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2020155

AI ASSIGNMENT 1

REPORT

The following files are being submitted:

- Prolog Files:
    - A1_InputCoursesDone.pl
    - A1_ElectivesAdvisory.pl
- PDF:
    - AI Assignment 1.pdf

Steps to run the program:

In order to evaluate the code for the assignment, follow the following steps:

1. Open a new SwiProlog window for each run of the program and compile both the submitted ‘.pl’ files.
2. After Compiling, start by entering the rule:
   `?- runInputsProg.`
3. Enter the inputs of all the courses you have done until now. Once you’ve added all the courses done, enter `stop.` to stop entering the courses done and end the program for adding inputs.
4. Now for starting the actual Electives Advisory program execution, enter the following command:
   `?- main.`
5. Answer the questions pertaining to your stream and semester for which you are looking advice.
6. Enter the departments other than your core department, from which you wish to do courses. Non-CSE and non-ECE, students must enter CSE in the subsequent options.
7. Based on the departments selected by you, you will get options for various specializations. Enter `y.` for the ones you are interested in.
8. Based on the responses, the Electives Advisory System will generate a list of courses which are recommended.

Considerations for determining the Electives:

The designed AI system considers various aspects for suggesting the Electives you should be choosing.

First of all, it considers your branch, the most important thing for suggesting electives.

The system considers whether you are choosing electives for an odd semester or an even semester, i.e. it considers only those electives which are being offered in that semester. This is decided by previous courses offered in IIITD in previous semesters. It also determines the professor who will be taking the course.

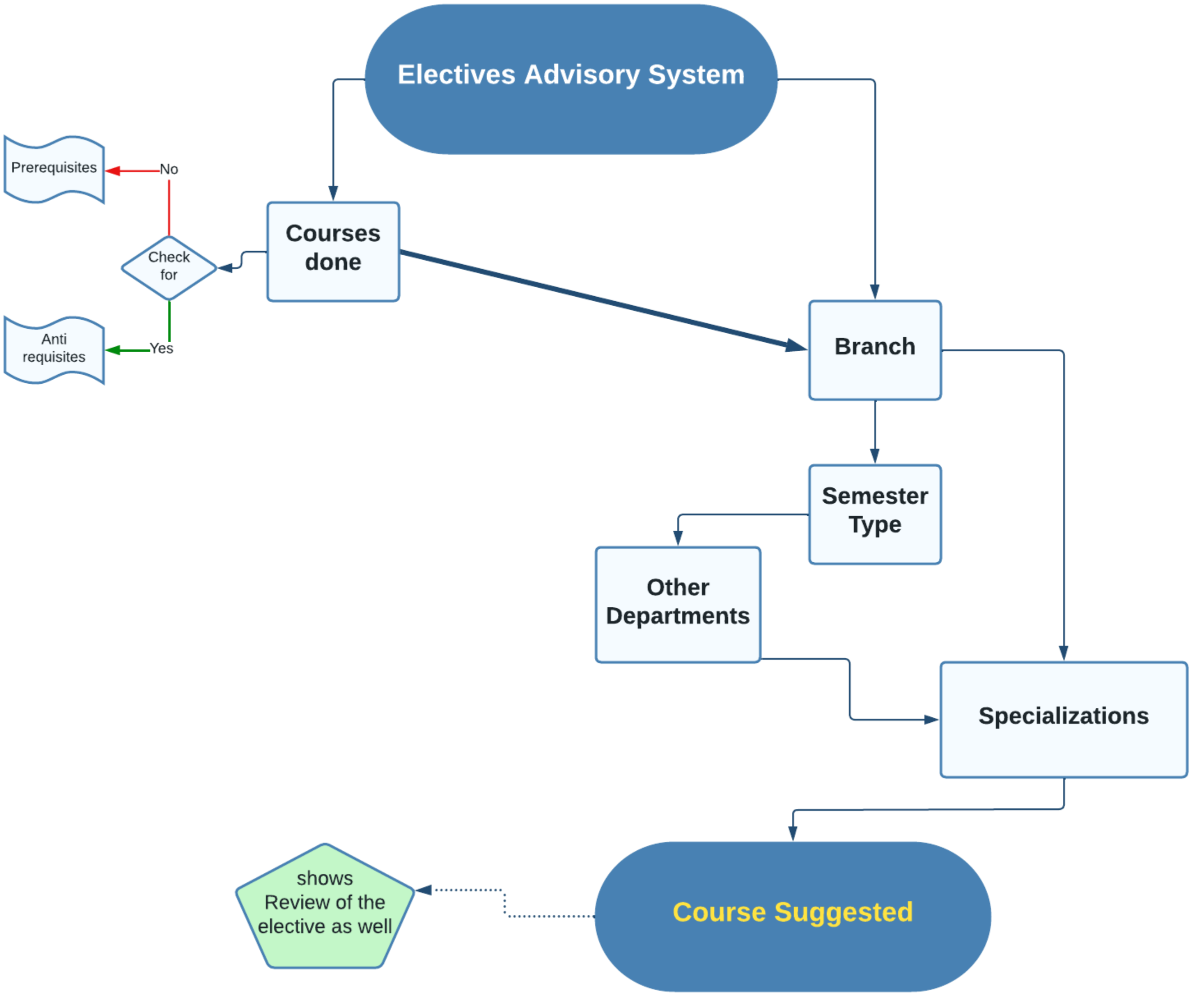
Then it asks for the departments in which you are interested to take up courses. You should enter the departments other than your core branch in which you wish to do the courses.

Depending on the department you enter, the AI system then asks for any kind of specializations you are interested in.

It searches for courses in those specializations and based on you are eligible to take the course, depending on whether you fulfil the prerequisites, the AI system shows a list of courses recommended for you take up in the upcoming semester. Apart from the prerequisites, the AI system also checks for antirequisites.

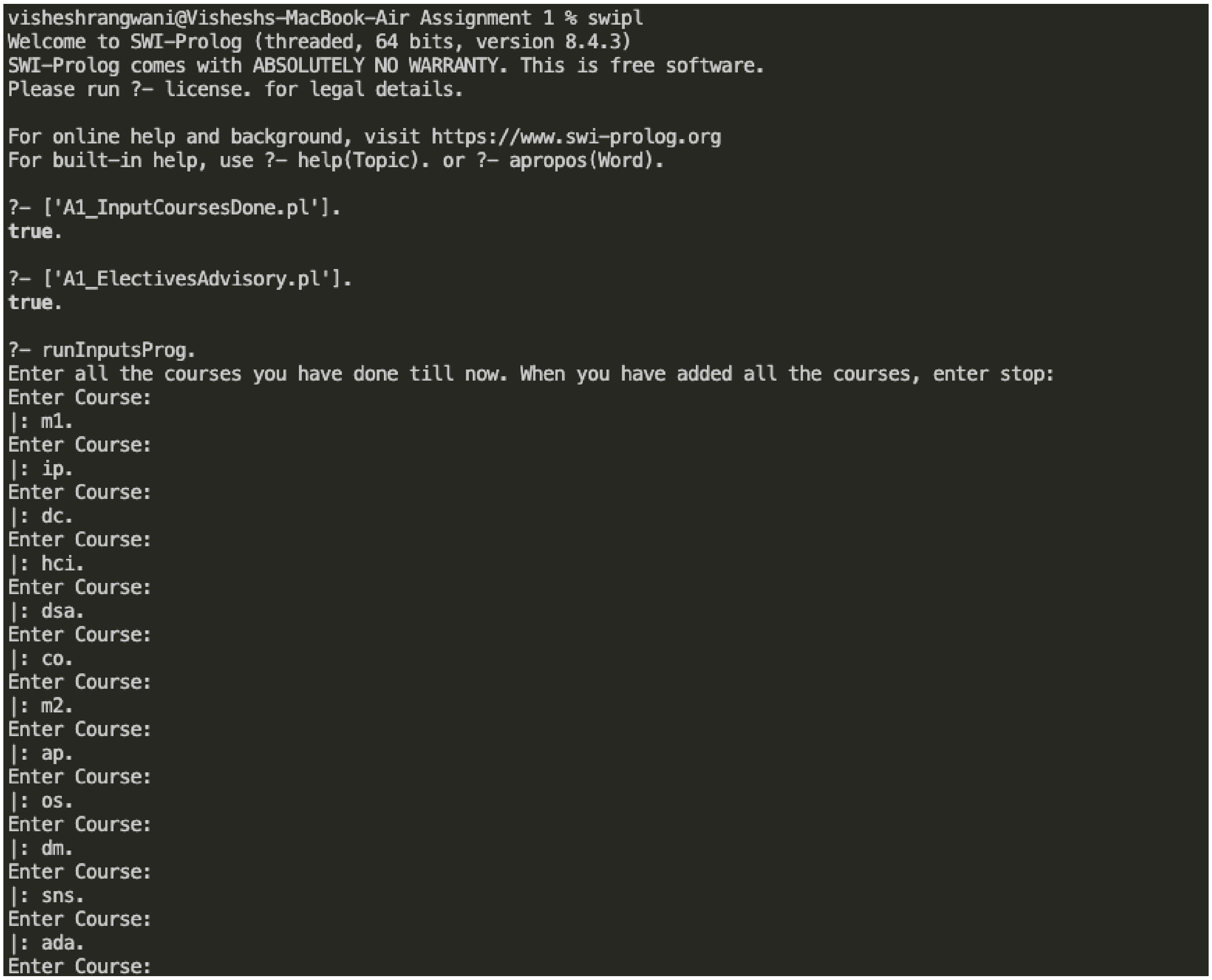
AI system not only suggests you the courses but also shows the Review of the students who have done that particular course in the past.

Flow Diagram of the Program:

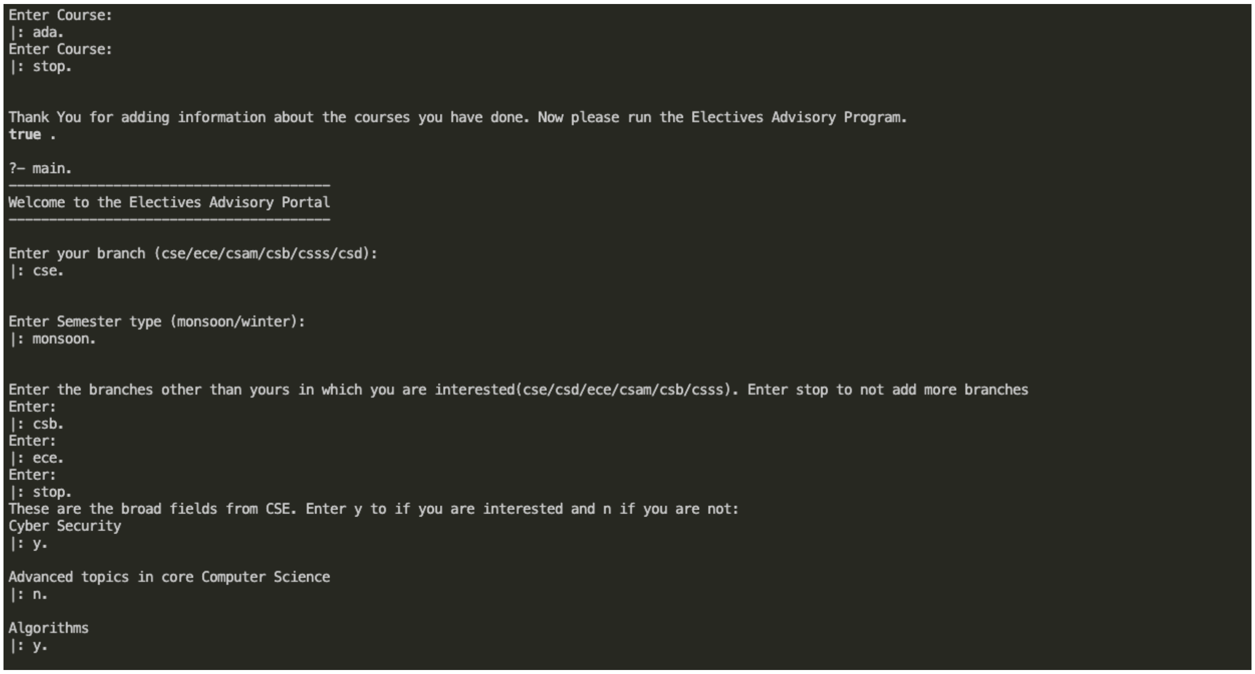


Sample Outputs:

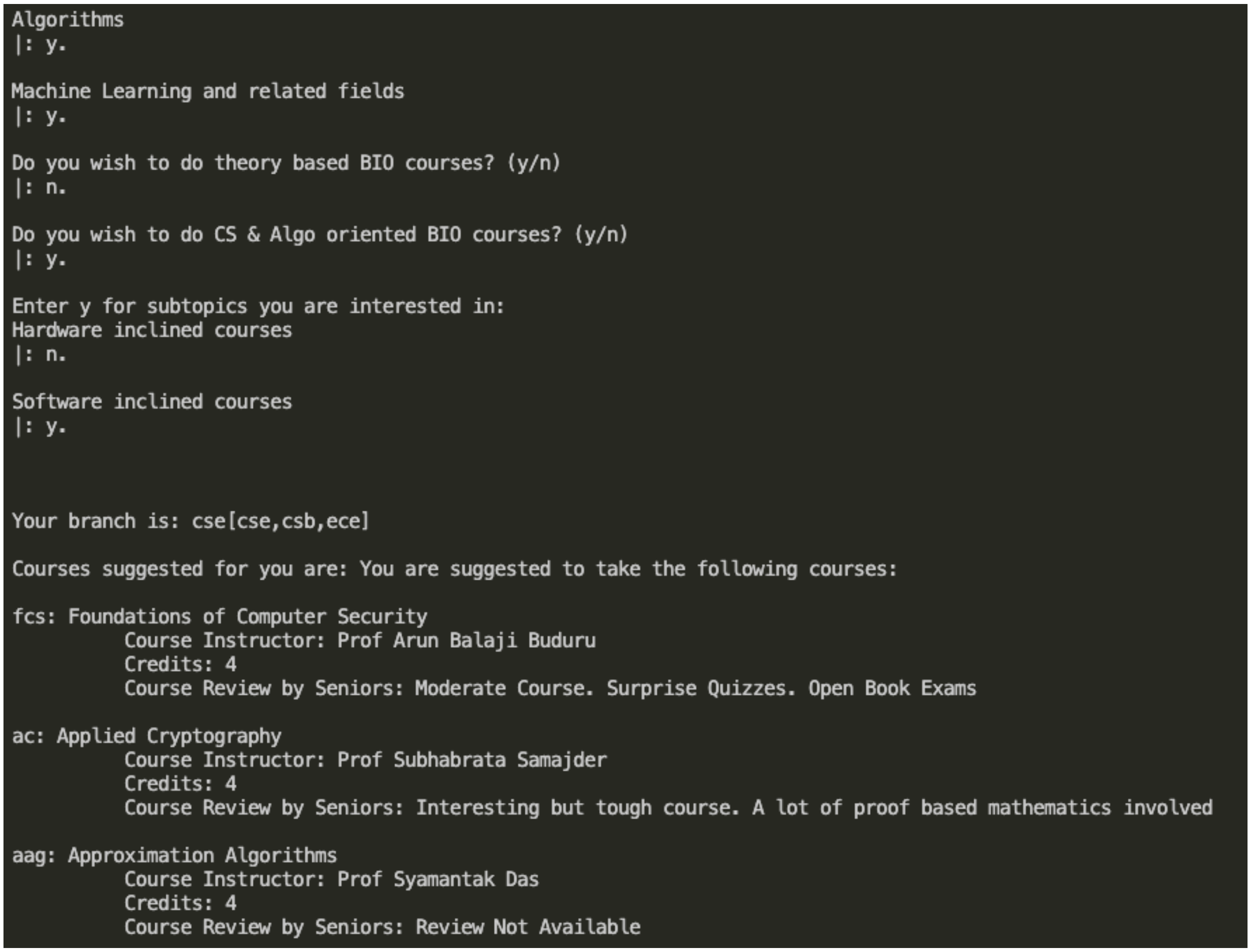
- For a CSE student who wishes to do Minor in Quantitative Biology and is interested in software oriented ECE courses gets the following recommendations based on pre-requisite and anti-requisites, determined by his input of courses done. The output is for monsoon semester. AI program also considers specific specializations he wishes to do in particular domains. Courses' review by seniors also shown.



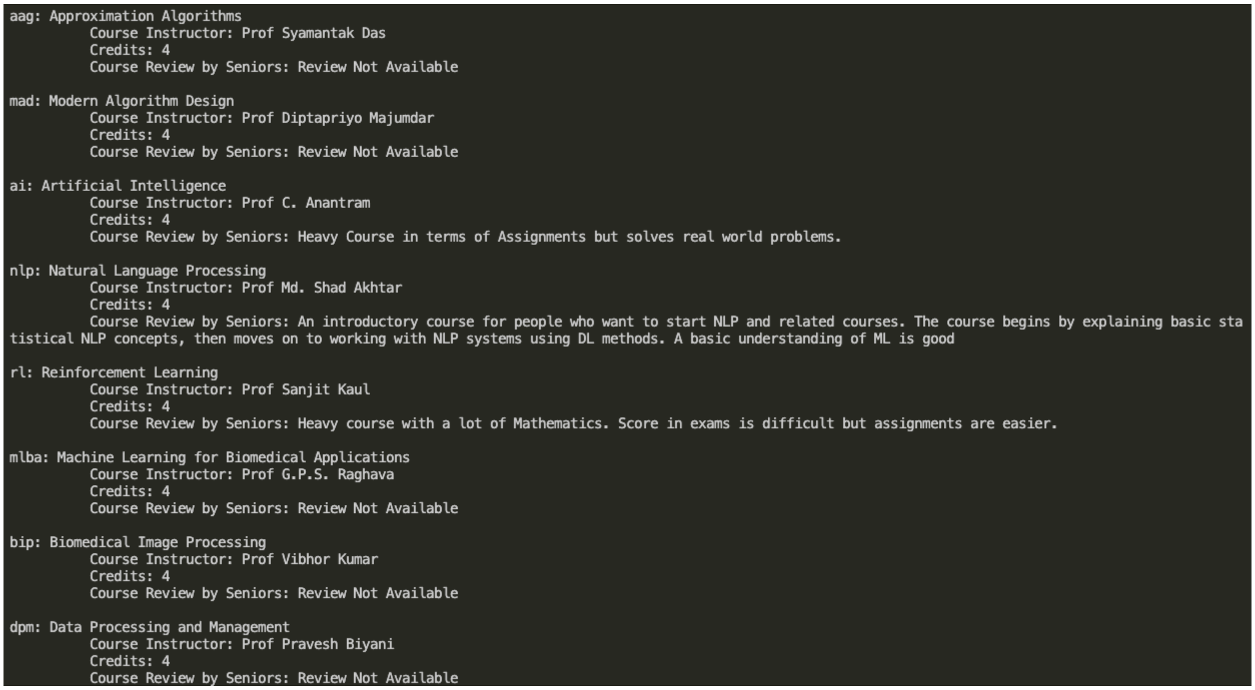
```
visheshrangwani@Visheshs-MacBook-Air Assignment 1 % swipl
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.3)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- ['A1_InputCoursesDone.pl'].
true.

?- ['A1_ElectivesAdvisory.pl'].
true.

?- runInputsProg.
Enter all the courses you have done till now. When you have added all the courses, enter stop:
Enter Course:
|: m1.
Enter Course:
|: ip.
Enter Course:
|: dc.
Enter Course:
|: hci.
Enter Course:
|: dsa.
Enter Course:
|: co.
Enter Course:
|: m2.
Enter Course:
|: ap.
Enter Course:
|: os.
Enter Course:
|: dm.
Enter Course:
|: sns.
Enter Course:
|: ada.
Enter Course:
```



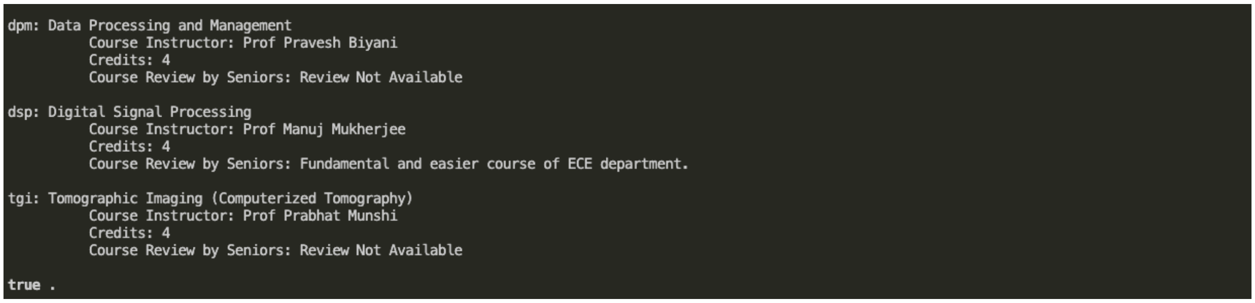
```
Enter Course:
|: ada.
Enter Course:
|: stop.


Thank You for adding information about the courses you have done. Now please run the Electives Advisory Program.
true .

?- main.
----------------------------------------
Welcome to the Electives Advisory Portal
----------------------------------------


Enter your branch (cse/ece/csam/csb/csss/csd):
|: cse.


Enter Semester type (monsoon/winter):
|: monsoon.


Enter the branches other than yours in which you are interested(cse/csd/ece/csam/csb/csss). Enter stop to not add more branches
Enter:
|: csb.
Enter:
|: ece.
Enter:
|: stop.
These are the broad fields from CSE. Enter y to if you are interested and n if you are not:
Cyber Security
|: y.

Advanced topics in core Computer Science
|: n.

Algorithms
|: y.
```



```
Algorithms
|: y.

Machine Learning and related fields
|: y.

Do you wish to do theory based BIO courses? (y/n)
|: n.

Do you wish to do CS & Algo oriented BIO courses? (y/n)
|: y.

Enter y for subtopics you are interested in:
Hardware inclined courses
|: n.

Software inclined courses
|: y.



Your branch is: cse[cse,csb,ece]

Courses suggested for you are: You are suggested to take the following courses:

fcs: Foundations of Computer Security
          Course Instructor: Prof Arun Balaji Buduru
          Credits: 4
          Course Review by Seniors: Moderate Course. Surprise Quizzes. Open Book Exams

ac: Applied Cryptography
          Course Instructor: Prof Subhabrata Samajder
          Credits: 4
          Course Review by Seniors: Interesting but tough course. A lot of proof based mathematics involved

aag: Approximation Algorithms
          Course Instructor: Prof Syamantak Das
          Credits: 4
          Course Review by Seniors: Review Not Available
```

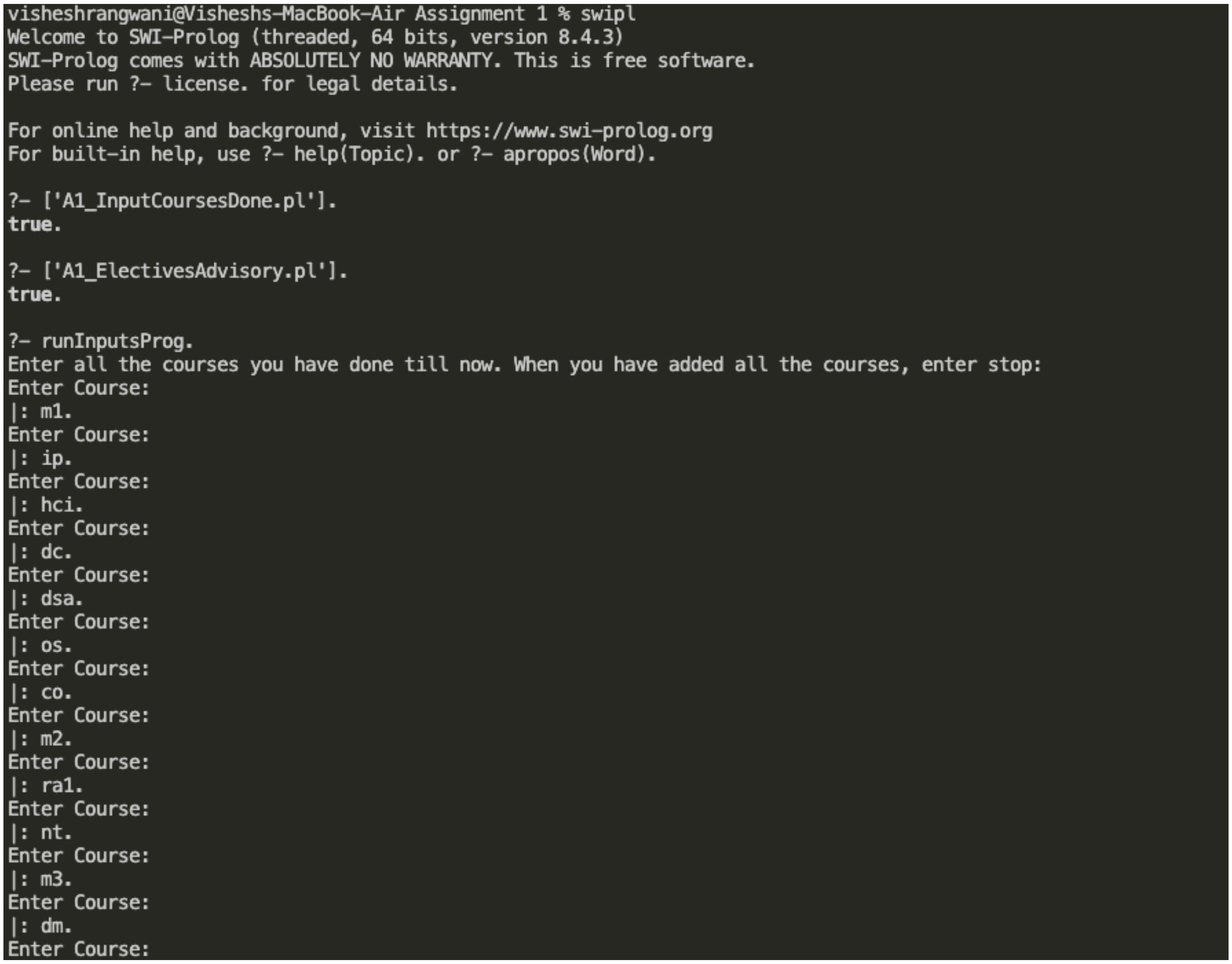


```
aag: Approximation Algorithms
          Course Instructor: Prof Syamantak Das
          Credits: 4
          Course Review by Seniors: Review Not Available

mad: Modern Algorithm Design
          Course Instructor: Prof Diptapriyo Majumdar
          Credits: 4
          Course Review by Seniors: Review Not Available

ai: Artificial Intelligence
          Course Instructor: Prof C. Anantram
          Credits: 4
          Course Review by Seniors: Heavy Course in terms of Assignments but solves real world problems.

nlp: Natural Language Processing
          Course Instructor: Prof Md. Shad Akhtar
          Credits: 4
          Course Review by Seniors: An introductory course for people who want to start NLP and related courses. The course begins by explaining basic sta
tistical NLP concepts, then moves on to working with NLP systems using DL methods. A basic understanding of ML is good

rl: Reinforcement Learning
          Course Instructor: Prof Sanjit Kaul
          Credits: 4
          Course Review by Seniors: Heavy course with a lot of Mathematics. Score in exams is difficult but assignments are easier.

mlba: Machine Learning for Biomedical Applications
          Course Instructor: Prof G.P.S. Raghava
          Credits: 4
          Course Review by Seniors: Review Not Available

bip: Biomedical Image Processing
          Course Instructor: Prof Vibhor Kumar
          Credits: 4
          Course Review by Seniors: Review Not Available

dpm: Data Processing and Management
          Course Instructor: Prof Pravesh Biyani
          Credits: 4
          Course Review by Seniors: Review Not Available
```

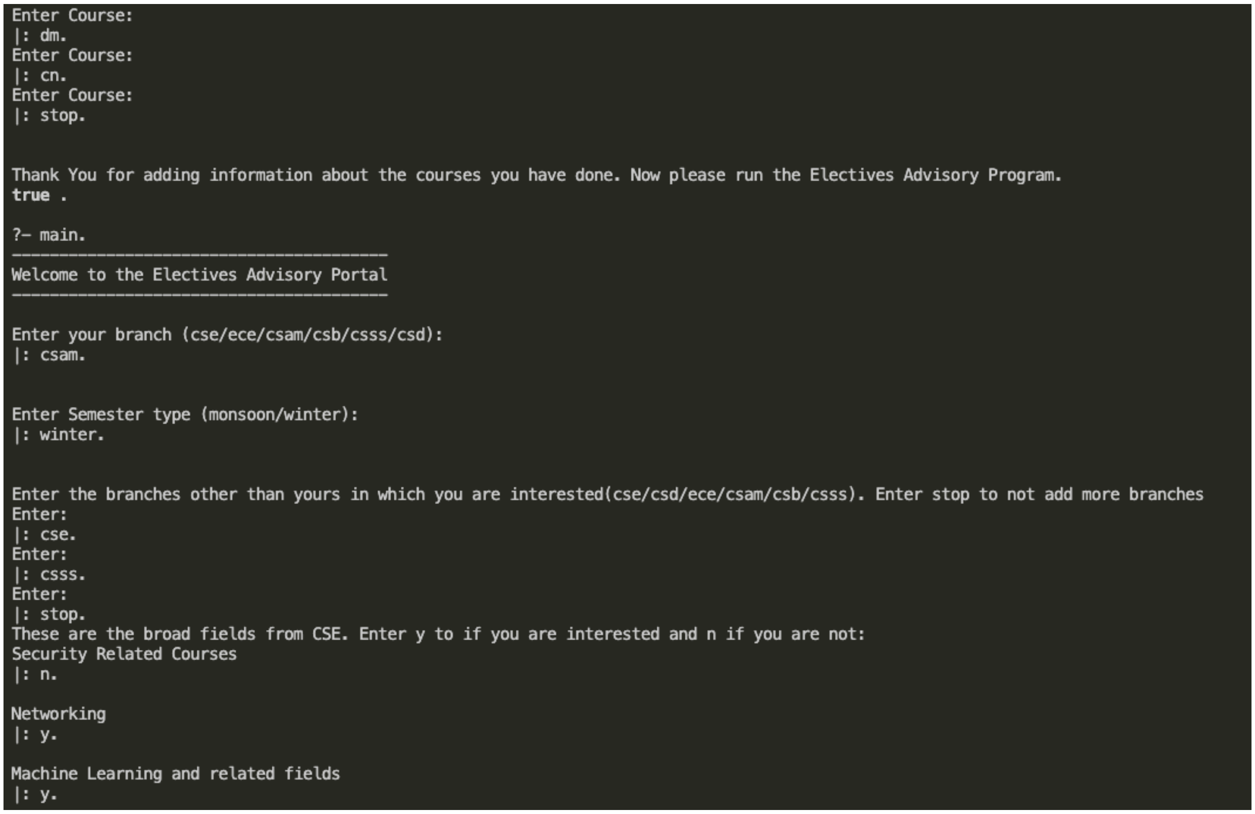


```
dpm: Data Processing and Management
          Course Instructor: Prof Pravesh Biyani
          Credits: 4
          Course Review by Seniors: Review Not Available

dsp: Digital Signal Processing
          Course Instructor: Prof Manuj Mukherjee
          Credits: 4
          Course Review by Seniors: Fundamental and easier course of ECE department.

tgi: Tomographic Imaging (Computerized Tomography)
          Course Instructor: Prof Prabhat Munshi
          Credits: 4
          Course Review by Seniors: Review Not Available

true .
```

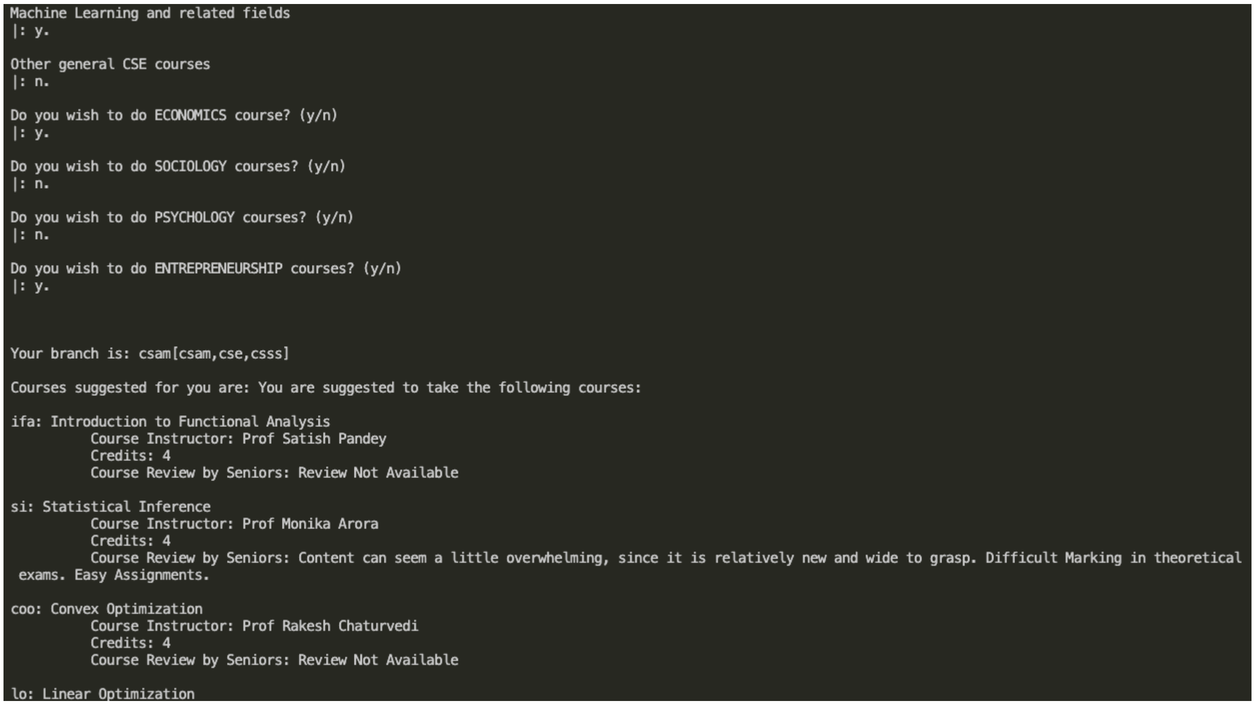
- The following output is for a CSAM student, who wishes to do courses from CSE department and also complete his SSH requirements. He wishes to get course suggestions for Winter Semester and would appreciate review of seniors.



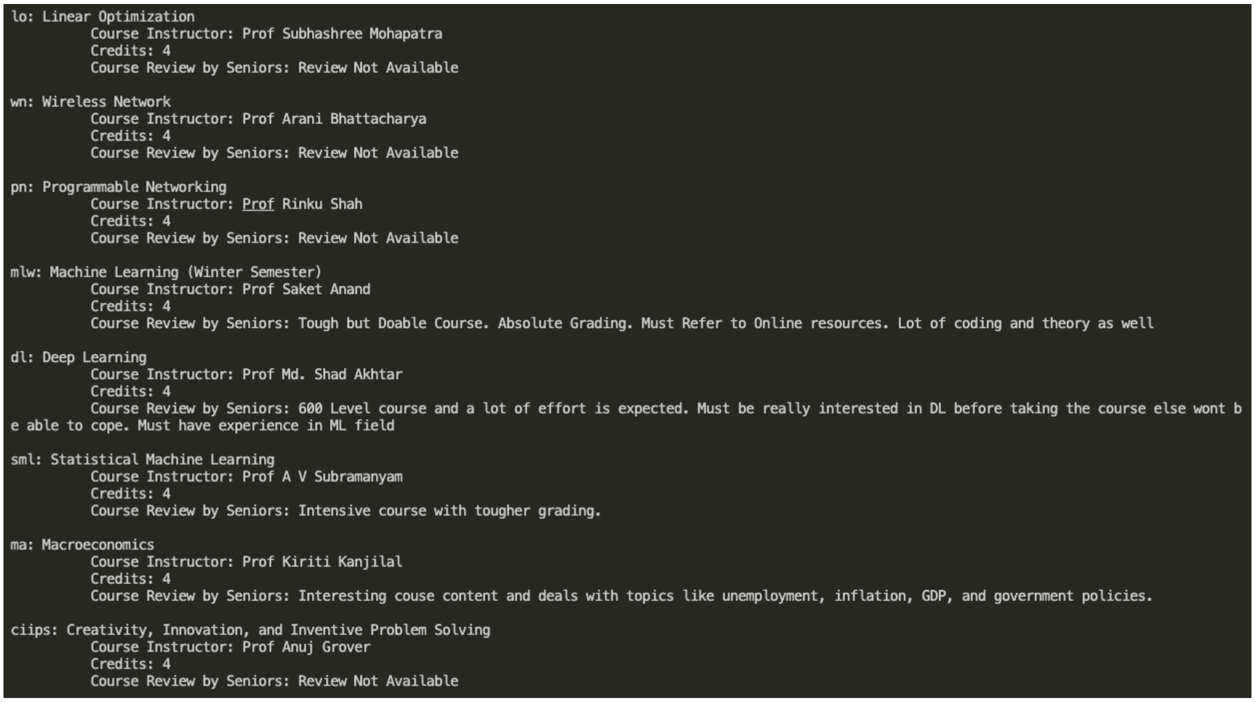
```
visheshrangwani@Visheshs-MacBook-Air Assignment 1 % swipl
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.3)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- ['A1_InputCoursesDone.pl'].
true.

?- ['A1_ElectivesAdvisory.pl'].
true.

?- runInputsProg.
Enter all the courses you have done till now. When you have added all the courses, enter stop:
Enter Course:
|: m1.
Enter Course:
|: ip.
Enter Course:
|: hci.
Enter Course:
|: dc.
Enter Course:
|: dsa.
Enter Course:
|: os.
Enter Course:
|: co.
Enter Course:
|: m2.
Enter Course:
|: ra1.
Enter Course:
|: nt.
Enter Course:
|: m3.
Enter Course:
|: dm.
Enter Course:
```



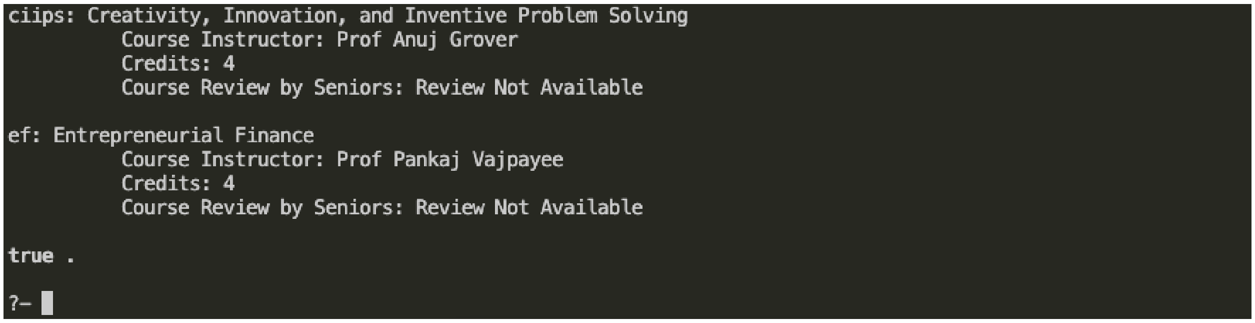
```
Enter Course:
|: dm.
Enter Course:
|: cn.
Enter Course:
|: stop.


Thank You for adding information about the courses you have done. Now please run the Electives Advisory Program.
true .

?- main.
----------------------------------------
Welcome to the Electives Advisory Portal
----------------------------------------

Enter your branch (cse/ece/csam/csb/csss/csd):
|: csam.


Enter Semester type (monsoon/winter):
|: winter.


Enter the branches other than yours in which you are interested(cse/csd/ece/csam/csb/csss). Enter stop to not add more branches
Enter:
|: cse.
Enter:
|: csss.
Enter:
|: stop.
These are the broad fields from CSE. Enter y to if you are interested and n if you are not:
Security Related Courses
|: n.

Networking
|: y.

Machine Learning and related fields
|: y.
```



```
Machine Learning and related fields
|: y.

Other general CSE courses
|: n.

Do you wish to do ECONOMICS course? (y/n)
|: y.

Do you wish to do SOCIOLOGY courses? (y/n)
|: n.

Do you wish to do PSYCHOLOGY courses? (y/n)
|: n.

Do you wish to do ENTREPRENEURSHIP courses? (y/n)
|: y.



Your branch is: csam[csam,cse,csss]

Courses suggested for you are: You are suggested to take the following courses:

ifa: Introduction to Functional Analysis
          Course Instructor: Prof Satish Pandey
          Credits: 4
          Course Review by Seniors: Review Not Available

si: Statistical Inference
          Course Instructor: Prof Monika Arora
          Credits: 4
          Course Review by Seniors: Content can seem a little overwhelming, since it is relatively new and wide to grasp. Difficult Marking in theoretical
 exams. Easy Assignments.

coo: Convex Optimization
          Course Instructor: Prof Rakesh Chaturvedi
          Credits: 4
          Course Review by Seniors: Review Not Available

lo: Linear Optimization
```



```
lo: Linear Optimization
          Course Instructor: Prof Subhashree Mohapatra
          Credits: 4
          Course Review by Seniors: Review Not Available

wn: Wireless Network
          Course Instructor: Prof Arani Bhattacharya
          Credits: 4
          Course Review by Seniors: Review Not Available

pn: Programmable Networking
          Course Instructor: Prof Rinku Shah
          Credits: 4
          Course Review by Seniors: Review Not Available

mlw: Machine Learning (Winter Semester)
          Course Instructor: Prof Saket Anand
          Credits: 4
          Course Review by Seniors: Tough but Doable Course. Absolute Grading. Must Refer to Online resources. Lot of coding and theory as well

dl: Deep Learning
          Course Instructor: Prof Md. Shad Akhtar
          Credits: 4
          Course Review by Seniors: 600 Level course and a lot of effort is expected. Must be really interested in DL before taking the course else wont b
e able to cope. Must have experience in ML field

sml: Statistical Machine Learning
          Course Instructor: Prof A V Subramanyam
          Credits: 4
          Course Review by Seniors: Intensive course with tougher grading.

ma: Macroeconomics
          Course Instructor: Prof Kiriti Kanjilal
          Credits: 4
          Course Review by Seniors: Interesting couse content and deals with topics like unemployment, inflation, GDP, and government policies.

ciips: Creativity, Innovation, and Inventive Problem Solving
          Course Instructor: Prof Anuj Grover
          Credits: 4
          Course Review by Seniors: Review Not Available
```



```
ciips: Creativity, Innovation, and Inventive Problem Solving
          Course Instructor: Prof Anuj Grover
          Credits: 4
          Course Review by Seniors: Review Not Available

ef: Entrepreneurial Finance
          Course Instructor: Prof Pankaj Vajpayee
          Credits: 4
          Course Review by Seniors: Review Not Available

true .

?- 
```

PROGRAM CODES:

For the file ‘A1_ElectivesAdvisory.pl’:

```
:- dynamic courseDone/1.


runInputsProg:-
   write('Enter all the courses you have done till now. When you have added all the
courses, enter stop: '), nl, inp_courses, nl, nl,
   write('Thank You for adding information about the courses you have done. Now please
run the Electives Advisory Program.'), nl.

inp_courses:-
   write('Enter Course: '), nl,
   read(CD),
   dif(CD, stop),
   assert(courseDone(CD)),
   inp_courses.

inp_courses.
```

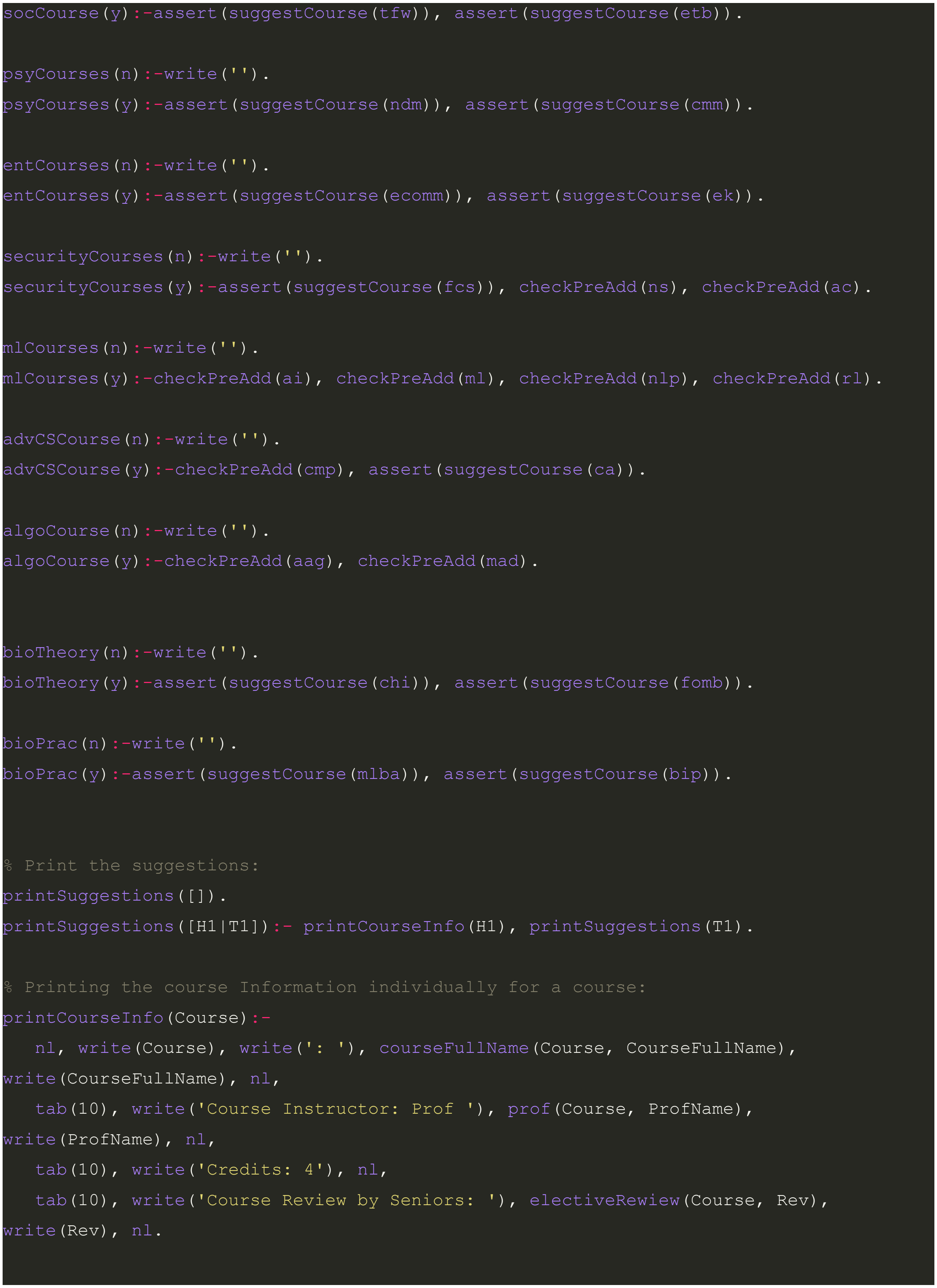
For the file ‘A1_ElectivesAdvisory.pl’:

```
:- dynamic suggestCourse/1.
:- dynamic courseDone/1.

% courseDone(nt).
% courseDone(ra1).
% courseDone(m1).
% courseDone(m2).
% % courseDone(m3).
% courseDone(ip).
% courseDone(dsa).
% courseDone(ap).
% courseDone(cn).
% courseDone(os).
% courseDone(sns).
% courseDone(hci).
```

```prolog
courseByBranch(cse, [fcs, ns, ac, ai, ml, nlp, rl, cmp, ca, aag, mad]).
courseByBranch(csb, monsoon, [mlba, bip, chi, fomb]).
courseByBranch(csss, monsoon, [gmt, ff, tfw, etb, ndm, cmm, ecomm, ek]).

main:-
   write('----------------------------------------'), nl,
   write('Welcome to the Electives Advisory Portal'), nl,
   write('----------------------------------------'), nl, nl,

   write('Enter your branch (cse/ece/csam/csb/csss/csd): '),nl,
   read(Branch),
   nl, nl,

   write('Enter Semester type (monsoon/winter): '),nl,
   read(SemesterType), nl, nl,

   % write('Enter courses done: '), nl, read(CD), assert(courseDone(CD)), nl,

   writeln('Enter the branches other than yours in which you are
interested(cse/csd/ece/csam/csb/csss). Enter stop to not add more branches'),
   addOtherDepts(OtherDepts),!,
   append([Branch], OtherDepts, DeptList),
   deptWiseCourses(SemesterType, DeptList),
   % getCourses(Branch, SemesterType),

   % write('Enter the value of X for check function: '),nl,
   % read(X), check(X),

   nl, nl, write('Your branch is: '), write(Branch), write(DeptList), nl, nl,
   write('Courses suggested for you are: '), findall(X, suggestCourse(X), Answer),
   write('You are suggested to take the following courses:'), nl,
printSuggestions(Answer), nl.

check(X):-X='yes', write('Y').
check(X):-X='no', write('N').

% Prints Course of 'Branch'
getCourses(Branch, SemesterType):-
   courseByBranch(Branch, SemesterType, Courses),
   nl, write('Possible Courses are: '),nl,
   write(Courses), nl.
```

```
% Add other branches in list, other than core branch.
addOtherDepts([NewDept|OtherDepts]):-
   write('Enter: '), nl,
   read(NewDept),
   dif(NewDept, stop),
   addOtherDepts(OtherDepts).

addOtherDepts([]).

% Print the courses based on selected streams in list
deptWiseCourses(_, []).
deptWiseCourses(SemesterType, [H|T]) :- getCourseSuggestion(H, SemesterType),
deptWiseCourses(SemesterType, T).


% To get the suggestion of the course based on branch
getCourseSuggestion(cse, monsoon):-
   write('These are the broad fields from CSE. Enter y to if you are interested and n
if you are not: '),nl,
   write('Cyber Security'), nl, read(X1), nl, securityCourses(X1),
   write('Advanced topics in core Computer Science'), nl, read(X2), nl,
advCSCourse(X2),
   write('Algorithms'), nl, read(X3), nl, algoCourse(X3),
   write('Machine Learning and related fields'), nl, read(X4), nl, mlCourses(X4).

getCourseSuggestion(csb, monsoon):-
   write('Do you wish to do theory based BIO courses? (y/n)'), nl, read(X5), nl,
bioTheory(X5),
   write('Do you wish to do CS & Algo oriented BIO courses? (y/n)'), nl, read(X6), nl,
bioPrac(X6).

getCourseSuggestion(csss, monsoon):-
   write('Do you wish to do ECONOMICS course? (y/n)'), nl, read(X7), nl,
ecoCourses(X7),
   write('Do you wish to do SOCIOLOGY courses? (y/n)'), nl, read(X8), nl,
socCourse(X8),
   write('Do you wish to do PSYCHOLOGY courses? (y/n)'), nl, read(X9), nl,
psyCourses(X9),
   write('Do you wish to do ENTREPRENEURSHIP courses? (y/n)'), nl, read(X10), nl,
entCourses(X10).
```

```
getCourseSuggestion(csam, monsoon):-
   checkPreAdd(cmpa),
   checkPreAdd(tnt),
   checkPreAdd(sc).

getCourseSuggestion(csd, monsoon):-
   assert(suggestCourse(iag)),
   assert(suggestCourse(davp)),
   checkPreAdd(df).

getCourseSuggestion(csb, winter):-
   write('Do you wish to do BIO courses related to DATA SCIENCE? (y/n)'), nl,
read(X11), nl, bioDataCourses(X11),
   write('Do you wish to do BIO related ALGORITHM courses? (y/n)'), nl, read(X12), nl,
biolArgo(X12).

getCourseSuggestion(csss, winter):-
   write('Do you wish to do ECONOMICS course? (y/n)'), nl, read(X13), nl,
ecoCoursesW(X13),
   write('Do you wish to do SOCIOLOGY courses? (y/n)'), nl, read(X14), nl,
socCourseW(X14),
   write('Do you wish to do PSYCHOLOGY courses? (y/n)'), nl, read(X15), nl,
psyCoursesW(X15),
   write('Do you wish to do ENTREPRENEURSHIP courses? (y/n)'), nl, read(X16), nl,
entCoursesW(X16).

getCourseSuggestion(csd, winter):-
   assert(suggestCourse(dis)),
   checkPreAdd(athcc),
   assert(suggestCourse(gdd)).

getCourseSuggestion(csam, winter):-
   checkPreAdd(ifa),
   checkPreAdd(si),
   checkPreAdd(coo),
   checkPreAdd(lo).

getCourseSuggestion(cse, winter):-
   write('These are the broad fields from CSE. Enter y to if you are interested and n
if you are not: '),nl,
   write('Security Related Courses'), nl, read(X17), nl, securityCoursesW(X17),
   write('Networking'), nl, read(X18), nl, networkCoursesW(X18),
   write('Machine Learning and related fields'), nl, read(X19), nl, mlCoursesW(X19),
   write('Other general CSE courses'), nl, read(X20), nl, otherCseW(X20).

getCourseSuggestion(ece, winter):-
   write('Enter y for subtopics you are interested in:'), nl,
   write('Communication related courses'), nl, read(X21), nl, commW(X21),
   write('Electronics Design'), nl, read(X22), nl, elecDesW(X22).

getCourseSuggestion(ece, monsoon):-
   write('Enter y for subtopics you are interested in:'), nl,
   write('Hardware inclined courses'), nl, read(X23), nl, hardWareM(X23),
   write('Software inclined courses'), nl, read(X24), nl, softWareM(X24).


hardWareM(n):-write('').
hardWareM(y):-
   assert(suggestCourse(icf)),
   assert(suggestCourse(qmd)).

softWareM(n):-write('').
softWareM(y):-
   assert(suggestCourse(dpm)),
   checkPreAdd(dsp),
   checkPreAdd(tgi).


commW(n):-write('').
commW(y):-
   checkPreAdd(rs),
   checkPreAdd(pdcs).

elecDesW(n):-write('').
elecDesW(y):-
   assert(suggestCourse(vdf)),
   checkPreAdd(aeld).




securityCoursesW(n):-write('').
securityCoursesW(y):-
   assert(suggestCourse(tmc)),
   checkPreAdd(tacs),
   checkPreAdd(nssii).

networkCoursesW(n):-write('').
networkCoursesW(y):-
   checkPreAdd(wn),
   checkPreAdd(pn).

otherCseW(n):-write('').
otherCseW(y):-
   checkPreAdd(mc),
   checkPreAdd(fpp),
   checkPreAdd(gpu).

mlCoursesW(n):-write('').
mlCoursesW(y):-
   checkPreAdd(mlw),
   assert(suggestCourse(dl)),
   checkPreAnti(sml).

ecoCoursesW(n):-write('').
ecoCoursesW(y):-assert(suggestCourse(ma)).

socCourseW(n):-write('').
socCourseW(y):-assert(suggestCourse(its)), assert(suggestCourse(ast)).

psyCoursesW(n):-write('').
psyCoursesW(y):-assert(suggestCourse(sp)), assert(suggestCourse(lm)).

entCoursesW(n):-write('').
entCoursesW(y):-assert(suggestCourse(ciips)), assert(suggestCourse(ef)).


bioDataCourses(n):-write('').
bioDataCourses(y):-assert(suggestCourse(bdmh)), assert(suggestCourse(dsg)).

bioAlgo(n):-write('').
bioAlgo(y):- assert(suggestCourse(acb)), assert(suggestCourse(cmor)).

ecoCourses(n):-write('').
ecoCourses(y):-assert(suggestCourse(gmt)), assert(suggestCourse(ff)).

socCourse(n):-write('').
```



```prolog
socCourse(y):-assert(suggestCourse(tfw)), assert(suggestCourse(etb)).

psyCourses(n):-write('').
psyCourses(y):-assert(suggestCourse(ndm)), assert(suggestCourse(cmm)).

entCourses(n):-write('').
entCourses(y):-assert(suggestCourse(ecomm)), assert(suggestCourse(ek)).

securityCourses(n):-write('').
securityCourses(y):-assert(suggestCourse(fcs)), checkPreAdd(ns), checkPreAdd(ac).

mlCourses(n):-write('').
mlCourses(y):-checkPreAdd(ai), checkPreAdd(ml), checkPreAdd(nlp), checkPreAdd(rl).

advCSCourse(n):-write('').
advCSCourse(y):-checkPreAdd(cmp), assert(suggestCourse(ca)).

algoCourse(n):-write('').
algoCourse(y):-checkPreAdd(aag), checkPreAdd(mad).


bioTheory(n):-write('').
bioTheory(y):-assert(suggestCourse(chi)), assert(suggestCourse(fomb)).

bioPrac(n):-write('').
bioPrac(y):-assert(suggestCourse(mlba)), assert(suggestCourse(bip)).


% Print the suggestions:
printSuggestions([]).
printSuggestions([H1|T1]):- printCourseInfo(H1), printSuggestions(T1).

% Printing the course Information individually for a course:
printCourseInfo(Course):-
   nl, write(Course), write(': '), courseFullName(Course, CourseFullName),
write(CourseFullName), nl,
   tab(10), write('Course Instructor: Prof '), prof(Course, ProfName),
write(ProfName), nl,
   tab(10), write('Credits: 4'), nl,
   tab(10), write('Course Review by Seniors: '), electiveRewiew(Course, Rev),
write(Rev), nl.
```

```prolog
% Details of the courses:

courseFullName(fcs, 'Foundations of Computer Security').
courseFullName(ns, 'Network Security').
courseFullName(ac, 'Applied Cryptography').
courseFullName(ai, 'Artificial Intelligence').
courseFullName(ml, 'Machine Learning').
courseFullName(nlp, 'Natural Language Processing').
courseFullName(rl, 'Reinforcement Learning').
courseFullName(cmp, 'Compilers').
courseFullName(ca, 'Computer Architecture').
courseFullName(aag, 'Approximation Algorithms').
courseFullName(mad, 'Modern Algorithm Design').
courseFullName(mlba, 'Machine Learning for Biomedical Applications').
courseFullName(bip, 'Biomedical Image Processing').
courseFullName(chi, 'Cheminformatics').
courseFullName(fomb, 'Foundations of Modern Biology').
courseFullName(gmt, 'Game Theory').
courseFullName(ff, 'Foundations of Finance').
courseFullName(tfw, 'Technology and the Future of Work').
courseFullName(etb, 'Enhancement Technologies and the Body').
courseFullName(ndm, 'Neuroscience of Decision Making').
courseFullName(cmm, 'Cognition of Motor Movement').
courseFullName(ecomm, 'Entrepreneurial Communication').
courseFullName(ek, 'Entrepreneurial Khichadi').
courseFullName(tnt, 'Topics in Number Theory').
courseFullName(cmpa, 'Complex Analysis').
courseFullName(sc, 'Scientific Computing').
courseFullName(iag, 'Introduction to Animation and Graphics').
courseFullName(davp, 'Digital Audio & Video Production Workflow').
courseFullName(df, 'Design Futures').
courseFullName(cmor, 'Computational Methods in Oncology Research').
courseFullName(bdmh, 'Big Data Mining in Healthcare').
courseFullName(acb, 'Algorithms in Computational Biology').
courseFullName(dsg, 'Data science in Genomics').
courseFullName(ma, 'Macroeconomics').
courseFullName(its, 'Information Technology and Society').
courseFullName(ast, 'Advanced Sociological Theory').
courseFullName(sp, 'Social Psychology').
courseFullName(lm, 'Learning and Memory').
courseFullName(ciips, 'Creativity, Innovation, and Inventive Problem Solving').
courseFullName(ef, 'Entrepreneurial Finance').
courseFullName(athcc, 'Advanced Topics in Human-Centered Computing').
courseFullName(dis, 'Design of Interactive Systems').
courseFullName(gdd, 'Game Design and Development').
courseFullName(si, 'Statistical Inference').
courseFullName(coo, 'Convex Optimization').
courseFullName(lo, 'Linear Optimization').
courseFullName(ifa, 'Introduction to Functional Analysis').
courseFullName(mlw, 'Machine Learning (Winter Semester)').
courseFullName(dl, 'Deep Learning').
courseFullName(mc, 'Mobile Computing').
courseFullName(fpp, 'Foundation of Parallel Programming').
courseFullName(gpu, 'GPU Computing').
courseFullName(wn, 'Wireless Network').
courseFullName(pn, 'Programmable Networking').
courseFullName(tmc, 'Theory of Modern cryptography').
courseFullName(tacs, 'Topics in Adaptive Cybersecurity').
courseFullName(nssii, 'Networks and System Security II').
courseFullName(sml, 'Statistical Machine Learning').
courseFullName(rs, 'Radar Systems / Antenna').
courseFullName(pdcs, 'Principles of Digital Communication Systems').
courseFullName(vdf, 'VLSI Design Flow').
courseFullName(aeld, 'Advanced Embedded Logic Design').
courseFullName(dpm, 'Data Processing and Management').
courseFullName(dsp, 'Digital Signal Processing').
courseFullName(tgi, 'Tomographic Imaging (Computerized Tomography)').
courseFullName(qmd, 'Quantum Materials and Devices').
courseFullName(icf, 'Integrated Circuit Fabrication').
% add prof


prof(fcs, 'Arun Balaji Buduru').
prof(ns, 'B N Jain').
prof(ac, 'Subhabrata Samajder').
prof(ai, 'C. Anantram').
prof(ml, 'Jainendra Shukla').
prof(nlp, 'Md. Shad Akhtar').
prof(rl, 'Sanjit Kaul').
prof(cmp, 'Piyus Kedia').
prof(ca, 'Sujay Deb').
prof(aag, 'Syamantak Das').
prof(mad, 'Diptapriyo Majumdar').
prof(mlba, 'G.P.S. Raghava').
prof(bip, 'Vibhor Kumar').
prof(chi, 'N. Arul Murugan').
prof(fomb, 'Vibhor Kumar').
prof(gmt, 'Kiriti Kanjilal').
prof(ff, 'Pankaj Vajpayee').
prof(tfw, 'Gayatri Nair').
prof(etb, 'Paro Mishra').
prof(ndm, 'Mrinmoy Chakrabarty').
prof(cmm, 'Sonia Baloni Ray').
prof(ecomm, 'Payel Mukherjee').
prof(ek, 'Anupam Saronwala').
prof(tnt, 'Anuradha Sharma').
prof(cmpa, 'Ashish Kumar Pandey').
prof(sc, 'Kaushik Kalyanaraman').
prof(iag, 'Anoop Ratn').
prof(davp, 'Aman Samuel').
prof(df, 'Grace Eden').
prof(cmor, 'Debarka Sen Gupta').
prof(bdmh, 'G P S Raghava').
prof(dsg, 'Vibhor Kumar').
prof(acb, 'Arul Murugan').
prof(ma, 'Kiriti Kanjilal').
prof(its, 'Amrit Srinivasan').
prof(ast, 'Gayatri Nair').
prof(sp, 'Venkata Ratnadeep Suri').
prof(lm, 'Mrinmoy Chakrabarty').
prof(ciips, 'Anuj Grover').
prof(ef, 'Pankaj Vajpayee').
prof(athcc, 'Pushpendra Singh').
prof(dis, 'Grace Eden').
prof(gdd, 'Aman Samuel').
prof(si, 'Monika Arora').
prof(coo, 'Rakesh Chaturvedi').
prof(lo, 'Subhashree Mohapatra').
prof(ifa, 'Satish Pandey').
prof(mlw, 'Saket Anand').
prof(dl, 'Md. Shad Akhtar').
prof(mc, 'Mukulika Maity').
prof(fpp, 'Vivek Kumar').
prof(gpu, 'Ojaswa Sharma').
prof(wn, 'Arani Bhattacharya').
prof(pn, 'Rinku Shah').
prof(nssii, 'Sambuddho Chakravarty').
prof(tmc, 'Donghoon Chang').
prof(tacs, 'Arun Balaji Buduru').
prof(sml, 'A V Subramanyam').
prof(rs, 'Shobha Sundaram').
prof(pdcs, 'Anand Srivastava').
prof(vdf, 'Sneh Surabh').
prof(aeld, 'Sumit Darak').
prof(dpm, 'Pravesh Biyani').
prof(dsp, 'Manuj Mukherjee').
prof(tgi, 'Prabhat Munshi').
prof(icf, 'S S Jamuar').
prof(qmd, 'Ram Krishna Ghosh').
% Add pre req


% Adding Pre Requisites:
preReq(tnt, [nt]).
preReq(cmpa, [ra1, xyz]).
preReq(sc, [m1]).
preReq(df, [dis]).
preReq(athcc, [hci]).
preReq(si, [m2]).
preReq(lo, [m1]).
preReq(coo, [m1]).
preReq(ifa, [m1]).
preReq(mlw, [m1, m2, ip, m3]).
preReq(mc, [ip]).
preReq(fpp, [ip, dsa, ap]).
preReq(gpu, [ip]).
preReq(wn, [cn]).
preReq(pn, [dsa, os, cn]).
preReq(tacs, [fcs]).
preReq(nssii, [cn, os]).
preReq(sml, [ip, m2]).
preReq(rs, [sns]).
preReq(pdcs, [pcs]).
preReq(aeld, [eld]).
preReq(dsp, [sns]).
preReq(tgi, [m1]).
preReq(ac, [dm]).
preReq(ns, [cn]).
preReq(ai, [dm]).
preReq(ml, [m1, m2, ip, m3]).
preReq(nlp, [m1, m2, ip, ada]).
preReq(rl, [m2]).
preReq(cmp, [m1, ip, dsa, ap]).
preReq(aag, [ada]).
preReq(mad, [ada]).


% Adding the anti-requisites:
antiReq(sml, pr).

% Adding reviews for each course
% Source for Reviews: Shared Elective Review Sheet
electiveRewiew(fcs, 'Moderate Course. Surprise Quizzes. Open Book Exams').
electiveRewiew(ns, 'Reviews not available').
electiveRewiew(ac, 'Interesting but tough course. A lot of proof based mathematics
involved').
electiveRewiew(ai, 'Heavy Course in terms of Assignments but solves real world
problems.').
electiveRewiew(ml, 'Theory Part was lesser. Familiarity with ML required. Lectures are
not sufficient.').
electiveRewiew(nlp, 'An introductory course for people who want to start NLP and
related courses. The course begins by explaining basic statistical NLP concepts, then
moves on to working with NLP systems using DL methods. A basic understanding of ML is
good').
electiveRewiew(rl, 'Heavy course with a lot of Mathematics. Score in exams is
difficult but assignments are easier.').
electiveRewiew(cmp, 'Review Not Available').
electiveRewiew(ca, 'Application based course. Learn about Gem5. Theory used in
project. Lot of evaluation components.' ).
electiveRewiew(aag, 'Review Not Available').
electiveRewiew(mad, 'Review Not Available').
electiveRewiew(mlba, 'Review Not Available').
electiveRewiew(bip, 'Review Not Available').
electiveRewiew(chi, 'Review Not Available').
electiveRewiew(fomb, 'Review Not Available').
electiveRewiew(gmt, 'Introductory course. Intro to to the notations and basic
ideas.').
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electiveRewiew(ff, 'The course offers good knowledge about basics of finance like
balance sheets, shares etc. and would help in real-life situations. It is a
high-scoring, low workload course').
electiveRewiew(tfw, 'Review Not Available').
electiveRewiew(etb, 'Review Not Available').
electiveRewiew(ndm, 'Review Not Available').
electiveRewiew(cmm, 'Review Not Available').
electiveRewiew(ecomm, 'Review Not Available').
electiveRewiew(ek, 'Review Not Available').
electiveRewiew(tnt, 'Review Not Available').
electiveRewiew(cmpa, 'Nice and Accommodating professor. Certain Prerequisites for
taking up course, to be discussed with sir.').
electiveRewiew(sc, 'Easier and less proof intensive Math course. Nice professor.
Higher grading percentages.').
electiveRewiew(iag, 'Review Not Available').
electiveRewiew(davp, 'Review Not Available').
electiveRewiew(df, 'Review Not Available').
electiveRewiew(cmor, 'Review Not Available').
electiveRewiew(bdmh, 'Review Not Available').
electiveRewiew(acb, 'Review Not Available').
electiveRewiew(dsg, 'Review Not Available').
electiveRewiew(ma, 'Interesting couse content and deals with topics like unemployment,
inflation, GDP, and government policies.').
electiveRewiew(its, 'Review Not Available').
electiveRewiew(ast, 'Review Not Available').
electiveRewiew(sp, 'Review Not Available').
electiveRewiew(lm, 'Very Light course, so difficult grading slabs.').
electiveRewiew(ciips, 'Review Not Available').
electiveRewiew(ef, 'Review Not Available').
electiveRewiew(athcc, 'Research intensive course in the domain of HCI. Lectures boring
at times.').
electiveRewiew(dis, 'Core course for DES students. Interesting Project but lengthy
exams.').
electiveRewiew(gdd, 'Learn game development using the unreal engine. Better to know
design tools beforehand').
electiveRewiew(si, 'Content can seem a little overwhelming, since it is relatively new
and wide to grasp. Difficult Marking in theoretical exams. Easy Assignments.').
electiveRewiew(coo, 'Review Not Available').
electiveRewiew(lo, 'Review Not Available').
electiveRewiew(ifa, 'Review Not Available').
electiveRewiew(mlw, 'Tough but Doable Course. Absolute Grading. Must Refer to Online
resources. Lot of coding and theory as well').
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electiveRewiew(dl, '600 Level course and a lot of effort is expected. Must be really
interested in DL before taking the course else wont be able to cope. Must have
experience in ML field').
electiveRewiew(mc, 'Covers the fundamentals of Android and some concepts of wireless
networks. Lot of Android programming and Hands on. Wireless networks also taught.').
electiveRewiew(fpp, 'Review Not Available').
electiveRewiew(gpu, 'Higher workload. surprise quizzes. Lots of evaluations.
Interesting assignments. Attending Lectures is must.').
electiveRewiew(wn, 'Review Not Available').
electiveRewiew(pn, 'Review Not Available').
electiveRewiew(tmc, 'Review Not Available').
electiveRewiew(tacs, 'Review Not Available').
electiveRewiew(nssii, 'Review Not Available').
electiveRewiew(sml, 'Intensive course with tougher grading.').
electiveRewiew(rs, 'Review Not Available').
electiveRewiew(pdcs, 'Difficult theory. Project related to research paper. attending
classes and taking notes is recommended.').
electiveRewiew(vdf, 'High workload but great course for anyone interested in VLSI.').
electiveRewiew(aeld, 'Review Not Available').
electiveRewiew(dpm, 'Review Not Available').
electiveRewiew(dsp, 'Fundamental and easier course of ECE department.').
electiveRewiew(tgi, 'Review Not Available').
electiveRewiew(qmd, 'Review Not Available').
electiveRewiew(icf, 'Review Not Available.').


checkPreAdd(CheckForCourse):-
   preReq(CheckForCourse, X), list_length(X, P, Q), ((P=Q,
assert(suggestCourse(CheckForCourse)),!); (write(''), !)).


checkPreAnti(CheckForCourse2):-
   checkPreAdd(CheckForCourse2), ((courseDone(pr), retract(suggestCourse(sml))) ;
(write(''))).


list_length([],0,0).
list_length([H|TAIL],N,Len) :- list_length(TAIL,N1, N2), N is N1 + 1, ((courseDone(H),
Len is N2+1); Len is N2).
```

References:

TechTree for IIITD
Tutorial Point course for Prolog
Official Prolog documentation
Lecture Slides
Review of Electives Doc