Forecasting Course Demand

Presented by: Kenneth Foshee, Ph.D.
The University of Alabama
Wednesday, April 17, 2013 9:15 AM - 10:15 AM
Session ID 691

Session Rules of Etiquette

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• If you must leave the session early, please do so as discreetly as possible
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Introduction

• One of the key tasks of an institution is to establish the schedule of classes to be offered
• Obvious considerations are:
  ➢ historical offerings and trends
  ➢ changes in demographics
  ➢ instructor availability and interest
  ➢ space
• We will examine student data specific to forecasting class needs by mining degree audit results
• By addressing student specific needs and plans, time to graduation may be improved
Agenda

- Examine and discuss the following methodologies for forecasting course demand with an emphasis on the last two:
  1. “Guesstimate” – Take last year’s schedule and make adjustments
  2. Statistical Analysis – Examine historical trends to forecast future need
  3. Degree Audit Analysis – Examine what the current population needs based on degree audit results
  4. Student Plans – Review what students have indicated they plan to take and when

UA Quick Facts

- Official Fall 2012 Enrollment: 33,602
  - Undergraduates: 28,026
  - Graduates: 4,994
  - Professional (Law & Medicine): 582
- Number of College/Schools: 12
- Number of Distinct, Currently Active Degree Codes:
  - Undergraduate: 27
  - Graduate: 51
- Number of Distinct, Currently Active Major Codes:
  - Undergraduate: 157
  - Graduate: 101
- Number of Currently Active Minor Codes: 87

“Guesstimate”

Adjust what was offered last year...
What Was Offered Last Year?

- The most common methodology in setting class schedule
- Adjust last year’s offerings based on availability and interest of faculty
- Guess/Estimate for changing demographics and student needs
- Adjust sections, rooms, number of seats in response to registration
- “After the fact” response

Problems

- Not accounting for historical trends with enrollment
- Not adjusting for changing student demographics such as growth/changes in major, retention
- Not responding to student plans, desired courses
- Not identifying gateway courses that impact time to degree
- The “Just in Time” approach can lead to room bottlenecks and staffing shortfalls

Statistical Model

Statistical review of previous offerings…
Statistical Forecast

- Examine trend-lines and estimate/forecast demand
- Identify weak demand courses versus high demand to reallocate resources
- Forecast based on previous growth patterns

Enrollment Pattern Example

- Take enrollment and number of sections to establish a trend
- Based on trend, forecast future demand
- For example:
  - Estimated Growth: Rate of change is calculated as change from year one to two plus year two to three divided by 2
  - Estimated Enrollment: Year four equals year three enrollment plus/minus estimated growth
Calculation

<table>
<thead>
<tr>
<th>Offering</th>
<th>Fall 2008</th>
<th>Fall 2009</th>
<th>Fall 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Est. Growth</td>
<td>Est. Enrollment</td>
<td>Est. Enrollment</td>
</tr>
<tr>
<td>MATH 301</td>
<td>1</td>
<td>63</td>
<td>89</td>
</tr>
<tr>
<td>MATH 343</td>
<td>1</td>
<td>28</td>
<td>83</td>
</tr>
<tr>
<td>MATH 355</td>
<td>1</td>
<td>47</td>
<td>66</td>
</tr>
<tr>
<td>MATH 380</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MATH 402</td>
<td>1</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

Estimating for New Freshmen

- Following early registration for continuing students, questions arose of how to forecast seats needed for new freshmen orientation
- For lower level courses, number of new freshmen in each course was determined
- Growth of new freshmen population estimated
- Number of additional seats needed was determined

<table>
<thead>
<tr>
<th>Course</th>
<th>2012-13 Est.</th>
<th>2013-14 Est.</th>
<th>2013-14 New FR</th>
<th>Add Seats</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 101</td>
<td>3,615</td>
<td>3,733</td>
<td>138</td>
<td>3,367</td>
</tr>
<tr>
<td>EN 102</td>
<td>834</td>
<td>834</td>
<td>0</td>
<td>278</td>
</tr>
<tr>
<td>EN 103</td>
<td>500</td>
<td>500</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>EN 104</td>
<td>32</td>
<td>32</td>
<td>4</td>
<td>29</td>
</tr>
</tbody>
</table>

Calculation
Problems

• Historical offering may not have been responding to true demand – historically demand greater than seats
• Not accounting for changes in demand due to hot, high growth programs – linear versus non-linear
• Not accounting for changes in degree requirements
• Not identifying gateway courses that impact time to degree

Course Need

What do students need based on degree audit...

Analyzing Degree Audit Result

• In 2009 UA began utilizing Degree Works (DW) as the University’s degree audit system
• DW has the ability to extract data to create various reporting tables
  ✔ Curriculum and Planning Assistant (CPA) views.
• Included is a table of what courses a student is required (MUST) or potentially (MAY) take as an elective
• By analyzing specific populations, an institution can more effectively address course demand/need
Audit Results

- Degree audit will show specific courses a student is required to take or may take for elective credit
- Example of upper level math requirements for a student

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Degree</th>
<th>Credit Hours</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000000</td>
<td>RA000035</td>
<td>MA</td>
<td>3</td>
<td>2011</td>
</tr>
<tr>
<td>10000000</td>
<td>RA000035</td>
<td>MA</td>
<td>3</td>
<td>2011</td>
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<td>RA000035</td>
<td>MA</td>
<td>3</td>
<td>2011</td>
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<td>RA000035</td>
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<td>10000000</td>
<td>RA000035</td>
<td>MA</td>
<td>3</td>
<td>2011</td>
</tr>
</tbody>
</table>

CPA Tables

- Will appear in “CPA_CLASSNEEDED” view as shown below (some columns deleted from view due to space)
- CPA results are updated by processing a population through a batch process (DAP22 in Transit)
Summary Report

• Data may now be extracted for a given population to form a summary table, in this example by student class:

<table>
<thead>
<tr>
<th>Upper Level</th>
<th>BUCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Yr</td>
</tr>
<tr>
<td>Total</td>
<td>1,598</td>
</tr>
<tr>
<td>AA 101</td>
<td>501</td>
</tr>
<tr>
<td>AA 102</td>
<td>501</td>
</tr>
<tr>
<td>AA 103</td>
<td>501</td>
</tr>
<tr>
<td>AA 104</td>
<td>501</td>
</tr>
<tr>
<td>AA 105</td>
<td>501</td>
</tr>
<tr>
<td>AA 106</td>
<td>501</td>
</tr>
</tbody>
</table>

Detail Report

• Specific student information for who must/may take a course can be extracted:

Problems

• Dependent on population of students selected for analysis
• Does not account for expected growth
• Seems to best serve upper level major courses, not lower level where students have wider selections
• Requires accurate audits for covering essentially all catalog years of students
• Will not assist with forecasting elective courses
Course Plan

What have students indicated they plan to take...

Student Educational Planner (SEP)

- SEP functionality of Degree Works allows a student to specify a term-by-term course plan of study
- The plan may be loaded, and modified, from a template, or created one term at a time
- The plan may be “locked” by an advisor once approved
- A student may have multiple plans, but only one “active” plan, which represents the student’s current plan of study
- Provides a means to report what courses a student wishes to take and when, which also includes electives

Creating a Plan from Template

- At UA, Undergraduates may load a template for a four year plan of study
  - Search for plan
  - Select and load the plan
- Alternatively, a plan may be batch loaded such as prior to an orientation session
Template (con’t)

- Once loaded, the plan may be edited and applied to the audit:

Creating a Plan by Course

- Students, with advisors, may develop a plan and see how planned courses would meet requirements

Planned Course Table

- Planned courses are stored in the DAP_PLANNER_DTL table
- Pull active plans where the degree equals to one being pursued by the student
- By combining with other student data, meaningful reports may be generated
Summary Report

- By linking the planner table to other data, we can extract summary data about course plans.
  - In this example, by planned term - 201140 - across student class
- Review course offerings to determine if number of seats matches expectations

<table>
<thead>
<tr>
<th>Course</th>
<th>1st</th>
<th>5th</th>
<th>4th</th>
<th>3rd</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>100A</td>
<td>3</td>
<td>79</td>
<td>105</td>
<td>200</td>
<td>3</td>
</tr>
<tr>
<td>101</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>116</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>206</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Detail Report

- Data is then reported with detailed student information
- Students may be encouraged to register for specific course(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>REG</th>
<th>CLASS</th>
<th>DEGR</th>
<th>HNTR</th>
<th>EMAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarah</td>
<td>SW</td>
<td>BSO</td>
<td>SW</td>
<td>SW</td>
<td>@stmu.edu</td>
</tr>
<tr>
<td>John</td>
<td>SW</td>
<td>BSO</td>
<td>SW</td>
<td>SW</td>
<td>@stmu.edu</td>
</tr>
<tr>
<td>Karen</td>
<td>SW</td>
<td>BSO</td>
<td>SW</td>
<td>SW</td>
<td>@stmu.edu</td>
</tr>
</tbody>
</table>

Detail Report (con’t)

In this example for a different term, note the high number registered (REG column) for the class indicating students within this major are following the plan.
Problems

• The department or college must have a commitment to building and maintaining plans to avoid partial data
• Dependent upon the population of students selected:
  ➢ New students?
  ➢ Stop outs?

Summary

• There are multiple ways to forecast course demand
• The degree audit system, Degree Works for this presentation, adds additional methods
• These additional methods are, as in all cases, only as good as your data
• The additional methods are dependent upon how the university/college community supports and utilizes the degree audit system
• By analyzing degree audit data, whether the audit or student plans, specific class needs and the impact of gateway courses can be addressed

Questions?
Thank You!

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