRV)

Every assignment is given to the professor with the minimum number of remaining legal values.

2.5.2 Degree

Degree refers to the number of nodes a node is neighbours with. At the start the professor with highest degree is assigned and consequently degree is used as a tie-breaker for MRV heuristic.

2.6 Local Search(Unimplemented)

To decrease the run time of the program and possibly assign more than 100 different faculties incomplete assignments can be generated where only a few faculties remain partially unassigned which do not have any legal values available in there domain, in this case local search algorithms can be used to iteratively exchange courses between faculties to lower the cost and potentially assign all the remaining faculties. Here cost is the total amount of the faculty load left unassigned.


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courseassignment.py generatev2.py 50_Faculty_Assignment.bx Terminal 2 30_Faculty_Assignment.bx 20_Faculty_Assignment.bx + 8

1 Faculty28, Max Load: 0.5, Available Load: 0.0, Preference 1: HODOC - EEE G626 - HARDWARE SOFTWARE CO-DESIGN -> 0.5,
2 Faculty1, Max Load: 1.5, Available Load: 0.0, Preference 1: HODOC - ME F314 - DESIGN OF MACHINE ELEMENTS -> 1, Preference 2: FODEL - MATH F212 - OPTIMIZATION -> 0.5,
3 Faculty23, Max Load: 1, Available Load: 0.0, Preference 1: FODEL - PHY F420 - QUANTUM OPTICS -> 1,
4 Faculty1, Max Load: 1.5, Available Load: 0.0, Preference 1: FODEL - PHY F312 - STATISTICAL MECHANICS -> 1, Preference 3: HODEL - ME G532 - MACHINE TOOL ENGINEERING -> 0.5,
5 Faculty18, Max Load: 1, Available Load: 0.0, Preference 1: FODDC - MATH F212 - OPTIMIZATION -> 0.5, Preference 2: FODEL - HSS F372 - INTRODUCTION TO SOCIAL PSYCHO -> 0.5,
6 Faculty19, Max Load: 1.5, Available Load: 0.0, Preference 1: FODDC - EEE F366 - LABORATORY PROJECT -> 1, Preference 2: FODEL - PHY F426 - PHY OF SEMICONDUCTOR DEV -> 0.5,
7 Faculty25, Max Load: 1, Available Load: 0.0, Preference 3: HODEL - ME G532 - MACHINE TOOL ENGINEERING -> 0.5, Preference 4: FODDC - ME F423 - MICRO-FLUIDICS & ITS APP -> 0.5,
8 Faculty16, Max Load: 1, Available Load: 0.0, Preference 1: HODOC - CS G553 - RECONFIGURABLE COMPUTING -> 1,
9 Faculty6, Max Load: 1.5, Available Load: 0.0, Preference 1: FODEL - PHY F426 - PHY OF SEMICONDUCTOR DEV -> 0.5, Preference 2: FODEL - HSS F372 - INTRODUCTION TO SOCIAL PSYCHO -> 0.5, Preference 3: FODDC - BITS F417 - MICRO-FLUIDICS & ITS APP -> 0.5,
10 Faculty13, Max Load: 1, Available Load: 0.0, Preference 3: FODDC - ECON F312 - MONEY BANK & FIN MARKETS -> 1,
11 Faculty29, Max Load: 1, Available Load: 0.0, Preference 2: FODEL - HSS F314 - MARITIME STUDIES & BLUE ECON -> 1,
12 Faculty17, Max Load: 1.5, Available Load: 0.0, Preference 2: HODOC - ME F423 - MICRO-FLUIDICS & ITS APP -> 0.5, Preference 3: FODEL - CS F441 - SELECTED TOPICS FROM COMP SCI -> 1,
13 Faculty12, Max Load: 0.5, Available Load: 0.0, Preference 3: FODEL - PHY F213 - OPTICS -> 0.5,
14 Faculty24, Max Load: 1.5, Available Load: 0.0, Preference 1: FODDC - PHY F315 - THEORY OF RELATIVITY -> 1, Preference 3: HODOC - MEL G611 - I C FABRICATION TECH -> 0.5,
15 Faculty4, Max Load: 1.5, Available Load: 0.0, Preference 3: FODEL - MATH F214 - ELEMENTARY REAL ANALYSIS -> 1, Preference 5: FODDC - BITS F417 - MICRO-FLUIDICS & ITS APP -> 0.5,
16 Faculty15, Max Load: 1, Available Load: 0.0, Preference 1: FODEL - PHY F213 - OPTICS -> 0.5, Preference 3: HODEL - BITS G629T - DISSERTATION -> 0.5,
17 Faculty2, Max Load: 1.5, Available Load: 0.0, Preference 2: HODOC - CHE F421 - BIOCHEMICAL ENGINEERING -> 0.5,
18 Faculty10, Max Load: 1.5, Available Load: 0.0, Preference 1: FODDC - CHEN F376 - DESIGN PROJECT -> 1, Preference 3: HODEL - MEL G631 - PHY & MO OF MICROLEV DEV -> 0.5,
19 Faculty9, Max Load: 0.5, Available Load: 0.0, Preference 1: FODDC - CHE F421 - BIOCHEMICAL ENGINEERING -> 0.5,
20 Faculty3, Max Load: 1, Available Load: 0.0, Preference 1: FODEL - HSS F227 - CROSS CULTURAL SKILLS -> 1,
21 Faculty26, Max Load: 1.5, Available Load: 0.0, Preference 2: HODOC - MEL G611 - I C FABRICATION TECH -> 0.5, Preference 4: FODDC - ECE F491 - SPECIAL PROJECT -> 1,
22 Faculty22, Max Load: 1, Available Load: 0.0, Preference 5: HODEL - BIO G512 - MOLEC MECH OF GEN EXPRE -> 1,
23 Faculty7, Max Load: 1.5, Available Load: 0.0, Preference 3: FODEL - CHEM F214 - INORGANIC CHEMISTRY I -> 1, Preference 5: HODEL - BITS G654 - ADV INSTRUMENTATION TECH -> 0.5,
24 Faculty21, Max Load: 1, Available Load: 0.0, Preference 1: FODDC - EEE F311 - COMMUNICATION SYSTEMS -> 1,
25 Faculty14, Max Load: 1.5, Available Load: 0.0, Preference 2: HODEL - BITS G654 - ADV INSTRUMENTATION TECH -> 0.5, Preference 3: HODOC - EEE G626 - HARDWARE SOFTWARE CO-DESIGN -> 0.5, Preference 4: FODEL - ECON F213 - MATHEMATIC & STAT METHOD -> 0.5,
26 Faculty20, Max Load: 1.5, Available Load: 0.0, Preference 4: HODEL - BITS G629T - DISSERTATION -> 0.5, Preference 11: FODDC - PHY F419 - ADVANCED SOLID STATE PHYSICS -> 1,
27 Faculty5, Max Load: 1.5, Available Load: 0.0, Preference 11: FODEL - EEE F376 - DESIGN PROJECT -> 1, Preference 1: HODEL - EE G501 - ENVIRONMENTAL SAMPLING AND ANALYTICAL METHODS -> 0.5,
28 Faculty30, Max Load: 0.5, Available Load: 0.0, Preference 1: HODEL - EE G501 - ENVIRONMENTAL SAMPLING AND ANALYTICAL METHODS -> 0.5,
29 Faculty8, Max Load: 1.5, Available Load: 0.0, Preference 6: HODEL - MEL G631 - PHY & MO OF MICROLEV DEV -> 0.5, Preference 7: FODEL - ECE F376 - DESIGN PROJECT -> 1,
30 Faculty27, Max Load: 1.5, Available Load: 0.0, Preference 3: FODDC - GS F234 - DEVELOPMENT ECONOMICS -> 1, Preference 12: FODEL - ECON F213 - MATHEMATIC & STAT METHOD -> 0.5,
31 Backtrack Count: 29
32
33 Faculty18, Max Load: 1, Available Load: 0, Preference 1: FODDC - MATH F212 - OPTIMIZATION -> 1,
34 Faculty12, Max Load: 0.5, Available Load: 0.0, Preference 1: FODEL - PHY F312 - STATISTICAL MECHANICS -> 0.5,
35 Faculty29, Max Load: 1, Available Load: 0, Preference 1: HODOC - CS G553 - RECONFIGURABLE COMPUTING -> 1,
36 Faculty19, Max Load: 1.5, Available Load: 0.0, Preference 1: FODDC - EEE F366 - LABORATORY PROJECT -> 1, Preference 3: HODEL - EE G501 - ENVIRONMENTAL SAMPLING AND ANALYTICAL METHODS -> 0.5,
37 Faculty16, Max Load: 1.5, Available Load: 0, Preference 2: FODEL - HSS F372 - INTRODUCTION TO SOCIAL PSYCHO -> 1,
38 Faculty11, Max Load: 1.5, Available Load: 0.0, Preference 1: HODOC - ME F314 - DESIGN OF MACHINE ELEMENTS -> 1, Preference 3: HODEL - EE G501 - ENVIRONMENTAL SAMPLING AND ANALYTICAL METHODS -> 0.5,
39 Faculty13, Max Load: 1, Available Load: 0, Preference 3: FODDC - ECON F312 - MONEY BANK & FIN MARKETS -> 1,
40 Faculty10, Max Load: 1.5, Available Load: 0.0, Preference 3: FODEL - PHY F312 - STATISTICAL MECHANICS -> 0.5, Preference 4: HODEL - ME G532 - MACHINE TOOL ENGINEERING -> 1, Preference 3: HODEL - ME G532 - MACHINE TOOL ENGINEERING -> 1,
41 Faculty17, Max Load: 1.5, Available Load: 0.0, Preference 2: HODOC - ME F423 - MICRO-FLUIDICS & ITS APP -> 1, Preference 3: FODEL - CS F441 - SELECTED TOPICS FROM COMP SCI -> 0.5,
42 Faculty6, Max Load: 1.5, Available Load: 0.0, Preference 1: FODEL - PHY F426 - PHY OF SEMICONDUCTOR DEV -> 1, Preference 3: FODDC - BITS F417 - MICRO-FLUIDICS & ITS APP -> 0.5,
43 Faculty10, Max Load: 1.5, Available Load: 0.0, Preference 1: FODEL - PHY F213 - DESIGN PROJECT -> 1, Preference 2: HODOC - ME G512 - FINITE ELEMENT METHOD -> 0.5,
44 Faculty15, Max Load: 1, Available Load: 0, Preference 1: FODEL - PHY F213 - OPTICS -> 1,
45 Faculty2, Max Load: 1.5, Available Load: 0.0, Preference 2: HODEL - ME G512 - FINITE ELEMENT METHOD -> 0.5, Preference 4: FODDC - BITS F417 - MICRO-FLUIDICS & ITS APP -> 0.5, Preference 5: FODDC - CHE F421 - BIOCHEMICAL ENGINEERING -> 0.5,
46 Faculty24, Max Load: 1.5, Available Load: 0.0, Preference 1: FODDC - PHY F315 - THEORY OF RELATIVITY -> 1, Preference 3: HODOC - MEL G611 - I C FABRICATION TECH -> 0.5,
47 Faculty4, Max Load: 1.5, Available Load: 0.0, Preference 2: FODEL - CS F441 - SELECTED TOPICS FROM COMP SCI -> 0.5, Preference 3: FODEL - MATH F214 - ELEMENTARY REAL ANALYSIS -> 0.5,
48 Faculty23, Max Load: 1, Available Load: 0, Preference 1: FODEL - PHY F420 - QUANTUM OPTICS -> 1,
49 Faculty25, Max Load: 1, Available Load: 0, Preference 6: FODEL - HSS F314 - MARITIME STUDIES & BLUE ECON -> 1,
50 Faculty14, Max Load: 1.5, Available Load: 0.0, Preference 2: HODEL - BITS G654 - ADV INSTRUMENTATION TECH -> 1, Preference 3: HODDC - EEE G626 - HARDWARE SOFTWARE CO-DESIGN -> 0.5,
51 Faculty3, Max Load: 1, Available Load: 0, Preference 1: FODEL - HSS F227 - CROSS CULTURAL SKILLS -> 1,
52 Faculty21, Max Load: 1, Available Load: 0, Preference 1: FODDC - EEE F311 - COMMUNICATION SYSTEMS -> 1,
53 Faculty22, Max Load: 1, Available Load: 0, Preference 1: FODEL - ECE F491 - SPECIAL PROJECT -> 1,
54 Faculty26, Max Load: 1.5, Available Load: 0.0, Preference 2: HODOC - MEL G611 - I C FABRICATION TECH -> 0.5, Preference 6: FODDC - CHE F421 - BIOCHEMICAL ENGINEERING -> 0.5, Preference 10: HODEL - BITS G629T - DISSERTATION -> 0.5,
55 Faculty9, Max Load: 0.5, Available Load: 0.0, Preference 3: FODEL - ECON F213 - MATHEMATIC & STAT METHOD -> 0.5,
56 Faculty20, Max Load: 1.5, Available Load: 0.0, Preference 1: FODDC - CHEM F214 - INORGANIC CHEMISTRY I -> 1, Preference 4: HODEL - BITS G629T - DISSERTATION -> 0.5,
57 Faculty30, Max Load: 0.5, Available Load: 0.0, Preference 3: FODEL - ECE F376 - DESIGN PROJECT -> 0.5,
58 Faculty7, Max Load: 1.5, Available Load: 0.0, Preference 4: HODEL - BIO G512 - MOLEC MECH OF GEN EXPRE -> 1, Preference 9: FODDC - GS F234 - DEVELOPMENT ECONOMICS -> 0.5,
59 Faculty5, Max Load: 1.5, Available Load: 0.0, Preference 5: FODDC - GS F234 - DEVELOPMENT ECONOMICS -> 0.5, Preference 11: FODEL - EEE F376 - DESIGN PROJECT -> 1,
60 Faculty27, Max Load: 1.5, Available Load: 0.0, Preference 2: FODEL - ECE F376 - DESIGN PROJECT -> 0.5, Preference 8: HODEL - MEL G631 - PHY & MO OF MICROLEV DEV -> 1,
61 Faculty8, Max Load: 1.5, Available Load: 0.0, Preference 8: HODDC - EEE G626 - HARDWARE SOFTWARE CO-DESIGN -> 0.5, Preference 12: FODDC - PHY F419 - ADVANCED SOLID STATE PHYSICS -> 1,
62 Faculty28, Max Load: 0.5, Available Load: 0.0, Preference 10: FODEL - ECON F213 - MATHEMATIC & STAT METHOD -> 0.5,
63 Backtrack Count: 125
64

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courseassignment.py generateV2.py 50_Faculty_Assignment.txt Terminal 2 Terminal 1 30_Faculty_Assignment.txt 20_Faculty_Assignment.txt

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49 Faculty35, Max Load: 1, Available Load: 0.0, Preference 1: FDCDC - BITS F347 - INTRO TOCARNATIC MUSIC -> 0.5, Preference 4: FDELE - CHE F312 - CHEMICAL ENGG LAB I -> 0.5,
50 Faculty29, Max Load: 1.5, Available Load: 0.0, Preference 8: FDCDC - BITS G548 - RESEARCH PRACTICE -> 1, Preference 10: FDCDC - ECE F376 - DESIGN PROJECT -> 0.5,
51 Backtrack Count: 10841
52
53 Faculty12, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - BITS G529 - RESEARCH PROJECT I -> 1, Preference 2: FDELE - CHE F312 - CHEMICAL ENGG LAB I -> 0.5,
54 Faculty28, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - BIO G532 - BIOSTATISTICS AND BIOMODELLING -> 1, Preference 3: FDCDC - CHE F376 - DESIGN PROJECT -> 0.5,
55 Faculty14, Max Load: 1, Available Load: 0, Preference 1: FDCDC - CS G519 - SOCIAL MEDIA ANALYTICS -> 1,
56 Faculty17, Max Load: 1, Available Load: 0, Preference 1: FDELE - EEE F211 - ELECTRICAL MACHINES -> 1,
57 Faculty38, Max Load: 1, Available Load: 0, Preference 1: FDCDC - EEE G613 - ADVANCED DIGITAL SIGNAL PROCESSING -> 1,
58 Faculty7, Max Load: 1, Available Load: 0, Preference 2: FDCDC - BITS G561T - DISSERTATION -> 1,
59 Faculty37, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - GS F233 - PUBLIC POLICY -> 0.5,
60 Faculty21, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - BITS G629T - DISSERTATION -> 1, Preference 2: FDCDC - GS F231 - DYN OF SOCIAL CHANGE -> 0.5,
61 Faculty11, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - CS F420 - NATURAL LANG PROCESS -> 0.5,
62 Faculty2, Max Load: 0.5, Available Load: 0.0, Preference 2: FDELE - HSS F332 - CINEMATIC ART -> 0.5,
63 Faculty33, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - PHY F436 - LASER SCIENCE AND TECHNOLOGY -> 1, Preference 3: FDELE - PHY F433 - TOPICS IN NONLINEAR OPTICS -> 0.5,
64 Faculty30, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - BITS F415 - INTRODUCTION TO MEMS -> 0.5,
65 Faculty16, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - MATH F111 - MATHEMATICS-I -> 1, Preference 2: FDCDC - GS F233 - PUBLIC POLICY -> 0.5,
66 Faculty36, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - MEL G624 - ADV VLSI ARCHITECTURES -> 1, Preference 11: FDCDC - CS F441 - SELECTED TOPICS FROM COMP SCI -> 0.5,
67 Faculty21, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - CHEN F214 - INORGANIC CHEMISTRY I -> 1, Preference 2: FDELE - GS F221 - BUSINESS COMMUNICATION -> 0.5,
68 Faculty13, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - ME F415 - GAS DYNAMICS -> 1, Preference 3: FDCDC - BIO G512 - MOLEC MECH OF GENE EXPRE -> 0.5,
69 Faculty45, Max Load: 1, Available Load: 0, Preference 1: FDCDC - PHY F491 - SPECIAL PROJECT -> 1,
70 Faculty49, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - MC G512 - FINITE ELEMENT METHOD -> 1, Preference 2: FDELE - CS F222 - DISCR STRUC FOR COMP SCI -> 0.5,
71 Faculty39, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - PHY F433 - TOPICS IN NONLINEAR OPTICS -> 0.5,
72 Faculty23, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - EEE G512 - EMBEDDED SYSTEM DESIGN -> 0.5,
73 Faculty15, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - EEE F311 - COMMUNICATION SYSTEMS -> 0.5,
74 Faculty4, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - BIO F417 - BIOMOLECULAR MODELING -> 1, Preference 4: FDELE - MEL G611 - I C FABRICATION TECH -> 0.5,
75 Faculty44, Max Load: 1, Available Load: 0, Preference 3: FDELE - CHE F211 - CHEMICAL PROCESS CALCULATION -> 1,
76 Faculty10, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - BIO G523 - ADV & APPLIED MICROBIO -> 0.5,
77 Faculty18, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - BITS F464 - MACHINE LEARNING -> 1, Preference 2: FDCDC - HSS F347 - INTRO TOCARNATIC MUSIC -> 0.5,
78 Faculty22, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - CS F429 - NATURAL LANG PROCESS -> 0.5,
79 Faculty19, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - EEE G512 - EMBEDDED SYSTEM DESIGN -> 0.5,
80 Faculty47, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - PHY F426 - PHY OF SEMICONDUCTOR DEV -> 0.5,
81 Faculty26, Max Load: 0.5, Available Load: 0.0, Preference 2: FDELE - PHY F412 - INTRODUCTION TO QUANTUM FIELD THEORY -> 1, Preference 3: FDELE - MEL G611 - I C FABRICATION TECH -> 0.5,
82 Faculty9, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - PHY F412 - INTRODUCTION TO QUANTUM FIELD THEORY -> 1, Preference 3: FDELE - MEL G611 - I C FABRICATION TECH -> 0.5,
83 Faculty34, Max Load: 1, Available Load: 0, Preference 1: FDCDC - BITS F332 - REAL TIME SYSTEMS -> 1,
84 Faculty41, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - GS F231 - DYN OF SOCIAL CHANGE -> 0.5,
85 Faculty32, Max Load: 1, Available Load: 0, Preference 1: FDCDC - BIO F312 - PLANT PHYSIOLOGY -> 1,
86 Faculty25, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - EEE F491 - SPECIAL PROJECT -> 1, Preference 5: FDELE - PHY F426 - PHY OF SEMICONDUCTOR DEV -> 0.5,
87 Faculty31, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - HSS F332 - CINEMATIC ART -> 0.5,
88 Faculty20, Max Load: 1.5, Available Load: 0.0, Preference 2: FDCDC - BIO G512 - MOLEC MECH OF GENE EXPRE -> 0.5, Preference 7: FDCDC - CHE G622 - ADV CHEMICAL ENGG THERMO -> 0.5,
89 Faculty24, Max Load: 1.5, Available Load: 0.0, Preference 3: FDCDC - BIO G512 - MOLEC MECH OF GENE EXPRE -> 0.5, Preference 5: FDCDC - CS F314 - SOFT DEV FOR PORT DEVICE -> 1,
90 Faculty24, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - BITS F415 - INTRODUCTION TO MEMS -> 0.5,
91 Faculty40, Max Load: 0.5, Available Load: 0.0, Preference 3: FDCDC - CS F407 - ARTIFICIAL INTELLIGENCE -> 0.5,
92 Faculty6, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - CHEM F313 - INSTRU METHODS OF ANAL -> 1, Preference 3: FDELE - ECE F434 - DIGITAL SIGNAL PROCESS -> 0.5,
93 Faculty27, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - ECE F434 - DIGITAL SIGNAL PROCESS -> 0.5, Preference 5: FDELE - DE G611 - DYNAMICS & VIBRATION -> 1,
94 Faculty42, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - MATH F353 - STATISTICAL INFER & APP -> 1, Preference 3: FDELE - GS F221 - BUSINESS COMMUNICATION -> 0.5,
95 Faculty46, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - HSS F347 - INTRO TOCARNATIC MUSIC -> 0.5, Preference 3: FDCDC - CHE G622 - ADV CHEMICAL ENGG THERMO -> 0.5,
96 Faculty35, Max Load: 1, Available Load: 0.0, Preference 1: FDCDC - HSS F347 - INTRO TOCARNATIC MUSIC -> 0.5, Preference 3: FDCDC - CHE G622 - ADV CHEMICAL ENGG THERMO -> 0.5,
97 Faculty48, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - EEE F212 - ELECTROMAGNETIC THEORY -> 1, Preference 12: FDELE - CHE F312 - CHEMICAL ENGG LAB I -> 0.5,
98 Faculty8, Max Load: 1.5, Available Load: 0.0, Preference 3: FDCDC - ECE F376 - DESIGN PROJECT -> 1, Preference 11: FDCDC - CS F441 - SELECTED TOPICS FROM COMP SCI -> 0.5,
99 Faculty50, Max Load: 0.5, Available Load: 0.0, Preference 7: FDCDC - BITS G548 - RESEARCH PRACTICE -> 0.5,
100 Faculty43, Max Load: 1, Available Load: 0.0, Preference 3: FDCDC - BITS G540 - RESEARCH PRACTICE -> 0.5, Preference 9: FDCDC - MATH F313 - NUMERICAL ANALYSIS -> 0.5,
101 Faculty3, Max Load: 1.5, Available Load: 0.0, Preference 7: FDELE - ME G515 - COMPUT FLUID DYNAMICS -> 1, Preference 6: FDCDC - CS F214 - LOGIC IN COMPUTER SC -> 0.5,
102 Faculty29, Max Load: 1.5, Available Load: 0.0, Preference 2: FDCDC - MATH F313 - NUMERICAL ANALYSIS -> 0.5, Preference 3: FDCDC - CS F407 - ARTIFICIAL INTELLIGENCE -> 0.5, Preference 6: FDCDC - CS F214 - LOGIC IN COMPUTER SC -> 0.5,
103 Backtrack Count: 4438
104
105 Faculty17, Max Load: 1, Available Load: 0, Preference 1: FDELE - EEE F211 - ELECTRICAL MACHINES -> 1,
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courseassignment.py < generateV2.py < 50_Faculty_Assignment.txt < Terminal 2 < Terminal 1 < 30_Faculty_Assignment.txt < 20_Faculty_Assignment.txt + 
152 Faculty35, Max Load: 1, Available Load: 0.0, Preference 1: FDCDC - HSS F347 - INTRO TOCARNATIC MUSIC -> 0.5, Preference 5: FDCDC - CS F314 - SOFT DEV FOR PORT DEVICE -> 0.5,
153 Faculty46, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - CS F215 - DIGITAL DESIGN -> 0.5, Preference 7: HDELE - ME G515 - COMPUT FLUID DYNAMICS -> 0.5, Preference 11: FDCDC - CS F214 - LOGIC IN COMPUTER SC -> 0.5,
154 Faculty44, Max Load: 1, Available Load: 0.0, Preference 2: HDELE - MEL G624 - ADV VLSI ARCHITECTURES -> 0.5, Preference 3: FDELE - CHE F211 - CHEMICAL PROCESS CALCULATION -> 0.5,
155 Backtrack Count: 71587
156
157 Faculty14, Max Load: 1, Available Load: 0, Preference 1: HDCDC - CS G519 - SOCIAL MEDIA ANALYTICS -> 1,
158 Faculty17, Max Load: 1, Available Load: 0, Preference 1: FDELE - EEE F211 - ELECTRICAL MACHINES -> 1,
159 Faculty16, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - MATH F111 - MATHEMATICS-> 1, Preference 2: FDCDC - GS F233 - PUBLIC POLICY -> 0.5,
160 Faculty49, Max Load: 1.5, Available Load: 0.0, Preference 1: HDCDC - ME G512 - FINITE ELEMENT METHOD -> 1, Preference 2: FDELE - CS F222 - DISCR STRUC FOR COMP SCI -> 0.5,
161 Faculty7, Max Load: 1, Available Load: 0, Preference 2: HDCDC - BITS G5617 - DISSERTATION -> 1,
162 Faculty38, Max Load: 1, Available Load: 0, Preference 1: HDCDC - EEE G613 - ADVANCED DIGITAL SIGNAL PROCESSING -> 1,
163 Faculty9, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - PHY F412 - INTRODUCTION TO QUANTUM FIELD THEORY -> 1, Preference 3: HDELE - MEL G611 - I C FABRICATION TECH -> 0.5,
164 Faculty11, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - CS F429 - NATURAL LANG PROCESS -> 0.5,
165 Faculty10, Max Load: 0.5, Available Load: 0.0, Preference 1: HDELE - BIO G523 - ADV & APPLIED MICROBIO -> 0.5,
166 Faculty28, Max Load: 1.5, Available Load: 0.0, Preference 1: HDCDC - BITS G529 - RESEARCH PROJECT I -> 1, Preference 2: HDELE - BIO G532 - BIOSTATISTICS AND BIOMODELLING -> 0.5,
167 Faculty15, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - EEE F311 - COMMUNICATION SYSTEMS -> 0.5,
168 Faculty12, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - CHE F312 - CHEMICAL ENGG LAB I -> 1, Preference 3: FDELE - CHE F211 - CHEMICAL PROCESS CALCULATION -> 0.5,
169 Faculty2, Max Load: 0.5, Available Load: 0.0, Preference 2: FDELE - HSS F332 - CINEMATIC ART -> 0.5,
170 Faculty19, Max Load: 0.5, Available Load: 0.0, Preference 1: HDELE - EEE G512 - EMBEDDED SYSTEM DESIGN -> 0.5,
171 Faculty39, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - PHY F433 - TOPICS IN NONLINEAR OPTICS -> 0.5,
172 Faculty40, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - HSS F332 - CINEMATIC ART -> 0.5,
173 Faculty47, Max Load: 1.5, Available Load: 0.0, Preference 1: HDELE - BITS G629T - DISSERTATION -> 1, Preference 2: FDELE - HSS F372 - INTRODUCTION TO SOCIAL PSYCHO -> 0.5,
174 Faculty1, Max Load: 1.5, Available Load: 0.0, Preference 2: FDCDC - GS F231 - DYN OF SOCIAL CHANGE -> 1, Preference 4: FDELE - PHY F433 - TOPICS IN NONLINEAR OPTICS -> 0.5,
175 Faculty33, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - PHY F346 - LASER SCIENCE AND TECHNOLOGY -> 1, Preference 5: FDCDC - CS F429 - NATURAL LANG PROCESS -> 0.5,
176 Faculty18, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - BITS F464 - MACHINE LEARNING -> 1, Preference 2: FDCDC - HSS F347 - INTRO TOCARNATIC MUSIC -> 0.5,
177 Faculty27, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - EEE F401 - SPECIAL PROJECT -> 1, Preference 3: FDCDC - BIO F312 - PLANT PHYSIOLOGY -> 0.5,
178 Faculty13, Max Load: 1.5, Available Load: 0.0, Preference 2: HDELE - ME F415 - GAS DYNAMICS -> 1, Preference 3: HDCDC - BIO G512 - MOLEC MECH OF GENE EXPRE -> 0.5,
179 Faculty41, Max Load: 0.5, Available Load: 0.0, Preference 2: FDCDC - CS F344 - SOFT DEV FOR PORT DEVICE -> 0.5,
180 Faculty23, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - EEE G512 - EMBEDDED SYSTEM DESIGN -> 0.5,
181 Faculty37, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - GS F233 - PUBLIC POLICY -> 0.5,
182 Faculty45, Max Load: 1, Available Load: 0, Preference 1: FDCDC - PHY F491 - SPECIAL PROJECT -> 1,
183 Faculty27, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - ECE F434 - DIGITAL SIGNAL PROCESS -> 1, Preference 5: HDELE - DE G611 - DYNAMICS & VIBRATION -> 0.5,
184 Faculty20, Max Load: 1.5, Available Load: 0.0, Preference 3: HDCDC - BIO G512 - MOLEC MECH OF GENE EXPRE -> 0.5, Preference 10: FDCDC - EEE F311 - COMMUNICATION SYSTEMS -> 0.5, Preference 12: FDELE - PHY F426 - PHY OF SEMICONDUCTOR DEV -> 0.5,
185 Faculty21, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - CHEM F214 - INORGANIC CHEMISTRY I -> 1, Preference 2: FDELE - GS F221 - BUSINESS COMMUNICATION -> 0.5,
186 Faculty4, Max Load: 1.5, Available Load: 0.0, Preference 2: FDELE - BIO F417 - BIOMOLECULAR MODELING -> 1, Preference 4: HDELE - MEL G611 - I C FABRICATION TECH -> 0.5,
187 Faculty22, Max Load: 0.5, Available Load: 0.0, Preference 3: HDCDC - CHE G622 - ADV CHEMICAL ENGS THERMO -> 0.5,
188 Faculty6, Max Load: 1.5, Available Load: 0.0, Preference 1: FDCDC - CHEM F313 - INSTRU METHODS OF ANAL -> 1, Preference 4: HDELE - MEL G624 - ADV VLSI ARCHITECTURES -> 0.5,
189 Faculty31, Max Load: 0.5, Available Load: 0.0, Preference 2: FDELE - HSS F372 - INTRODUCTION TO SOCIAL PSYCHO -> 0.5,
190 Faculty29, Max Load: 1.5, Available Load: 0.0, Preference 2: FDCDC - MATH F313 - NUMERICAL ANALYSIS -> 1, Preference 11: HDELE - DE G611 - DYNAMICS & VIBRATION -> 0.5,
191 Faculty5, Max Load: 1.5, Available Load: 0.0, Preference 2: FDCDC - BIO G523 - ADV & APPLIED MICROBIO -> 0.5, Preference 4: FDELE - EEE F212 - ELECTROMAGNETIC THEORY -> 1,
192 Faculty50, Max Load: 0.5, Available Load: 0.0, Preference 1: FDELE - MATH F353 - STATISTICAL INFER & APP -> 0.5,
193 Faculty33, Max Load: 1, Available Load: 0.0, Preference 2: HDELE - MEL G624 - ADV VLSI ARCHITECTURES -> 0.5, Preference 3: FDELE - CHE F211 - CHEMICAL PROCESS CALCULATION -> 0.5,
194 Faculty48, Max Load: 1.5, Available Load: 0.0, Preference 2: FDCDC - BIO F312 - PLANT PHYSIOLOGY -> 0.5, Preference 3: FDCDC - MATH F353 - STATISTICAL INFER & APP -> 0.5, Preference 6: FDELE - CS F215 - DIGITAL DESIGN -> 0.5,
195 Faculty26, Max Load: 0.5, Available Load: 0.0, Preference 1: HDELE - BIO G532 - BIOSTATISTICS AND BIOMODELLING -> 0.5,
196 Faculty32, Max Load: 1, Available Load: 0, Preference 5: FDCDC - CHE F376 - DESIGN PROJECT -> 1,
197 Faculty36, Max Load: 1.5, Available Load: 0.0, Preference 2: FDCDC - CS F314 - SOFT DEV FOR PORT DEVICE -> 0.5, Preference 11: FDCDC - CS F441 - SELECTED TOPICS FROM COMP SCI -> 1,
198 Faculty5, Max Load: 1, Available Load: 0, Preference 1: FDELE - BITS G553 - REAL TIME SYSTEMS -> 1,
199 Faculty24, Max Load: 0.5, Available Load: 0.0, Preference 1: FDCDC - BITS F415 - INTRODUCTION TO MEMS -> 0.5,
200 Faculty35, Max Load: 1, Available Load: 0.0, Preference 1: FDCDC - HSS F347 - INTRO TOCARNATIC MUSIC -> 0.5, Preference 3: HDCDC - CHE G622 - ADV CHEMICAL ENGG THERMO -> 0.5,
201 Faculty43, Max Load: 1, Available Load: 0, Preference 3: HDCDC - BITS G540 - RESEARCH PRACTICE -> 1,
202 Faculty30, Max Load: 0.5, Available Load: 0.0, Preference 11: FDELE - GS F221 - BUSINESS COMMUNICATION -> 0.5,
203 Faculty46, Max Load: 1.5, Available Load: 0.0, Preference 1: FDELE - CS F215 - DIGITAL DESIGN -> 0.5, Preference 7: HDELE - ME G515 - COMPUT FLUID DYNAMICS -> 1,
204 Faculty8, Max Load: 1.5, Available Load: 0.0, Preference 3: FDCDC - ECE F376 - DESIGN PROJECT -> 1, Preference 10: FDELE - PHY F426 - PHY OF SEMICONDUCTOR DEV -> 0.5,
205 Faculty3, Max Load: 1.5, Available Load: 0.0, Preference 6: FDCDC - CS F214 - LOGIC IN COMPUTER SC -> 1, Preference 10: FDCDC - BITS F415 - INTRODUCTION TO MEMS -> 0.5,
206 Faculty42, Max Load: 1.5, Available Load: 0.0, Preference 4: FDELE - CS F222 - DISCR STRUC FOR COMP SCI -> 0.5, Preference 9: FDCDC - CS F407 - ARTIFICIAL INTELLIGENCE -> 1,
207 Backtrack Count: 85414
208

```

Simple 0 none

Ln 208, Col 1 Spaces: 4 50_Faculty_Assignment.txt

4 Crash Test

| FacultyID | Category | Preference 1 | Preference 2 | Preference 3 | Preference 4 | Preference 5 | Preference 6 | Preference 7 | Preference 8 | Preference 9 | Preference 10 | Preference 11 | Preference 12 | | | |
|-----------|----------|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|--|--|--|
| Faculty1 | x1 | FDCDC - HSS F313 - II FDCDC - CHEM F213 - HDELE - ME G512 - FI FDCDC - BIO F214 - IN'FDELE - HSS F235 - IN HDCDC - BIO G523 - HDELE - BITS G619 - PR FDELE - PHY F315 - THE(HDCDC - BIO G514 - FDELE - GS F231 - DYN FDELE - EEE F215 - DI FDCDC - ECON F355 - BUSS ANAL & VALUATION | | | | | | | | | | | | | | |
| Faculty2 | x3 | FDELE - ECON F211 - FDELE - CS F402 - CON FDELE - HSS F338 - C(FDCDC - CHEM F213 - I FDELE - HSS F235 - IN FDCDC - HSS F313 - FDCDC - BIO F214 - INTHDELE - BITS G619 - PR(HDCDC - BIO G526 - HDELE - ME G512 - FIN HDCDC - BIO G523 - /FDCDC - CHEM F214 - INORGANIC CHEMISTRY I | | | | | | | | | | | | | | |
| Faculty3 | x3 | HDELE - BIO G515 - S(FDCDC - CHEM F213 - FDCDC - ECON F491 - HDCDC - BIO G523 - A(FDCDC - EEE F428 - E FDELE - ECON F211 - FDELE - HSS F235 - INT HDCDC - BIO G514 - MCFDELE - GS F231 - DY FDELE - HSS F338 - COHDELE - BITS G619 - F(FDCDC - BIO F214 - INTEGRATED BIOLOGY | | | | | | | | | | | | | | |
| Faculty4 | x1 | FDCDC - CHEM F213 - FDCDC - HSS F313 - IN FDCDC - ECON F491 - FDELE - CS F402 - COM/FDCDC - CHEM F214 - HDELE - BIO G515 - S(FDELE - EEE F215 - DIGI HDCDC - BIO G523 - AD HDCDC - BIO G526 - FDELE - HSS F338 - COHDELE - ME G512 - FI FDELE - ECON F211 - PRINCIPLES OF ECONOMICS | | | | | | | | | | | | | | |
| Faculty5 | x3 | FDELE - EEE F215 - DI(HDELE - BITS G619 - PF FDELE - ECON F211 - HDCDC - BIO G523 - /FDCDC - HSS F235 - IN FDCDC - HSS F313 - I FDELE - HSS F338 - COHDELE - ME G512 - FIN(HDCDC - BIO G523 - FDCDC - BIO F214 - IN FDCDC - ECON F491 - FDCDC - ECON F355 - BUSS ANAL & VALUATION | | | | | | | | | | | | | | |
| Faculty6 | x2 | FDELE - EEE F215 - DI(FDCDC - BIO F214 - IN HDCDC - BIO G523 - /FDCDC - CHEM F213 - I FDELE - HSS F338 - CC(FDCDC - ECON F211 - FDCDC - CHEM F214 - I HDCDC - BIO G514 - MC(FDCDC - EEE F428 - E HDELE - BITS G619 - P(FDELE - GS F231 - DY(HDELE - ME G512 - FINITE ELEMENT METHOD | | | | | | | | | | | | | | |
| Faculty7 | x2 | HDCDC - BIO G526 - (HDCDC - BIO G514 - MF(FDCDC - ECON F491 - HDELE - ME G512 - FIN(FDCDC - ECON F355 - FDCDC - HSS F313 - I HDELE - BIO G515 - STE(FDELE - HSS F235 - INT(FDELE - HSS F338 - C FDELE - EEE F215 - DIC(FDELE - CS F402 - CO(FDCDC - CHEM F214 - INORGANIC CHEMISTRY I | | | | | | | | | | | | | | |
| Faculty8 | x3 | FDCDC - BIO F214 - IN FDCDC - HSS F313 - IN FDCDC - ECON F355 - FDELE - PHY F315 - TH(HDELE - BITS G619 - PHDCDC - BIO G514 - FDELE - EEE F215 - DIGI HDCDC - BIO G526 - CA(FDELE - HSS F338 - C FDCDC - CHEM F213 - FDELE - GS F231 - DY(HDELE - BIO G515 - STEM CELL & REGENER BIO | | | | | | | | | | | | | | |
| Faculty9 | x3 | FDCDC - EEE F428 - E FDELE - EEE F215 - DIGI FDELE - HSS F338 - C(FDCDC - BIO F214 - IN'HDELE - BIO G515 - STHDCDC - BIO G523 - HDELE - BITS G619 - PR FDELE - GS F231 - DYN(FDCDC - CHEM F214 HDCDC - BIO G514 - N FDCDC - ECON F491 - FDELE - CS F402 - COMPUTATIONAL GEOMETRY | | | | | | | | | | | | | | |
| Faculty10 | x3 | HDELE - ME G512 - FI(FDELE - CS F402 - CON/FDCDC - CHEM F213 - FDCDC - CHEM F214 - I FDELE - GS F231 - DYN FDELE - PHY F315 - THDCDC - BIO G514 - MI(FDELE - HSS F338 - CON(HDCDC - BIO G523 - FDCDC - ECON F355 - FDCDC - EEE F428 - E HDELE - Bits G619 - PROFESSIONAL PRACTICE | | | | | | | | | | | | | | |
| Faculty11 | x1 | FDCDC - ECON F491 - FDELE - ECON F211 - PHDCDC - BIO G514 - I HDELE - BIO G515 - ITHDELE - ME G512 - FI(HDCDC - BIO G523 - FDCDC - ECON F355 - FDELE - CS F402 - COM(FDCDC - CHEM F213 - FDCDC - PHY F315 - TH FDELE - HSS F338 - C(FDCDC - EEE F428 - ENERGY STORAGE SYSTEMS | | | | | | | | | | | | | | |
| Faculty12 | x2 | HDCDC - BIO G526 - C(FDELE - HSS F235 - INT(FDCDC - EEE F428 - E FDELE - ECON F211 - P FDCDC - BIO F214 - IN HDELE - BITS G619 - HDCDC - BIO G514 - M(FDELE - PHY F315 - THE(FDCDC - ECON F355 - FDELE - EEE F215 - DIC(FDCDC - CHEM F214 - HDELE - ME G512 - FINITE ELEMENT METHOD | | | | | | | | | | | | | | |
| Faculty13 | x3 | HDELE - BIO G515 - S(FDELE - GS F231 - DYN FDELE - ECON F211 - FDCDC - ECON F491 - SHDCDC - BIO G526 - CHDCDC - BIO G523 - FDELE - HSS F338 - CON(FDCDC - ECON F355 - B(FDCDC - BIO F214 - I HDELE - BIO G515 - STE(FDELE - CS F402 - COM(HDCDC - BIO G514 - FDCDC - ECON F491 - FDELE - GS F235 - IN FDCDC - BIO F214 - INTEGRATED BIOLOGY | | | | | | | | | | | | | | |
| Faculty14 | x2 | FDELE - GS F231 - DY(HDCDC - BIO G526 - C(FDCDC - EEE F428 - E FDELE - PHY F315 - TH(FDCDC - ECON F355 - FDELE - GS F231 - DYN FDELE - PHY F315 - THEORY OF RELATIVITY | | | | | | | | | | | | | | |
| Faculty15 | x3 | FDELE - HSS F338 - CC(FDELE - ECON F211 - FDCDC - CHEM F213 - FDCDC - ECON F355 - FDELE - CS F402 - CO(FDCDC - ECON F491 - S(FDELE - BITS G619 - PR(FDELE - PHY F315 - T HDCDC - BIO G526 - C HDELE - BIO G515 - S(HDCDC - BIO G514 - MOLECULAR IMMUNOLOGY | | | | | | | | | | | | | | |
| Faculty16 | x3 | FDCDC - ECON F355 - HDCDC - BIO G523 - AI(FDELE - CS F402 - CO(FDCDC - BIO F214 - IN'(HDELE - BITS G619 - P HDELE - ME G512 - F(FDELE - EEE F215 - DIGI FDELE - HSS F338 - CON(FDCDC - CHEM F213 FDCDC - EEE F428 - EN(FDELE - HSS F235 - IN(HDCDC - BIO G526 - CANCER BIOLOGY | | | | | | | | | | | | | | |
| Faculty17 | x3 | HDELE - ME G512 - FI(FDELE - ECON F211 - P FDELE - HSS F235 - IN FDELE - HSS F338 - CO(HDCDC - BIO G514 - N FDCDC - ECON F355 FDCDC - EEE F428 - EN(FDCDC - BIO F214 - INT(HDCDC - BIO G523 - FDCDC - HSS F313 - IN HDELE - BIO G515 - S FDELE - GS F231 - DYN OF SOCIAL CHANGE | | | | | | | | | | | | | | |
| Faculty18 | x3 | HDCDC - BIO G514 - IHDCDC - BIO G526 - C(FDCDC - ECON F491 - FDELE - HSS F338 - CO(FDCDC - EEE F428 - E FDELE - EEE F215 - D HDELE - BIO G515 - STE(FDELE - PHY F315 - THE(FDCDC - CHEM F214 FDCDC - HSS F313 - IN HDELE - BITS G619 - FFDELE - CS F402 - COMPUTATIONAL GEOMETRY | | | | | | | | | | | | | | |
| Faculty19 | x1 | FDELE - GS F231 - DY(HDCDC - BIO G514 - MF(FDELE - CS F402 - CO(FDCDC - CHEM F213 - FDCDC - ECON F491 - HDELE - BIO G515 - S(FDCDC - EEE F428 - EN(HDCDC - BIO G526 - CA(FDELE - HSS F338 - C FDCDC - HSS F313 - IN HDELE - BITS G619 - F FDELE - PHY F315 - THEORY OF RELATIVITY | | | | | | | | | | | | | | |
| Faculty20 | x3 | FDCDC - ECON F355 - FDCDC - ECON F491 - IHDCDC - BIO G523 - /FDCDC - BIO F214 - IN FDELE - HSS F338 - CCHDCDC - BIO G526 - FDELE - PHY F315 - THE FDELE - EEE F215 - DIGI FDELE - GS F231 - DY HDELE - Bits G619 - F FDCDC - CHEM F214 - INORGANIC CHEMISTRY I | | | | | | | | | | | | | | |

Result:

```

File Edit View Run Kernel Tabs Settings Help
localhost: ~ DivyanshuDivyanshu$ python3 generateV2.py FacultyData/Invalid_20_Faculty.csv Assignments/invalid_assignment.txt
Invalid Data
python3 generateV2.py FacultyData/Invalid_20_Faculty.csv 0.03s user 0.03s system 60% cpu 0.097 total
divyanshuDivyanshu$ 

```

5 Consistency Report

For an input containing n faculty $n - 5$ is the threshold value before which backtracking is forbidden, rather instead the program restarts from scratch as it is a much faster and has much higher probability to produce consistent results. The program also restarts from scratch in the case when backtrack count has already reached 100k. When checking with 20 faculties, we got consistent results for every dataset we generated(about 20). For 30 faculties the level of consistency is almost similar to 20 faculties while for 50 faculties the backtracking algorithm generated assignment for 7 out of 10 cases within 10 seconds whereas two cases took 70k-80k backtracks taking approximately 40-50 seconds. However one case surpassed the 100k backtracks threshold and restarted thereafter generating the assignment within 5 seconds the next time.