A Systematic Approach for Generating the Prerequisite Charts Used in Student Advising in Universities

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Abstract - Advising is a very important process in helping students graduate on time. Many universities are using experienced Advisors and/or various software tools to assist in the advising process. This work presents a systematic way to generate the prerequisite charts from a catalog of courses. Due to both prerequisite and corequisite relationships, we defined a new data structure. We called it *Bicycle Acyclic Graph*, and to the best of our knowledge it is novel. This graph is now part of our department's public policy related to student advisement.

Category: Societal Implications/Quality of Life/Public Policy - global education & human resources, ethics and professional responsibility.

I. Introduction

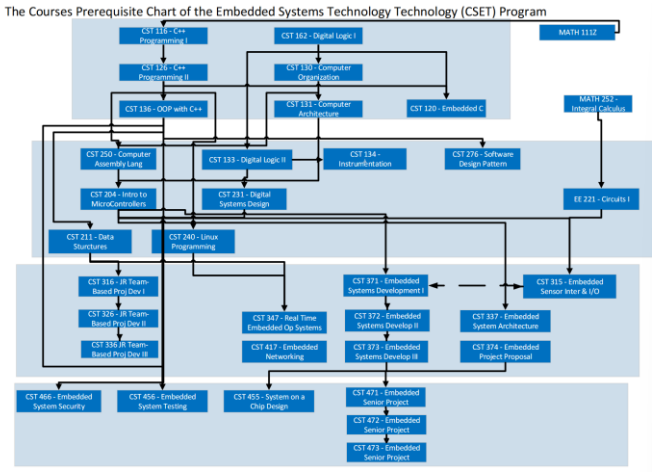
If a course requires a prerequisite course or needs to be taken during a specific semester or term, an advisor is knowledgeable enough to guide students through that decision-making process. [1]

ABET accreditation requires an outstanding advising process to help students graduate on time. This can be achieved using experienced Advisors, prerequisite charts, software assisting the student, and more.

If the student has graduated from an CAC/EAC/ETAC of ABET-accredited Bachelor program, then the presumption is that these prerequisites/ corequisites have been satisfied. Otherwise, the program must ensure that each student attains these post-secondary educational and professional experiences. [2]

II. The System Model

Our systematic approach is simply searching in the database of courses of each program (Embedded Systems Technology, Computer Engineering Technology, Software Engineering Technology) and creating the dependencies



The transitive closure of *PCG* is the relationship obtained by composing *PR* and *CR* in *PCG*, denoted *PCG+*. For example, a level 1 course A is a prerequisite for a level 4 course B if there is a path in *PCG* from A to B.

Graph *PCG* is a special one like the so-called traditional *Directed Acyclic Graph* (*DAG*), but still different because it accepts cycles of size two. However, neither *PCG* nor *DAG* allows the paths to go back toward the first level of courses (freshman). We call this new data structure a *Bicycle Acyclic Graph* (*BAG*). In other words, a *PCG* cannot go up likewise a *DAG*, but it can be on the same level due to the bicycle generated by the corequisite relationship. Formally, a *BAG* is a graph such that for any courses A and B from *BAG*, there is a path from A to B using *PR* and *CR* relationships.

III. Findings

It is the student's and advisor's responsibility to have the PRC data structure expedite toward an effective advisement process. It is now part of our department's public policy related to student advisement.

Conclusion

Our work presented our systematic approach to generate the prerequisite chart for all three CSET programs at Oregon Tech. In the future, we intend to fully automate the process of extracting the

relationships: prerequisite and corequisite. Let us denote by A and B two arbitrary courses. We say that A is a prerequisite of B, denoted as A --> B, if A is listed as a prerequisite course of B in the course catalog. We say A is a corequisite of B, denoted as A <--> B, if A is listed as a corequisite of course B or B is listed as a corequisite of A in the course catalog.

Our work contains the *Prerequisite Relation* (*PR*) and *Corequisite Relationship* (*CR*), as our data structure, denoted the *Prerequisite Corequisite Graph* (*PCG*). Note that *CR* is a symmetric relationship, that is, if A *CR* B, then B *CR* A. Obviously, this is not the case in the *PR* relationship.

prerequisite relations by automatically parsing the catalog of course files.

References

[1] U.S. Department of Education, The Importance of Academic Advising in Higher Education. August 10, 2022 [downloaded on February 1, 2024 from https://blog.ed.gov/2022/08/the-importance-of-academic-advising-in-higher-education/] [2] Criteria for Accrediting Engineering Programs, 2022 – 2023, [downloaded on February 1, 2024, from https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2022-2023/]