Critical Analysis of Course Pre-requisites

Shashi Kaparthi, Ph.D., Director, Institutional Research
Ben Schafer, Ph.D., Associate Professor of Computer Science
Pat Hart, Office of Institutional Research

University of Northern Iowa
Motivation

- Recent Focus on College Affordability by the Congress, the Department of Education, the Board of Regents etc.

- College Affordability
  - Depends on Tuition Rates and Financial Aid
  - Depends on Time to Graduation

- Time to Graduation
  - Brainstorming Session Held Recently in the Enrollment Management Council
    - One possible strategy is to critically evaluate course pre-requisites and streamline them if possible (of course, without sacrificing academic rigor/standards)
Our Project Team

- Shashi Kaparthi
  Director, Institutional Research
  University of Northern Iowa

- Ben Schafer
  Associate Professor of Computer Science
  University of Northern Iowa

- Pat Hart
  Information Coordinator
  Office of Institutional Research
  University of Northern Iowa
Analysis

- We examined every course in the 2008-2010 catalog [http://www.uni.edu/catalog/](http://www.uni.edu/catalog/)

- Example:
  In-depth coverage of the theory and practice of financial accounting for assets, including accounting standards/concepts development, time value of money, and revenue recognition. Prerequisite(s): 120:030; 120:031; junior standing. (Offered Fall, Spring, and Summer)
Course Pre-requisites Chart:

- 120:129 Intermediate Accounting I
- 120:030 Prin Of Financial Acctng
- 120:031 Prin Of Managerial Acctng
- Junior standing
Another Example:
Another Example:

200:109  
Dev/Assessment  
Young Child

or

200:030  
Dynamics of Human Development  
or the equivalent

junior standing

consent of instructor
Another Example:

- 210:257 Coordnt Prog Gifted Talent
- 210:254 The Gifted & Talented
- 210:255 Educ Strategy Gift/Talent

or

and

consent of instructor
Getting from point A to point B

How did we get from:

   In-depth coverage of the theory and practice of financial accounting for assets, including accounting standards/concepts development, time value of money, and revenue recognition.
   Prerequisite(s): 120:030; 120:031; junior standing. (Offered Fall, Spring, and Summer)

 to

120:129
Intermediate Accounting I

120:030
Prin Of Financial Accntng

120:031
Prin Of Managerial Accntng

junior standing
Getting from point A to point B

1. Replaced all “natural language” phrases with special tags:
   - Example tags:
     - “junior standing” was replaced with <STD_JR>
     - “consent of instructor” was replaced with <CON_inst>
     - “15 hours in psychology” was replaced with <MH_psy_15>
   - Required some manual intervention to determine which tags were needed
   - Allowed us to adjust for slightly different wording of the same requirements
     - “enrollment requires admission to the MBA Program”
     - “requires admission to the MBA Program”
     - “admission to the MBA Program”
2. Built “proper” Boolean expressions
   - 120:030; 120:031; junior standing.
     - 120:030 AND 120:031 AND <STD_JR>
   - 810:036 or consent of instructor.
     - “810:036 OR <CON_inst>”
   - 200:030 or equivalent or consent of instructor; junior standing.
     - ( 200:030<NOTE_EQ> OR <CON_inst> ) AND <STD_Jnr>
   - 210:254; 210:255; or consent of instructor.
     - 210:254 AND 210:255 OR <CON_inst>
Getting from point A to point B

3. Converted each course’s Boolean expression to a DOT file
   - Dot is a plaintext graph description language.

```plaintext
digraph C_200109 {
    rankdir=BT;
    C_200109 [label="200:109\nDev/Assesmnt\nYoungChild"]
    C_200030_30 [label="200:030\nDyns Of Humn\nDvlpmnt\nor the equivalent"]
    SP_CON_inst_30 [label="consent of\ninstructor"]
    SP_STD_Jnr_3 [label="junior standing"]
    OR_C_200109_30 [shape=box,label="or"]
    OR_C_200109_30 -> C_200109
    C_200030_30 -> OR_C_200109_30
    SP_CON_inst_30 -> OR_C_200109_30
    SP_STD_Jnr_3 -> C_200109
}
```
Getting from point A to point B

4. Processed the DOT files into image map based gifs using graphviz
Analysis Continued...

- We generated course pre-requisite charts for all the 2500+ courses
- Available online in an easy to access website: http://www.ir.uni.edu/courses
- Combined them into department-wide charts
-Computed a simple complexity score for courses as well as departments

ASSUMPTION/HYPOTHESIS

- Complexity, large sequences of courses - directly proportional to time-to-graduation
Contributions/Conclusions

- Visual tool for a quick overview of curriculum for both students and administrators
- Present analysis/charts for consideration by faculty/department heads for streamlining/curriculum improvements
- Relate characteristics of these charts to time-to-degree and graduation rates through statistical analyses

- THANKS…