


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



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- If you must leave the session early, please do so as discreetly as possible
- Please avoid side conversation during the session
- Please complete the session evaluation

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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



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Agenda

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

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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: 31
- Number of Distinct, Currently Active Major Codes:
 - Undergraduate: 157
 - Graduate: 101
- Number of Currently Active Minor Codes: 87

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“Guesstimate”

Adjust what was offered last year...


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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


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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

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Statistical Model

Statistical review of previous offerings...

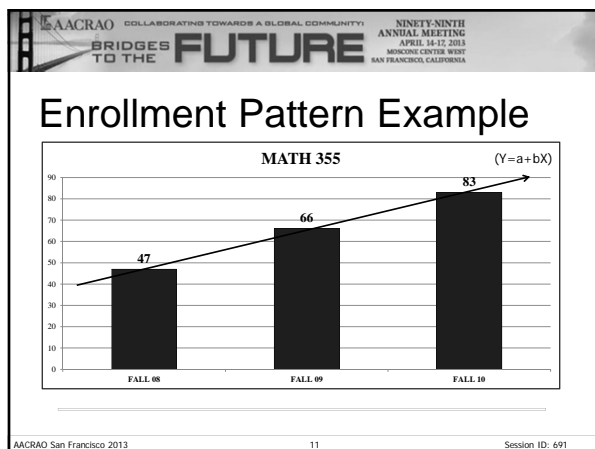
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Statistical Forecast

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

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Methodology

- 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

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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


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Course Need

What do students need based on degree audit...

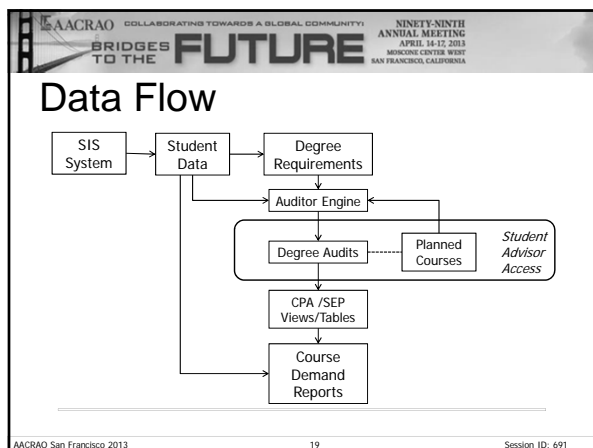
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Analyzing Degree Audit Result

- 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

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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

■ Concentration in Pure Mathematics Catalog: 2008-2010 Credits Required: 36
GPA: 0.000 Credits Applied: 6

Unmet conditions for this set of requirements: 36 credits are required. You currently have 6, you still need 30 more credits.
Optional Additional Electives requirement is used only to calculate additional minor classes in GPA if needed.

| | | |
|---|---|-----------|
| <input type="checkbox"/> Linear Algebra | Still Needed: 1 Class in MATH 237* or 237* | MAY Take |
| <input type="checkbox"/> Applied Differential Equations | Still Needed: 1 Class in MATH 238* | |
| <input checked="" type="checkbox"/> Advanced Linear Algebra | MATH 371 Advanced Linear Algebra JP (3) Fall 2011 | |
| <input type="checkbox"/> Principles of Modern Algebra | Still Needed: 1 Class in MATH 470* | MUST Take |
| <input type="checkbox"/> Intro to Real Analysis | Still Needed: 1 Class in MATH 486* | |
| <input type="checkbox"/> Mathematics Course | Still Needed: 1 Class in MATH 465* or 471 or 487* | |
| <input type="checkbox"/> Upper-Level Math Electives | MATH 301 Discrete Mathematics JP (3) Fall 2011 | |
| | Still Needed: 3 Credits in MATH 300-499 | |

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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)

| STU ID | REQ ID | DISCIPLINE | COURSE_NUM | TAKE TYPE | COURSE_ADVICE_TEXT | SCHOOL | DEGREE | ACTIVE_TERM |
|----------|----------|------------|------------|-----------|--------------------|--------|--------|-------------|
| 10000000 | RA000035 | MATH | 470 | MUSTTAKE | MATH 470 | UG | BS | 201140 |
| 10000000 | RA000035 | MATH | 486 | MUSTTAKE | MATH 486 | UG | BS | 201140 |
| 10000000 | RA000035 | MATH | 465 | MAYTAKE | MATH 465 | UG | BS | 201140 |
| 10000000 | RA000035 | MATH | 471 | MAYTAKE | MATH 471 | UG | BS | 201140 |
| 10000000 | RA000035 | MATH | 487 | MAYTAKE | MATH 487 | UG | BS | 201140 |
| 10000000 | RA000035 | MATH | 300-499 | MUSTTAKE | MATH 300-499 | UG | BS | 201140 |

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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

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Course Plan

What have students indicated they plan to take...

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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 students *current* plan of study
- Provides a means to report what courses a student wishes to take and when, which also includes electives

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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

Pre-defined Plan Search

Level: Undergraduate

Degree: Bachelor of Science

Major: Mathematics

Minor: All Minors

Concentration: Pure Math Track (MATH)

College: All Colleges

Catalog: All Catalogs

Search Clear All

Search Results: 2 pre-defined plans found

Mathematics (MFT) 08-10

Mathematics (MFT) 10-12

Load into my plan

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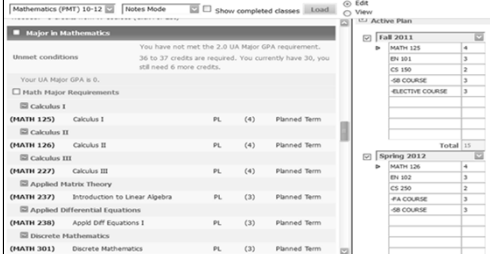
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Template (con't)

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

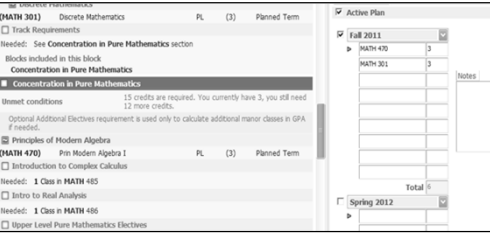


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Creating a Plan by Course

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



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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

| DAP_STU_ID | DAP_SCHOOL | DAP_DEGREE | DAP_ACTIVE_FLAG | DAP_TERM | DAP_DISCIPLINE | DAP_COURSE_NUM |
|------------|------------|------------|-----------------|----------|----------------|----------------|
| 10000000UG | BS | Y | 201110 | MATH | 238 | |
| 10000000UG | BS | Y | 201110 | MATH | 371 | |
| 10000000UG | BS | Y | 201140 | MATH | 470 | |
| 10000000UG | BS | Y | 201140 | MATH | 486 | |
| 10000000UG | BS | Y | 201210 | MATH | 465 | |

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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

| 201140 | Term Total..... | 1. FR | 2. SO | 3. JR | 4. SR | 5. PG |
|--------|-----------------|-------|-------|-------|-------|-------|
| | | 43 | 79 | 150 | 209 | 6 |
| SW | Course | 43 | 79 | 150 | 209 | 6 |
| | 100 | 22 | 12 | 4 | 1 | 0 |
| | 101 | 3 | 0 | 1 | 0 | 0 |
| | 110 | 0 | 0 | 0 | 1 | 0 |
| | 200 | 8 | 16 | 11 | 2 | 0 |
| | 206 | 2 | 1 | 1 | 4 | 0 |
| | 308 | 0 | 0 | 4 | 4 | 0 |

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Detail Report

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

| CVID | NAME | REG | CLASS | DEGR | MAJR | EMAIL |
|--------|---------------------------|-----|-------|------|------|---------------------------|
| 201210 | | | | | | |
| SW 320 | | | | | | |
| | 1. [redacted] R. | | SR | BSO | SW | [redacted]@crimson.ua.edu |
| SW 351 | | | | | | |
| | 2. B. [redacted] S | | SO | BSO | SW | [redacted]@crimson.ua.edu |
| | 7. B. [redacted] G | | FR | BSO | SW | [redacted]@crimson.ua.edu |
| | 8. C. [redacted] A | Y | SO | BSO | SW | [redacted]@crimson.ua.edu |
| | 9. D. [redacted] N. | | JR | BSO | SW | [redacted]@crimson.ua.edu |
| | 10. G. [redacted] M. | | SO | BSO | SW | [redacted]@crimson.ua.edu |
| | 11. J. [redacted] Michael | | FR | BSO | SW | [redacted]@crimson.ua.edu |
| | 12. N. [redacted] A | | SO | BSO | SW | [redacted]@crimson.ua.edu |

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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:

| CVID | NAME | REG | CLASS | DEGR | MAJR | EMAIL |
|--------|-------------------------|-----|-------|------|------|---------------------------|
| 201140 | | | | | | |
| SW 345 | | | | | | |
| | 1. [redacted] Elizabeth | Y | JR | BSO | SW | [redacted]@crimson.ua.edu |
| | 2. [redacted] N. | | JR | BSO | SW | [redacted]@crimson.ua.edu |
| | 3. [redacted] D. | Y | SR | BSO | SW | [redacted]@crimson.ua.edu |
| SW 351 | | | | | | |
| | 1. [redacted] D. | Y | JR | BSO | SW | [redacted]@crimson.ua.edu |
| | 2. [redacted] D. | Y | JR | BSO | SW | [redacted]@crimson.ua.edu |
| | 3. [redacted] L. | Y | JR | BSO | SW | [redacted]@crimson.ua.edu |
| | 4. [redacted] N. | Y | JR | BSO | SW | [redacted]@crimson.ua.edu |
| | 5. [redacted] C. | Y | JR | BHS | HS | [redacted]@crimson.ua.edu |
| | 6. [redacted] J. | Y | SO | BSO | SW | [redacted]@crimson.ua.edu |
| | 7. [redacted] M. | Y | SO | BSO | SW | [redacted]@crimson.ua.edu |
| | 8. [redacted] S. | Y | SO | BSO | SW | [redacted]@crimson.ua.edu |

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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?

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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


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Questions?

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Thank You!

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